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Editorial

Information Management and Business Review (IMBR) provides a digital forum for researchers to share their knowledge and publish research work in the fields of information management, business, management and related disciplines. The work submitted for publication consideration in IMBR should address empirical and theoretical developments in the subjects related to the scope of the journal in particular and allied theories and practices in general. Author(s) should declare that work submitted to the journal is original, not under consideration for publication by another journal and that all listed authors approve its submission to IMBR. It is IMBR policy to welcome submissions for consideration, which are original, and not under consideration for publication by another journal at the same time. Author (s) can submit: Research Paper, Conceptual Paper, Case Studies and Book Review. The current issue of IMBR is comprises papers of scholars from different universities of Malaysia, Indonesia, China, Thailand and Oman. Acceptance of Korean Food Culture among Young Generations, Tourism Destination Image, Pushing the Boundaries of Food Product Innovation Acceptance, Educator and Caregiver Challenges in Transitioning Students, Impact of Environmental Knowledge on Food Waste Reduction and Sustainability Practices, Hospitality and Tourism Education Perspective, Data Mining and Sentiment Analysis, Student Engagement and Performance Towards Work-Based Learning, Domestic Tourist Intentions, Development of Halal Well-Being Experience Quality, Managing Complexities in Giant Freshwater Prawn Breeding Facilities, Integrated Circular Supply Chain Framework, Social and Finance Security on Gig Workers' Well-being, Medicine Wastage in Private Clinics, How Artificial Intelligence Affected Audit Quality, Role of Artificial Intelligence in the Halal Industry, Digital Zakat Management Research, Decision-Making For Entrepreneurship, Success of SMEs in the Digital Transformation Era, Fraudulent Financial Reporting, Intention to Receive Future COVID-19 Booster Vaccines, Purchase Intention of Fashion Goods via Digital Marketing, Mismatch between Individual Values and Organizational Values, Trend-Driven Innovation for Food Market, Organizational Resilience Through Digital Technology Adoption, Sentiment Analysis on Digital Barriers, Big Five Personality Traits and Waqf Participation, Social Media Content among MSMEs, Knowledge Management Capabilities and Learning Orientation, Social Media Marketing, Foreign Direct Investment and Economic Growth, Effects of Sustainable Development on the Sustainable Performance, Optimal Despatch Rider Management, Technology-Organization-Authoritative Framework, Retirement Savings Behavior, Impact of Remuneration and Motivation on Employee Performance, Community-Based Ecotourism, Public Private Partnership and Financial Implication, Islamic Financial Literacy, Non-Payment of Housing Maintenance Fees, Job Satisfaction and Turnover Intention, Progressive 4.0 Technology Integration, Optimization of Warehouse Operations, Healthcare Service Quality, Fostering Future Investors, Financial Liberalization, Framework for Technopreneurial Behavior, Industrial Relations with Ukhuwwah, Innovative Work Behavior, Social Sustainability in Malaysian Supply Chains, Innovation Capability and Employee Performance, Unclaimed Property, Revisiting Okun's Law, Food Consumption Preference, Non-Shariah Compliance Risks, Online Food Delivery Apps, Mobile Banking Users, Retirement Schemes, Retirement Preparedness among Low-Income Private Sector Employees, Taxation and Cost of Living, Trust in Blockchain Technology, Green Purchase Behavior, Buy Now, Pay Later Spending Spree, Employee's Work-Life Balance, Team Effectiveness, Customer Satisfaction on Online Banking, Housing Prices, Employer Brand Knowledge, Determinants of Participatory Intention, Leadership on Organisational Commitment, Digital Economy and Exports, SWOT Analysis, Offline-Online Learning Switching Behavior, Psychosocial Factors of Mental Health Well-being, Sustainable Transport, Retaining Talent in Digital Era, Predictors of Social Media Marketing, Online Shopping Patterns, Efficacy of Cosmetic Product Safety Regulations, Development of Human Capital, Broadband Services Quality, Determinants of Zakat Payment, Spirituality at Work in Enhancing Job Performance, Islamic Environmental, Social and Governance, Green Innovation and Firm Performance, Internal Control Mechanisms in Malaysian Public Sector, Radio Frequency Identification System, Work-Life Balance among Gig Workers, Elements of Life Necessities, Service Monitoring System Ratings, Knowledge Management, Kaizen Culture and Training, E-SERVQUAL and Expectancy Disconfirmation Theory, Banks' Performance Amid the Unexpected Crises, Halal Organizational Sustainability, Expertise for Sustainable Ecotourism, Zakat Assistance on Academic Achievement, Financial Literacy of Female Entrepreneurs, Community-Driven Industrial Education, Socioeconomic Profiling and CSR-Driven STEM Education are some of the major practices and concepts examined in these studies. All the submitted papers were first assessed by the journal committee and then the external editorial team for relevance and originality of the work and then blindly peer-reviewed by external reviewers depending on the subject matter of the paper. After the rigorous peer-review process, the submitted papers were selected based on originality, significance and clarity of the purpose. The special issue will therefore be a unique proposition, where scholars will be able to appreciate the latest results in their field of expertise and to acquire additional knowledge in other relevant fields.

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Acceptance of Korean Food Culture among Young Generations in Malaysia: Health and Authentic Taste Perspectives

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Abstract: The Korean Wave, also known as Hallyu, has significantly impacted global culture, and has affected people around the world. This influence has also become a trend in Malaysia, where Korean cultural products are widely embraced, especially by the younger generation. The authenticity of Korean flavors is essential for maintaining its unique culinary identity while health-conscious markets around the world have led to a surge in demand for Korean food Therefore, this study aims to assess the consumer acceptance of Korean food in Malaysia, particularly in Sungai Petani, Kedah, and Pulau Pinang. The Korean Wave, which represents the global popularity of South Korean culture since the 2000s, has exerted a considerable influence on various cultural aspects, including cuisine. Through a quantitative survey, data were collected from 150 participants in the northern area, specifically targeting Generations Y and Z through convenience sampling. The collected data was then analyzed for descriptive statistics, and the correlation to test the hypotheses. The results indicate a significant positive correlation between consumer acceptance of Korean food, health perspectives, and authentic taste variables. The findings of this study suggest that increased exposure to Korean culture through the Korean Wave boosts consumer acceptance and purchase intentions for Korean food culture in Malaysia. This information is valuable for marketers and restaurateurs seeking to capture the growing demand for Korean cuisine. This study offers a localized perspective on the global phenomenon of Korean cultural influence and provides practical recommendations for future research.

Keywords: *Consumer acceptance, Korean food, Culture, Health Perspective, Authentic taste*

1. Introduction

The Korean Wave, or Hallyu, refers to the global popularity of South Korean culture, which began to spread in East Asia and has since spread worldwide. This phenomenon encompasses various elements of Korean pop culture, including music, movies, fashion, cosmetics, and cuisine (Hanaki, Singhal, Han, Kim, & Chitnis, 2007). Since 2002, Malaysia has actively participated in this cultural trend (Cho, 2010). Growing interest in Korean society and culture has spurred Malaysians to learn the Korean language and explore Korean food, which has become increasingly popular.

The Korean Wave's influence in Malaysia began with the "Winter Sonata" broadcast in 2002, leading to a broader acceptance of Korean pop culture. The show's theme song, rebranded in Malay as "Sonata Musim Salju" and performed by Hazami, topped the Malaysian music charts. Korean music (K-pop) has also gained a substantial following among Malaysian teenagers and young adults, especially at concerts such as I.Seoul.U Concert featuring K-pop artists at the KL Convention Center attracting 6000 fans (New Straits Times, 2017). Korean food popularity in Malaysia has been bolstered by TV shows like "Running Man," which often feature Korean cuisine. The show has a significant following, with 6,000 fans attending a fan meeting in Malaysia in 2017 (The Star, 2017). Additionally, Korean cultural events such as the Korean Lifestyle Road Show 2016 and K-Food Fair have further exposed Malaysians to Korean culture, lifestyle, and culinary traditions.

Asian cuisine, particularly Korean cuisine, has been attracting increasing attention worldwide. Consumers are drawn to Korean cuisine due to its perceived uniqueness and nutritional value compared to other Asian food options (Ha & Jang, 2009). Kim and Sim (2017) observed that the main reason for the increase in the positive perception of Korean food among consumers was the influence of Korean dramas and movies streaming in Malaysia. Based on Jobst (2023), a global survey conducted in 2022 on South Korean cultural content among select countries found that Korean food was highly popular among Malaysian respondents, with over 68% reporting that Korean food was popular in their country. This can be seen by the mushrooming of outlets based in Korea, such as Kyochon 1991, Seoul Garden, Myeondong Topokki, and K-Fry, with halal certification. Jobst

(2022) also stated that the most preferred Korean food worldwide is Korean fried chicken, followed by kimchi, bibimbap, bulgogi, and tteokbokki. Nahar et al., (2018) also revealed that some of the most popular Korean dishes in Malaysia include kimchi, ramen, chigae, chimek, and samgyupsal. Furthermore, according to Astuti and Asih (2021), Korean food has gained popularity worldwide because of its diverse range of dishes and robust flavors. Korean cuisine, which includes dishes like bibimbap and kimchi, has captured the attention of many foodies all over the world and has helped Korean cuisine become more widely accepted (Mujani et al., 2022).

In Malaysia, Korean cuisine has expanded, especially in Kuala Lumpur (Akbarruddin, 2020). With a strong preference for spicy cuisine, Malaysians have influenced the Korean restaurant industry to focus on meeting customers' desires by providing a diverse selection of spicy dishes (Mon and Pil, 2017; Chee & Yazdanifard, 2021). Local Malaysians have a strong interest in the variety of Korean cuisines and the culture they represent. Due to its growing popularity, Korean food faces widespread acceptance in Asia. It is known for its health benefits, featuring low-calorie dishes containing whole grains, vegetables, seafood, meat, and fish (Min, 2009). In addition to health perceptions, the halal label on a restaurant is getting the attention of Malaysian consumers, especially Muslim consumers (Buang et. al, 2018). There has been an increased awareness of the halal status of oriental foods, including Chinese, Japanese, and Korean cuisines. Therefore, more attention must be paid to the halal integrity of Korean foods (Mohd Amin et.al, 2020). Meanwhile, food is a powerful symbol of cultural identity and can influence social status and tourism (Frochot, 2003; Sims, 2009). Therefore, the preservation and authenticity of traditional Korean flavors are essential for maintaining their unique culinary identity. Moreover, the ease of making Korean dishes, accessible in a supermarket, with their nutritional value and unique flavors, positions Korean food as both practical and appealing to a global audience. This demonstrates how the traditional culinary practices of Korea resonate with contemporary food trends and consumer preferences.

This study examines how ethnic authenticity and health influence customer acceptance intentions. Although the popularity of the Korean Wave has been increasing in Malaysia over time, there has been little attempt to conduct empirical or nonempirical research, particularly on the topics linked to customer satisfaction and the acceptability of healthy and authentic taste of Korean food in Malaysia. Consumer satisfaction and acceptance research on food consumption has generally focused on other cultural foods in Malaysia, such as Korean Japanese by Agus et al. (2018) which investigated how a Korean restaurant's ambiance influences repurchase intention. This study aims to examine how Malaysian consumers perceive Korean cuisine, with a particular emphasis on the Sungai Petani, Kedah, and Pulau Pinang regions. This research seeks to understand and further explore the factors (health and authentic flavors perspectives) that influence young generations of Malaysians' acceptance of the culture of Korean cuisine.

2. Literature Review

Overview of Korean Food in Malaysia

The relationship between food and tourism has been extensively examined in terms of various terminologies, such as food tourism, cuisine tourism, culinary tourism, and gastronomic tourism. Food is crucial for attracting international visitors to a country as a tourist destination. Long (2004) highlighted that countries leveraging their unique culinary offerings can enhance their tourism appeal by creating a distinctive gastronomic image. The awareness and appreciation of a country's culinary image have been identified as major components of a travel experience. Consequently, national, and local policies must effectively link food and tourism to actively foster food tourism as a key attraction (Long, 2004; Hwang et al., 2017). The success of such policies is evident in the case of Korean cuisine, where dishes like "kimchi" and "bulgogi" have piqued the interest of Malaysian visitors who seek to experience authentic Korean flavors (Hwang et al., 2017).

One of the standout successes in Korean cuisine is "bibimbap," which has gained international popularity because of its appealing presentation and unique taste profile (Shin & Jeong, 2015). The colorful vegetable and egg dish with red chili paste is visually appealing and flavourful and is loved by people worldwide. Long (2004) further explained that the combination of diverse ingredients provides a complex yet harmonious taste, making it a culinary highlight. In Korean cuisine, grilling and frying are not as commonly used methods, such as fermentation, boiling, grilling, seasoning, and pickles making. Among these options, fermentation is the most

favored because it not only enhances the flavors of the food but also helps preserve it for an extended period (Kim et al., 2016). A distinct characteristic of Korean food is its emphasis on fermentation, with "kimchi" being the most renowned example. Kimchi, a well-known spicy napa cabbage dish, is traditionally buried in the earth during its fermentation time (Oum, 2019). Fermented food culture is a unique element that distinguishes Korean food and adds to its appeal in the culinary tourism sector.

Health Perspectives

The literature on the health benefits and cultural significance of Korean food highlights the unique aspects of its culinary traditions. Kim et al. (2016) asserted that Korea's agricultural history has fostered a distinctive food culture characterized by a high vegetable intake and the use of fermentation techniques. This has spurred growing curiosity about Korean cuisine, particularly its health benefits. Research indicates that the health benefits of Korean food are largely attributable to its ingredients and cooking methods (Health Magazine, 2006). For instance, the fermentation process, which uses effective microorganisms to prevent spoilage, is a key component of many Korean dishes. Popular fermented foods, such as kimchi, doenjang (fermented soybean paste), and gochujang (fermented red chili paste), are not only integral to Korean cuisine but also offer numerous health benefits (Shin & Jeong, 2015).

Kimchi, for example, is known for its probiotic properties, which help reduce harmful gut bacteria, thereby promoting digestive health. Similarly, other fermented foods like jeotgal (salted fermented seafood) enhance flavor, appetite, and nutritional value (Kim et al., 2016). Furthermore, the Korean diet is rich in vegetables and seaweed, which provide essential vitamins and fiber. Vegetables such as lettuce, peppers, carrots, and cucumbers are often consumed raw with sauces like gochujang and doenjang, while seaweed dishes made from laver, kelp, and green algae are common (Kim et al., 2016). The inclusion of varied seasonings, or yangnyeom, created from ingredients like garlic, green onions, red pepper, and ginger, sets Korean food apart from other East Asian cuisines (Surh, 2003). Medicinal herbs and spices, such as black pepper, are also used to enhance the flavors and health benefits of Korean dishes, demonstrating the deep connection between food and health in Korean culinary practices (Hu, 1610). Additionally, the cultural significance of food in Korea is deeply rooted in family traditions, with home-cooked meals (jipbap) symbolizing a mother's love and dedication and emphasizing the importance of natural, unprocessed ingredients (Kim et al., 2016).

Halal Issues: The concept of halal, which denotes what is permissible or lawful in Islamic law, has become a prevalent term in the food industry, particularly in Muslim countries. The term not only applies to food and beverages but also extends to various aspects of Muslim daily life, emphasizing sanitation, protection, and nutritional value. Baharuddin et al. (2015) highlighted that halal and toyyiban (meaning clean and nutritious) symbolize sensitivity toward ensuring food safety and hygiene that is acceptable for Muslim consumption. The growing awareness of and demand for halal food aligns with broader consumer trends toward food safety, health, and ethical considerations.

Previous studies have indicated a significant overlap between the principles of halal food and the general consumer demand for sustainable and ethically produced food. For instance, the halal food market's expansion is partly driven by non-Muslim consumers who are attracted to the perceived higher standards of food safety and quality associated with halal certification (Alqudsi, 2014). This means that halal food products, by adhering to stringent health and ethical standards, can appeal to a broader market beyond the Muslim community. Furthermore, the integration of halal standards into mainstream food safety practices can enhance overall food quality. For example, Tieman and Ghazali (2014) argued that adopting halal certification in global supply chains not only ensures compliance with Islamic dietary laws but also promotes better food safety practices, benefiting all consumers. This demonstrates how halal accreditation can serve as a benchmark for high-quality, safe, and ethically produced food.

Easy to make and prepare: The convenience and simplicity of preparing Korean dishes are integral aspects of their popularity, particularly dishes like bibimbap, which primarily uses grains such as rice and barley. Shin and Jeong (2015) note that Korean cuisine frequently features various types of bap (cooked rice), including steamed rice, boiled barley, and multigrain rice, as the fundamental components of main dishes. Kimchi, a staple side dish in Korean cuisine, exemplifies the ease of preparation. It is typically accompanied by grilled meats, vegetables, and salads seasoned with garlic and chili powder. These side dishes, whether cooked fresh or

seasoned with vinegar, are straightforward to make, highlighting the practicality of Korean cooking (Shin & Jeong, 2015). Seasoning is another critical element that enhances the flavor of Korean food. Key seasonings include fermented soy sauce, fermented soybean paste, vinegar, gochujang (fermented red chili paste), and fermented fish sauces made from anchovies and shrimp. These seasonings not only add depth and complexity to dishes but also underscore traditional fermentation techniques that are central to Korean culinary practices (Shin & Jeong, 2015).

Research supports the idea that the simplicity and ease of preparation of Korean dishes contribute to their appeal. Korean food is not only tasty and varied, but it is also affordable and easy to find, therefore, it is a popular choice for food exploration. According to Ashraf (2024), many traditional Korean dishes are made with simple, easily accessible ingredients, which contributes to their affordability. This accessibility is further enhanced by the health benefits associated with the ingredients and preparation methods used in Korean dishes, making them attractive to health-conscious consumers (Kim et al., 2016). Moreover, the incorporation of fermented ingredients not only improves the taste and nutritional profile of dishes but also aligns with modern dietary preferences that favor natural and minimally processed foods. The fermentation process, which has been refined over centuries, plays a crucial role in preserving food and enhancing its flavors, contributing to the distinctive taste of Korean cuisine (Kim et al., 2016). By referring to the literature review, the following hypothesis is proposed:
H1: There is a relationship between the health perspectives and the acceptance of Korean food culture by young consumers.

Authentic Taste of Korean Food
Food represents a country's culture and is part of it. Accordingly, foods from other countries can appeal to foreigners as unique and sometimes exotic characteristics reflecting a country's culture (Jang et.al, 2012). This uniqueness and difference are often described as "authenticity." This authenticity factor has a significant impact on customers in other countries and is a crucial element of ethnic foods that sets them apart from local cuisines (Chandon et al., 2000; Peabody, 1985; Leclerc et al., 1994). Authenticity is a powerful concept frequently used by restaurateurs to market their cuisine; and deliver a genuine experience to consumers (Jang et al., 2011). The evaluation of authenticity in ethnic restaurants hinges on whether the food is prepared according to traditional methods by local people, ensuring that it is not modified to satisfy consumer expectations (Ebster & Guist, 2004). The definition of traditional Korean food by Chung (2015) and Chung (2009) reflects the idea that food is made with raw materials or ingredients that are traditionally used in Korea, or with similar ingredients. It also involves using authentic or similar cooking methods as well as having historical and cultural characteristics. Additionally, traditional Korean food has developed and is passed on throughout people's lives. Another significant factor is the visual appeal of Korean cuisine, characterized by vibrant colors and textures. Kwon et al. (2015) highlighted that the aesthetic presentation of Korean food, including the arrangement of various banchan (side dishes), plays a crucial role in the dining experience. Fermentation and preservation are central to Korean culinary practices. Kimchi, a staple of Korean cuisine, exemplifies these methods. Park et al. (2016) discussed how fermentation imparts unique flavors and health benefits, making it a cornerstone of Korean dietary habits. The fermentation of kimchi and other fermented foods like doenjang (soybean paste) and gochujang (chili paste), is essential for flavor development and nutritional enhancement.

Creating an authentic dining experience involves more than just tasting the food; it encompasses the entire restaurant atmosphere (Jang et al., 2011). For instance, employees at Korean ethnic restaurants may wear traditional Korean clothing (hanbok), and the decor may reflect Korean cultural elements, making customers feel as though they are in a mini Korea. This immersive environment, combined with the hiring of original Korean chefs to maintain authentic tastes, reinforces the restaurant's commitment to authenticity. Despite the staged elements, customers can still perceive these experiences as authentic, demonstrating that authenticity is subjective and can be shaped by ethnic images and atmospheres (Ebster & Guist, 2004). This indicates that authenticity in ethnic restaurants is not only about maintaining traditional culinary methods but also about creating a holistic experience that resonates with consumers' expectations of authenticity.

Ethnic Foods: In recent years, various ethnic cuisines have become increasingly popular in global food markets. Ethnic food evolves from human culture, and human biological phenomena have significant sociocultural characteristics and are integral to human values (Kwon, 2017). This surge is driven by the increasing availability of ethnic food restaurants and supplies, along with consumers' growing desire to diversify and balance their nutritional diets (Jones, 1997). Mun (2009) emphasized that Asia plays a crucial role in the global food market, particularly in promoting unique foods with functional benefits. Modern consumers are keen on exploring new food experiences and flavor combinations, spurred, by the global exchange of culinary traditions, which include the distinctive flavors imparted by specific spices (Danhi and Slatkin, 2009).

Dietary changes are essential for maintaining a healthy lifestyle, and simplified diets often lead to more health issues (Frison et al., 2006). As cultures evolve and spread globally, consumers' food preferences expand, with various ethnic foods being incorporated into their regular diets (Tian, 2001). Different ethnic groups possess unique cultural backgrounds that influence their food and dietary habits. The recognition of flavor is closely linked to memory, and personal experiences with food are significant in consumer choices (Brandon et al., 2011). Varadachari (2002) noted that the inability to precisely define or measure taste contributes to the connection between memories and taste experiences. Gilmore and Pine's (2007) model asserts that ethnic cuisine must maintain its original taste to remain "true to itself." The global use of diverse sauces has significantly enhanced the flavor profiles of various dishes (Rengsutthi and Charoenrein, 2011), with sauces being a crucial factor in defining the unique taste of a dish. The waste of food products leads to an underappreciation of their unique qualities, which influence eating habits (Mojet and Koster, 2005).

Previous studies have revealed variations in consumers' ability to recall traditional cuisines. For instance, Yusop et al. (2009) found that Chinese consumers living in Europe struggled to identify Chinese dishes. This noted that "authenticity" may vary according to individual experiences and the primary foods used in testing. Jang et al. (2012) discovered that customers experience positive emotions when dining in Korean restaurants because of the authentic atmosphere, highlighting the importance of maintaining an ethnic restaurant's genuine environment. Tey et.al (2018) highlighted the current understanding of why consumers choose to eat ethnic food and stated that this understanding can be improved by identifying the values that influence food preferences. By referring to the literature review, the following hypothesis is proposed:
H2: There is a relationship between the authentic taste of Korean food and young consumer acceptance.

Acceptance of Malaysian Consumers toward Korean food
The growing popularity of Korean dramas (K-dramas) in Malaysia has significantly boosted the visibility and acceptance of Korean culture, particularly its cuisine. The interest in Korean culture has penetrated various aspects of Malaysian life, from entertainment to culinary preferences. This cultural influence is evident in the increasing demand for Korean food among Malaysians, particularly teenagers and young adults, who actively seek out and embrace these culinary experiences. The popularity of Hallyu culture offers an opportunity to expose Korean food goods to consumers in Muslim-majority nations who are already familiar with and interested in Korean culture (Basri et.al, 2024)). This phenomenon can be observed in the widespread popularity of Korean restaurants and food products in Malaysia, which cater to the growing demand for authentic Korean dining experiences.

Previous studies have highlighted the Malaysian market's acceptance of Korean food is driven by its portrayal in popular media, which has successfully captured the imagination and taste buds of the younger demographic (Tan, 2023). The visual and narrative appeal of K-dramas often includes detailed depictions of Korean food, enticing viewers to explore these dishes in their real lives. This media influence is corroborated by empirical research indicating that exposure to foreign cultures through media significantly impacts food choices and dining preferences (Mun, 2009). Furthermore, the trend of Malaysian teenagers actively seeking Korean food aligns with broader global trends of increasing interest in ethnic foods. Jones (1997) notes that ethnic food consumption is rising rapidly worldwide, driven by consumers' desires for novel and diverse culinary experiences. In the Malaysian context, this trend is particularly pronounced among youth, who view Korean food as both a trendy and culturally enriching option.

Culture: According to Gupta (2003), culture can be understood as a way of life, that encompasses cultivated theories, learned behaviors, shared mental programs, convincing philosophies, and interconnected symbols that provide a framework for members of society. This definition underscores the role of culture in shaping social norms and behaviors. Food is deeply intertwined with cultural identity and social structures. Hall and Mitchell (2000) argue that food serves multiple purposes beyond mere sustenance, linking it to issues of identity, culture, production, consumption, and sustainability. This perspective highlights the potential of destination foods to connect various senses and cultural understandings, positioning food as a significant element in tourism and cultural exchange. Seo and Yun (2015) added that individual food consumption reflects personal identity and agree that what we eat conveys meaning about who we are.

The promotion of unique and traditional cuisines can significantly enhance a country's culinary image and attract tourists. Long (2004) asserted that countries with distinctive cuisines can leverage food as a key element of tourism, particularly in the realm of culinary tourism. This idea is supported by Bessière (1998), who notes that traditional food not only provides pleasure but also serves as a cultural activity that can draw tourists to specific locations. This underscores the role of local food in enriching travel experiences and fostering cultural education. Strategic promotion of local foods has become a central component of tourism development. Local dishes can enhance a destination's appeal by offering tourists the opportunity to taste unique and authentic flavors. This approach is evident in various government initiatives that promote the uniqueness of national cuisines. For example, Huang (2009) discusses how Korean tourism effectively utilizes TV dramas and entertainment to popularize Korean cuisine, illustrating the powerful influence of media on food trends. The rise of the Korean Wave (K-Wave) exemplifies how cultural products, such as TV dramas, can boost the popularity of a nation's cuisine and contribute to its cultural and economic growth. Huang (2009) further concludes that the intersection of culture and economy is vital for social structure, with Korean TV dramas serving as a successful example of cultural and economic imperialism.

Research Framework

Figure 1: presents the proposed research framework of this study.

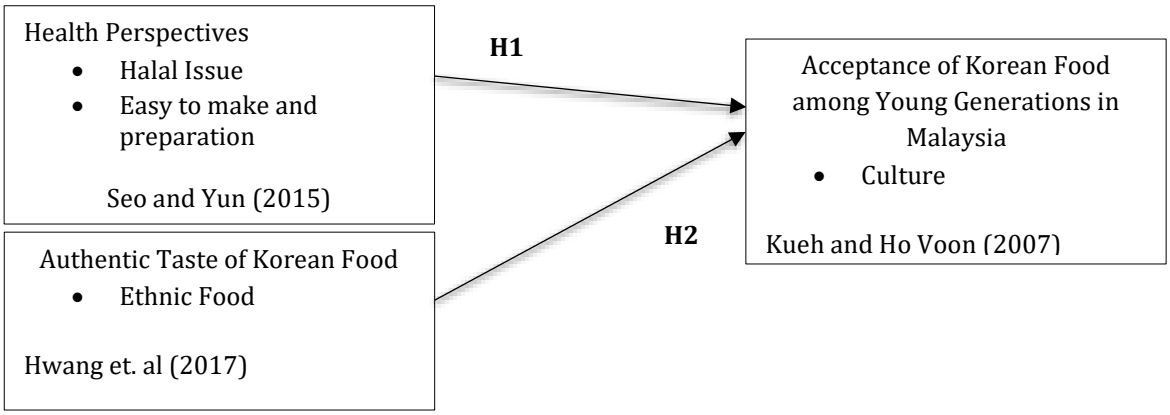


Figure 1: Propose research framework adopted from Hwang et.al (2017), Seo and Yun (2015), and Kueh and Ho Voon (2007).

3. Methodology

Research Design and Sampling

Bloomfield and Fisher (2019) stated that quantitative research explores more valuable outcomes through proper evaluation in the form of figures. Therefore, this study used a quantitative research design focusing on producing numerical evidence to analyze cause-and-effect relationships within the research context. Specifically, it is a descriptive study that aims to look at the relationship between the independent variables (health perspectives, authentic taste of Korean Food) and the dependent variable (acceptance of Korean food culture among young generations). The population of this study is Generation Y (age 22-39) and Generation Z (age 6-23) who reside in Sungai Petani, Kedah, and Pulau Pinang. A convenience sampling method was used

and randomly selected 150 respondents participated in the survey using G-Power software. All 150 questionnaires were prepared and distributed via Gmail, WhatsApp, and social media platforms such as Facebook and Instagram. The questionnaire was designed using Google Forms.

Instrumentation

The research instrument was created to meet the research objectives, research questions and research framework. The questionnaire consists of four main sections which are as follows; Part A (Hwang et.al (2017) focused on the respondent's frequency of eating Korean food, how they learned about Korean food, and how often they ate it. Part B evaluated respondents' opinions on Korean food health perspectives, such as halal certification and ease of preparation (Seo and Yun (2015). Part C assessed the respondents' perceptions of the authentic taste of Korean food from Hwang et.al (2017). Part D (Kueh and Ho Voon (2007) measured the respondents' acceptance of Korean food in terms of culture. Part E focuses on respondents' demographic profiles. The questions were designed to be simple and easy for the respondents to understand. The respondents were required to indicate their level of agreement on a five-point Likert scale ranging from (1) with "strongly disagree" to (5) with "strongly agree".

4. Results and Discussion

The statistical tests used to analyze data such as descriptive, frequency, and the Pearson Correlation analysis were used to examine the relationship between the independent variables and the dependent variable. The questionnaire item was divided into the frequency of eating Korean Food, Korean food health perspectives, authentic taste of Korean Food, consumer acceptance of Korean food, and demographic profile.

Reliability Test

To test the validity of the instrument, the study conducted a reliability test on the research instrument using Cronbach's Alpha. These results demonstrate that the research instrument had strong internal consistency and reliability across all sections. The high Cronbach's Alpha values for the items in each section are positively correlated and provide consistent measurement. The results are presented in Table 1:

Table 1: Cronbach's alpha values

Instruments	Alpha Cronbach's Value	Number of Items
Korean Food Health Perspectives	0.966	12
The authentic taste of Korean food	0.975	4
Consumer acceptance	0.984	7

Profile of Respondents

Table 2 displays the demographic profile of the respondents who participated in the study. The age distribution of the 150 respondents was as follows; 37 (24.7%) were 18-20 years old, 86 (57.3%) were 21-23 years old, 17 (11.3%) were 24-26 years old, 2 (1.3%) were 27-29 years old, and 8 (5.3%) were 30-36 years old. The gender distribution was 46 (30.7%) male and 104 (69.3%) female respondents. In terms of education level, 91 (60.7%) students had a bachelor's degree, 44 (29.3%) had a diploma, 12 (8%) had SPM, and 3 (2%) had post-graduate studies. For salary, 90 (60%) were students, 15 (10%) earned 1000-1500, 15 (10%) earned 2500-5000, 11 (7.3%) earned 0-500, 10 (6.7%) earned 1500-2500, and 9 (6%) earned 500-1000.

Table 2: Frequency and percentages of demographic profiles.

		Frequency	Percentage (%)
Gender	Male	46	30.7
	Female	104	69.3
Age	18 – 20 years	37	24.7
	21 – 23 years	86	57.3
	24 – 26 years	17	11.3
	27 – 29 years	2	1.3

	30-year-old and above	8	5.3
Education Level	SPM	12	8.0
	Diploma	44	29.3
	Degree	91	60.7
	Others (Master, PhD, etc)	3	2.0
Salary	Students	90	60.0
	RM 0 - RM500	11	7.3
	RM 500 – RM 1000	9	6.0
	RM 1000 – RM 1500	15	10.0
	RM 1500 – RM2500	10	6.7
	RM2500 – RM5000	15	10.0

The results of screening questions about the frequency of eating Korean food displayed in Table 3 show that out of 150 respondents, 143 (95.3%) had tried Korean food, while 7 (4.7%) had not. The second analysis focused on the sources through which respondents learned about Korean food with 22 respondents (14.7%) hearing about it from the internet, 91 (60.7%) from social media, 30 (20%) from friends, and 7 (4.7%) from family. For the frequency with which respondents eat Korean food, the analysis revealed that 2 respondents (1.3%) ate Korean food every day, 6 (4%) once a week, 65 (43.3%) once a month, and 77 (51.3%) ate it once a year. The final analysis assessed respondents' opinions on the affordability of Korean food, with 79 respondents (52.7%) believing Korean food is affordable, and 71 (47.3%) not.

Table 3: Frequency and percentage of respondents eating Korean Food

		Frequency	Percentage (%)
Have you tried Korean food?	Yes	143	95.3
	No	7	4.7
Where have you heard about Korean food?	Internet	22	14.7
	Social media	91	60.7
	Friends	30	20.0
	Family	7	4.7
How often do you eat Korean food?	Every day	2	1.3
	Once a week	6	4.0
	Once a month	65	43.3
	Once a year	77	51.3
In your opinion, Korean food is affordable to purchase?	Yes	79	52.7
	No	71	47.3

Descriptive Analysis of Korean Food Health Perspectives

Table 4 presents the means and standard deviations of various factors related to Korean food health perspectives. The results indicate a range of perceptions regarding the health and appeal of Korean food. The highest-rated factor was "Korean food is attractive to eat" with a mean score of 3.89 (SD = 0.923), indicating strong agreement among respondents on the visual appeal of Korean cuisine. Respondents also highly rated the perception that Korean food is hygienic, with a mean score of 3.75 (SD = 1.011). The taste of Korean food acceptable to young consumers received a mean score of 3.69 (SD = 0.904), showing a generally positive attitude toward Korean cuisine flavors The ease of finding ingredients for cooking Korean food at home had a mean score of 3.62 (SD = 0.946), implying that respondents found it relatively convenient to access these

ingredients. The aspect of using organic and fresh ingredients in Korean cuisine was rated as 3.57 (SD = 0.839), indicating a favorable view toward healthier food choices. The use of halal and trustworthy ingredients in Korean restaurants received a moderate mean score of 3.55 (SD = 0.816), agreeing with a positive perception among consumers. On the other hand, the lowest-rated factor was "Have you ever cooked Korean food?" with a mean score of 2.59 (SD = 1.238), suggesting that fewer respondents have personal experience preparing Korean food.

Table 4: Descriptive Statistics of Korean Food Health Perspectives

Variable	Mean	Std. Deviation
Have you ever cooked Korean food?	2.59	1.238
The food served at the restaurant is hygienic	3.75	1.011
Korean restaurants use halal and trustworthy ingredients	3.55	0.816
Korean food is attractive to eat	3.89	0.923
The restaurant uses organic and fresh ingredients	3.57	0.839
The food served is easy and not complicated to eat	3.62	0.946
The taste of food is acceptable for Malaysians	3.69	0.904
If we want to cook at home, the ingredients are easy to find	3.12	1.032
The method of cooking Korean food is simple and not complicated	3.33	0.847
The food tastes delicious even when cooked at home	3.45	1.014
The food is rich in nutrition and delicious	3.68	0.900
The food is easy to prepare and make	3.41	0.920

Descriptive Analysis of Authentic Taste of Korean Food

Table 5 presents the mean and standard deviation for various factors related to the authentic taste of Korean food. The highest-rated factor is "Can accept the taste of Korean food" with a mean score of 3.72 (SD = 0.956), indicating a strong overall acceptance of Korean food's taste and its acceptableness to respondents. The perception of a unique and exotic relish owing to the differences in food from other countries received a mean score of 3.66 (SD = 0.858), suggesting a positive view toward the distinctiveness of Korean flavors. The feeling of dining at a high-class restaurant with effort rather than just consuming instant food received a mean score of 3.57 (SD = 0.937), indicating a moderate agreement among respondents regarding the dining experience associated with Korean food. The lowest-rated factor is "Can you eat other side dishes with rice, for example, kimchi?" with a mean score of 3.53 (SD = 1.145), suggesting reservations about specific Korean side dishes.

Table 5: Descriptive Statistics of the Authentic Taste of Korean Food

Variable	Mean	Std. Deviation
Can accept the taste of Korean food	3.72	0.956
Can feel unique and exotic relish due to having food that is different from that of other countries	3.66	0.858
Can you eat other side dishes with rice, for example, kimchi?	3.53	1.145
Can get the feeling of going to a high-class restaurant with effort, unlike just eating fast food	3.57	0.937

Descriptive Analysis of the Consumer Acceptance of Korean Food

Table 6 displays the mean and standard deviation for various factors related to consumer acceptance of Korean food. The highest-rated factor is "Can differentiate between Korean and other cuisines" with a mean score of 3.79 (SD = 0.869), indicating that consumers could clearly distinguish Korean food from other types of food. "The service offered at the restaurant was satisfactory" received a mean score of 3.67 (SD = 0.871), suggesting a generally positive perception among respondents regarding the service quality at Korean restaurants. "Can identify the Korean restaurant properly without confusing them with Chinese or Malay restaurant" had a mean

score of 3.64 (SD = 0.929), indicating a relatively high level of agreement among respondents in correctly identifying Korean restaurants. "Quickness of order and service in Korean restaurant" had a mean score of 3.59 (SD = 0.876), indicating a moderate level of agreement among respondents regarding the efficiency of service at Korean restaurants. "Customers get the feeling at Korea when entering a restaurant" had a mean score of 3.50 (SD = 0.947), indicating a moderate level of agreement among respondents that they experience a sense of being in Korea when entering a Korean restaurant". The price of the food and service provided is affordable" received a mean score of 3.34 (SD = 0.989), suggesting a moderate level of agreement among respondents regarding the affordability of Korean food and services. On the other hand, "The staff use Korean language at the restaurants in addition to English and Malay language" received a mean score of 2.97 (SD = 1.058), suggesting a lower level of agreement among respondents regarding the use of Korean language by Korean restaurant staff.

Table 6: Descriptive Statistics of Consumer Acceptance of Korean Food

Variable	Mean	Std. Deviation
Customers get the feeling of being in Korea when entering a restaurant	3.50	0.947
Staff use the Korean language at the restaurant in addition to English and Malay	2.97	1.058
Can identify Korean restaurants properly without confusing them with Chinese or Malay restaurants	3.64	0.929
The price of the food and services provided is affordable	3.34	0.989
Can differentiate between Korean and other cuisines	3.79	0.869
The service offered at the restaurant was satisfactory	3.67	0.871
Quickness of order and service in a Korean restaurant	3.59	0.876

Correlation Analysis of Variables

The Pearson correlation coefficient analysis was conducted to determine the relationship between Korean food health perspectives (independent variable) and consumer acceptance of Korean food (dependent variable). The Pearson Correlation analysis in Table 7 shows a significant positive relationship between Korean food health perspectives and consumer acceptance of Korean food, with a correlation coefficient (r) of 0.991 and a p-value of 0.000 ($p < 0.01$). This means that there is a statistically significant relationship between the two variables, leading to the rejection of the null hypothesis (H0) and acceptance of the alternative hypothesis (H1). Thus, H1 is accepted. Therefore, the relationship between Korean food health perspectives and consumer acceptance is effective, indicating that improvements in the health aspects of Korean food are likely to lead to increased consumer acceptance. The high correlation coefficient (0.991) demonstrates that as consumers perceive Korean food to be healthier, their acceptance and preference for it correspondingly increase. This aligns with previous research emphasizing the importance of health perceptions in consumer food choices (Raghunathan, Naylor, & Hoyer, 2006).

Table 7: Pearson Coefficient Correlation between Korean Food Health Perspectives and Consumer Acceptance

Variable	Korean Food Health Perspectives	Consumer Acceptance of Korean Food
Korean Food Health Perspectives	1	.991**
Consumer Acceptance of Korean Food	.991**	1
Sig. (2-tailed)	**-**	**.000**
N	**150**	**150**
Correlation is significant at the 0.01 level (2-tailed)		

The Pearson correlation coefficient analysis in Table 8 displays the relationship between the authentic tastes of Korean food (independent variable) and consumer acceptance of Korean food (dependent variable). The analysis revealed a significant positive relationship between authentic Korean food taste and consumer

acceptance of Korean food. The correlation coefficient (r) was 0.987, with a p-value of 0.000 ($p < 0.01$), indicating a statistically significant relationship between these variables. Consequently, the null hypothesis (H0) is rejected, and the alternative hypothesis (H1) is accepted. Thus, H2 is accepted. Therefore, the relationship between the authentic tastes of Korean food and consumer acceptance is effective. This highlights that as consumers perceive Korean food to be more authentic in taste, their acceptance and preference for it increase significantly.

Table 8: Pearson Coefficient Correlation between Authentic Taste of Korean Food and Consumer Acceptance

Variable	Authentic Taste of Korean Food	Consumer Acceptance of Korean Food
Authentic Taste of Korean Food	1	.987**
Consumer Acceptance of Korean Food	.987**	1
Sig. (2-tailed)	**-**	**.000**
N	**150**	**150**
Correlation is significant at the 0.01 level (2-tailed)		

Influences of Korean Health Perspectives on Consumer Acceptance

Health perspectives related to Korean food can influence consumer acceptance of Korean food. According to the respondents, we can see that not everyone has tried Korean food, possibly because of its high cost. Respondents agreed that Korean food is appealing because it is commonly served with meat wrapped in a special sauce and fresh lettuce. This is supported by the descriptive analysis of health perspectives related to Korean food, which reveals that the item "Korean food is attractive to eat" has the highest score, with an average of 3.89. Additionally, we should consider that health also involves hygiene. Korean people are known for their cleanliness standards, as they always wear gloves when eating and their eating places are clean and tidy. Korean food is also popular because it includes various vegetables that help reduce cholesterol and promote positive biological activity. Dietitians state that many common ingredients used in Korean cuisine are vegetables, and cooking methods such as grilling, stewing, and fermenting are healthier than deep frying. Furthermore, the ingredients in Korean food can improve digestion, strengthen bones, and promote skin health. When dining at a Korean restaurant, it is common to be served soup with every meal, which is a satisfying and relatively low-calorie option. Undoubtedly, when food is served freshly, customers are more likely to seek it out due to its benefits for their well-being (Rozekhi, Hussin, Siddiq, Rashid and Salmi, 2016). As Rozekhi et al. mentioned, restaurants must make customers aware of and guarantee the use of fresh products and ingredients. This is essential for establishing long-term and profitable relationships with customers.

Influence of Authentic Taste on Consumer Acceptance of Korean Food

The results show a Pearson correlation, with an R-value of 0.987. This shows a positive relationship between the authentic tastes of Korean food and consumer acceptance of Korean food. The data confirms that the authentic taste of Korean food can influence consumer acceptance. The Pearson correlation value (0.987) indicates a strong correlation between authentic taste and consumer acceptance. Regarding the research question of whether authentic taste can impact consumer acceptance, most respondents in Sungai Petani, Kedah, and Pulau Pinang agreed that taste significantly influences their choice to eat Korean food. The global popularity of Korean cuisine is demonstrated by the acceptance of authentic Korean flavors, such as kimchi. Kimchi, a staple in Korean food, is particularly noted for its unique flavors and health benefits, leading people worldwide to seek out and learn how to prepare it themselves and promote healthy meals in traditional ways (Hongu et al., 2017). This is supported by the result of the descriptive analysis, which shows that the lowest score for "Can eat other side dishes with rice, for example, kimchi" is 3.53, indicating agreement on a Likert scale ranging from 2-Disagree to 4-Agree.

5. Managerial Implications and Recommendations

This study contributes to understanding customer preferences and the acceptance of Korean food among residents in Penang and Sungai Petani, Malaysia, and it fills a gap in the literature on cultural influences in local contexts. The localized focus enhances the result accuracy and offers insights into psychological perspectives on consumer behavior. Practically, the study aids consumers in making informed choices, encourages repeat patronage, and helps restaurant owners improve customer experiences, thus driving business growth. The findings can inform policymakers on strategies to promote cultural exchange and tourism by leveraging the global popularity of Korean culture to strengthen bilateral relations and economic opportunities between Malaysia and South Korea.

However, this study has some limitations that need to be addressed. The study was geographically conducted in Sungai Petani, Kedah, and Pulau Pinang, thereby limiting the sample size of respondents. Additionally, compared to larger cities such as Kuala Lumpur, the number of Korean restaurants is relatively small, and few have halal certification. This limitation of both location and sample size may have affected the generalizability of the findings. Despite these limitations, the study provides valuable insights into Malaysian consumers' acceptance of Korean food. Therefore, future research should underscore this challenge by expanding the geographical scope to encompass various regions in Malaysia, such as Kuala Lumpur, Johor Bahru, and other cities with larger populations. Including more diverse areas will help obtain a more representative sample, which can improve the generalizability of the findings (Rozekhi et al., 2016). Moreover, increasing the sample size will enhance the reliability and validity of the results. Larger sample sizes help mitigate the effects of hidden values and provide a more accurate picture of population preferences. This will employ more robust statistical analyses, such as multivariate regression, to identify key predictors of consumer acceptance. Additionally, further studies should investigate the importance of the authenticity of Korean food which is valuable for restaurants. Understanding how different authenticity aspects, such as ingredients, cooking methods, and dining experiences, influence consumer satisfaction can guide business practices.

Conclusion

This study provides valuable insights into the factors influencing Malaysian young consumers' acceptance of Korean food, focusing on residents of Penang and Sungai Petani, Kedah. The findings reveal a strong positive correlation between the authentic taste of Korean food and consumer acceptance ($r = 0.987$, $p < 0.01$), highlighting the significant role of unique flavors in shaping consumer preferences. Furthermore, the health benefits associated with Korean food, including its vegetable-rich ingredients and hygienic dining practices, were critical in influencing consumer attitudes. This study concludes that many Malaysian consumers have already tasted Korean food, with some expressing a preference for it to the extent of regular consumption. This demonstrates the increasing presence of Korean restaurants in Malaysia, such as Seoul Garden, Mr Dakgalbi, K-Fry, Kyochon 1991, and 4Fingers, which reflects this growing interest. This information is valuable for restaurant owners and policymakers. It can help create a diverse culinary landscape that meets different consumers' needs.

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Tourism Destination Image: Towards a Better Performance on Malay Restaurant by Reflecting Competitive Advantage in Business Organization

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Abstract: A study on revisit intention has a different meaning in business development. Competitiveness in business activities such as in Malay restaurants needs to use a various method. To gain the functionality of the development, innovation practices and destination image should be aimed for a better understanding of the overall concept. This study aims to design a conceptual understanding of the destination image and innovation practices toward Malay restaurant performance grounded in competitive advantage theory. Furthermore, competitive advantage provides insight into how the connection between business organizations will help the development and sustainability of business performance. In addition, it will bring a more significant contribution to the structure of the organization. This article suggests that a significant measurement of competitiveness could be ascertained from a performance perspective. The article integrates previous studies on the respective measures and proposes a conceptual framework for tourist destination image. Destination image relates to restaurant performance, which can be studied further in the future. It will contribute to the significance of practicality and theoretically as it mentioned the purpose of destination image and competitive advantage towards Malay restaurant performance. However, in terms of Malay restaurant performance, it still needs to be discussed in depth as it has a limited view of the discussion. Determinants of tourism destination image, innovation practices, and restaurant performance are also discussed for future research.

Keywords: *Competitive advantage, destination image, innovation practices, restaurant performance, intention to travel*

1. Introduction and Background

Tourism activities have changed rapidly over the years influenced by technological advancement and application (Kumar & Shekkar, 2020). The changes are seen as an advantage for the business surroundings to support the local economy and to prepare for the significant relevancy of current demand. In terms of relation, sub-sectors such as tourism and hospitality industry have a major role in progressive advancement towards development. Tourist flexibility of interest and the complexity of their behavior in choosing their preferences during their travel including their preference on choosing food and beverages are unique (Pilis, Kabus, & Miciula, 2022). The relationship in terms of tourist movement and preferences in travel intention and revisit intention has been discussed by Pilis et al. (2022) in the context of food service management.

The rapid growth of technological factors has shaped both tourism and food service industries to become more quality-centric for the customer could be seen in the remarkable market competitiveness (Gheribi & Bonadonna, 2019). As mentioned by Gheribi and Bonadonna (2019), various job creation through these industries have helped in the local economy and generated sustainability for further development. Knowledge in cognitive behavior is illustrated by the statement as important for business opportunity as it influences people's movement, attitude, and behavior to choose their preferences. As stated by Barney (1991), knowledge is an insight that can be equipped by experience and education and it derives a competitive advantage to be more strategically developed.

The growth from the technology advancement has brought a new structure in strategizing the effort on business and marketing (Hassan, Akanmu, Mohamed, & Nazir, 2019). Most of the restaurants have developed their strategy to compete with their competitors and to follow current trends to get more insight from their potential customers. Based on this point, Nafukho, Hairston, and Brooks (2004) stated that knowledge, experience, and skills are inseparable and could reveal significant competitiveness in business performance. It is known to the business development where the prominence evidence by mentioning business performance would gain strategic attainment from the competitive advantage.

Previous studies on Malay business restaurants have indicators of the positive revealed by using competitive advantage (Ghazali, Nashuki, & Othman, 2018; Alias, Ariffin & Abdullah, 2021). However, in the discussion, tourism destination image involvement in the construction is still limited and needs to be discussed thoroughly. The discussion on the subject had not been discussed widely for the related construct and the study on tourism destination image on Malay restaurant performance is limited. Thus, the significance of the study is to specifically justify the construct of tourist destination image and the Malay restaurant performance. While it is important to see how the destination image and business organization should be operating, the study on Malay restaurants would be sufficient as revisiting the intention to travel are indicator of the construct (Kralikova, Peruthova, & Ryglova, 2020).

2. Literature Review

Competitive Advantage: In a study of competitive advantage, it has been reported that competitive advantage will assist business organizations in optimizing performance and motivate the effort of business organizations to develop (Dubey, Gunasekaran, Childe, Blome, & Papadopoulos, 2019). Collins (2020) suggested that competitive advantage is involved within the resource-based view (RBV) theory which works as a stronghold for organizational structure (Azeem, Haider, & Sajjad, 2021). Knowledge sharing and innovation in the organizational process should be implemented for competitive advantage to be integrated with the organizational structure. Other than that, the competitive advantage has been mentioned as a tool in sustaining business performance including innovation practices to maintain the proposition of organizational development (Azeem et al., 2021).

Innovation Practices: Evidence from the study concluded that creativity can be the definition of destination image development in a particular destination (Lita, Faisal, & Meuthia, 2020). This involves innovation practices which the potential can be found by the application of creativity in Indonesia. The implementation of technological advancement and the adoption of new technology would be added to the business opportunity (Ahmad & Scott, 2019). The role of innovation can be seen in the Malaysian restaurant industry which comprehends the tourism quality involving revisiting intention and travel destination image (Chowdhury, Prayag, Patwardhan, & Kumar, 2020). In the context of restaurant performance, innovation practices have been described as one of the tools to develop the internal and external environment of company profitability (Najib, Septiani, & Nurlaela, 2020). As mentioned in the previous study on the restaurant industry, innovation could represent the restaurant's image and also give necessary guidance for the restaurant to evolve (Lee, Hallak, Sardeshmukh, 2019).

Tourist Destination Image: Previous studies mentioned the concept of tourism destination image has seemed vague and normally referred to the psychological aspect which has an uncertain definition to define the term (Lai & Li, 2015). Several scholars attempted to examine the term to relate it to the current concept (Gallarza, Saura, & Garcia, 2002; Pike, 2007). Based on the empirical evidence from the previous findings, there is a different perspective on each of the evidence by using different methods. For instance, the quantitative method had different connotations on the analysis and the qualitative had a different value on the perspective. Based on Hetzel (2023), the term can be simplified by following the factors that have been listed to define tourism destination image, (1) rich with heritage, (2) cuisines heritage, (3) affordable and friendly locals, (4) entertainment consideration, (5) rich with histories, (6) shopping, and (7) festivals. These factors are common in creating an image of destination development. Furthermore, the responsibility of local authorities to initiate factors for the development of destination is likely to be resorted.

However, Rasoolimanesh, Seyfi, Rastegar, and Hall (2021) argued that the implication of destination image should be improved by the psychological needs of individuals which are influenced by their experience and behavior. Particularly, previous scholars have mentioned the usage of cognitive and affective components in specific destination images (Tan & Wu, 2016; Karl, Muscat, & Ritchie, 2020). In addition, other scholars mentioned that the cognitive component should be measured by implying two determinants known as an intention to travel and revisit intention. From the statement, it can be concluded that destination image can be reflected in the two factors that involve cognitive and affective as well as it could affect the whole decision of an individual to travel and revisit the destination.

The Influence of Intention to Travel on Restaurant Performance: Cognitive and affective abilities have been discussed widely by previous studies to indicate the complexity of destination image (Tassiello & Tillotson, 2020). The connection the captivity has re-known the term of destination image with travel motivation which involved subjective terms of one's previous visit and travel experience. The concept of travel intention has been justified by Zhang, Wu, Morrision, Tseng, and Chen (2018) as an indicator of the individual's desire and perception of the quality that is residual in the destination. It also involves the way the individual experiences the service quality of any hospitality provider including the restaurant business.

However, based on Ting, Fam, Cheah, Richard, & Nan (2019), found that the opportunities in the food and beverages and restaurant business with destination image have a significant contribution to the intention to travel. Following the rules in cognitive and affective abilities, the researchers have stated that the influence that might appear in individual psychological thought to choose the restaurant or food and beverages involves the authenticity, quality, ingredients, and preparation of the cuisines themselves (Ting et al., 2019). The experience that they will gain through the consumption of food will potentially bring the intention upfront. Hasan, Som, and Ismail (2018) have their opinion on the statement which justified that the intention to travel is related to the satisfaction and intention to revisit. This is where the determinant spreads for the relation between dimensions.

The Influence of Revisit Intention on Restaurant Performance: Individuals who decide to revisit the destination have a different behavior which can be classified into their intention for the destination's innovation, promotional effort, and positive memory which come from experience (Um, Chon, & Ro, 2006). Based on the report that has been prepared by Zhang, Wu, and Buhalis (2017), most of the tourists who decide to revisit the destination are generally influenced by their perception and experience. The destination also depends on these factors to keep loyal visitors from revisiting the destination. In addition, there were arguments on the revisit intention comes from the ethnic food and ethnic restaurant performance (Hwang, Kim, Choe, & Chung, 2018). For instance, Korean culture has evolved to be the most followed culture including their trend of food and the intention is majorly on the satisfaction and experience of the tourist from television, food culture, and the first-time traveller to South Korea (Omar & Karim, 2013).

On the other hand, Khairi and Darmawan (2021) suggested that restaurants should follow past studies to conserve food authenticity to keep loyal visitors. Furthermore, Safian, Osman, Wahab, Othman, and Azhar (2021) claimed the same justification which indicates that the focus of restaurants should be more on sustaining the quality, uniqueness, service quality, attractiveness of the destination, location, tourism facilities, and the most important thing is the satisfaction of the customers. These factors are inevitable and could bring more visitors and repeat customers by following the destination image logical understanding. Therefore, the destination image is an important suggestion for restaurant performance to be more reliable and competitive.

Restaurant Performance: The restaurant industry has been mentioned as one of the massive contributors to gross profit (Domi, Keco, Capelleras, & Mehmeti, 2019). The report from WTTC (2018) stated that the restaurant industry made a profitable growth financially in the development of society. The effectiveness of technological advancement and other factors in developing and sustaining restaurant performance can be seen as an external contribution for a particular reason. As mentioned by Bagur-Femenias, Perramon, and Oliveras-Villanueva (2019), the quality that is needed to sustain restaurant performance includes the serving, menu, food, and environment. These qualities will guide the restaurant to be more competitive according to the competitive advantage theoretically. It offers a direct change based on the determinants of restaurant performance namely growth, sustainability performance, profitability, and satisfaction with performance (Lai, Abidin, Hasni, Karim, & Ishak, 2021; Kim & Jang, 2020; Erkmen, 2019; Isnaini, Nurhaida, & Pratama, 2020)

In a case study in the context of Malay restaurant performance, one of the factors that provide a useful advantage for the restaurant's persistence is the image that has been portrayed by the restaurant to attract customers and revisit customers (Abdullah & Isa, 2020). An exceptional finding that mentioned clearly how the destination image would contribute to the restaurant's sustainability and performance in terms of tourism context. However, a previous study stated that in terms of sustaining the restaurant's overall performance, the managers and owners of the restaurant should emphasize the performance indicators and attributes namely resources, materials, handling, service, environment and other indicators involved (Ramli & Surbaini, 2020).

Tourist Destination Image Conceptual Framework: The contribution of the tourism sector has brought about a massive development in the local economy. Based on the statement of a previous study, the tourism sector has opened up various opportunities and left a remarkable perception of tourist destinations including destination image (Al-Ansi & Han, 2019). It has not evolved only for the sole purpose; however, it involved other sub-sectors that comprehend the availability of the massive sector. The restaurant industry is truly given an inspiring opportunity to evolve and align with the tourism sector as one of the factors of tourist perception of the destination image is restaurant attributes (Lai, Khoo-Lattimore, & Wang, 2017). Other than that, travel decision was made by the tourist because of their intention based on their perception of the destination. Meanwhile, revisit intention is based on their experience throughout the expedition in the foreign countries or the destination provider. Based on the antecedents that have been discussed, tourist experience and knowledge are a breakthrough for food image and branding (Lai et al., 2017). The positive food experience might have a possibility for the tourist to decide whether it is suitable for them to revisit the place for another food experience (Hsu & Scott, 2020).

Furthermore, competitive advantage plays a major role in connecting the performance of a restaurant to be acceptable for customer consumption (Gheribi & Bonadonna, 2019). Destination image has been mentioned as a possible indicator of the visiting customer who comes from word of mouth (WOM) or revisit customer (Kralikova et al., 2020). This argument is in line with the other scholars who mentioned that the business strategy should try to provide demand from the environment, quality of service, excellent menu, and good management (Kumar M, Govindarajo, & Khen, 2019). A case study about the changes in the restaurant has implied that the destination image has created value from the perspective of the customer which supports the restaurant's name (Ragab, Mahrous, & Ghoneim, 2019).

Literature on destination image has explained the essential dimensions of destination image known as intention to travel and revisit intention. Based on the arguments and assumptions on tourist destination image literature, there is a significant finding relating the construct to restaurant performance. The concept of destination image can be applied to get a greater impact on restaurant sustainability which eventually provides a greater effect to the local expenditure, economically. The destination image is grounded by two major elements in the construct namely intention to travel and revisit intention. Therefore, the construct can be measured for the relevancy of better restaurant performance and sustainability performance.

3. Discussion

In this article, the relationship between tourist destination image and Malay restaurant performance is discussed to get ample results of the variables. Although a fundamental understanding of tourist destination image focuses on the tourism industry, the review of previous literature has a significant impact on the restaurant industry and food and beverages industry as well (Hsu & Scott, 2020; Lai et al., 2017). It can be concluded that tourist destination image has affecting factors that can be applied in any sub-sectors in the tourism and hospitality industry. Various studies on tourist destination image have made an impact on the effort to identify the tourist experience and knowledge to revisit the destination and to have an intention to go travel because of the destination image; however, there has been limited study on the ethnic restaurants. From the perspective of literature, there seems to be consent on destination image and Malay restaurant performance are two important components in handling sustainability performance. The measurement of destination image will directly respond to the Malay restaurant performance which refers to the indicators that have been mentioned (intention to travel and revisit intention).

4. Conclusion

The proposed conceptual model integrates the relationship between tourist destination image and restaurant performance in computing the overall assessment of Malay restaurant sustainability performance. The proposed conceptual model offers a different set of determinants which includes growth, sustainability performance, profitability, and satisfaction with performance (Lai et al., 2021; Kim & Jang, 2020; Erkmen, 2019; Isnaini et al., 2020). Hence, the critical understanding of the dynamism of tourist destination image and restaurant performance will help the integrated conceptual framework to understand the whole structure of tourism ability and restaurant strength in sustaining business performance.

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Pushing the Boundaries of Food Product Innovation Acceptance: A Case of Radical Ready-to-Eat Food Product Innovation in Malaysia

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Abstract: This study examines the impact of food neophobia and food innovation on Malaysian consumer attitudes, subjective norms, perceived behaviour control, and consumer behaviour intention towards ready-to-eat (RTE) foods. Additionally, this study investigates the mediating effects of food innovation, attitude, subjective norms, and perceived behaviour control on the relationship between food neophobia and consumer behaviour intention. A quantitative cross-sectional study was used whereby an online survey was developed and disseminated via social media platforms to all Malaysian consumers aged 18 years and above from October 2023 to January 2024. A total of 321 valid responses were used for hypothesis testing using SPSS and MPlus software. This study found eleven out of nineteen proposed hypotheses were statistically significant. Food neophobia directly influences food innovation, attitude, subjective norms, and perceived behaviour control. More importantly, this study found the significant influence of attitude, subjective norms, and food innovation as mediators in influencing the association between food neophobia and consumer behaviour intention. Findings from this study contribute to the RTE food behavioural studies by incorporating the theory of planned behaviour and stimulus-organism-response models. This study also introduces attitude, subjective norms, and food innovation as mediators in influencing the association between food neophobia and consumer behaviour intention. Results from the integrated model provide a more comprehensive understanding of the impact of food neophobia and food innovation on consumer attitude, subjective norms, perceived behaviour control, and behaviour intention. Findings underline the importance of RTE food producers exploring young consumers as the new markets for their products.

Keywords: *Food innovation, Food Neophobia, Malaysia, Ready to Eat Food, Stimulus Organism Theory, Theory of planned behavior*

1. Introduction and Background

Ready-to-eat (RTE) foods are described as foods that are pre-cleaned, precooked, packaged, and ready for consumption without further preparation process or cooking (Hwang et al., 2012). According to the Food Standards Agency in the United Kingdom, consumers can consume RTE foods such as salads, sandwiches, cheese, and desserts directly, as the foods do not need to be cooked or reheated before serving (Food Standard Agency, n.d.). This study operationalizes RTE foods as requiring minimal or no additional preparation or cooking before consumption. The RTE foods market is expanding worldwide due to a major shift in consumer choices and lifestyles (Malik et al., 2018; Casini et al., 2015). Consumer demographic shifted to urbanization, more disposable income and less time to spend on food preparation due to busy work and social engagement are among the factors influencing the increase in demand for RTE foods (Alvarez et al., 2018). Moreover, RTE foods require little to no preparation (Hwang et al., 2012), thus meeting the needs of modern consumers looking for convenient products (Azman et al., 2023). The variations offered convenience without sacrificing taste and, in some cases, nutrition, making the RTE a very appealing product for consumers (Scholderer & Grunert, 2005; Scholliers, 2015).

Crises such as the recent COVID-19 outbreak also contributed to the changing trends in the prepared foods market (Chenarides et al., 2021). The stay-at-home policy influenced the increase in home cooking and cooking frequency (Dezanetti et al., 2022). Although an increase in home cooking was reported during the earlier lockdown period, consumers started shifting to convenient and safe RTE options as the pandemic continued. The availability of e-hailing food delivery services, particularly during the restriction period of COVID-19, booster the growth of RTE foods trends in Malaysia as consumers can save time and order RTE foods via online

food ordering applications such as Foodpanda and Grab (Roslan & Mohd Nawi, 2022). For younger age groups in the Republic of Korea, RTE food is consumed as a snack, thus suggesting the need for a healthier RTE food diet (Choi, 2022). This trend is still observed despite the end of the lockdown restriction as consumers found the RTE foods to meet their requirement for wholesome and convenient products.

According to Statista (2024), the revenue for the RTE foods market in Malaysia as of March 2024 is US$2.15 billion. The market is expected to grow by 6.83% yearly, and the RTE meals market volume is expected to amount to 0.50 billion kilograms by 2028 (Statista, 2024). The growing need for ready meals due to hectic lives will propel the global ready meals market's expansion. Azman et al. (2023) surveyed Malaysian consumers and found that the convenience of RTE foods was the main factor influencing consumer behaviour, followed by health and taste. Earlier, Anusha et al. (2020) found convenience as the main motivation for RTE food purchase, and most Malaysians purchase RTE foods during lunch and spend up to RM20.00 (US$4.23) per meal. The increased desire for a variety of quick RTE options can be attributed to consumers' greater openness to tasting new and unusual flavours as international cuisines become more accessible and diverse. The rising population of health-conscious consumers increases the need to offer various healthy RTE food options that are easily accessible in the market.

Despite its popularity, RTE foods are associated with incidents of foodborne illness cases (Mengistu et al., 2022), and consumers raising concerns about their safety. RTE food suppliers serving unsafe food products to consumers without proper hygiene and safety practices are among the primary cause of foodborne illness (Cheesman et al., 2023). Such incidents create feelings of fear towards anything new and forbid consumers from trying new things or breaking from their routine, such as consuming RTE foods. Nonetheless, the RTE foods industry's globalization has also made it easier for new packaging technologies to be introduced, extending these items' shelf lives and guaranteeing their freshness and quality over time (Jabs & Devine, 2006). Chinchkar et al. (2023) addressed the importance of nanotechnology in enhancing the packaging quality of RTE food while improving the shelf life and preventing it from being contaminated by the external environment. With a proper system, RTE food producers can guarantee consumers' safety when consuming RTE foods.

Additionally, the market for RTE foods has grown significantly because of globalization, evolving social trends, and increasing disposable incomes. Interest in RTE food has recently expanded, mostly due to lifestyle changes. RTE food products are trending due to their convenience and quick preparation time. While the RTE foods business is expanding worldwide, a limited number of literature has addressed the perception and acceptance of Malaysian consumers of RTE food. Companies in the food business are actively responding to consumer needs in this dynamic landscape by focusing on health and wellness qualities, developing innovative products, and implementing sustainable practices. The rise in the market for RTE foods reflects both the food industry's flexibility and responsiveness to changing consumer demands, as well as a fundamental shift in how people approach their meals.

This study aims to answer the following research questions: (a) What is the impact of food neophobia and food innovation on consumer attitude, subjective norms, and perceived behaviour control towards RTE food's behaviour intention? (b) What is the impact of attitude, subjective norms, and perceived behaviour control on consumer RTE food's behaviour intention? (c) Does food innovation, attitude, subjective norms, and perceived behaviour control mediate the relationship between food neophobia and consumer RTE foods behaviour intention?

2. Literature Review

This research proposed two integrative theories to investigate the consumer's acceptance of radical RTE food product innovation in Malaysia: the stimulus organism response theory and the theory of planned behaviour. Applying stimulus organism response theory and the theory of planned behaviour is common in consumer behaviour studies (Alam et al., 2024; Liu et al., 2023). The theory of planned behaviour strength lies in its ability to explain the cognitive process that occurs during the decision-making process, while stimulus organism response theory adds another dimension to consumer behaviour research through stimulus or external factors that also have a significant influence in this research (Uzunoglu & Sozer, 2020; Bigne et al., 2020). Furthermore, the theory of planned behaviour constructs integrated into the stimulus organism response framework also

allows researchers to observe the mediating effect of organisms between stimulus and response, which allows for a better understanding of the phenomena under investigation (Alam et al., 2024).

Stimulus Organism Response Theory

The stimulus-organism response theory, introduced by Mehrabian and Russell (1974), is based on the notion that human response is directed by stimulus and organism. This theory is widely used in consumer behaviour studies as it can explain external and internal influences that influence consumer behaviour (Wu & Li, 2018; Chang et al., 2011; Kim et al., 2020). Consumer decision-making is a very complex process, especially for involvement purchases such as food products, as decision-making is often based on habit and automatic processes, thus creating another layer of complexity to fully understand why certain products appealed to consumers while certain products failed to attract consumers (Gigerenzer & Gaissmaier, 2011). Interaction between internal and external influences allows for a better understanding of the actual process that occurs during the decision-making process. The importance of stimulus in product packaging and the actual appearance of the products is widely discussed in the literature, as this stimulus often facilitates automatic decision-making (Clement, 2007). The perception of a stimulus is processed through the mediating response of organisms, which, in this case, is the consumer's internal cognitive process. Thus, the consumers' backgrounds and belief systems will automatically evaluate whether the stimulus fits their needs. Therefore, stimulus organism response theory allows researchers to test the specific stimulus against an organism, providing a better understanding of the area or product under investigation.

Radical Food Innovation as Stimulus: Food innovation is a standard process for staying relevant and competitive in the food industry. These include the need to cater to the changes in the consumers' expectations (Rabadán et al., 2021), managing the depletion of resources due to global warming (Gallen, 2019), and the need to feed the growing population (Hussain & El-Din Ahmed, 2023). The food industry's response to this issue is through food innovation. To ensure alignment with the goals of sustainability can be achieved, the market has launched genetically modified foods, insect-based foods, cultured meat, and plant-based products to help with the potential of future food shortages. These innovative ventures need to attract consumers while overcoming their reluctance toward unfamiliar food (Siddiqui et al., 2022). However, these unconventional foods are considered radical innovations that create a significant cultural and cognitive challenge in some cultures (Fischer & Van Loo, 2021; Gallen, 2019). While some cultures have long embraced the idea of eating insects and other unconventional foods, it is still cognitively challenging for most of the population (Onwezen et al., 2019).

Increased awareness about the relationship between food and health has pushed the innovation of products catering to consumers' health (Rabadán et al., 2021). Examples of products include vegan, gluten-free, and foods free from allergens. A study on European customers indicated that different opinions on improving health through food technology cause inconsistent approval of food innovation for health advantages (Priyadarshini et al., 2019). Organic farming, which stems from the refrainment of unnatural elements in food, brought organic foods to the shelves. Genetically modified foods are the industry's response to the need to produce superior products and quality for the masses. Nevertheless, consumers have a low acceptance of new food technologies due to the belief that the advantages of these technologies are overstated and concerns about potential adverse effects on health, natural quality, and the environment (Coutinho et al., 2021). To mitigate neophobia and promote sustainability, strategies tailored to introduce novel food items successfully are imperative (Wendt & Weinrich, 2023). Furthermore, it is strongly recommended that the industry prioritize using natural ingredients to create nutritious food that aligns with customer preferences and sustainability objectives.

Ready-to-Eat (RTE) Radical Food Innovation Influence on Neophobia and Organism: Ready-to-eat (RTE) foods refer to convenience products that require minimal preparation and are available in the market in many types and variants. RTEs have both practical and hedonistic benefits (Okada, 2005). Although some of these items are familiar to the consumers, the presentation may need to be more familiar, which causes reluctance or avoidance from the consumers. In the case of radical food innovation, the content of the product itself represents something that needs to be more familiar to most consumers; hence, it is difficult for consumers to accept these products (Gallen, 2019; Tan et al., 2015). Intrinsic stimulus refers to the actual products without looking at the packaging and often has a much more significant impact on consumer acceptance (Morris et al., 2022). Hence, without referring to the packaging, the idea of consuming the products is already rejected;

studies conducted in Western countries since 2015 indicate that specific radical food innovations are not well accepted in this society (Ardoin & Prinyawiwatkul, 2021). This psychological condition is known as food neophobia, which determines consumers' acceptance or rejection of new foods (Siddiqui et al., 2022). Rejection of foods may stem from unfavourable sensory qualities, disgust regarding the source or nature of the food, and fear of harmful health effects (Vidigal et al., 2014). Foods familiar with taste or health benefits are more acceptable to consumers (Dittmar, 1992). The selection of foods may also be a means for certain groups to demonstrate their ethnic identity and affiliation.

Furthermore, food neophobia also refers to the inclination to avoid trying new foods instead of regularly consuming the same kinds of food (Muhammad et al., 2016). As the technology matures and becomes more common, consumer behaviour changes to eliminate aversion to certain foods (Gaviria & Bluemelhuber, 2010). Food neophobia worsens with ageing (Dovey et al., 2008). As individuals enter middle age, health issues may increase their reluctance to try new foods, while younger consumers tend to have the least neophobia (Siegrist, 2008). Based on the review of the literature, this study proposed that:
H1a. There is a positive relationship between food neophobia and food innovation.
H1b. There is a positive relationship between food neophobia and attitude.
H1c. There is a positive relationship between food neophobia and subjective norms.
H1d. There is a positive relationship between food neophobia and perceived behaviour control.

Innovative Ready-to-Eat (RTE) Radical Food Influence on Organism: Consumers are sceptical of food innovation as it deviates from traditional products, which are considered authentic and healthier (Verneau et al., 2014). Technological developments in the food industry are linked to customer trust, which regrettably often results in doubt, mistrust, and ambiguity on the part of the consumer (Siegrist, 2008). It has been demonstrated that the qualities of an innovation affect how widely accepted it is (Van Wezemael et al., 2014; Barrenar et al., 2015). As technology advances and people gain confidence, product acceptance rises. Improvements in flavour, nutritional value, and packaging are among the advancements that have gained widespread acceptance (Chen, 2007; Evans & Cox, 2006). However, specific food product innovations push consumers' acceptance boundaries, which is why many food manufacturers refrain from pursuing radical innovation, as it is very costly and risky (Buijs et al., 2009).

In contrast, radical innovation can create worthwhile products for the organization; the risk often weighs more than the benefit. For instance, while radical food innovation has the potential to penetrate the underserved market (Gallen, 2019), however previous studies on radical food innovation do not support this theory (Onwezen et al., 2019). Consumer acceptance is the main issue, as the success of any product relies heavily on demand, and consumers' support is necessary for the existence to be relevant.

Genetically modified foods and nanotechnology are another example of radical food innovation. However, studies have shown that consumers fear these products as they resist them in the market (Hartmann & Siegrist, 2016). Genetically modified foods refer to “organisms in which genetic material has been modified with a new or intentionally modified primary molecular structure” (Rollin et al., 2011). When it comes to genetically modified foods, customers are worried about their health and the possibility of getting cancer. However, acceptance of genetically modified foods depends on customer understanding and information (Stanton et al., 2021). Based on the arguments, the following hypotheses are developed:
H2a. There is a positive relationship between food innovation and attitude.
H2b. There is a positive relationship between food innovation and subjective norms.
H2c. There is a positive relationship between food innovation and perceived behaviour control.

Theory of Planned Behaviour
The theory of planned behaviour introduced by Ajzen (1991) posits that human behaviour is directly related to intention, where intention directs the behaviours. Even though the behaviour is not directly observed, studies have shown that intentions accurately predict behaviour (Ajzen, 1991). The theory of planned behaviour consists of three predictors: attitude, subjective norms, and perceived behavioural control. In consumer behaviour studies, the theory of planned behaviour is one of the main theories widely used as it predicts intentions and behaviour toward product purchases for single products to various products or brands (Ajzen, 2015; Han & Stoel, 2017).

Attitude Towards RTE Radical Food Innovation and Its Influence on Behavioural Intention: Attitude refers to the evaluative judgment towards an attitude object, which also differs in strength based on valence (Fishbein & Ajzen, 2010; Haddock & Maio, 2008). Hence, attitude is multifaceted, consisting of hedonic/affective and utilitarian/cognitive dimensions (Voss et al., 2003; Nystrand & Olsen, 2020). Attitude is the foundation for predicting human behaviour, reflecting one disposition toward a specific condition or action (Ajzen, 1991; Ajzen, 2015). While intention helps to predict consumers' future intentions, attitude also plays a significant role in consumers' decision-making, as attitude is the internal force that guides the intention and behaviour, which leads to quick and effortless decision-making (Sanbonmatsu & Fazio, 1990). Attitude plays a significant role in low-involvement decision-making as it allows consumers to make quick decisions; the importance of attitude in predicting purchase behaviour for ready-to-eat products is well documented in previous studies (Smigic et al., 2023; Thienhirun & Chung, 2018; Bae et al., 2010). In food consumption, attitude and intention are frequently most strongly correlated (McDermott et al., 2015).

Attitude is one of the most robust predictors in the theory of planned behaviour due to its temporal stability or persistence toward changes (Conner et al., 2022). Hence, consumers' attitudes toward certain products, whether it is positive or negative, will have a significant influence on intention; in fact, effectiveness is one of the critical elements in attitude theory as affective represents valence or degree of likeability towards certain products or brands (Yeap et al., 2020). RTE radical food innovation studies show that most consumers find it difficult to accept new types of food due to their strong attitude toward unfamiliar or unconventional food. Culture is one of the cornerstones in forming human attitudes, which are the main barrier to radical food innovation (Pascucci & Magistris, 2013). Based on the review of the literature, the hypotheses formulated as below:
H3. There is a positive relationship between attitude and behavioural intention.
H6a. Attitude mediates the relationship between food neophobia and behavioural intention.
H6d. Food innovation and attitude mediate the relationship between food neophobia and behavioural intention.
H6g. Attitude mediates the relationship between food innovation and behavioural intention.

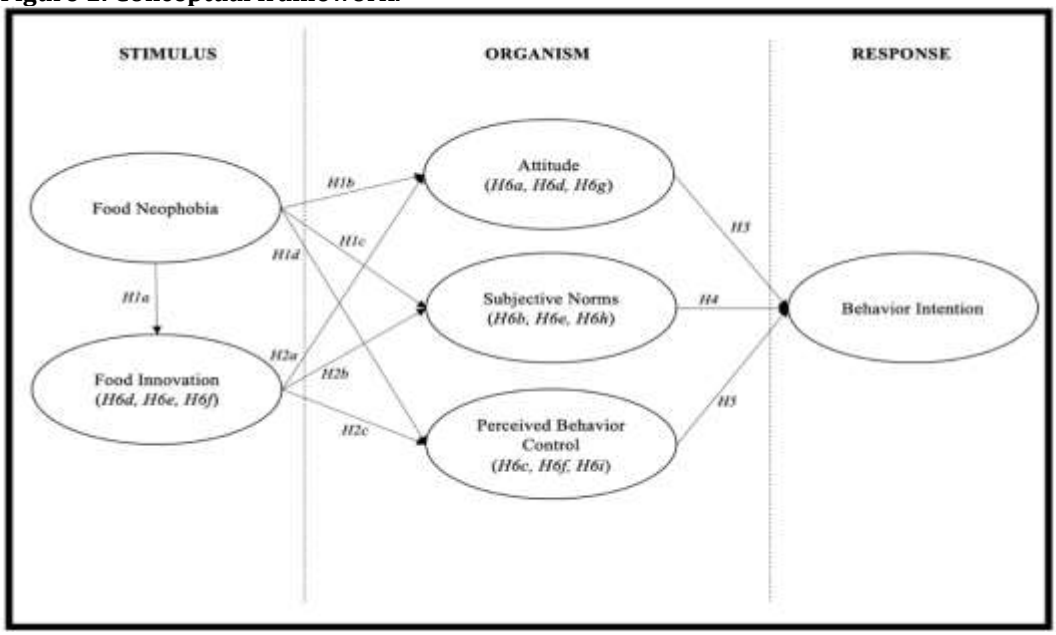
The Influence of Subjective Norms Towards RTE Radical Food Innovation and Behavioural Intention: Subjective norms refer to social pressure or the influence or pressure to perform certain behaviours (Ajzen, 1991). Subjective norms strongly influence consumers' behaviour because the decision-making also considers how others, including reference groups, will view one decision and whether it meets societal expectations (Al-Swidi et al., 2014). Overall, subjective norms do have a strong influence on consumers' decisions. For instance, a study by Hofstede and Bond (1984) shows that Asian countries, including Malaysia, fall under a collectivist culture where the opinions of those surrounding them are important to them. Although this study was conducted many years ago, the latest study on a similar subject has been carried out by Sumari et al. (2020), which still indicates that Malaysian culture is firmly collectivist. Therefore, the opinion of the reference group and those surrounding the consumers shape their final decision. Despite the patriarchal family system still being widely practised in Malaysia, with the increasing numbers of women entering the workforce, the changes in women's daily chores are becoming significant (Yuhaniz & Jusan, 2016). Changes can be seen through many studies on the acceptance of ready food in Malaysia, as it is now becoming a common consumption practice, especially among young adolescents (Basurra et al., 2021; Azman et al., 2023). While the home-cooked meal is expected in the patriarchal family system, societal changes have allowed for products such as this to be accepted by society due to their advantages, such as saving time and convenience in nature (Azman et al., 2023).

On the other hand, subjective norms' influence on radical food innovation was found to be challenging as subjective norms are related to the collective perception of society. Consuming unconventional is considered socially acceptable, which can lead to unfavourable perceptions and intentions toward radical food innovation (Fischer & Van Loo, 2021). Based on this argument, this study hypothesized that:
H4. There is a positive relationship between subjective norms and consumer behavioural intention.
H6b. Subjective norms mediate the relationship between food neophobia and behavioural intention.
H6e. Food innovation and subjective norms mediate the relationship between food neophobia and behavioural intention.
H6h. Subjective norms mediate the relationship between food innovation and behavioural intention.

The Influence of Perceived Behavioural Control Towards RTE Radical Food Innovation and Behavioural Intention: Perceived behavioural control is deciding whether to perform the behaviour based on the situation. While attitude provides the foundation for intention and subjective norms concerned about the view of others, perceived behavioural control is the actual factor determining whether the behaviour should be performed because humans still have free will (Ajzen, 1991). Hence, consumer behaviour is performed when the situation allows it; thus, consumers still have the power to control it even though the attitude and subjective norms favour performing the behaviour. For RTE food intention purchases, consumers facing time constraints and seeking convenience solutions will view these products as favourable (Azman et al., 2023). On the other hand, those who view RTE as unhealthy will only consider purchasing this product after time constraints (Alkerwi et al., 2015; Laska et al., 2015). Despite consumers consciously making the decision and having the power to do so, perceived behavioural control has a strong connection with attitude and subjective norms, and the strength of these variables will shape the final decision. Suppose the attitude and subjective norms do not favour radical food innovation. In that case, the chances are that they will not perform the behaviour even though the consumers can do so. From the review of literature, the following hypotheses are developed:
H5. There is a positive relationship between perceived behaviour control and consumer behavioural intention.
H6c. Perceived behaviour control mediates the relationship between food neophobia and behaviour intention.
H6f. Food innovation and perceived behaviour control mediate the relationship between food neophobia and behaviour intention.
H6i. Perceived behaviour control mediates the relationship between food innovation and behaviour intention.

Based on the literature review of the study variables, the researchers integrated the theory of planned behaviour and stimulus organism response theory and developed a conceptual framework, as shown in Figure 1. This study will investigate food neophobia and innovation's impact on Malaysian consumer attitudes, subjective norms, perceived behaviour control, and RTE food behaviour intention. Additionally, this study will investigate the impact of attitude, subjective norms, and perceived behaviour control on Malaysian consumer's RTE food behaviour intention. Lastly, this study will test the mediating effect of food innovation, attitude, subjective norms, and perceived behaviour control on the relationship between food neophobia and RTE food behaviour intention.

Figure 1: Conceptual framework.



3. Methodology

Sample and Procedures

The study aimed to investigate the impact of food neophobia and food innovation on consumer attitude,

subjective norms, and perceived behaviour control towards RTE foods' behaviour intention and to examine the mediation effects of food innovation, attitude, subjective norms, and perceived behaviour control. Using a quantitative convenience sampling approach, we developed an online questionnaire via Google Forms. We disseminated the survey link via social media platforms such as WhatsApp and Facebook. We sampled Malaysian consumers aged 18 years and above and asked them to forward the survey link to their networks. Respondents were assured of confidentiality and were informed about the study's purposes, data assurance, and anonymity. The respondents were asked for consent, and a screening question was included to ensure only eligible respondents (18 years and above) participated in the survey. An introduction to RTE food with some examples and the definition of each variable was given to ensure all respondents understood before proceeding with the questionnaire. The data collection period was from October 2023 to January 2024. Of the 323 responses, 321 were valid responses that were retained for analysis after eliminating non-eligible responses.

Measures

The current study adapted measures from previous studies. Food neophobia was assessed using five items developed by Pliner and Hobden (1992). Attitude (four items), subjective norms (four items), perceived behavioural control (three items), and behaviour intention (three items) were measured using scales developed by Verbeke and Vackier (2005). Food innovation was measured using six items from Goldsmith and Hofacker (1991). All the items were measured on a five-point Likert-type response scale with the level of agreement from (1) strongly disagree to (5) strongly agree. The demographic section consisted of some demographic profiling questions and consumer preferences about specific types of food. A bilingual-type questionnaire (English and Malay) was developed, and bilingual researchers performed back-to-back translation procedures for all the measures (Brislin, 1990) to ensure Malaysian consumers understood the items. A pilot study was conducted with a small sample to ensure no issue with the questionnaire. The pilot study findings did not lead to any changes in the scale items.

Data Analysis

The gathered data was coded using SPSS version 28 for preliminary and inferential statistics. Descriptive statistics were computed for each measure, such as means, standard deviations, coefficient alpha internal consistency for reliability, and intercorrelations between the constructs. Using Mplus version 8.3, a confirmatory factor analysis was conducted to determine the reliability and validity of the measures and to check for the fit of the proposed model (Muthen & Muthen, 2017). Then, we tested the conceptual model, hypothesizing the associations among the latent variables, for direct and indirect effects using structural equation modelling in Mplus. The output was assessed to determine the overall goodness of fit, the significance of the path coefficients, and the variance explained. We utilized the Harman one-factor test based on Podsakoff et al.'s (2012) recommendation for common method bias.

4. Results and Analysis

Demographic Information

Table 1 shows the characteristics of the respondents. Based on 321 respondents, the survey consisted of 51.2% females, followed by 48.8% males. Many of them were between 18 to 26 years old (61.3%, *n* = 196). Most respondents earned less than RM2,500 (US$534) a month (63.2%, *n* = 191). The data indicated that most respondents preferred plant-based food (Yes, 66%, *n* = 212) and genetically modified food (Yes, 68.5%, *n* = 220). Nonetheless, 83.2% of respondents did not prefer insect-based foods (No, *n* = 367) or 3D printed foods (No, 61.1%, *n* = 196). Regarding ethnic foods from different countries, an equal distribution of respondents preferred Japanese (Yes, 80.7%, *n* = 259) and Korean (Yes, 80.7%, *n* = 259), justifying the rise in popularity of Japanese and Korean restaurants in Malaysia. Meanwhile, about the same distribution of respondents preferred foods from the Philippines (Yes, 61.4%, *n* = 197) and Spanish (Yes, 60.4%, *n* = 194). About 248 respondents (77.3%) like organic foods. In terms of personalized foods, 65.7% like gluten-free food (*n* = 211), and 62.6% like allergen-free food (Yes, 62.6%, *n* = 201), while 55.8% of respondents dislike vegan food (*n* = 179).

Table 1: Respondents' demographics profiles.

Demographic	*Categories*	*n*	*%*
Gender	Male	156	48.8
	Female	164	51.2
Age group	18-26	196	61.3
	27-42	62	19.4
	43-58	58	18.1
	59 and above	4	1.3
Monthly income	Less than RM2,500 (US$534)	191	63.2
	Between RM2,501 to RM4,850 (US$534 to US$1,036)	60	19.9
	Between RM4,851 to RM10,970 (US$1,036 to US$2,343)	31	10.3
	More than RM10,971 (US$2,343)	20	6.6
Plant-based food	Yes	212	66.0
	No	109	34.0
Insect-based foods	Yes	54	16.8
	No	367	83.2
Cell-cultured meat	Yes	146	45.5
	No	175	54.5
3D printed foods	Yes	125	38.9
	No	196	61.1
Genetically modified foods	Yes	220	68.5
	No	101	31.5
Japanese food	Yes	259	80.7
	No	62	19.3
Korean food	Yes	259	80.7
	No	62	19.3
Philippine food	Yes	197	61.4
	No	124	38.6
Spanish food	Yes	194	60.4
	No	127	39.6
Organic foods	Yes	248	77.3
	No	73	22.7
Vegan	Yes	142	44.2
	No	179	55.8
Gluten-free	Yes	211	65.7
	No	110	34.3
Allergen-free	Yes	201	62.6
	No	120	37.4

Measurement Model Assessment

Table 2 presents the results of the constructs and their variables, including the reliability coefficients, composite reliability (CR), and average variance extracted (AVE). Reliability was assessed using Cronbach's alpha to check the internal consistency of the measures. The Cronbach's alpha values range from 0.788 to 0.936, above the suggested cut-off point of 0.60, which indicates internal consistency (Hair et al., 2010). Results for the measurement model indicated that all the variables had a composite reliability of > 0.60 (0.803 – 0.938), demonstrating the questionnaire's reliability. Fornell and Larcker (1981) recommended a CR value above 0.60 or more and AVE greater than 0.50. The AVE for each construct reported in Table II indicates an acceptable convergent validity (Bagozzi & Yi, 1988). The correlation of a construct with other constructs is less than the square root of its AVE, which successfully establishes the discriminant validity (Table 3). Confirmatory factor analysis revealed satisfactory goodness-of-fit indices and statistics. Chi-square test (x^2 = 819.612, df = 260, p < 0.001, x^2/df = 3.152); Root Mean Square Error of Approximation (RMSEA) = 0.082; CFI = 0.907, TLI = 0.893; Standardized Root Mean Square Residual (SRMR) = 0.066. All factor loadings of the constructs are significant (p < 0.001), ranging from 0.624 to 0.941, except for item four, under food neophobia, with a factor loading of 0.237. We followed Harman's (1976) approach for a single-factor test to evaluate common method variance among the variables. Results revealed that without rotation, four factors with eigenvalues of > 1 could be extracted; the cumulative explained and the percentage of variance was 44.751%, which is below 50%, indicating no common method bias. Hence, we concluded that common method bias would not be an issue for our analyses (Podsakoff et al., 2012).

Table 2: Factor loadings and reliability statistics.

Construct	Items	λ	SMC (λ2)	CR	AVE
Food neophobia (α = 0.801)	I like to try new RTE foods.	0.89	0.79	0.83	0.53
	I will try new RTE food available in the market.	0.88	0.77		
	I am constantly sampling new and different RTE foods.	0.80	0.64		
	I trust the RTE foods available in the market.	0.24	0.06		
	I like RTE foods from different countries.	0.62	0.39		
Food Innovation (α = 0.936)	I buy new, different, or innovative RTE foods before anyone I know.	0.78	0.61	0.94	0.72
	Generally, I am among the first in my circle of friends to buy new, different, or innovative RTE foods.	0.88	0.78		
	Compared to my friends, I purchase more new, different, or innovative RTE foods.	0.89	0.80		
	I always purchase new, different, or innovative RTE foods in shops and supermarkets.	0.83	0.69		
	I am the first among my friends who are familiar with brand-new, different, or innovative RTE foods.	0.88	0.78		
	I purchase new, different, or innovative RTE foods even if I have not tasted/experienced them beforehand.	0.80	0.64		
Attitude (α = 0.788)	RTE food is safe.	0.72	0.52	0.80	0.51
	RTE food is healthy.	0.78	0.61		
	RTE food is nutritious.	0.70	0.48		
	RTE food is tasty.	0.64	0.41		
Subjective norms (α = 0.875)	My family thinks I should eat/buy RTE food.	0.70	0.49	0.88	0.64
	My friends think I should eat/buy RTE food.	0.81	0.65		
	People around me often encourage me to eat/buy RTE food.	0.84	0.71		

	My relatives/siblings think I should eat/buy RTE food.	0.85	0.72		
Perceived behaviour control (α = 0.884)	I am knowledgeable about RTE food.	0.85	0.71	0.89	0.72
	I am well-informed about RTE food.	0.90	0.80		
	I am well-informed about the benefits offered by RTE food.	0.80	0.64		
Behaviour intention (α = 0.916)	The chances that I will purchase RTE foods are high.	0.92	0.84	0.92	0.79
	The chances that I will eat RTE foods are high.	0.94	0.89		
	My willingness to introduce RTE food to my daily consumption is high.	0.81	0.66		

Table 3: Fornell and Larcker's correlation matrix (criterion test).

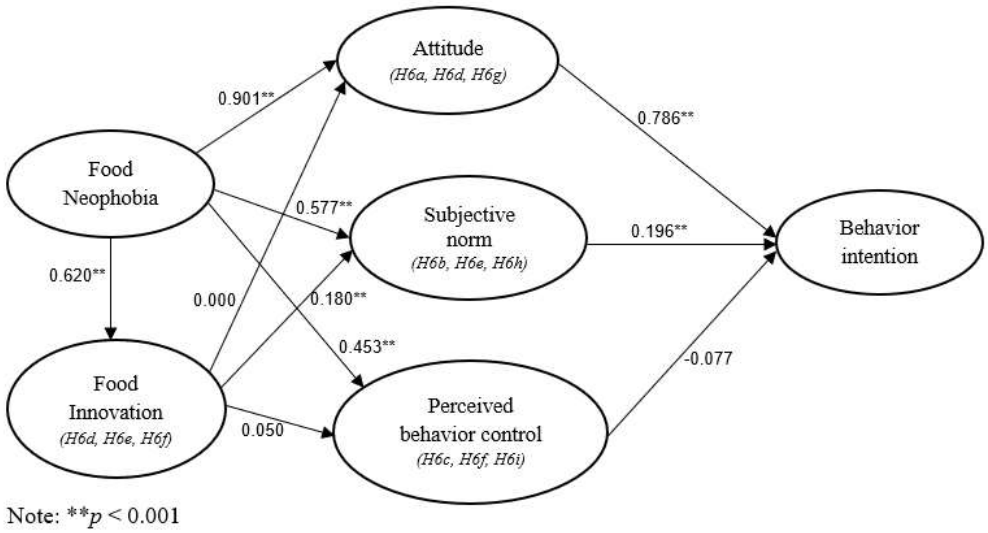
Variables	Food Neophobia	Food Innovation	Attitude	Subjective Norms	Perceived Behaviour Control	Behaviour Intention	Discriminant validity
Food Neophobia	(0.727)						Yes
Food Innovation	0.607**	(0.846)					Yes
Attitude	0.652**	0.441**	(0.711)				Yes
Subjective Norms	0.575**	0.506**	0.640**	(0.802)			Yes
Perceived Behaviour Control	0.367**	0.322**	0.457**	0.405**	(0.848)		Yes
Behaviour Intention	0.775**	0.562**	0.699**	0.643**	0.370**	(0.891)	Yes

Notes: Diagonals represent the square root of the AVE, whereas the off diagonals represent the correlations.
** Correlation is significant at the 0.01 level (2-tailed).

Structural Model Assessment

Results for the structural model revealed satisfactory goodness-of-fit indices and statistics. Chi-square test (x^2 = 919.649, df = 265, $p < 0.001$, x^2/df = 3.47); Root Mean Square Error of Approximation (RMSEA) = 0.088; CFI = 0.891, TLI = 0.877; Standardized Root Mean Square Residual (SRMR) = 0.073. The results of the hypothesis testing show that food neophobia has a positive effect on food innovation (β = 0.620, $p < 0.001$), attitude (β = 0.901, $p < 0.001$), subjective norms (β = 0.577, $p < 0.001$), and perceived behaviour control (β = 0.453, $p < 0.001$), thus supporting H1a – H1d. Nonetheless, when assessing the effect of food innovation, only the effect of food innovation on subjective norms is found to be significant (β = 0.180, $p < 0.05$), supporting H2b, while no significant results were found for food innovation on attitude (H2a) and on perceived behaviour control (H2c) ($p > 0.05$). Furthermore, this study found that attitude positively influenced behaviour intention (β = 0.786, $p < 0.001$) and subjective norms influenced behaviour intention (β = 0.196, $p < 0.05$); hence, H3 and H4 are supported. However, no significant result was obtained for perceived behaviour control on behaviour intention ($p > 0.05$). Figure 2 shows the structural model with direct effects.

Figure 2: A structural model with direct effects.



Mediation Analysis

Using Mplus software, we performed bias-corrected bootstrapping confidential interval analysis with 5,000 re-samplings to test the mediating effects of the proposed variables in Figure 1 (Hayes, 2018). This procedure generated a bootstrapped percentile and bias-corrected confidence intervals based on 5,000 samples at a 95% confidence interval (C.I.). Based on Preacher et al. (2007), the researchers reported the significance of the mediating effect by determining whether the estimated confidence interval included zero. Based on the results presented in Table 4, the findings exhibit four significant mediation effects out of nine proposed mediation effects. The findings show that attitude significantly mediates the relationship between food neophobia and behaviour intention (95% C.I. = 0.495, 0.888), which supported H6a. Additionally, subjective norms significantly mediate the relationship between food neophobia and behaviour intention (95% C.I. = 0.026, 0.237), supported by H6b. Interestingly, this study found that innovation and subjective norms significantly mediate the relationship between food neophobia and behaviour intention (95% C.I. = 0.002, 0.065), further supporting H6e. Subjective norms mediate the relationship between innovation and behaviour intention (95%, C.I. = 0.003, 0.102); thus, supported H6h. With the present model, approximately 81.2% of the variability in attitude (R^2 = 0.812), 49.4% of the variability in subjective norms (R^2 = 0.494), 23.6% of the variability in perceived behaviour control (R^2 = 0.236), 38.4% of the variability in food innovation (R^2 = 0.384), and 79% of the variability in behaviour intention (R^2 = 0.790), can be explained.

Table 4: Bootstrapping mediation results.

Hypothesis	Point estimate	Bootstrap 5000 times 95% confidence interval			
		Bias-corrected		Percentile	
		Lower	Upper	Lower	Upper
H6a. Food Neophobia → Attitude → Behaviour Intention	0.708	0.524	0.976	0.495	0.888
H6b. Food Neophobia → Subjective Norms → Behaviour Intention	0.113	0.028	0.257	0.026	0.237
H6c. Food Neophobia → Perceived Behaviour Control → Behaviour Intention	-0.035	-0.096	0.006	-0.089	0.006
H6d. Food Neophobia → Food Innovation → Attitude → Behaviour Intention	0.000	-0.072	0.065	-0.067	0.061
H6e. Food Neophobia → Food Innovation → Subjective Norms → Behaviour Intention	0.022	0.003	0.070	0.002	0.065

H6f. Food Neophobia → Food Innovation →Perceived Behaviour Control → Behaviour Intention	-0.002	-0.019	0.005	-0.017	0.004
H6g. Food Innovation → Attitude → Behaviour Intention	0.000	-0.124	0.119	-0.103	0.099
H6h. Food Innovation → Subjective Norms → Behaviour Intention	0.035	0.004	0.122	0.003	0.102
H6i. Food Innovation → Perceived Behaviour Control → Behaviour Intention	-0.004	-0.032	0.008	-0.027	0.007

Discussion

This study aimed to examine RTE food neophobia and food innovation on Malaysian consumers' attitudes, subjective norms, perceived behaviour control, and behaviour intention using two integrative theories: the theory of planned behaviour and stimulus organism response theory. Based on the direct associations tested, this study confirmed that food neophobia positively influenced food innovation, attitude, subjective norms, and perceived behaviour control. This finding is in tandem with previous literature on food neophobia, which determines consumer acceptance and rejection of new foods (Siddiqui et al., 2022). Food innovation acceptance may be influenced by consumer familiarity with the taste or health benefits (Dittmar, 1992), whereas rejection is influenced by unfavourable sensory qualities or fear of harmful health effects (Vidigal et al., 2014). Food neophobia among consumers might be influenced by foodborne illness cases (Mengistu et al., 2022) and improper hygiene and safety practices among RTE food suppliers (Cheesman et al., 2023). Despite that, RTE food safety and hygiene can be enhanced through quality packaging using nanotechnology to improve the shelf life and prevent contamination (Chinchkar et al., 2023). Moreover, this study found that food innovation positively influenced subjective norms, whereas attitude and subjective norms positively influenced consumer behavioural intention.

Findings from this study confirmed the role of attitude and subjective norms as mediators in influencing the associations between food neophobia and behaviour intention. Such findings corroborated Al-Swidi et al. (2014), who suggested that subjective norms strongly influence consumer behaviour because the decision-making process is also influenced by how others view one's decision and whether it meets society's expectations. Asian cultures, such as Malaysia, are still collectivist when they believe the opinions of those around them are essential (Sumari et al., 2020). Attitude is not only a significant predictor of behaviour intention but also acts as a mediator to food neophobia and behaviour intention. In other words, food neophobia can affect behavioural intention toward RTE food products through the mediator of consumer attitude (either positive or negative). Interestingly, this study reported both food innovation and subjective norms significantly mediate the relationship between food neophobia and behaviour intention. Also, this study found subjective norms mediate the relationship between food innovation and behaviour intention.

Furthermore, this study briefly profiles RTE food consumer segments in Malaysia. Based on the data, it is found that more Malaysians preferred plant-based food, genetically modified foods, and organic foods compared to insect-based foods, cell-cultured, and 3D printed foods. The plant-based food product is getting popular these days as consumers believe that plant-based alternatives are healthy, and some tried the plant-based food because of the food trend (Mahasuweerachai et al., 2023; Statista Research Department, 2022). Our findings on Malaysian consumer's preferred organic food are supported by a previous study in Malaysia by Abdullah et al. (2022). Nevertheless, the socio-economic background of the consumers might prohibit them from frequently consuming organic foods because these foods are typically sold at higher prices than non-organic food (Abdullah et al., 2022; Guine et al., 2022). Findings on organic food preference among Malaysians also aligned with a similar study conducted in China (Huo et al., 2023), Bangladesh (Kabir, 2023) as well as in Portugal and Turkey (Guine et al., 2022). Consumer knowledge of organic food health benefits could influence their food preference.

Regarding ethnicity, more Malaysians preferred Japanese and Korean food than Philippine and Spanish. Such findings aligned with the current situation in Malaysia, with many Japanese and Korean restaurants available, especially in major cities like Kuala Lumpur and Penang. Korean food is popular among young consumers (Wan & Yazdanifard, 2021). For personalized foods, more Malaysians preferred gluten- and allergen-free food to

vegan food. Nonetheless, Mohd Fauad et al. (2020) found higher carbohydrate and lower protein content in gluten-free products than in gluten-containing products; hence, they concluded that gluten-free products have no nutritional advantage but cost more than gluten-containing products. Interestingly, this study found that more people dislike vegan food, which contradicted Zainal Abidin et al. (2017), where nearly 60% of their respondents (non-vegetarian Chinese consumers in Malaysia) had a favourable view of vegetarian food. Vegetarian food is popular among the Chinese and Indian communities due to religious beliefs.

5. Implications and Conclusion

Theoretical Implications

From a theoretical perspective, the overall findings contributed to the RTE foods-related studies. This study represents the pioneering effort in combining the theory of planned behaviour and stimulus organism response theory to investigate the Malaysian consumer behaviour intention of RTE foods. Results from the integrated model provide a more comprehensive understanding of the impact of food neophobia and food innovation on consumer attitude, subjective norms, perceived behaviour control, and behaviour intention. Such findings also fill the gap in terms of model development for RTE-related research since previous studies utilized descriptive research design (Anusha et al., 2020; Basurra et al., 2020). Moreover, findings on the mediating effects of food innovation, attitude, subjective norms, and perceived behaviour control on the relationship between food neophobia and consumer behaviour intention contribute to the current literature in RTE foods-related and consumer behavioural studies; hence, justify the novel contribution of this study.

Managerial Implications

The study offers several practical implications. The growing demand for RTE foods is driven by convenience, ease of access, and various choices suitable for consumers, particularly those with a busy schedule. They do not need to spend much of their time preparing food. Therefore, food producers should promote RTE food products by increasing awareness and highlighting the benefits of consuming RTE foods. For instance, promoting the quick and convenient aspects of RTE foods and offering healthier RTE food options could diminish the negative perception toward RTE food, thus, increasing consumer acceptance. Moreover, this study sheds light on the untapped potential for RTE food producers to explore young consumers as the new markets for their products. Using young and well-known food influencers could increase the young consumers' intention to purchase RTE food products. Appropriate strategies are needed to avoid food neophobia toward new food trends in the market. For instance, food producers and marketers can positively present the food or use well-known influencers to showcase the food, so it looks delicious. Siddiqui et al. (2022) suggested that food neophobia can be reduced when consumers taste the new foods themselves. Additionally, food producers and marketers must understand consumer behaviour patterns, protect consumer health, and take preventive measures to prevent foodborne diseases from RTE foods.

Limitations and Future Research Recommendations

This study is constrained by several limitations, drawing attention to future research avenues. First, this empirical study uses cross-sectional and self-reported data to test the hypotheses; thus, there could be bias in the responses. Future research can further explore the associations between the variables using longitudinal studies. Longitudinal research could also provide more insights into RTE foods' behaviour patterns over time. Second, this study may lack generalizability due to its research context, as it focused exclusively on Malaysian consumers. For that reason, cross-country data can be beneficial in model comparisons to investigate the differences between Malaysia and other countries (e.g., Indonesia, Thailand) in terms of RTE foods behavioural intention. Future research could validate our findings with consumers from other countries. A comparison study between countries will benefit future researchers to investigate the similarities and differences of RTE food trends between countries. While no cross-country study has been found on RTE food to date, a study by Guine et al. (2022) on organic food trends and consumption among consumers from Portugal and Turkey found similar results in terms of consumption pattern, albeit consumers in Portugal have a higher value perception for organic products compared to Turkey.

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Bridging the Gap: Addressing Educator and Caregiver Challenges in Transitioning Students with ASD to Higher Education and TVET - A Scoping Review

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Abstract: Students with Autism Spectrum Disorder (ASD) often struggle with communication and social skills, necessitating significant support from family, caregivers, and educators. In Malaysia, while Special Education Needs (SEN) students are typically integrated into general education during their school years, their presence in tertiary education or TVET remains underrepresented. This scoping review aims to identify and understand the challenges general educators and caregivers face in facilitating the transition of ASD students from higher education to tertiary education and TVET. A comprehensive analysis of literature from Scopus, ProQuest, and Science Direct databases, focusing on studies published between 2013 and 2023, was conducted. The findings reveal mixed experiences, highlighting significant difficulties and areas for improvement. General educators and caregivers report numerous challenges, including inadequate training, insufficient resources, and a lack of tailored support systems, which collectively hinder the smooth transition of ASD students into higher educational settings. It suggests that targeted interventions and increased collaboration between educators and caregivers can lead to more positive outcomes. This study provides original insights into the specific needs and barriers faced by ASD students in Malaysia, offering valuable implications for policymakers, educators, and caregivers to create more inclusive and effective educational transitions. Future research on transitioning students with ASD to higher education and TVET should focus on longitudinal studies to track long-term outcomes, the development and evaluation of targeted intervention programs, and the role of assistive technologies in the transition process.

Keywords: *Autism spectrum disorder(ASD), General educators, Caregivers, Challenges, Transition, Tertiary Education, and Technical and Vocational Education Training (TVET)*

1. Introduction

Autism spectrum disorder (ASD) is a rapidly growing neurodevelopmental disorder, with an increasing number of students diagnosed each year. This rise has led to more students with ASD enrolling in tertiary education and TVET (Technical and Vocational Education and Training) programs (Virolainen et al., 2020). Despite this increase, many youths with ASD face significant challenges in completing post-secondary education due to their unique needs and difficulties. Educating these students requires specialized training for educators, as emphasized by the National Autism Society of Malaysia (NASOM), which notes that students with ASD present unique challenges compared to their typically developing peers.

The current situation regarding the education of students with ASD involves examining global and Malaysian support systems for People with Disabilities (PWD), including international frameworks such as the UN Convention on the Rights of Persons with Disabilities (UNCRPD) and Malaysia's National Education Blueprint 2013-2025 (Ministry of Education Malaysia, 2013). Government policies, such as the Persons with Disabilities Act 2008, are assessed for their effectiveness in addressing the needs of students with ASD (Ministry of Women, Family and Community Development Malaysia, 2021). Current research highlights the specific needs of ASD students, including gaps in resources and support services (Smith et al., 2023). The effectiveness of intervention programs, assistive technologies, and educator training is evaluated, alongside the impact of cultural and socioeconomic factors on these students' educational experiences (Chen et.al., 2023).

Moreover, integrating a creative entrepreneurship-based learning model may leverage entrepreneurial projects to enhance problem-solving, adaptability, and creativity, providing ASD students with real-world experience

and confidence. By incorporating social skills training and collaborative opportunities, this model addresses social integration and communication challenges, preparing ASD students for academic, vocational, and entrepreneurial success in a supportive environment (Handajani et al., 2022)

There is a pressing need to prioritize support for individuals with High-Functioning Autism Spectrum Disorder (HFASD) to facilitate their development and integration into higher education settings. This review paper examines the challenges general educators and caregivers face in supporting the transition of ASD students into tertiary education and TVET. Transition experiences have a long-term impact on the social and academic performance of individuals with ASD, influencing their success in post-secondary education (Stack et al., 2020).

Recent studies have highlighted the complexities and growing concerns surrounding the education and support of individuals with ASD in Malaysian society (Ilias et al., 2019). Further, there has been a notable rise in the enrolment of students with ASD in tertiary education and Technical and Vocational Education and Training (TVET) programs across Malaysia. The Individuals with Disabilities Education Act (IDEA) in the United States was established to ensure greater accessibility and adequate educational achievements for individuals with special needs (Al Jaffal, 2022). However, youths with ASD often struggle with communication, social skills deficits, and repetitive behaviors, leading to less support due to societal misunderstandings about the disorder. General educators often display less positive attitudes and lower levels of knowledge compared to special education educators (Segall & Campbell, 2012). This is due to a lack of training and understanding negatively impacts their ability to support ASD students effectively in inclusive education settings (Messemer, 2010).

To support students with ASD in transitioning into tertiary education or TVET, it is crucial for general educators and caregivers to fully understand the disorder. ASD is associated with a wide range of behaviors and characteristics, necessitating varying levels of support. The demands of students with ASD, including distinctive traits and disruptive behaviors, pose significant challenges for educators, particularly when resources are limited (Gómez-marí et al., 2022).

Institutional support and resources are often inadequate, further complicating the challenges faced by general educators and caregivers. Proper training and clear policies are essential for effectively supporting students with ASD. Without specialized training, educators may fail to provide the necessary support, hindering the academic and social development of these students (Talib & Paulson, 2015). Additionally, societal stigmatization and discrimination exacerbate these challenges, highlighting the need for comprehensive education on ASD in teacher training programs (Majin et al., 2017).

ASD is characterized by pervasive developmental disorders affecting social capabilities, fixations on specific topics, and repetitive behaviors (Segall, 2008). Students with ASD require different levels of support depending on the severity of their disorder. Caregivers, who often understand their children's behavior better than educators, play a crucial role in this support system. However, the transition process into tertiary education or TVET can be challenging for caregivers, resulting in inadequate support.

The increasing prevalence of students with ASD in post-secondary institutions necessitates the development of strategies to meet their needs (Gardner & Iarocci, 2013). Educators must be knowledgeable about ASD, and caregivers must be prepared to assist educators in providing the necessary support for a smooth transition. Therefore, this review systematically explores the challenges faced by general educators and caregivers in supporting ASD students transitioning to higher education and TVET.

3. Methodology

The review was carried out following the framework outlined by Arksey and O'Malley (2005). The six stages are outlined below.

Study design and protocol: A scoping review method was employed, as this method can be used to identify gaps in existing literature (Arksey & O'Malley, 2005). A systematic review was based on several criteria which include record identification on the database, screening, assessing eligibility of article and data extraction for analysis. Through the synthesisation of a wide range of literature and articles, a systematic review will help to

determine the challenges faced by general educators and caregivers in supporting ASD students in their transition into tertiary education and TVET. The eligibility criteria will only focus on papers published in English journal articles and review papers were included, in line with other eligibility of accessing papers that focus only on general educators, caregivers, autism spectrum disorder (ASD), transition, tertiary education and technical and vocational education training.

Formulation of research question: The research starts by describing the rationale for the review according to the context of the research. Initial construct a statement of the question that highlights 3 important elements in (PCC) which are population, concept and context. Additionally, a research question was formulated - What are the challenges faced by general educators and caregivers in supporting students with ASD that transition into tertiary education and TVET?

Systematic searching strategies: In conducting systematic searching techniques, three stages of identification, screening, and eligibility were done to ensure the study conducted was non-biased and most importantly followed the scoping review process for a broad search outcome.

Identification: The initial stage of this systematic search is identification, which was done to identify the appropriate keyword to be used for the open database search. Based on the research question developed, several keywords were identified for database searching. The keywords for this review are "challenges", "general educators", "caregivers", "transition", "autism spectrum disorder (ASD)"AND "tertiary education", as well as other related keywords such as "high functioning autism spectrum disorder (HFASD)", "autism", "ASD", "general education", "university", "parents", "general educator", AND "technical and vocational education training (TVET)". The systematic review data identification was done on 13th July 2023 by selecting three open database sources which are Scopus, ProQuest, and Science Direct. The advanced search function in each open database helps to narrow down the literature to manageable numbers to be identified. This step has yielded (N= 1,810) prospective articles for the screening process.

Screening: The screening stage for the systematic search strategy is critical as it distinguishes between potential and non-potential articles that are appropriate for this review study. The screening process is a selection of articles by utilizing the screening function in the database search function. The early screening process was conducted by strictly observing the article keywords, title and abstract (Pahlevan-Sharif et al., 2019). This review article focuses on the challenges that general educators and caregivers encounter in facilitating ASD students' transition to postsecondary education and TVET. Because some of the papers were irrelevant to the scoping review, only the most relevant prior papers were retrieved. However, N=265 prospective papers are acquired and chosen for the eligibility process.

Eligibility: In the third step, which concerns eligibility, the selected 265 papers were re-examined to guarantee adherence to the inclusion and exclusion criteria. The abstracts were examined at this stage to establish the papers' eligibility. If the suitability of the article was not clearly stated in the title, the entire content was skimmed. As a result, 235 publications were removed as the title, abstract and content did not meet the context of the scoping review and research question. As a result, only N=30 papers articles were ultimately selected for the final qualitative synthesis.

Table 1: Eligibility Criteria

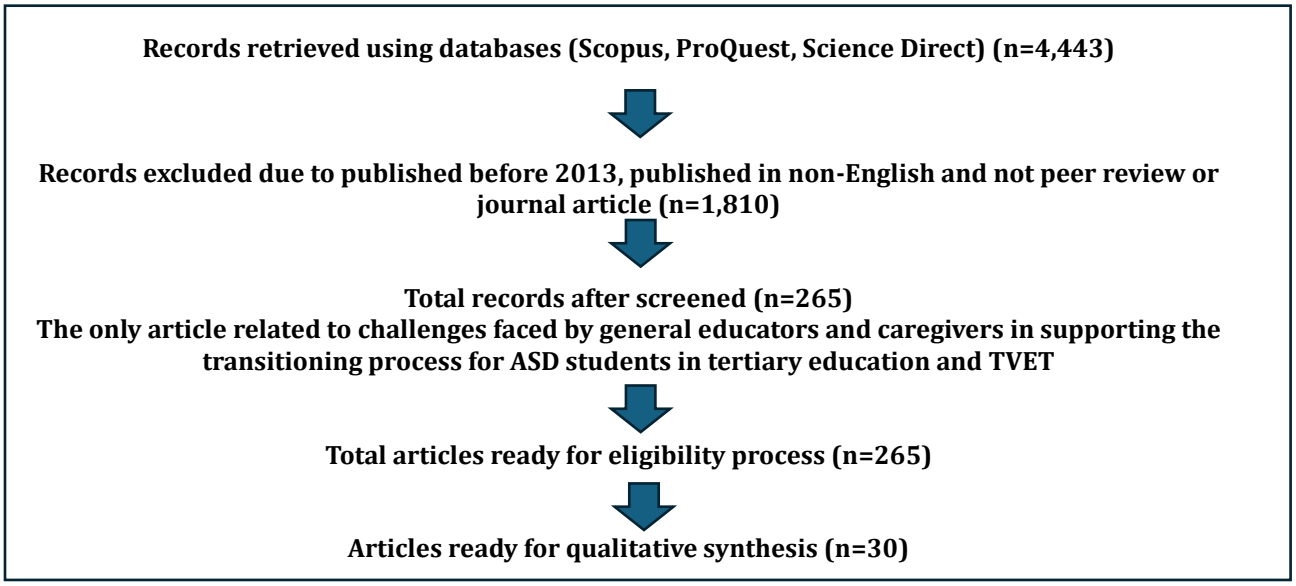
Criteria	Inclusion	Exclusion
Timeline	2013 until 2023	Records below 2013
Document Type	Article journal Empirical study and peer review article	Business articles, letters, editorials, conference reviews, notes, and book
Language	English	Other than English
Region	International	None
Choice of Article	Selection of article based on keyword search in the database	Article other than the keyword searching
Search option	Emerald Insight, Science Direct, and Google Scholar	Other than these three databases.

Keywords	"challenges", "general educators", "caregivers", "transition", "autism spectrum disorder (ASD)" "tertiary education" "high functioning autism spectrum disorder (HFASD)", "autism", "ASD", "general education", "university", "parents", "general educator", AND "technical and vocational education training (TVET)"	Keywords that are not suggested by
Search for relevance	Title and abstract of each article	All the unclear articles' title and abstract
Final selection	The only article related to challenges faced by general educators and caregivers in supporting the transitioning process for ASD students in tertiary education and TVET	Articles which are not providing the information related to the topic.

4. Results and Discussion

Based on data charting (Figure 1), N=30 research articles were eligible for selection and analysis. Data portray research article publication from 2013 to 2023. The primary research in the similar research context is diverse with quantitative and qualitative research design. General findings noted that students with ASD face challenges relating to people's beliefs concerning their intellectual deficit, neglect of their caregivers, financial difficulty and stigmatization from their surroundings. The majority of parents (24 out of 29 or 83%) expressed concerns about their child's social relationships. This is not unexpected given that social skill challenges are a major component of ASD. Parental stress is mentioned due to ASD student's transition to the next level of education. Parent struggle with anxiety and doubts throughout the process of their autistic children's transitions.

Figure 1: Systematic Searching Strategies for Scoping Review



The findings of this scoping review reveal significant challenges faced by general educators and caregivers in supporting the transition process for ASD students into tertiary education and TVET. These challenges can be addressed and mitigated by understanding several key issues.

Firstly, students with ASD encounter difficulties stemming from societal beliefs about their intellectual capabilities, which often leads to stigmatization and neglect from caregivers and peers. This societal perception can hinder their ability to thrive in educational settings. Misconceptions and stereotypes about ASD often lead to assumptions of intellectual deficits. The general public and even some educators may wrongly perceive all individuals with ASD as having uniformly low cognitive abilities. This misconception fails to recognize the

spectrum's wide variability in intellectual functioning (Douglas & Sedgewick, (2024)). The variability in intellectual abilities within the ASD spectrum is substantial. While some individuals may have significant challenges in academic settings, others demonstrate exceptional skills in specific domains, such as mathematics, music, or visual arts. Recognizing and supporting this diversity is crucial for providing tailored educational interventions. However, the educational system often struggles to accommodate this variability adequately. Standardized assessments and rigid curriculum structures may not capture the true potential of students with ASD, leading to underestimation of their capabilities and inappropriate educational placements. Organizations like Autism Speaks emphasize the importance of personalized education plans that consider individual strengths and challenges.

Parents and families must provide a firm foundation for autistic students to feel safer and at ease engaging in school activities. Based on student replies, (Davis et al., 2021) underlined the relevance of parental and family ties for success throughout the transition to college and during enrolment. (Packer et al., 2022)discovered a similar conclusion on parental engagement playing an important role in aiding children's growth throughout their transition to a new setting. Similarly, (Sefotho & Onyishi, 2020) observed that students' responses to signs of stress and anxiety are due to a lack of family members or close friends.

Caregivers of individuals with ASD often experience profound emotional and physical stress due to the demands of caregiving. The relentless nature of managing behavioral challenges, navigating complex healthcare systems, and advocating for educational and social support can lead to caregiver burnout and compromised mental health. Research, such as studies cited by the Autism Society, underscores the higher prevalence of stress-related disorders among caregivers compared to the general population. The neglect of caregivers' needs can perpetuate a cycle of strain and diminish their capacity to provide effective support to individuals with ASD.

Caregiver support systems play a crucial role in facilitating the transition of students with ASD into tertiary education or TVET settings, where they encounter unfamiliar environments (Wang, Liu & Zhang.,2022). These systems encompass emotional and psychological support, academic and non-academic assistance, and environmental adjustments, all aimed at helping students settle and succeed in new educational contexts. ASD students, often marginalized and misunderstood, face significant challenges such as prejudice and stereotypes, hindering their academic focus and growth (Davis, Watts & Lopez, 2021). Establishing inclusive learning environments is paramount, ensuring that these students can effectively communicate, learn, and interact with peers, tailored to their specific educational needs and capabilities (Maysela Azzahra et al., 2022). This personalized approach not only supports academic development but also fosters social and emotional growth through interactions with peers. During transitions to higher education, ASD students commonly experience feelings of isolation, anxiety, and difficulty in social engagement, necessitating strong support networks from trusted individuals to maintain their mental well-being (Davis et al., 2021). Studies emphasize the pivotal role of parental involvement, counseling, teacher support, and peer assistance in ensuring successful transitions and ongoing academic and social integration (Packer et al., 2022; Sefotho & Onyishi, 2020). These findings underscore the critical need for robust caregiver support systems to enhance the educational journey and overall well-being of ASD students navigating new educational landscapes.

The financial strain on caregivers of individuals with ASD is substantial. Costs associated with specialized therapies, medical care, and educational support often exceed typical household budgets. Moreover, the caregiving responsibilities may limit caregivers' ability to maintain full-time employment or pursue career advancements, leading to economic insecurity. The neglect of financial support mechanisms and workplace accommodations exacerbates these challenges. Policy reforms are essential to ensure equitable access to financial assistance, respite care services, and employment protections for caregivers of individuals with ASD. Additionally, financial difficulties and a lack of understanding of their surroundings exacerbate the challenges faced by these students. Parents have also expressed concerns about their children's poor social relationships, which can impact their overall educational experience (Davis et al., 2021).

Furthermore, the review found that many caregivers experience stress and anxiety during the transition process. This stress is often due to a lack of understanding of institutional policies and poor relationships with general educators. Effective collaboration and communication between caregivers and educators are crucial to providing the necessary support for ASD students (White et al., 2017). Caregivers also reported feeling

overwhelmed by the need to advocate continuously for their children's needs and support (Sefotho & Onyishi, 2020). Furthermore, the emotional and psychological strain on caregivers during the transition process is well-documented in the literature. Davis et al. (2021) and White et al. (2017) both note that students with ASD often struggle with loneliness, anxiety, and peer interactions, necessitating substantial support from caregivers. The review corroborates these findings, highlighting the significant stress and anxiety experienced by caregivers, often due to a lack of understanding of institutional policies and poor relationships with general educators.

Educators have an important role in delivering adequate education for their pupils, whether they have special needs or are typically developing. However, not all general educators have positive attitudes towards the inclusion of students with ASD in general education settings, some have neutral and negative attitudes (Mahzan & Md Nor, 2023). General and special education educators must be properly equipped with appropriate information, a good attitude, and extensive experience to safeguard kids with ASD from being bullied by their typically developing peers who may be unaware of the disease (Dağlı Gökbulut, Gökbulut, & Yeniasır, .,2024). In examining the critical role of educators in providing effective education for students with Autism Spectrum Disorder (ASD), several key studies underscore significant challenges and necessary improvements. Ballantyne et al. (2021) highlight a pervasive issue: many general educators lack the expertise needed to effectively manage and educate students with ASD, which significantly hinders their ability to provide adequate support. This finding underscores the importance of targeted training and professional development initiatives aimed at equipping educators with the necessary skills and knowledge. Segall (2008) contributes further by revealing that educators with limited experience in ASD education often possess insufficient knowledge about the disorder, thereby impeding their effectiveness in inclusive classroom settings. Simó-Pinatella et al. (2023) emphasize that inadequate knowledge remains a significant barrier to providing inclusive education, emphasizing the need for comprehensive training programs tailored to address specific educational needs related to ASD. Ismail et al. (2018) delve into the challenges faced by Technical and Vocational Education and Training (TVET) educators, citing issues such as inadequate training and lack of industry experience, which hinder their ability to effectively prepare students with ASD for the workforce. Moreover, Talib and Paulson (2015) highlight the diverse and individualized support needs of ASD students, advocating for personalized educational approaches that accommodate varying learning styles and behavioral patterns. Together, these studies underscore the complex landscape of ASD education, pointing to critical need for ongoing professional development and tailored support strategies to enhance educational outcomes for students with ASD.

Consequently, general educators are found to be incapable of providing successful inclusion for students with ASD due to their lack of knowledge and understanding of the disorders. A study by (Simó-Pinatella et al., 2023) stated that insufficient knowledge is one of the barriers to providing inclusive education. Knowledge relating to ASD is very crucial for educators as the students might need substantial support to fulfill their needs. Students with ASD are diagnosed with brain impairment which causes them to have difficulty in two main areas which are social communication and interaction and repetitive and recurring behaviors.

Besides, many past studies have also highlighted the challenges and lack of quality among TVET educators, mentioning that they lack training and industrial experience. For instance, a study by (Ismail et al., 2018) stated that according to their interviews with lecturers, instructors, and industrial employees, the problems with incompetent educators stem from their teaching techniques, poor classroom management, a lack of industry experience, a lack of competence skills, and a lack of passion in teaching the given topics. This issue is very crucial to investigate as it will affect the performance of students in TVET programs to produce a highly skilled workforce. Educators' training is particularly important to ensure students maximize their potential in preparing them for the industrial world. Besides, well-trained educators will help in providing inclusive education for special needs students in TVET programs.

Besides, to properly accommodate these students in vocational streams, educators are needed to be knowledgeable about the disorder and each of their student's behaviors. The prior study mentioned that despite the fact all autistic students have common underlying impairments, no two are exactly alike (Talib & Paulson, 2015). For example, one of the students with ASD might have intellectual ability but also have speech and language impairments which make them socially communicate and interact with people while others might suffer emotional functioning impairment or display restricted interest in certain areas. Students with ASD who

demonstrate restricted behavior, or repetition of behaviors might have a hard time shifting from normal situations to different situations due to their rigid routines in conjunction with having a fixation on interests.

Besides that, Integrating the principles of Education 4.0 with the challenges in transitioning ASD students to higher education and TVET involves leveraging personalized learning, collaborative tools, advanced technologies, and lifelong skill development. By utilizing adaptive learning platforms, virtual reality for social skills practice, user-friendly assistive technologies, and continuous education pathways, educators and caregivers can better address the individualized needs of ASD students. Professional development for educators, tailored curriculum design, robust support systems, and advocacy for supportive policies are essential steps to create an inclusive, effective educational environment that prepares ASD students for future success (Kibat et al., 2021).

In conclusion, addressing these challenges requires a multifaceted approach that includes increasing awareness and understanding of ASD among general educators, fostering strong relationships between caregivers and educators, and providing comprehensive support systems that encompass emotional, psychological, academic, and environmental assistance (Maysela Azzahra et al., 2022). By tackling these issues, we can create a more inclusive and supportive educational environment for ASD students.

5. Conclusion

The scoping review provides an opportunity in the knowledge gap related to such context of challenges faced by general educators and caregivers in supporting the transitioning process for ASD students in tertiary education and TVET. A smooth transitioning process could be achieved by ASD students which would also help them to be in an inclusive education setting and achieve good academic performance that led them to have future careers like their typical development peers. However, the attitude of some general educators needs to be observed as they also play a significant role in ensuring ASD student's transition process can be achieved. Important note depicts that general educators and caregivers do influence the support given to students with ASD in transitioning into tertiary education and TVET. Although some issues related to general educators' experience, training, and knowledge, as well as their impacts on supporting students with ASD, emerged as significant, exploration to gain a better understanding relating to this study. Different views between scholars on whether general educators or caregivers provide a better support system for ASD students in transition, cooperation between both parties still plays a significant role in providing a better future for ASD students.

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The Impact of Environmental Knowledge on Food Waste Reduction and Sustainability Practices among Hospitality Students in Malaysia

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Abstract: Environmental sustainability and food waste reduction are among the critical challenges facing the hospitality industry worldwide. This study was conducted to identify the impact of environmental knowledge on food waste reduction and sustainability practices among hospitality students in Malaysia. A quantitative approach was used, and we surveyed 94 hospitality students from various programs at UiTM Penang. The online questionnaire was conducted and analyzed using Pearson correlation and multiple regression analysis. There is a significant positive correlation between environmental knowledge, food waste behaviors and sustainability-related behaviors. The strongest relationship was found between food waste behaviors and sustainability-related behaviors, suggesting that environmental knowledge and food waste practices are closely related to broader sustainability behaviors in hospitality education. The study contributes to the understanding of how environmental education can shape the future of hospitality professional practice, offering valuable insights for the development of industry curricula and training programs aimed at promoting sustainable practices in the hospitality sector.

Keywords: *Environmental Knowledge, Food Waste, Sustainability, Hospitality Education*

1. Introduction

The hospitality industry is currently at a critical phase, facing the challenges of environmental sustainability and resource management. Of particular concern within the industry is the industry's significant contribution to food waste, a problem that causes significant economic losses but also exacerbates environmental degradation. This issue has received growing attention from researchers, policymakers, and industry leaders, as evidenced by a growing body of literature on sustainable practices in hospitality (Gössling et al., 2015; Filimonau & De Coteau, 2019).

In Malaysia, there is a very urgent need to address the issue of food waste in the particularly bad hospitality sector. Bernama (2021) has reported that the Solid Waste Management and Public Cleansing Corporation (SWCorp) found that Malaysians generate about 16,687.5 tonnes of food waste every day, a figure that has seen an alarming increase in recent years. The hospitality industry, including hotels and restaurants, is a significant contributor to this waste, underlining the need for targeted interventions and research in the sector.

The United Nations outlined that the fundamental SDGs agenda is comprised of 17 ambitious sustainable development goals (SDGs), which include 169 targets and 231 different indicators (Russell-Bennett et al., 2024). Sustainable Development Goal 12 (SDG12) is particularly pertinent as it encompasses various avenues essential for promoting responsible consumption and production. The global material footprint is increasing at a rate that surpasses both population increase and economic productivity. SDG12 specifically tackled urgent concerns related to material footprints, the comparison between disposal and recycling rates, waste reduction, waste management, food loss in the supply chain, and food waste management. Additionally, SDG12 is intricately linked to SDG4 (Quality Education) due to the pivotal role that education plays. This study underscores the power of education in enhancing awareness and comprehension of sustainability, and ways action can be taken in our respective fields to combat food waste.

It has been noted that food waste, despite its inclusion in the agendas of numerous nations and organizations poses a significant challenge that hinders the attainment of certain sustainable development goals (SDGs). Food waste (FW) is well-known for its role in causing many types of pollution that have negative impacts on public health and social justice, as well as leading to economic losses (Leal Filho et al., 2023). Universities, comparable

to mini-cities or large enterprises, are locations where FW (food waste) is a significant challenge (Lazell, 2016). This indicates the necessity for further investigation to gain a more comprehensive understanding of this significant matter and to evaluate the potential shifts in attitudes and behavior among young individuals following their exposure to information regarding food waste and its consequences (Kaur et al., 2020; Principato et al., 2015). Students, particularly university students are the future stakeholders of the world and hence their behavior towards the environment dictates their actions about environmental issues like food waste.

There is a significant gap in understanding how these factors specifically influence food waste reduction behavior among hospitality students in Malaysia, although previous studies have explored environmental knowledge and sustainable practices in various contexts. This study was conducted to address this gap by investigating the relationship between environmental knowledge, food waste behaviors, and broader sustainability practices among hospitality students.

The objectives of this study are:

To examine the level of environmental knowledge among hospitality students in Malaysia.
To assess the relationship between environmental knowledge and food waste reduction behaviors.
To investigate the link between food waste behaviors and broader sustainability practices.
To provide recommendations for enhancing sustainability education in hospitality programs.

Therefore, the objectives of this study can contribute to the growing body of literature on sustainability in hospitality education and offer practical insights that can be applied to the development of curricula and industry training programs.

2. Literature Review

Environmental Knowledge

Environmental knowledge refers to the information individuals have on the state of the environment, climate change, environmental views, and the ecological effects of consumption and production and sustainability practices (Pagiaslis and Krontalis, 2014). In recent years, environmental knowledge has been found to have an indirect impact on individuals' intention to participate in conservation efforts; it can thus be regarded as being important in models that aim at predicting individuals' environmental behavior (Gkargkavouzi et al., 2019; Paço and Lavrador, 2017).

Recent studies show that knowledge could indirectly result in behavioral change by affecting the intention to engage in conservation efforts and could hence be used to predict behavioral intention and environmental behavior (Gkargkavouzi et al., 2019). This finding suggests that knowledge serves as a foundation for developing pro-environmental attitudes and behaviors. Similar findings on the significant impact of environmental knowledge on behavior have been presented by Otto and Pensini (2017) and Paço and Lavrador (2017). The development of environmental concerns depends on what people learn about environmental issues rather than vice versa. Moreover, even though environmental knowledge is responsible for inducing environmental concern, people could be interested in learning more about environmental issues after showing initial environmental concern (Saari et. al, 2021). In the context of hospitality education, Barr (2007) found that students with a deep understanding and knowledge of the issue of food waste are more expected to refrain from wasting food. These findings emphasize the impending impact of integrating environmental education into hospitality curricula to foster more sustainable practices among future industry professionals.

Food Wastage Behavior

The issue of food waste is one of the most critical issues in the hospitality industry with very significant economic, environmental and social implications. Every year third of the food produced globally is either lost or wasted along the food supply chain (FSC) causing significant economic, environmental, and social damage (Principato et. al, 2021). Food wastage behavior is significantly related to one's understanding of the issue as stated by Barr (2007) where those who possess a strong understanding of the issues associated with food waste are more inclined to refrain from wasting food. Based on this premise, we anticipate a favorable impact on the

decrease of food waste among those who possess a comprehensive understanding of the food waste issue, including its spread and measurement.

However, Peschel et al. (206) found that, while less knowledge might make one less likely to make an environmentally friendly choice, better knowledge might not make one significantly more likely to choose it either as people tend to balance between factors such as price and the environment. Household food consumption has been regarded as a key point in food waste generation and significant efforts by e.g., the Food and Agricultural Organization of the United Nations and the European Commission have been directed to assist consumers in reducing food waste (Toma et. al 2020). Another factor affecting food waste behavior is date labeling as a report in their study -date labeling influences the selection of food at the point of purchase and its subsequent consumption and most likely has a strong effect on consumers' decision of what to eat or throw out (Toma et. al, 2020).

Whereas, in the context of higher education, Lazell (2016) identified universities as significant generators of food waste, comparable to mini-cities or large enterprises. This study highlights the importance of addressing food waste behaviors among students, particularly those in hospitality programs who will go on to influence industry practices. Kaur et al. (2021) conducted a systematic literature review of food waste in educational institutions, emphasizing the need for more research on interventions to reduce food waste in these settings. The findings of their study have underlined the potential of education to play an important role in shaping sustainable food consumption behaviors.

Sustainability Related Behavior

Sustainability-related behaviors encompass a range of actions aimed at reducing the negative impact on the environment and leading to ecological balance in the long term. In the context of hospitality, these behaviors can include energy conservation, water management, and responsible sourcing practices. According to Han (2021), the essential drivers of environmentally sustainable consumer behavior include (green image, pro-environmental behavior in everyday life, environmental knowledge, green product attachment, descriptive social norm, anticipated pride and guilt, environmental corporate social responsibility, perceived effectiveness, connectedness to nature, and green value). However, this study focuses on sustainable consumption behavior since the samples are hospitality students who undertake hands-on training in the kitchen, barista lab and mock restaurant.

Sustainable consumption behavior is often associated with pro-environmental consumption behavior, which is an aspect of individuals' behavior that helps reduce their negative impact on the environment (Dhandra, 2019). Pro-environmental behavior can be defined as behavior that causes minimal harm or is beneficial to the environment (Steg and Vlek, 2009). In consumer research, the theory of planned behavior (TPB; Ajzen, 1991), has been predominant in research on sustainable consumer behavior, for example, when predicting the behavior of individuals in connection with the disposal of household waste (Ari and Yilmaz, 2016; Mannetti et al., 2004), water conservation, and green consumerism (Turaga et al., 2010). The TPB (Ajzen, 1991) is often used to measure pro-environmental behavioral intention and actual behavior. Many studies using the TPB indicate that attitudes, subjective norms, and behavioral control can strongly influence consumers' purchasing intentions (Yadav and Pathak, 2017). In addition, knowledge and awareness of environmental issues have been highlighted as having an important influence on pro-environmental behavior (Eom et al., 2016; Klockner, 2013; Tam and Chan, 2018). Saari et al. (2021) have developed a theoretical model that studies sustainable consumption behavior, by incorporating various practices related to individuals' efforts to behave more sustainably. Their models include actions such as buying pesticide-free products, reducing energy consumption, and avoiding products that are not environmentally friendly. This holistic approach to sustainability behavior is very much in line with our study of hospitality students, who may face these issues in their future professional roles.

Interconnections and Synthesis

Past literature discloses a robust interconnection between environmental knowledge, food waste behavior, and broader sustainability practices. Environmental knowledge acts as a foundation, to understand the effects of an individual's actions. As such, it can influence certain behaviors such as food waste reduction, as well as broader sustainability practices. However, the relationship between knowledge and behavior does not occur

directly. Factors such as attitudes, social norms, and behavioral control play a very important role in translating knowledge into action. These issues have highlighted the need for a multifaceted approach to promote sustainable practices in hospitality education and the industry in general. Recent studies (e.g., Principato et al., 2021; Han, 2021) have emphasized the need for a compressive approach that addresses both specific behaviors (such as food waste reduction) and broader sustainability practices. This holistic perspective is in line with the purpose of the study we conducted to examine the relationship between environmental knowledge, food waste behaviors, and sustainability-related behaviors among hospitality students. Thus, while there is a wide range of literature available that can provide useful insights into the individual components of our study, there are still gaps that exist in understanding how these factors interact specifically in the context of hospitality education in Malaysia. Our research was conducted to address this gap, while at the same time contributing to a more comprehensive understanding of how environmental knowledge shapes future hospitality professional practice related to food waste and sustainability.

3. Methodology

This study uses a quantitative approach to examine the relationship between environmental knowledge, food waste behavior, and sustainability-related behaviors among hospitality students in Malaysia. The target population for this study consists of hospitality students at UiTM Penang. We have used a combination of two techniques, namely the convenience and the snowball sampling technique to reach the participants. To collect data for this study, we leveraged modern communication channels that are familiar to our target demographic. The digital survey was created using Google Forms, a user-friendly platform that allows for easy access and completion by participants. We initially shared survey links through various student WhatsApp groups, leveraging existing social networks in the hospitality program. Recognizing the potential for wider reach, we also encourage participants to present surveys to their peers, using a snowball sampling approach. This method has proven to be effective in growing our group of participants beyond our immediate contacts, as students share links with classmates and friends in relevant programs. The combination of direct distribution and peer-to-peer sharing helps us cast a wider network, capturing multiple perspectives from within the hospitality student community. After data cleaning, our final sample consisted of 94 valid responses.

Measurement Instrument:
The questionnaire for this study consisted of four parts. Among them is demographic information: Including gender, age, year of study, current level of study and type of program. Then, the Environmental Knowledge scale: Adapted from Kaiser and Fuhrer (2003), this scale includes 10 items that measure students' understanding of environmental issues, especially those related to food waste and sustainability in the hospitality industry. Responses were measured on a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). Next, the Food Waste Behavior Scale: Item is based on Principato et al. (2015), this 8-item scale evaluates student behavior related to food waste reduction. Responses were measured on a 5-point Likert scale (1 = Never to 5 = Always). Finally, the Sustainability-Related Behaviors scale adapted from Han (2021), this 12-item scale measures a broader range of sustainability practices. Responses were measured on a 5-point Likert scale (1 = Never to 5 = Always). A total of 20 hospitality students were involved in the pilot test to ensure clarity and relevance. The Cronbach alpha used to assess the reliability of each scale showed good internal consistency ($\alpha > 0.80$).

4. Findings and Discussion

The data for this study was analyzed using IBM SPSS Statistics 26. Descriptive statistics were calculated for demographic variables and scale items. Pearson correlation analysis was conducted to examine the relationship between variables. Multiple regression analyses were conducted to assess the predictive power of environmental knowledge on food waste behaviors and sustainability-related behaviors.

Descriptive Analysis
In the study, we initially had a total of 100 respondents. However, during the data cleaning process, we identified that 6 of the respondents were not from the hospitality program, which was a requirement for inclusion in the study. Consequently, we excluded these 6 invalid responses, leaving us with a final sample of 94 valid participants (Table 1).

The gender breakdown of the valid respondents shows that the majority, 73 participants (77.7%), identified as female, while the remaining 21 participants (22.3%) identified as male. When examining the age distribution, we found an equal split between the 18-20 and 21-23 age groups, each comprising 40 participants (42.6%). The remaining 14 participants (14.9%) were in the 24-26 age range. Looking at the year of study, we had a fairly even representation, with 21 first-year students (22.3%), 36 second-year students (38.3%), and 37 third-year students (39.4%). In terms of the current level of study, 44 participants (46.8%) were pursuing a bachelor's degree, while 50 participants (53.2%) were enrolled in a diploma program. Finally, the program types represented in the sample were diverse, with 51 participants (54.3%) studying Hotel Management, 27 (28.7%) in Pastry Arts, 14 (14.9%) in Culinary Arts, and 2 (2.1%) in Food Service Management.

This descriptive overview provides valuable insights into the characteristics of the 94 valid respondents included in our study, allowing us to better understand the composition of the sample and lay the groundwork for further analyses.

Table 1: **Descriptive Analysis**

Characteristic	Frequency	Percent	Valid Percent	Cumulative Percent
Gender				
Female	73	77.7%	77.7%	77.7%
Male	21	22.3%	22.3%	100.0%
Age				
18-20	40	42.6%	42.6%	42.6%
21-23	40	42.6%	42.6%	85.1%
24-26	14	14.9%	14.9%	100.0%
Year of Study				
1st year	21	22.3%	22.3%	22.3%
2nd year	36	38.3%	38.3%	60.6%
3rd year	37	39.4%	39.4%	100.0%
Current Level of Study				
Bachelor's degree	44	46.8%	46.8%	46.8%
Diploma program	50	53.2%	53.2%	100.0%
Program Type				
Culinary Arts	14	14.9%	14.9%	14.9%
Food Service Management	2	2.1%	2.1%	17.0%
Hotel Management	51	54.3%	54.3%	71.3%
Pastry Arts	27	28.7%	28.7%	100.0%

Correlation Analysis

A Pearson correlation analysis was undertaken to investigate the associations between Environmental Knowledge (EnvKnow), Food Waste Behaviour (FoodW), and Sustainability-Related Behaviour (SustainB). The results are presented in Table 2.

Table 2: Correlations Between Environmental Knowledge, Food Waste Behavior, and Sustainability-Related Behavior

		Correlations		
		EnvKnow	**FoodW**	**SustainB**
EnvKnow	Pearson Correlation	1	.462**	.476**
	Sig. (2-tailed)		<.001	<.001
	N	94	94	94
FoodW	Pearson Correlation	.462**	1	.651**
	Sig. (2-tailed)	<.001		<.001

	N	94	94	94
SustainB	Pearson Correlation	.476**	.651**	1
	Sig. (2-tailed)	<.001	<.001	
	N	94	94	94

**. Correlation is significant at the 0.01 level (2-tailed).

The results of the above correlation analysis have shown that students' environmental knowledge increases and they will tend to engage in more responsible food waste behavior and general sustainability practices. The analysis revealed significant positive correlations between all variables. Environmental Knowledge showed moderate positive correlations with both Food Waste Behavior ($r = .462$, $p < .001$) and Sustainability-Related Behavior ($r = .476$, $p < .001$). This suggests that as hospitality students' environmental knowledge increases, they are inclined to engage in more positive food waste behaviors and general sustainability practices. Particularly, the strongest correlation was observed between Food Waste Behavior and Sustainability-Related Behavior ($r = .651$, $p < .001$). This strong positive relationship suggests that students who establish more responsible food waste behaviors are also expected to participate in broader sustainability practices. These findings support our hypothesis that environmental knowledge is associated with both specific food-related behaviors and general sustainability practices among hospitality students. The strong correlation between food waste and sustainability behaviors proposes that concentrating on food waste reduction in hospitality education could have stronger impacts on overall sustainability behavior.

These results support previous research (e.g., Kaiser & Fuhrer, 2003; Redman & Redman, 2014) signifying the importance of both knowledge and specific behaviors in stimulating overall sustainability practices. They also emphasize the interconnected nature of food-specific behaviors and broader sustainability actions in the context of hospitality education.

Multiple Regression Analysis

To further examine the predictive power of environmental knowledge on food waste behavior and sustainability-related behavior, we conducted multiple regression analyses. The regression analysis revealed that Environmental Knowledge significantly predicts both Food Waste Behavior ($\beta = 0.462$, $p < .001$) and Sustainability-Related Behavior ($\beta = 0.476$, $p < .001$). These results suggest that environmental knowledge explains approximately 21.3% of the variance in Food Waste Behavior ($R^2 = 0.213$) and 22.7% of the variance in Sustainability-Related Behavior ($R^2 = 0.227$).

Table 3: Multiple Regression Results

Dependent Variable	Predictor	B	SE B	β	t	p
Food Waste Behavior	(Constant)	1.872		0.328	5.707	<.001
	EnvKnow	0.497	0.097	0.462	5.124	<.001
Sustainability-Related Behavior	(Constant)	1.763	0.313		5.632	<.001
	EnvKnow	0.518	0.093	0.476	5.570	<.001

5. Conclusion

The findings from this study have provided very valuable insights into the relationship between environmental knowledge, food waste behavior, and sustainability-related behaviors among hospitality students in Malaysia. A positive correlation can be seen between environmental knowledge and both food waste behavior ($r = .462$, p. <.001) and sustainability-related behavior ($r = .476$, p. <.001). This has shown that as hospitality students' environmental knowledge increases, they tend to engage in more responsible food waste behaviors and general sustainability practices. The results from results of this study have also shown that focusing on reducing food waste in hospitality education can have a wider influence on students' sustainability behaviors. These findings have provided an important insight for educators and policymakers. The positive correlation between environments. By amalgamating environmental education and stressing the importance of reducing food waste in the hospitality curriculum, educators have the potential to foster a more stable-oriented generation of

hospitality professionals. This, in turn, can contribute to the broader goal of promoting environmentally sustainable practices in the hospitality industry.

Suggestions for Future Research

Future research should prioritize examining the detailed practices and instructional strategies that effectively transform environmental knowledge into tangible sustainable behavior among hospitality students. The study was limited and focused on only one institution in Malaysia and its reliance on self-reported behavior. Future research should be more detailed and extend the study to multiple institutions that have hospitality-related programs in Malaysia. Furthermore, longitudinal studies can examine the enduring effects of educational interventions on the occupational durability of graduates in real-life settings over an extended duration.

In conclusion, this study strongly emphasizes the importance of environmental knowledge in fostering sustainable practices among students and who will become future hospitality professionals. The hospitality industry can move towards more environmentally responsible operations, contributing to global sustainability goals by addressing food waste and broader sustainability issues through education.

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Conceptualizing Extended Reality Metaverse-based Pedagogy Model: A Hospitality and Tourism Education Perspective

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Abstract: The prevalence of online learning has significantly increased, particularly in light of the COVID-19 pandemic. Nevertheless, the shift to online education has presented numerous obstacles and concerns. The correlation between a lack of enthusiasm towards online learning and subpar academic achievements suggests the necessity to tackle the issues that impact students' involvement. Educators need to address obstacles encountered by students in online learning, including diminished concentration and inadequate learning delivery. Metaverse technologies, which have attracted growing interest among academia and practitioners, can be the answer to mitigate issues related to online education. Although metaverse technologies show promise for online education, there is a lack of research on their suitability for hospitality education. Comprehending how metaverse technologies can be seamlessly incorporated into online hospitality educational environments is crucial for the progression of such technology. Therefore, this study aims to conceptualize an extended reality metaverse-based pedagogy model for online hospitality education. The conceptual paper is a great resource for stakeholders who are interested in investigating the possibilities of metaverse technologies for hospitality education. This work also establishes a basis for future research that investigates the application of metaverse technologies in online educational environments.

Keywords: *Metaverse, pedagogy model, extended reality, online teaching, hospitality and tourism*

1. Introduction

Online teaching has become increasingly prevalent, especially during the COVID-19 pandemic. With technological advancement, the education system has shifted from traditional classroom to online course delivery (Murray & Pérez, 2015). However, this transition to online education has brought about various challenges and issues. These challenges include obstacles that affect students' engagement and interest in the online learning process (Okyere et al., 2022). Educators have identified various challenges faced by students in online learning, such as decreased focus and unsatisfactory learning platforms (Yusuf, 2020). Students' lack of participation in online classes has also been attributed to factors such as low motivation, ineffective teaching design, and imperfect online education platforms (Agustina, 2022; Hong et al., 2021). Furthermore, the lack of interest in online learning was found to lower learning outcomes, indicating a need to address factors influencing students' engagement (Suhairi et al., 2023). These challenges can be mitigated by a metaverse-based teaching pedagogy (Rahman et al., 2023).

Metaverse is a technology that allows users to interact and engage with each other in virtual environments (Buhalis et al., 2022). Its potential for advancing online education has garnered increasing interest among academics and scholars. Generally, metaverse in education has focused on educational design that can be tailored for learners of different generations using artificial intelligence technologies (Tlili et al., 2022). This suggests the effectiveness of metaverse technologies in accommodating learners of diverse age groups. Metaverse is a new social communication platform that can radically transform conventional forms of social participation in education (Kye et al., 2021). More importantly, metaverse technologies enable a fair learning environment that is not tied to time and space (Park & Kim, 2022a). These suggest that metaverse technologies have the potential to enhance students' online learning experience, acceptance of technology, and motivation toward learning. Recently, the possibility of the metaverse to advance the learning process into a more versatile, interactive, and interesting experience has been empirically proven by Rahman et al. (2023).

Despite the promising potential of metaverse technologies for online education, limited studies have explored the viability of metaverse technologies for hospitality education. Hwang and Chien (2021) attributed this to the lack of exposure to the potential of the metaverse. Although the use of metaverse in tourism and hospitality management has been explored (Buhalis et al., 2022), a robust framework that implements metaverse technologies in hospitality education has not been conceptualized. Research in this area could investigate how metaverse applications can enhance experiential learning (Buhalis et al., 2022; Wei, 2023). But how do metaverse technologies empower education pedagogy? An understanding of how metaverse technologies can be integrated into hospitality educational settings is essential for advancing the field of metaverse-based education.

To provide an understanding of a metaverse-based pedagogy model for hospitality and tourism education, this study conceptualized a framework that integrates metaverse technologies into online hospitality education. To answer the research question, this study synthesizes previous literature to present critical components of the metaverse-based pedagogy framework, particularly on its application to hospitality online education. The study also recommends strategies for metaverse technologies implementation in online hospitality education. The study should serve as a valuable resource for educators, researchers, and practitioners interested in exploring the potential of metaverse technologies for enhancing online hospitality and tourism education. Through the conceptualization of the extended reality pedagogy framework, the study provides a foundation for future research aimed at maximizing the use of metaverse technologies in online hospitality and tourism educational settings.

2. Literature Review

Online Learning and Metaverse Technologies

Online learning refers to the provision of education through the use of the Internet and other electronic gadgets (Wallace, 2003). It has seen a significant increase in popularity, particularly during the COVID-19 pandemic, which expedited its adoption as a primary mode of education (Okyere et al., 2022). Online learning provides flexibility, accessibility, and convenience for both students and educators, enabling learning to occur at any time and from any location. However, online learning in higher education also presents challenges that can impact student experiences, interests, and engagement. Issues such as lack of personal interaction and feelings of isolation can lead to poor student experiences in online classes (Suhairi et al., 2023; Wallace, 2003). The absence of face-to-face interactions and a physical classroom environment may also decrease student engagement and motivation, ultimately affecting learning outcomes (Hafeez et al., 2022). Here, online learning presents a main challenge in maintaining student interest and willingness to stay engaged in virtual environments. This issue may be resolved by metaverse technologies.

Metaverse is characterized by immersivity and interactivity (Buhalis et al., 2022). As metaverse technologies allow for a highly interactive learning environment, the potential of metaverse technologies for improving online education has attracted scholars' attention. For example, Buhalis et al. (2022) highlighted that the metaverse is a mixture of reality and virtual environments that provide users with a platform for social engagement and interaction. Characterized by its spatial, immersive, shared, and real-time nature, the metaverse provides users with extended digital selves and virtual experiences (Hadi et al., 2023; Weinberger, 2022). Metaverse is envisioned as a futuristic digital frontier that integrates various technologies (i.e., virtual reality, augmented reality, social media) to create a seamless and interconnected virtual environment (Hadi et al., 2023; Weinberger, 2022). It serves as a platform where users can explore, interact, and collaborate in virtual spaces, blurring the boundaries between physical and digital realms. The metaverse is defined by its ability to offer users a unique and immersive experience that transcends traditional online interactions (Weinberger, 2022; Suh & Ahn, 2022).

In the context of higher learning education, the metaverse offers a chance to open completely new approaches to online learning environments for students and teachers (Onu et al, 2024). With metaverse technologies, educational institutions can build effective and meaningful learning environments that increase students' interest, interaction, and learning outcomes (Akour et al., 2022; Singla et al., 2023). Metaverse holds significant potential for creating a constructivist learning environment for learners, where they can interact with virtual avatars and flexible learning settings (Singla et al., 2023). Nevertheless, like any other significant educational

innovation such as augmented reality (Ahmad Ridzuan et al., 2020), the metaverse also has its challenges. These challenges need to be systematically addressed to ensure efficient utilization of metaverse across various learning areas of hospitality education. The benefits and challenges of integrating metaverse technologies into hospitality educational settings are discussed in the following section.

Potential Metaverse Applications, Benefits, and Challenges in Hospitality Online Education

Metaverse technologies present both benefits and challenges to online education. Jagatheesaperumal et al. (2022) who investigated the uses, difficulties, and unresolved challenges of extended reality and Internet of Things-enabled metaverses have provided a guide for integrated advanced technologies that enhance students' experience and learning outcomes. Zhang et al. (2022) discussed possible uses of metaverse in education, including blended learning, language learning, competence-based education, and inclusive education. In their view, these metaverse technology applications can be adapted to hospitality education to create dynamic and engaging learning environments. These scholars suggest that the metaverse offers exciting opportunities for hospitality education, including immersive simulations, virtual customer interactions, and experiential learning environments.

The potential benefits of metaverse applications in transforming hospitality students' learning experiences are evident in various studies. For instance, Park and Kim (2022a) examined how the metaverse impacts customer experience and value co-creation in the field of hospitality and tourism management. They suggest that integrating metaverse technologies into hospitality education can help educators enhance student engagement, and learning outcomes, and develop practical skills. Here, it indicates that hospitality education that integrates metaverse may provide students with immersive experiences that imitate real-world hospitality interactions. This could improve students' comprehension of customer service and engagement. As such, a metaverse-based teaching pedagogy is beneficial for practical-based courses such as front office, housekeeping, food and beverage service and culinary (Patiar et al., 2021).

Kye et al. (2021) provided an overview of current trends and future research directions for the metaverse in the hospitality and tourism industry. They suggest that integrating metaverse technologies into hospitality education allows students to acquire hands-on experience in hotel operations, event planning, and guest services, equipping them for a seamless transition into the hospitality industry. Tlili et al. (2022) explored the potential applications of a metaverse in education, including blended learning and competency-based education. Lee and Jo (2023) found the potential of metaverse-based collaboration activities in developing students' personality traits and skills by exploring the application of metaverse in problem-based learning curricula from hospitality students' perspectives. Similarly, Horng and Hsu (2024) also demonstrated an enhanced comprehension of hospitality knowledge and skills through an evaluation of AR and VR's impact on learning outcomes.

Although metaverse technologies are advantageous for hospitality education, the challenges and potential issues of their applications require thorough consideration. Several scholars shed light on these challenges and raise questions associated with the integration of metaverse in educational settings. Park and Kim (2022b) for example, highlight the limitations and challenges (e.g., social influences, constraints regarding educational value deviations, awareness of Metaverse usage) of implementing immersive metaverse This urges for more research on challenges that can impact the effectiveness and usability of metaverse in online education. Akyürek et al. (2024) argue that metaverse often requires a high-speed internet connection and costs more compared to traditional learning tools. Tlili et al. (2022) identify a research gap in lifelogging applications in the educational metaverse, highlighting potential challenges in leveraging metaverse technologies for educational purposes.

Ajani (2023) discusses challenges such as privacy concerns, digital literacy gaps, and the importance of inclusivity in metaverse applications. The author views these challenges can pose obstacles to the widespread adoption and effective use of the metaverse in online education. Zheng et al. (2023) point out problems with online education in the metaverse, such as the risk of distractions, eye strain, and delays in question-and-answer sessions. They found these challenges can impact student engagement and learning outcomes in virtual learning environments. Li and Yu (2023) address potential challenges that may hinder sustaining metaverse-based blended English learning, emphasizing the importance of overcoming obstacles to ensure the success of

metaverse applications in educational contexts. If integrating metaverse into education is beneficial, how to overcome these challenges? To answer the question, it is therefore important to develop a robust framework on how to integrate extended reality technology such as Metaverse into online hospitality education. The proposed conceptual framework is detailed in the next section.

3. Extended Reality Empowered Educational Pedagogy Framework

As educators and institutions strive to integrate metaverse extended-reality technologies into the curriculum, it is essential to understand its critical components. Generally, there are six components entailing technology infrastructure (Coyne et al., 2021; Huang & Roscoe, 2021), technology familiarization (Kluge et al., 2022), instructional design (Khlaif et al., 2024), content development (Meccawy, 2023), assessment and evaluation (Gandolfi et al., 2020), and continuous improvement (Geisen & Klatt, 2022). Each component plays a distinctive role in the successful integration of metaverse extended-reality technologies in educational settings. Understanding the importance of these components will help educators and institutions produce a comprehensive and efficient online learning pedagogy.

The framework relies heavily on an established technology infrastructure to ensure the smooth functioning of immersive experiences. This encompasses high-performance computing resources, reliable networking, and readily accessible platforms (Al-Adwan et al., 2023; Akyürek et al., 2024). An efficient infrastructure is crucial for content delivery and seamless real-time interaction among all learners. It comprises servers, networking equipment, headsets, other devices, and platforms facilitating metaverse extended-reality technology experiences. Contrary to traditional educational settings that use simple computer laboratories or online learning platforms, metaverse extended-reality technologies require a more complex and resource-demanding infrastructure. Smooth and immersive experiences necessitate the use of more resilient and high-performing technology. The significance of a solid technical infrastructure for successful metaverse extended-reality technologies implementation is emphasized by Coyne et al. (2021) who highlighted the importance of dependable and high-performing computing resources. Huang and Roscoe (2021) provide additional insight into the issue by examining the specific requirements of head-mounted displays in engineering education. They highlight the need for hardware that can handle detailed and complex visual representations.

Secondly, educators and students should gradually introduce the technology through different platforms. A recent study by Kluge et al. (2022) found several obstacles to adopting metaverse extended-reality technologies. One of the key issues is the insufficient proficiency among educators, which hinders the effective implementation of these technologies. To tackle these problems, it is important to provide comprehensive training and assistance to educators as it enables them to acquire essential skills required to utilize metaverse extended-reality technologies (Kluge et al., 2022). Familiarisation efforts often involve training sessions, workshops, and continuous support mechanisms that improve learners' confidence and expertise. Traditional instructional technologies might require less familiarisation since they are typically more intuitive or are familiar to learners. As the use of metaverse extended-reality technologies technology grows more prevalent, it is essential to ensure that both educators and learners are familiar and at ease with these tools (Al-Adwan et al., 2023; Akyürek et al., 2024).

The third component is instructional design. Traditional education typically emphasizes instructional design that centers around textual materials, videos, and conventional interactive components. Metaverse extended-reality-enabled instructional design is a more complex procedure that entails the creation of three-dimensional models, virtual environments, and interactive simulations. This entails developing learning experiences that capitalize on the distinct capabilities of metaverse extended-reality technologies and align with the intended learning objectives (Al-Adwan et al., 2023). This encompasses interactive and immersive instructional strategies, simulations, and activities that foster engagement and enhance understanding (Onu et al., 2024). Khlaif et al. (2024) address the transition in instructional design towards more utilization of interactive and immersive content. This highlights the importance of engaging students with content that goes beyond conventional approaches while still in line with the learning objectives.

Fourth is content development, which involves the creation of educational materials that can be delivered using metaverse extended-reality platforms. This encompasses 3D models, virtual tours, augmented reality overlays,

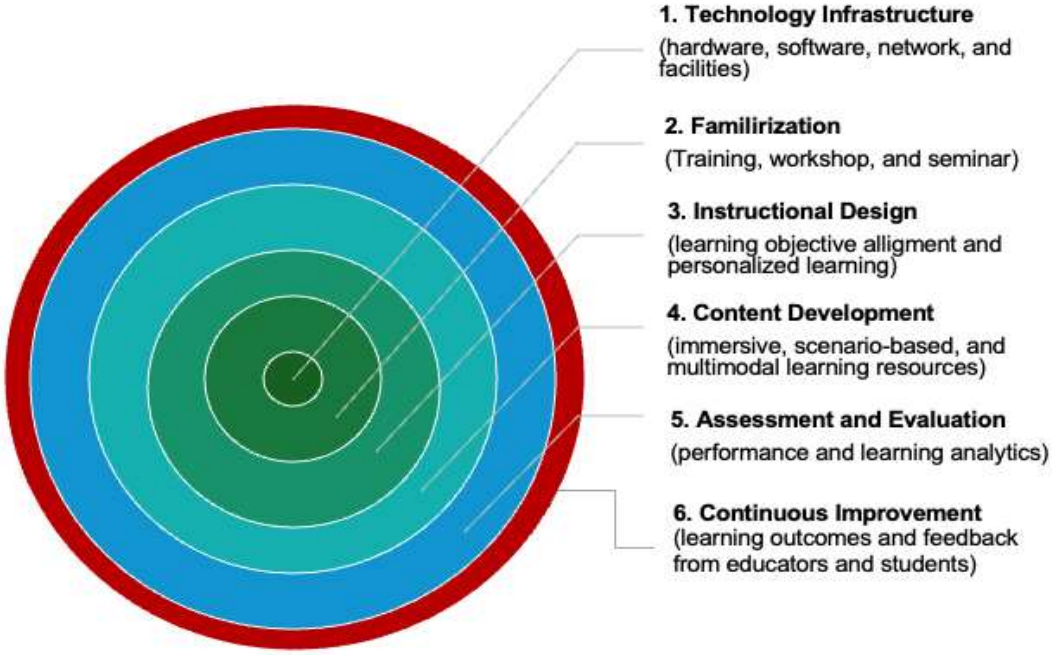
and various other forms of immersive multimedia content. Traditional content development often entails the creation of textbooks, worksheets, and standard multimedia content. Developing the content necessitates an entirely different set of skills, encompassing 3D modelling, animation, and programming for interactive components. When creating metaverse extended-reality content, it is important to prioritize the learner experience by making sure it is easy to use, interesting and can be accessed by a wide range of learners (Al-Adwan et al., 2023). Meccawy's (2023) study indicates that involving learner-centered design in metaverse extended-reality apps significantly impacts learning efficacy. This makes it a crucial aspect in content development towards meeting learners' requirements.

To assure the efficacy of metaverse learning experiences, the fifth component incorporates developing and implementing techniques to assess and evaluate learners' progress. The assessments comprise both formative and summative evaluations. Metaverse extended-reality assessments should offer more interactivity and engagement than traditional assessments (Griffin, 2021). Employing simulations and real-time feedback offered a more thorough evaluation of learner understanding and skills (Geisen & Klatt, 2022). Furthermore, the assessment and evaluation process must establish clear performance criteria, utilize learning analytics, and quantify learning outcomes. Gandolfi et al. (2020) conducted a study that introduced the Extended Reality Presence Scale to measure learners' engagement and presence in extended-reality environments. This scale adds a new dimension to assessments that are lacking in existing methods. This suggests that extended-reality technology integration can provide more dynamic and responsive assessment methods as tools in the evaluation process.

Finally, organizational support is crucial for ongoing development in educational environments. The advancement of the metaverse extended-reality framework necessitates the consistent evaluation and revision of tools, content, and instructional approaches in response to feedback and technological improvements. This guarantees that the framework stays current and practical. This entails keeping abreast of the most recent metaverse extended-reality technology, modifying instructional content to more effectively cater to the needs of learners, and consistently assessing the efficacy of the tools in education. Geisen and Klatt (2022) proposed the use of real-time feedback mechanisms in extended reality to promote ongoing development in education. They argue that these techniques can be modified for wider educational use to boost learning outcomes. Thus, the organization's support could start by clearly defining its objectives in utilizing extended-reality technologies and promoting a culture that fosters experimentation and innovation. This approach ensures that the integration of extended reality into educational practices remains dynamic, effective, and aligned with educational goals.

Based on the abovementioned discussion, the six components namely technology infrastructure, technology familiarization, instructional design, content development, assessment and evaluation, and continuous improvement play crucial roles in ensuring a successful integration of metaverse extended-reality technologies into hospitality education. This section discusses the importance of these components and how each component helps educators and institutions produce a comprehensive and efficient online learning pedagogy. Based on the importance of these components, a conceptual framework of extended reality metaverse-based educational pedagogy is illustrated in Figure 1.

Figure 1: Extended Reality Metaverse Empowered Educational Pedagogy Model



4. Strategies to Integrate Extended Reality Metaverse Educational Pedagogy Framework

Integrating metaverse technologies into online hospitality education involves the creation of an immersive and interactive virtual environment that simulates real-world scenarios of hospitality settings. Strategies for the integration must relate to the curriculum itself, technological investment, training for instructors and students, stakeholder involvement, and continuous assessment of metaverse technologies. First, the integration of extended reality into online hospitality education must focus on curriculum improvement. Traditional learning methods and pedagogies must be modified by creating virtual classrooms that simulate hospitality scenarios. This can be done by creating a metaverse-based module that aligns newly created activities with the current curriculum and learning outcomes. Revising curriculums by incorporating courses and training will enhance the learning experience of current students and enable future students to easily integrate metaverse technologies into learning (Al-Adwan et al., 2023).

Secondly, the successful implementation of metaverse technologies in hospitality education lies within the investment in extended reality equipment. According to Al-Adwan et al. (2023), providing access to virtual or augmented reality devices is the basis for a metaverse-based education as it creates a virtual campus for instructors and students to immerse and interact through virtual classrooms. They also suggested a few other ways of successful implementations, including the installation of a high-speed Internet connection that supports smart wearable devices and the use of gamification to increase perceived enjoyment among students. Accessibility and technological infrastructure in terms of stability and speed of the Internet are critical factors affecting students' perceived ease of use (Akyürek et al., 2024).

The next strategy for the integration of metaverse technology is professional training for instructors. Metaverse technologies are new to a lot of educators. Providing training in metaverse technologies usage will familiarise instructors with metaverse platforms, tools, and devices that enhance their effectiveness in creating and managing virtual teaching activities; at the same time, trained instructors can help students get comfortable and proficient in using metaverse for learning (Al-Adwan et al., 2023). This is agreed by Akyürek et al. (2024) who stated that improving instructors' know-how skills will increase their acceptance of new technologies. However, a one-time training is insufficient. Institutions must provide continuous support and training to help instructors keep up with the latest developments in metaverse technologies. Educators also need to pay close

attention to those students with special needs, such as autism, so that they will not be left behind (Md Nor et al., 2023)

Integration of metaverse technologies into the current hospitality education curriculum directly affects students. Therefore, the fourth strategy is to enhance student engagement and interaction. To do these, institutions must design an interactive virtual environment that is realistic for students to practice hospitality (e.g., hotel operations, airline operations, F&B services) skills. Institutions may also use metaverse technologies to encourage collaborative projects where students can be exposed to real-world hospitality operations (Griffin, 2021). Instructors also play an important role in enhancing student engagement and interaction with metaverse technologies. By creating a supportive learning environment such as necessary resources and clear learning objectives, students will understand each assignment within the metaverse-based module and trust that metaverse technologies are beneficial to their learning (Al-Adwan et al., 2023). The importance of institutions in providing training for students to adopt metaverse technologies is also highlighted by Akyürek et al. (2024) who suggested proper guidance will enhance students' perceived ease of use of new technologies.

Lastly, strict policies, rules and regulations must be implemented to guide metaverse-based education. Metaverse technologies can be double-edged swords that benefit and harm the users. While metaverse technologies are beneficial in improving learning outcomes, they challenge users in terms of the risk of privacy security (Zhou & Kim, 2022). Zhang et al. (2022) suggested the content and its creators be traceable to ensure the safety and security of its users. Al-Adwan et al. (2023) suggested the establishment of law enforcement authorities who can govern relevant laws such as real-name verification.

The integration of metaverse technologies offers a few benefits to both students, instructors, and higher learning institutions. First, it enhances teaching and learning experiences. The immersive nature of metaverse technologies allows instructors and students to immerse and interact in the simulation of real-world hospitality scenarios (Onu et al., 2024). This not only improves students' practical skills and better prepares students for employment, but the interactivity and engaging nature of the metaverse experience will also increase students' engagement and enthusiasm for learning. This leads to the second implication, in which integrating metaverse technologies into hospitality education will help develop skills and operational proficiency for students. Through the simulations of real-world hospitality scenarios, students can practice various skills, including front desk operation skills and F&B skills (Patiar et al., 2021).

However, a few challenges arise in the successful implementation of metaverse technologies in hospitality education. First, not all institutions can afford investment in such technologies. Secondly, not all students have access to extended reality devices. In these cases, these challenges must be taken into consideration as access to the devices is the basis for a successful implementation of metaverse technologies. Ensuring all instructors and students have access to relevant devices and stable and high-speed Internet is important to avoid failure. Next, the cost of implementation is high (Mystakidis, 2022). Metaverse technologies require significant investment in devices such as headsets, virtual reality glasses or a computer lab. This presents certain barriers to some institutions. Still, the metaverse offers possibilities for innovative teaching and learning experiences and transforms traditional hospitality education. It enables collaboration among instructors and students from all around the world for an enhanced learning experience. Thus, strategic integration of metaverse technologies into online hospitality education can provide students with cutting-edge and experiential learning that better prepares them for the evolving industry. Successful implementation of the metaverse will also enhance the institution's reputation and competitive advantages.

5. Conclusion

The paper discusses the integration of metaverse and extended reality technologies into hospitality education. It emphasizes the importance of instructional design, content development, assessment techniques, and organizational support for effective implementation. It outlines the need for technological investment, instructor training, and student engagement while addressing challenges such as high costs and access to technology. Additionally, it presents then strategies to integrate metaverse's applications in hospitality education, particularly in online learning contexts. However, several limitations should be addressed, such as the need for high-speed internet access, potential privacy concerns, and the digital literacy gap among the

students. Failing to consider these issues could hinder the effective implementation of metaverse extended reality technologies in online hospitality educational settings. Future research directions should focus on developing robust frameworks for integrating metaverse technologies into online hospitality education. Scholars should evaluate the long-term impacts of metaverse extended reality technologies on online learning outcomes. Additionally, future studies could investigate how metaverse applications can enhance experiential learning and customer service training. This can ultimately contribute to a more comprehensive understanding of the role of metaverse extended reality in online hospitality education.

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Food for Thought in Malaysian Borneo: Data Mining and Sentiment Analysis of Tripadvisor Reviews for Online Destination Branding

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Abstract: Unique destination branding in tourism is crucial to gaining a competitive advantage. Local food is a significant component of a destination brand which Destination Management Organisations (DMOs) must integrate into their official marketing efforts. DMOs must monitor the popularity and perception of their food promotions against the competition. Online promotion and management are challenging due to the rise of user-generated content. Automatic data mining techniques were used to determine the extent to which tourist food choices on TripAdvisor matched foods promoted by DMOs and how distinct these choices were from a rival DMOs' promotion. We compared online food promotion between the Sabah Tourism Board and the Sarawak Tourism Board. We developed a software system to automatically extract food branding business intelligence from TripAdvisor restaurant reviews. The application of web crawling and scraping technology was applied to extract data and use Sentiment Analysis for interpretation. Online foods promoted by DMOs for each region were found to contain only a few common dishes, but these were more popular than region-specific foods. Significantly different distributions of food choices were found for each region. Some potentially useful differences between foreign and domestic tourists and locals were also identified. Sentiment analysis revealed hidden information in reviews useful for potential food destination branding. Findings from TripAdvisor confirm practical suggestions for improving brand distinctiveness found in the literature. This study is the first to develop an actual system that DMOs could use to estimate the online popularity of their promoted foods and those of their competition.

Keywords: *Destination Branding, Local Food, Data Mining, Sentiment Analysis, TripAdvisor, Malaysian Borneo*

1. Introduction

In the tourism industry, effective destination branding is crucial to gaining a competitive advantage (Rinaldi & Beeton, 2015). Brands are complex and consist of destination attributes ranging from the purely physical, and historical to the cultural. Good branding distinguishes a destination from comparable others to reduce the gap between projected and perceived image (Költringer & Dickinger, 2015). This can be especially difficult when destinations are geographically adjacent but culturally similar. Destination Management Organisations (DMOs) are responsible for producing, promoting and managing an official destination brand through a variety of channels (Pike & Page, 2014). DMOs need to track and manage public opinion toward the various aspects of the destination brand. DMOs must know whether the products promoted are popular and viewed positively; ideally according to different demographics such as domestic and foreign tourists. Any perceived issues with their brand and opportunities for improvement must be identified and addressed to enhance destination competitiveness (Pike & Page, 2014). DMOs also monitor the overlap between their promotions and those of the competition.

Local food is a significant tourism product that contributes to a destination brand (Ellis et al., 2018) and is the aspect of destination branding considered in this study. Local food is integrated into official destination marketing efforts by DMOs (Choe & Kim, 2018; Björk & Kauppinen-Räisänen, 2016). Stalmirska (2021) suggests local food has varied definitions categorizable into geographic, cultural, and socio-economic dimensions. Notably, local food is an important element of tourist destinations, representing culture and providing a learning opportunity for tourists (Ellis et al., 2018; Björk & Kauppinen-Räisänen, 2016). Gastronomic tourism is a significant niche market for most destinations (Berbel-Pineda et al., 2019). However, a recent study indicates cuisines are neither fully utilized nor skilfully integrated into destination marketing

efforts (Okumus et al., 2018). Attempts have been made to clarify how DMOs could use gastronomic events to enhance destination competitiveness (Nelson, 2021; Stalmirska, 2021; Pivčević & Lesić, 2020). As advocated by Lai et al. (2017) there exists a dual-perspective review of food image: one projected by destination marketers, the other a mental representation as perceived by tourists and an understanding of both is essential for building a positive brand image. Food, culinary experiences, and gastronomy are used in tourism by DMOs, governments and industry groups for place branding (Gulisova, 2022). Debates in the literature discuss whether gastronomy is used for place branding or whether place brand influences the perception of gastronomy (Gulisova, 2022). Other questions include whether gastronomy is authentic, exclusive, market-driven, single cuisine, multicultural or cosmopolitan (Gulisova, 2022).

With the advent of Web 2.0, destination branding is no longer under the sole purview of official entities. Online promotion and management are necessary nowadays due to the rise of User Generated Content (UGC) in the form of social media, blogs, and travel review sites (Mariani, 2020). In tourism destination marketing, UGC is a cost-effective communication means to promote destinations online (Mariani, 2020). An important class of UGC is found on travel review websites such as TripAdvisor (TA) comprised of voluntary unpaid contributions from virtual members. TA is used by 455 million unique visitors per month from all over the world (Putri & Kusumaningrum, 2017; Rossetti et al., 2016) and contains over 570 million reviews concerning accommodations, airlines, attractions, and restaurants. TA has been used as a source of customer opinion in tourism studies but focused on scenic spots or cruising or were general (Li et al., 2021; Tao & Kim, 2019; Schuckert et al., 2016). More recently, Lim et al. (2019) studied how online food reviews influenced tourists' behavioral intention toward ethnic foods in the context of Gen-Y tourists in Malaysia and discovered a direct relationship suggesting the result of reading online reviews increases involvement and intention to seek out local food. However, their paper did not focus solely on TA reviews and gaps remain in extracting, interpreting, and applying TA reviews which could provide insights for DMOs for destination branding.

For destination branding, DMOs could use TA to monitor their local food promotions since it contains restaurant reviews that describe foods consumed by tourists. It is also possible to find all restaurant reviews for a particular destination and to find a subset of reviews that contain a particular keyword. However, TA has several limitations as a tool for branding. First, it is not directly possible within TA to find reviews for a list of many foods, which may each go by several names, nor to compile informative and useful statistics for this list which might aid food branding. For example, if a DMO promotes 20 different foods then it should be possible to find out the popularity of each food by the number of reviews it has, and to also determine how positively it is seen after consumption.

Secondly, reviews cannot be broken down according to whether the reviewer is a foreign or domestic tourist or a resident. This information could be important for assessing the impact of DMO promotions which are aimed primarily at foreign tourists. And TA, like many review sites, has a simplistic overall rating system of 0 to 5 stars, rather than ratings for individual content, making it possible that the rating will not reflect the specific content of interest. For example, there are many zero-star reviews on Amazon.com where the reviewer loved the product but hated the delivery or customer service (Valdivia et al., 2017). To avoid misleading ratings, a finer-grained analysis of review text with analysis at a sentence level is required. In principle, DMOs could extract all this information from TA by manually querying restaurants and foods, reading thousands of reviews in detail to identify and record references to foods, making judgments about opinions in individual sentences, and compiling statistics. Considering the sheer number of TA reviews, this would require considerable time and effort, which would have to be repeated from scratch if the list of promoted foods ever changed.

Due to these practical limitations, a software system able to automatically perform these tasks could be highly beneficial for DMOs. Indeed, the application of computer-based methods taken from data mining is a wider trend in tourism studies that has demonstrated itself. Much recent work has been carried out using data mining techniques, on TA and other UGC in a tourism setting, including Sentiment Analysis (SA). "Sentiment analysis, or opinion mining, is an active area of study in the field of natural language processing that analyses people's opinions, sentiments, evaluations, attitudes, and emotions via the computational treatment of subjectivity in the text" (Hutto & Gilbert, 2014, p.217). SA aims to determine positive and negative attitudes contained in the text and has been applied in tourism studies (Ren & Hong, 2017; Valdivia et al., 2017; Becken et al., 2020; Bruno et al., 2019; Chen et al., 2020; Yu & Zhang, 2020). Few studies have explicitly considered how DMOs can utilize

data mining methods and SA in their destination branding efforts (Filho, 2020; Franzoni & Bonera, 2019). In this respect, our study attempts to address this deficiency.

We aimed to develop a software system to replace the human effort required to extract food branding business intelligence from TA restaurant reviews. This required the application of web crawling and scraping technology to extract relevant data, and the use of SA to interpret it. The type of SA was aspect-based (Valdivia et al., 2017), meaning that it was specifically conducted on review sentences regarding local food and no other features of the review. Although practical suggestions for DMOs on how to use local food as a destination marketing tool are available (Choe & Kim, 2018), this study is the first to develop an actual system that DMOs could use to estimate the online popularity of their promoted foods and those of their competition. For this purpose, we chose to focus on Malaysian Borneo, a food haven in South East Asia.

According to Zainal et al. (2010) to experience gastronomy in Malaysia, it is best to visit the peninsular states of Melaka, Perak, Penang and Borneo regions of Sabah and Sarawak. Malaysia is well-known as a food paradise due to the fusion of the culinary traditions of its diverse ethnic communities (Hussin, 2018). Recent studies on food tourism as a tool for destination branding in Malaysian Borneo have not looked at online reviews of food. Ting et al. (2019) studied tourists from Peninsular Malaysia, Sabah, Singapore, and Indonesia to examine their intention to consume Dayak food when they visit Sarawak, Malaysia; findings identified differences from conative perspectives. Fam et al. (2020) examined factors that influence the consumption of Kadazan-Dusun food between foreign (China, Europe) and domestic (Malaysian) tourists uncovering some similarities. However, Fam et al. (2020) found sensory appeal influenced food choice for the China market whereas convenience and mood influenced food choice for the domestic market. There remains a dearth of knowledge on tourist sentiments towards local foods promoted by DMOs in Malaysian Borneo. Therefore, this study chose the DMOs from the Malaysian Borneo regions of Sabah and Sarawak. Although adjacent to one island, each has distinctive local foods and was considered a good case study for branding distinctiveness. The research questions, underpinned by the objectives, are as follows: [1] What local food is being promoted by DMOs in Malaysian Borneo? [2] what is tourist sentiment towards local food on TA for Malaysian Borneo? [3] how distinct are tourist food choices between two rival DMOs food promotions? We aimed to evaluate the promotion of local food by the DMOs of Sabah and Sarawak against TA reviews using data mining techniques and an SA system developed for this purpose. Could gastronomy be a factor of internal differentiation according to TA reviews?

This paper begins with an introduction to the context which will justify the choice of Malaysian Borneo as the case study. Specifically, this section presents an insight into the types of local foods being promoted on the respective regional DMOs' websites. We pinpoint the overlap between the two regions' food promotions including foods unique to the region, foods common to both regions and foods unique to the other region. Next, we outline the TA data mining systems developed for this study followed by the SA algorithm used to analyze food reviews for each region. Findings and discussion deliberate on the popularity of DMOs-promoted foods overall and in detail for each region. Finally, we evaluate the effectiveness of DMO's food promotion online.

2. Context of the Study

Malaysia has three geographic regions, Peninsular Malaysia, Sabah and Sarawak across the South China Sea on Borneo Island, the third largest island in the world with an area of 743,330 km^2 situated in Southeast Asia. Borneo is shared by three nations: Malaysia Brunei Darussalam, and Indonesia (region of Kalimantan) (see Figure 1). Malaysian Borneo offers unique tourist experiences different from those in Peninsular Malaysia. Sabah and Sarawak are melting pots of cultural diversity, and both utilize 'Borneo' in their tourism destination brand promoting the exotic wilderness and culture of Borneo. These bordering regions are culturally diverse yet share similar tourism offerings of nature, adventure, and culture (Kler & Wong, 2018) promoted by regional DMOs.

Figure 1: Sabah and Sarawak within Malaysia



Sabah Tourism Board (STB) markets "Sabah, Malaysian Borneo as the premier nature adventure destination in the world" (www.sabahtourism.com). Sabah on the northern portion of Borneo has an established tourism industry based on rainforests, iconic wildlife (orang utan and proboscis monkeys), national parks (terrestrial and marine) and culture. Sabah has over fifty main ethnic groups with their languages of which thirty-two comprise the Indigenous Dusunic, Murutic and Paitanic families of Austronesian languages (Kitingan, 2015, p. 269). Sabah is also home to other Austronesian communities including the Bajau (Sama Family), the Brunei and Kadayan, and the Iranun, as well as non-Austronesian peoples (Chinese and Indians), products of migration (Kitingan, 2015). The largest Indigenous group in Sabah is the *Kadazan Dusun* for whom Indigenous dishes are reflective of their traditions, culture and practices including the *Hinava (*flavourful raw fish salad), *Ambuyat* (a sticky dish made from sago palm starch), *Jeruk Bambangan* (a preserved condiment made of wild mango endemic to Sabah), *Tuhau (a pungent condiment made of wild ginger endemic to Borneo), Lihing (rice wine), Pinasakan* (fish dish) and *Bosou* (tangy fermented meat) (Fam et al., 2020). Sarawak Tourism Board (ST) promotes itself as a home to adventures of the wilderness and cultural diversity. Longhouses are a unique way of life for the indigenous people. Sarawak is known as 'The Land of the Hornbills' as these birds are symbolic of the *Dayak*. According to the Sarawak constitution, a *Dayak*, or an Indigenous person is legally defined as all non-Muslim natives (Weinlein, 2017). Fifty percent of the population here consists of indigenous people including the *Iban, Kayan, Penan* and *Bidayuh* groups (Weinlein, 2017). Other groups include the Malays, Chinese and small immigrant societies from both Asian and European backgrounds (Ting et al., 2019). According to Ting et al. (2019), traditional Dayak food includes *Tubu* (stems), *Tuak* (an alcoholic beverage made from rice wine) and *Pansuh* (meat cooked with bamboo) prepared and cooked using natural resources from the forest. Sarawak ethnic cuisine is unique due to the local ingredients, cooking processes and practices embedded within the different ethnic groups in the region (Wan Sageng et al., 2020). The next section evaluates the local foods promoted by each DMO.

Online Food Promotions: Sabah Tourism Board versus Sarawak Tourism Board

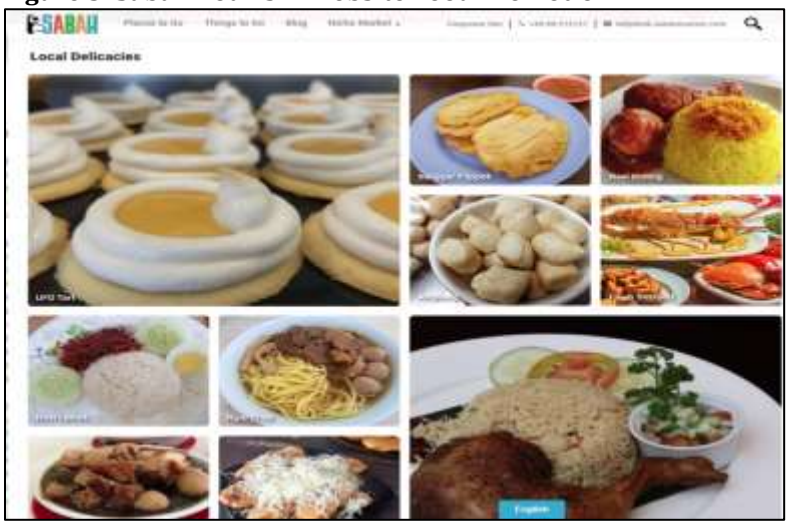
STB's website (https://www.sabahtourism.com/what-to-eat/) promotes 15 different foods on a single page entitled "What To Eat" which is accessible directly from the homepage.

Figure 2: Sabah Tourism Promoted Foods

Laksa, Amplang, Ngiu Chap, Beaufort Mee, Seafood, Bah Kut Teh, Satay, Nasi Ayam, Nasi Lemak, Soto, Pisang Goreng, Fish Head Curry, UFO Tart, Sangar Pappek, Nasi Kuning

Foods are presented using large, attractive pictures that can be clicked for more detail. Figure 3 (overlead) shows some of the foods promoted.

Figure 3: Sabah Tourism Website Food Promotion

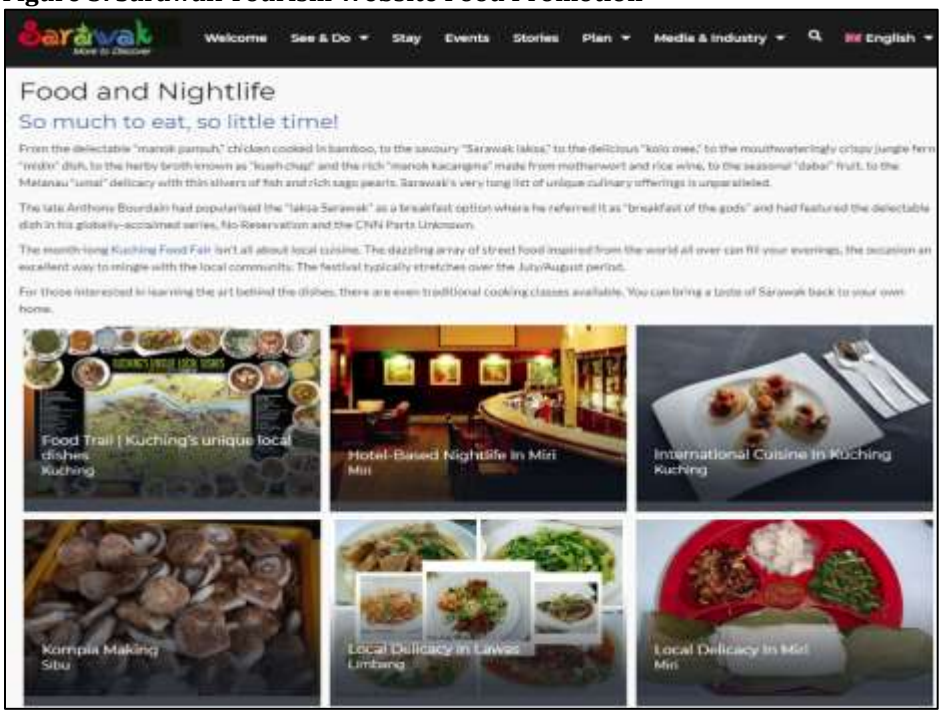


ST's promotion (https://sarawaktourism.com/attractions_type/food-nightlife/) is far less focused than that of STB. Their website provides a combined "Food and Nightlife" section where a total of 43 foods are found scattered across 19 separate pages. The foods are not specifically listed and are simply part of paragraphs describing various events and restaurants. There are also two pages promoting Western and International foods rather than local food in this section. ST promotes a total of 43 foods:

Figure 4: Sarawak Tourism Website Food Promotion

laksa,kolo mee,manok pansoh,kek lapis,umai,midin,kompia,kampua, nuba laya, kueh chap,gula apong, ngiu chap, seafood, satay, nasi lemak, ayam penyet, roti canai, mee jawa, beehoon, lalapan ayam, mee mamak, mee sua, fish soup, rice porridge, belacan beehoon, kedondong juice, fish balls, daun ubi, mixed pork soup, kopi c, belacan midin, mee udang, roti arab,soya bean milk, beehoon cangkuk manis, fried dabai rice, grilled three layered pork, lamah,linut ambuyat, manok gulai terung asam, petai belacan, sago linut, tempoyak fish

Figure 5: Sarawak Tourism Website Food Promotion

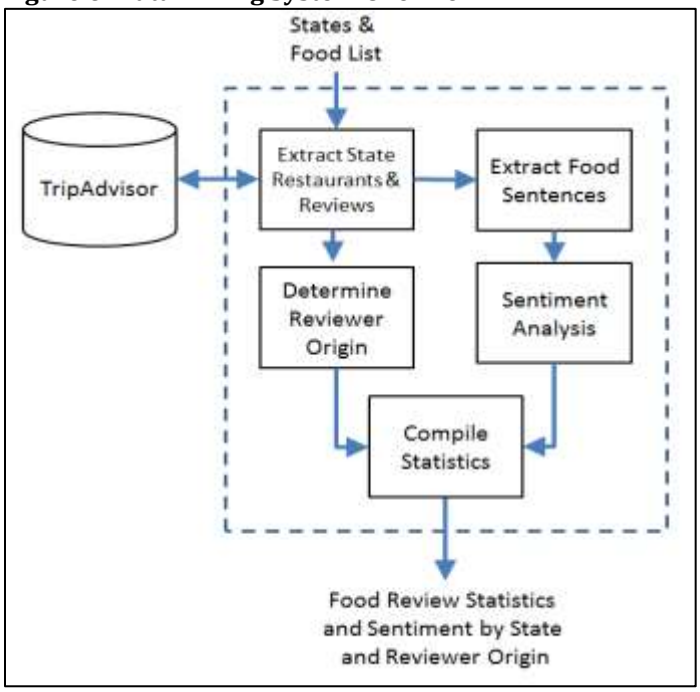


There is some overlap between DMO promotions. Both DMOs promote the five common dishes: *Seafood, Nasi Lemak, Satay, Ngiu Chap*, and *Laksa.* There are thus three food classes to consider for each DMO promotion: (i) foods unique to the region (Sabah 10, Sarawak 38); (ii) foods common to both regions (5); and (iii) foods unique to the other region (Sabah 38, Sarawak 10). Accounting for the five (5) common foods, the combined list of DMO-promoted foods contains 53 dishes. Notably, the commonly promoted dishes are at odds with informal knowledge of what are strictly "local foods". Seafood is not considered to be a traditional food of the local people of either Sabah or Sarawak. STB actively promotes *Laksa* which is perceived as very strongly specific to Sarawak, whereas ST promotes *Ngiu Chap* which is perceived as moderately specific to Sabah. Notably, *Satay* and *Nasi Lemak* are generic Malaysian foods with neither being region-specific. Despite the overlaps in promoted foods, there is still a good overall separation between DMO promotions. The five (5) common foods constitute only 33% of STB's foods and just 12% of foods by ST. If we assume that all foods are equally popular, the distinction between DMO promotions is supported by a highly negative correlation (r = -0.77) between the list of foods for each region. However, the practical significance of the overlap in promotion will only be seen by the number of reviews for these common foods versus region-specific dishes, which will be determined by data mining presently.

3. Materials and Method

The basic outline of our TA data mining system is shown in Figure 6. Custom Python code was written to crawl and scrape restaurants and reviews for a given list of regions and foods. In this case, the regions were Sabah and Sarawak and the list of foods was from the DMOs (states and food lists). Within each review, individual sentences for foods were extracted and subject to SA. Reviewer origin (nationality of the reviewer) was estimated by comparing the reviewer's location with lists of towns in both Sabah and Sarawak. Food review and SA statistics were then compiled for reviews according to region and reviewer origin.

Figure 6: Data Mining System Overview



The particular SA algorithm used was VADER (Valence Aware Dictionary for Sentiment Reasoning) in its freely available Python implementation (Hutto & Gilbert, 2014). VADER can achieve an F1 score of 0.96 on social media text and is a highly cited algorithm (Hutto & Gilbert, 2014). It should be noted that like most SA algorithms, when given a sentence to analyze, VADER will output a value between -1 and +1 meaning strongly negative or strongly positive and with 0 indicating neutral sentiment. Scores of +1 or -1 are theoretical ideals and in practice, scores of around -0.3 and +0.3 are considered highly negative or positive for everyday day text.

A total of 2,294 restaurants were found on TA for Sabah and Sarawak, with approximately equal numbers for each region. All reviews for each restaurant were crawled and scraped from TripAdvisor and stored locally for analysis. In total, 22,387 reviews were extracted, again with approximately half for each region. Then, each review was processed to identify those which were about the foods promoted by each DMO.

4. Findings and Discussion

Overall Popularity of DMO Promoted Foods

The most basic level of popularity data required by a DMO would be the percentage of total reviews for their foods, both collectively as a set of promoted dishes, and individually to identify relative popularity within their promotion. This would be done compared to all other available foods (for example, Western, Middle Eastern, Japanese) which compete less directly compared to the other regional DMOs foods (direct competition).

Table 1 denotes 2,871 reviews in Sabah restaurants that appraised 15 STB foods, and 3,488 reviews in Sarawak restaurants that evaluated the 43 ST foods.

Table 1: Number of Reviews for Sabah and Sarawak Restaurants on TripAdvisor

State	Restaurants	Reviews	Reviews containing foods promoted by State DMO
Sabah	1,169	11,954	2,871 (24%)
Sarawak	1,125	10,433	3,488 (33%)

There is some degree of overcounting in the totals above since a single review may sometimes contain references to more than one food. This notwithstanding, it was evident that STB and ST-promoted foods are referenced in 24% and 33% of all restaurant reviews in their respective regions. One's expectations and goals for market share will determine how impressive these percentages are but, given the vast number of foods available in Sabah today, 24% of all region restaurant reviews for only 15 specific foods can be considered quite respectable. With 33% of reviews, ST foods are certainly found in a greater proportion of restaurant reviews, but this may simply be the result of having almost three times as many foods under promotion than Sabah.

These percentages can help DMOs estimate the overall popularity of their promoted foods versus all other available food choices (Western, Middle Eastern, Japanese). It is reasonable to want an exhaustive list of those other foods that account for the remaining 76% and 67% of food reviews. However, that data mining task is of a different type to the one conducted here and is known to be extremely difficult with current methods. Whilst it is relatively straightforward to find text containing known food types, determining a set of unknown food types is a problem of Named Entity Recognition which is still immature for open-ended domains like the current one. This will be the topic of future work. Therefore, the following analysis will only concern evaluating the relative popularity of the 53 DMO-promoted foods. It was noted earlier that there is overlap in the foods promoted by the DMOs and that this overlap defines three classes of foods: those unique to each region, those common to both, and those foods of the other region. It is useful to identify the distribution of reviews according to these three classes as shown in Table 2.

Table 2: TripAdvisor Reviews broken down by DMOs

State	Unique State DMO foods	Common DMO foods	Other state DMO's foods
Sabah	449	2,422	244
Sarawak	1,252	2,236	323

It was evident most reviews for both regions are about the five foods common to both promotions. In Sabah, these common foods account for 85% = 2,422 / (449+2,422) of total DMO reviews. In Sarawak, common foods account for only 64% of reviews (2,236 / (1,252+2,236) meaning that more uniquely ST foods are reviewed. Also shown is the percentage of reviews within region restaurants for foods promoted exclusively by the other DMO. For Sabah, uniquely Sarawak foods are of the same order of magnitude as uniquely Sabah foods. Sarawak has a similar number of reviews for uniquely Sabah foods, but this is offset by the greater number of reviews for region-only foods. Again, this may be due to the greater number of foods promoted by Sarawak. After this basic analysis of food popularity, DMOs might next want to study the distribution of reviews over individual foods and use SA to monitor customer perception of reviews.

Detailed Popularity of DMO Promoted Foods

The grouped review counts shown in Table 2 were broken down to show the individual popularity of the 53 promoted foods within each region. Each sentence containing a DMOs promoted food was subject to SA using the VADER algorithm and the mean sentiment for each food type was calculated. Also extracted was the mean TA rating for the reviews containing references to each food. The results are shown in Tables 3 and 4 for Sabah and Sarawak restaurants, respectively.

Sabah Tourism Promoted Foods

Table 3: TripAdvisor Popularity and Sentiment for DMO promoted foods in Sabah Restaurants

	Food	# of Reviews	% of Reviews	Mean Sentiment	Mean TA Review Rating	Sabah Tourism Promoted	Sarawak Tourism Promoted
1	seafood	1961	63	0.34	0.60	√	√
2	nasi ayam	263	8	0.27	0.52	√	
3	laksa	164	5	0.34	0.64	√	√
4	nasi lemak	120	4	0.23	0.48	√	√
5	satay	99	3	0.28	0.61	√	√
6	ngiu chap	78	3	0.37	0.67	√	√
7	fish soup	75	2	0.43	0.70		√
8	roti canai	73	2	0.40	0.62		√
9	bah kut teh	68	2	0.33	0.58	√	
10	Soto	56	2	0.26	0.54	√	
11	fish head curry	34	1	0.38	0.59	√	
12	ayam penyet	30	1	0.27	0.56		√
13	kolo mee	26	1	0.38	0.72		√
14	fish balls	12	< 1	0.18	0.43		√
15	pisang goreng	9	< 1	0.19	0.82	√	
16	ufo tart	8	< 1	-0.08	0.45	√	
17	beehoon	7	< 1	0.34	0.54		√
18	mee mamak	7	< 1	0.06	0.77		√
19	nasi kuning	6	< 1	0.20	0.53	√	
20	umai	4	< 1	0.27	0.40		√
21	Beaufort mee	4	< 1	0.23	0.50	√	
22	mee jawa	3	< 1	0.03	0.20		√
23	kopi c	3	< 1	0.18	0.60		√
24	kampua	1	< 1	0.21	0.60		√
25	kek lapis	1	< 1	0.13	1.00		√
26	mee sua	1	< 1	0.00	0.60		√
27	rice porridge	1	< 1	0.00	-0.60		√
28	amplang	1	< 1	0.00	0.60	√	
		Total 3,115	**Total 100**	**Mean 0.22**	**Mean 0.55**	**Total 14/15**	**Total 19/43**

As seen in Table 3, only 28 of the 53 DMO-promoted foods were reviewed in Sabah at all but nearly all of the 15 STB foods were reviewed, with only *Sanggar Pappek* (banana fritters served with spicy condiment) receiving no reviews. However, the popularity of these 14 foods is highly uneven. Seafood is overwhelmingly the most popular food, accounting for 63% of all reviews. Its high popularity is also found with a mean

sentiment of 0.34, which is impressively positive. In comparison, the next most popular food, *Nasi Ayam* (chicken rice), accounts for only 8% of reviews but it too has good positive sentiment. *Nasi Ayam* is the most popular food that is uniquely promoted by STB. Confirming the suggestion of Table II, it is evident that all five of the commonly promoted foods are in the top ten, and that the other unique promotions are far less popular. The unique foods *Pisang Goreng* (banana fritters), *UFO Tart* (local tart), *Beaufort Mee* (local noodles), and *Nasi Kuning* (yellow rice) are borderline unpopular by review count.

These manual observations can be quantified by calculating the correlation between the number of reviews for each food and the lists of foods promoted by each DMO. Overall, Sabah restaurant food review counts correlate with STB food promotion at r = 0.31, which is a moderate positive relation. Of course, cause cannot be conclusively determined by this analysis, since STB could simply be promoting what they already know to be popular, but this is still a respectable level of consistency.

Mean TA review ratings are also listed in Table III. These ratings have been transformed from the original range (0 to 5) to the range (-1 to +1) to allow comparison with the results of SA. Sentiment and rating are found to correlate at r = 0.35 which at a gross level is reassuring since total divergence between ratings and sentiment would be cause for concern. However, inspection reveals several differences between sentiment and rating that are missed in this overall correlation. These may reveal food-specific opinions that are missed in overall review ratings. In particular, review sentences about *UFO tart* were found to have a mean negative sentiment, but the overall ratings of the relevant restaurant reviews are still positive. On detecting such a divergence, a DMO can use our system to retrieve the original review text for manual analysis to confirm this finer-grained opinion. For *UFO tart*, it was found that some of the raw reviews featured negative opinions that are missed in the review rating, but detected by SA at a sentence level, as shown in Table VI below. This demonstrates the potential of aspect-based SA for better market awareness which can prompt DMOs to manage these negative opinions.

Table 4: Divergence between TA review ratings and food sentences

Overall TA Review Rating (0-5)	Specific Sentences on UFO Tart
3	"Do not order the UFO tart here even is Sandakan speciality."
2	"One of the most overrated UFO tarts I ever tasted"
5	"Unfortunately, they no longer offer UFO tarts...."

After considering Sabah restaurant reviews about STB food promotion, a DMO can also study how they relate to direct competition. Sabah restaurant food review sentences correlate with ST food promotion at r = 0.02 which is close to uncorrelated. This result is achieved despite the high popularity of the five commonly promoted foods because i) ST has so many more foods and ii) most that are unique to Sarawak have few or no reviews in Sabah. So, for STB, this combination of moderate correlation with promoted foods but low correlation with ST foods can be considered a good result.

Sarawak Tourism Promoted Foods

The analysis for ST is shown in Table 5 below. While seven of the same foods are in the top 10 for both regions, these are distributed very differently in Sarawak. These include s*eafood, nasi ayam* (chicken rice), *laksa* (spicy noodles), *nasi lemak* (fragrant rice cooked in coconut milk and pandan leaves served with condiments), *satay* (skewered meat), *Ngiu Chap* (beef noodles), *roti canai* (fried unleavened bread served with curry). Additionally, the exclusively Sarawakian dish *Kolo Mee* (dry-style noodles served with meat) is ranked highly only in Sarawak (14% versus 1% of sentences in Sabah). Similarly in Sabah, *Seafood* is the most popular promoted food, but in Sarawak, seafood accounts for far fewer reviews and is also slightly less positively viewed. Other foods are comparably popular with seafood. *Laksa*, which belongs strongly to Sarawak, is consumed almost as much as *Seafood* and nearly four times more frequently than in Sabah. *Kolo Mee* is also Sarawakian but very popular in Sabah.

Table 5: TripAdvisor Popularity and Sentiment for DMO promoted foods in Sarawak Restaurants

	Food	# of Reviews	% of Reviews	Mean Sentiment	Mean TA Review Rating	Sabah Tourism Promoted	Sarawak Tourism Promoted
1	seafood	1016	27	0.31	0.57	√	√
2	laksa	861	23	0.32	0.64	√	√
3	kolo mee	515	14	0.30	0.66		√
4	nasi ayam	277	7	0.32	0.51	√	
5	satay	150	4	0.25	0.51	√	√
6	nasi lemak	148	4	0.26	0.46	√	√
7	midin	119	3	0.22	0.50		√
8	ayam penyet	101	3	0.32	0.51		√
9	roti canai	79	2	0.35	0.51		√
10	ngiu chap	61	2	0.29	0.56	√	√
11	mee jawa	60	2	0.32	0.56		√
12	kompia	60	2	0.19	0.51		√
13	umai	57	1	0.28	0.54		√
14	kampua	45	1	0.22	0.63		√
15	kek lapis	42	1	0.19	0.68		√
16	Soto	35	1	0.27	0.67	√	
17	gula apong	26	1	0.28	0.74		√
18	manok pansoh	26	1	0.28	0.72		√
19	beehoon	21	1	0.22	0.43		√
20	kueh chap	19	< 1	0.34	0.62		√
21	lalapan ayam	17	< 1	0.11	0.65		√
22	mee mamak	11	< 1	0.43	0.75		√
23	mee sua	10	< 1	0.12	0.60		√
24	fish soup	7	< 1	0.15	0.66		√
25	rice porridge	6	< 1	0.23	0.47		√
26	belacan beehoon	6	< 1	0.33	0.47		√
27	pisang goreng	5	< 1	0.22	0.60	√	
28	kedondong juice	5	< 1	0.05	0.52		√
29	fish balls	4	< 1	0.05	0.40		√
30	daun ubi	4	< 1	0.18	1.00		√
31	mixed pork soup	3	< 1	-0.03	0.60		√
32	bah kut teh	2	< 1	-0.05	0.80	√	
33	fish head curry	2	< 1	0.07	0.20	√	
34	nasi kuning	2	< 1	0.26	0.80	√	
35	kopi c	2	< 1	0.30	0.80		√
36	belacan midin	2	< 1	0.20	0.20		√
37	mee udang	2	< 1	0.35	1.00		√
38	roti arab	2	< 1	0.21	0.80		√
39	soya bean milk	1	< 1	0.25	1.00		√
		Total 3,811	**Total 100**	**Mean 0.23**	**Mean 0.61**	**Total 11/15**	**Total 33/43**

Overall, Sarawak restaurant food review sentences correlate with ST food promotion at r = 0.10 which is a weakly positive relation. This is far lower than for STB and is likely to be due to the greater number of foods promoted. And, if DMO promotion drives rather than simply reflects food choices, then this weaker correlation may be due to the comparatively unfocused food promotion on the ST website. As for the competing region's promotion, Sarawak food reviews correlate with STB food promotion at r = 0.02 which is essentially uncorrelated. So even though there is considerable overlap in the most popular foods, the greater number of foods for Sarawak cancels this out overall. The low correlation between Sarawak food reviews and both STB and ST food promotions can be considered a mixed result for ST. The correlations between DMO-promoted foods and relevant reviews on TripAdvisor are summarised in Table 6 below.

Table 6: Correlations between DMO food promotions and restaurant reviews for DMO-promoted foods by State

	TA Restaurant Reviews for DMO foods	
	Sabah Restaurants	**Sarawak Restaurants**
Sabah Tourism Foods	0.31	0.02
Sarawak Tourism Foods	0.02	0.20

Estimating DMOs Promotion Effectiveness

As discussed, the moderate positive correlation found between STB food promotions and Sabah reviews does not prove that the DMOs promotions drive the consumer behavior seen on TA. This cannot be established without a control group that has not been subject to the food promotions, which has never been formally done. However, some insight might be still found by analyzing differences in the foods chosen by locals and tourists. It is reasonable to assume that foreign tourists would be more exposed to DMO promotions than locals, with domestic tourists somewhere in between. If food choices by foreign tourists were found to be noticeably more in line with DMO promotions than locals then there is some evidence that the promotions are responsible. It is acknowledged that using locals as a control group is far from perfect since most locals differ significantly in knowledge and background from foreign tourists and are also far less likely to place reviews on TA. Nevertheless, some insight may be obtained.

To allow this kind of analysis, the origin of the reviewer for each review containing DMO foods was estimated, with results shown in Table 7. As might be expected, there are more total reviews by tourists but the proportion of multiple reviews by local reviewers is higher than that of the others due to extended access to local restaurants.

Table 7: Reviewer Origin for DMO-promoted food reviews on TripAdvisor

Origin	Reviews	Unique Reviewers
Sabah	720	295
Sarawak	1149	392
Domestic	2261	823
Foreign	2797	1425
Total	**6,926**	**2,935**

When broken down by reviewer origin (foreign, domestic, local), the Sabah restaurant results from the previous section are shown in Table 8 below. To simplify the presentation here, only the top 10 foods are listed although the results are similar for the remaining foods not shown. The first set of columns displays raw review counts for each food with obvious differences by reviewer origin. However, since there are fewer locals than other types, the middle set of columns shows these counts as a percentage of the total number of sentences for that reviewer type. When normalized this way, the differences in choices are less stark but there are some worth noting.

Locals review TA notably less seafood than both types of tourists and have a slightly less positive sentiment towards it. Although foreign tourists have the highest positive sentiment towards seafood, domestic tourists

choose it more. Perhaps this is because domestic tourists have become more aware of seafood through everyday Malaysian life (anecdotally, Sabah is known for seafood among Malaysians even though it is not considered a traditional Sabah dish). Locals eat more of the generically Malaysian *Nasi Ayam* but think less of it, perhaps reflecting everyday eating that domestic tourists may seek to avoid when on holiday.

But perhaps surprisingly, there are no decisive differences between the DMOs-promoted foods chosen by foreign tourists and by locals. The minor differences observed can be considered only weak evidence that STB food promotion drives food choices.

Table 8: TripAdvisor Reviews and Sentiment for Top 10 DMO promoted foods in Sabah by Reviewer Origin

	# reviews			% of reviews			Mean Sentiment		
	For.	**Dom.**	**Loc.**	**For.**	**Dom.**	**Loc.**	**For.**	**Dom.**	**Loc.**
seafood	873	689	399	63	68	56	0.39	0.34	0.30
nasi ayam	109	72	82	8	7	11	0.35	0.26	0.20
laksa	84	54	26	6	5	4	0.36	0.34	0.31
nasi lemak	47	27	46	3	3	6	0.28	0.25	0.17
satay	68	13	18	5	1	3	0.24	0.32	0.27
ngiu chap	22	24	32	2	2	4	0.41	0.39	0.3
fish soup	20	35	20	1	3	3	0.45	0.39	0.46
roti canai	47	12	14	3	1	2	0.44	0.29	0.47
bah kut teh	37	15	16	3	1	2	0.29	0.42	0.27
Soto	17	17	22	1	2	3	0.29	0.18	0.32
	1324	**958**	**675**	**96**	**94**	**94**	**0.35**	**0.32**	**0.31**

For Sarawak, the story is slightly different. A smaller proportion of local reviews are for foods in the top ten. Notably, the top 10 foods account for only 84% of local reviews versus 89% for foreign and 88% for domestic tourists. This indicates that more reviews by locals are about the less popular foods not chosen by domestic or foreign tourists. As in Sabah, seafood is less popular and less positively seen among locals, and this attitude also applies to the top 4 foods listed in Table 9.

Table 9: TripAdvisor Reviews and Sentiment for Top 10 DMO promoted foods in Sarawak by Reviewer Origin

	# reviews			% of reviews			Mean Sentiment		
	For	**Dom**	**Loc**	**For**	**Dom**	**Loc**	**For**	**Dom**	**Loc**
seafood	405	325	286	29	26	25	0.34	0.3	0.29
laksa	341	291	229	24	23	20	0.30	0.32	0.33
kolo mee	185	197	133	13	16	12	0.33	0.3	0.26
nasi ayam	85	79	113	6	6	10	0.35	0.31	0.29
satay	57	43	50	4	3	4	0.24	0.24	0.28
nasi lemak	66	46	36	5	4	3	0.24	0.31	0.23
midin	38	45	36	3	4	3	0.31	0.13	0.21
ayam penyet	30	33	38	2	3	3	0.32	0.25	0.4
roti canai	30	27	22	2	2	2	0.34	0.32	0.39
ngiu chap	28	6	27	2	< 1	2	0.25	0.3	0.31
	1265	**1092**	**970**	**89**	**88**	**84**	**0.30**	**0.28**	**0.30**

Findings provide slightly stronger evidence that food choices by foreign and domestic tourists are more in line with ST food promotion than those of locals. However, it is harder to reconcile this finding with the weak correlation found between reviews and ST promotion earlier and the less focused approach taken on the website.

5. Conclusions, Limitations and Future Work

The objective of this study was to use data mining techniques to determine the extent to which tourist food choices are in line with foods promoted by DMOs, and how distinct these choices are from a rival DMO's promotion. The specific dataset used was TripAdvisor restaurant reviews and the DMOs studied were STB and ST in Malaysian Borneo. Online foods promoted by DMOs were analyzed for each region and found to be highly distinctive with only five foods promoted by both. However, analysis of TA reviews showed that these commonly promoted foods were more popular in both regions than region-specific foods. In Sabah, common foods accounted for 33% of promotion and 85% of reviews for DMO foods. In Sarawak, common foods were 12% of promotion and 64% of reviews for DMO foods, showing that Sarawak had more reviews for region-specific foods than Sabah. Significantly different distributions of food choices were found for each region and some small but potentially useful differences in food choice and sentiment between tourists and locals were also identified. Aspect-based SA revealed several discrepancies between TA review sentences concerning specific food types and overall review ratings, leading to potentially actionable information to manage food branding. Notably, the DMOs promoted foods did not include most of the indigenous dishes of Sabah or Sarawak. As such, it is essential that both popular local cuisines and indigenous dishes should be competently incorporated into destination marketing efforts with specific presence on DMO websites, and with 'places to eat' icons listed by district, suburbs, or streets in the city. Social media influencers such as bloggers and vloggers should remain as active ambassadors for DMOs as tourists continue to trust UGC. Moreover, there are plenty of local dishes that remain uncited in the literature and were not covered in this analysis. Food must be seen as a vital component of marketing efforts because local foods do impact visitors' perceived image of the destination. Notably, in 2021, Kuching in Sarawak gained the accolade of City of Gastronomy under the UNESCO Creative Cities Network and this will enhance its destination brand by linking farm to fork. Sabah is encouraged to consider food for thought as a supplementary destination image.

This study provides valuable insights into the distinction between projected and perceived images (Költringer & Dickinger, 2015; Lai et al., 2017) which might enhance food destination branding using data mining methods and SA for DMOs (Filho, 2020; Franzoni & Bonera, 2019). Findings contribute to the literature indicating support that local foods are used to form the destination brand in both regional DMOs and support destination marketing (Ellis et al., 2018; Choe & Kim, 2018; Björk & Kauppinen-Räisänen, 2016). However, findings also support the contention by Okumus et al. (2018) that local cuisines have not been skilfully integrated into the marketing efforts. For example, dishes are being promoted by DMOs that receive low or no reviews on TA. Findings also present a system with which DMOs can utilize data mining methods to integrate food into tourism marketing and SA to improve destination branding. Application of this data mining system would support suggestions by Filho (2020) and Franzoni and Bonera (2019) ensuring SA as projected by TA reviews is utilized for regional differentiation which could indeed uplift local gastronomy for destination marketing. Findings also support the work by Yu and Zhang (2020) that knowledge of customer feelings towards gastronomy is an important aspect of the dining experience. In this study, the novel system generates vital information for destination branding as it provides indications of reviews and sentiments for foreign and domestic tourists as well as locals based on UGC from TA.

The findings presented here are only early work but provide some level of insight that DMOs may find useful in monitoring their promotions and those of the competition. Both regions had some encouraging results and some areas to address. There are obvious limitations in using TA for business intelligence compared to commissioning a dedicated study. However, the data is free and requires little work if automation techniques from data mining are used. As stated earlier, a more comprehensive determination of foods in all region restaurant reviews would be an advantage but such an open-ended task is highly challenging for current Natural Language Processing and was beyond the scope of this current project. This will be addressed in future work. Also, the system developed here will be extended to process reviews in languages other than English. On

TripAdvisor, there are significant numbers of regional restaurant reviews in Malay and Mandarin which may modify the conclusions drawn here.

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Exploring Factors Impacting Student Engagement and Performance Towards Work-Based Learning Among Culinary Students

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Abstract: This study explored factors affecting student engagement and performance in Work-Based Learning (WBL) among culinary students at Universiti Teknologi MARA (UiTM), Cawangan Pulau Pinang Branch, using a qualitative approach. Semi-structured interviews with six (6) Diploma Culinary Arts students from the 2019 and 2020 WBL programs were analyzed through thematic analysis. The findings revealed crucial factors influencing engagement and performance. Positive aspects included a strong knowledge base, high discipline, effective time management, and proactive behavior. However, significant barriers such as sexual harassment and unfair treatment by supervisors were identified. The study also highlighted the importance of industry involvement and feedback for successful WBL experiences. To improve the WBL program, it is recommended to enhance collaboration with industry partners, systematically gather feedback, and adopt flexible program designs. Addressing these issues could significantly boost learning outcomes, performance, and overall student engagement in the WBL program.

Keywords: *Student engagement, performance, work-based learning, Culinary Students*

1. Introduction

The hospitality industry has experienced significant growth and remains a key driver in the advancement of the tourism and food service sectors, primarily due to the exceptional skills and competencies of its workforce in delivering high-quality services. This expansion necessitates that Higher Education Institutions (HEIs) develop comprehensive educational frameworks that align with market demands and the need for well-trained, competent employees (Wei, 2018). The intense competition within the hotel industry underscores the need for culinary programs that equip students with the necessary skills to meet industry standards (Farmaki, 2018).

Effectively balancing supply and demand in the hospitality sector and differentiating between students' experiences and expertise within both educational settings and the hotel industry is crucial. As many countries modernize their infrastructure and technology to meet international standards, a skilled workforce becomes increasingly essential (Schuh et al., 2015). Employers must prioritize qualifications to meet these standards, and internship programs are vital in preparing students for future careers. HEIs play a pivotal role by offering practical internship opportunities that simulate real work environments and meet employer expectations (Hughes et al., 2013). To produce well-rounded, entrepreneurial, skilled, and knowledgeable graduates, the Malaysian education system introduced Work-Based Learning (WBL) in 2007 (Mimi et al., 2021). Work-based learning (WBL) was initially introduced to enhance the education and training system within Malaysian Technical Vocational Education and Training (TVET) institutions. As part of TVET, the WBL program has successfully attracted a skilled workforce to Malaysia with minimal government investment. In 2011, the Malaysia Centre for Tourism and Hospitality Education (MyCenTHE) incorporated WBL into its hospitality education curriculum. The program aims to provide students with practical industry experience during their tertiary studies and to prepare them for the workforce by immersing them in real-world hospitality settings. This initiative aligns with the Malaysia Education Blueprint 2020-2025, which seeks to develop industry-led curricula to improve graduate employability and address skill mismatches.

Moreover, WBL programs are centered on the concept of student engagement and provide a dynamic method for integrating academic knowledge with real-world experience. This engagement manifests in various forms, all of which are crucial to the success of WBL initiatives. Scholars have positioned student engagement within a broader motivational framework, such as the self-system model of motivational development (Connell &

Wellborn, 1991; Skinner et al., 2008), to theorize its precursors in students' learning environments and psychological processes.

Many scholars have demonstrated that declining levels of student engagement are strong predictors of early withdrawal from education and training, particularly in secondary education (Lam et al., 2016; Lamote et al., 2013; Rotermund, 2010). Understanding this phenomenon requires viewing student engagement as a process through which students progressively disengage from education, aligning with the notion that early leaving from education and training (ELET) often represents the culmination of this gradual disconnection (Finn, 1989).

Student engagement is crucial for academic achievement, resulting in attention, class participation, and learning motivation (Fredricks et al., 2004). Engagement influences student retention, learning, achievement, and graduation (Nelson Laird et al., 2008). Coates (2006) identifies student involvement as crucial for developing students' sense of belonging to their institutions. The level of engagement can significantly impact a student's performance and the overall success of the work-based learning (WBL) experience.

Through the practical context of work-based learning, the application of theoretical knowledge can be seen as a comprehensive measure of student performance (Ossenberg et al., 2020). Theoretical and practical learning heavily influence this method, which enables students to apply their academic knowledge in real-life hospitality situations leading to increased engagement and skills development (Sudjimat et al., 2019). Performance evaluations are based on professionalism, skill development, involvement in one's learning process, academic success and feedback assimilation; practical experience promotes job competencies and positive learning environments (Ossenberg et al., 2020; Sudjimat et al., 2019). The technical as well as soft skills proficiency, participation in complex activities, reflective practices use and mentors' feedback are preconditions of success (Ossenberg et al., 2020). In conclusion, WBL performance reflects on outputs such timely completion of projects and attainment of competencies thus equipping students with future jobs as well as improving educational outcomes and skills (Ossenberg et al., 2020).

Work-based learning (WBL) at UiTM Penang is an integral component of the university's curriculum, designed to bridge the gap between academic learning and real-world industry experience. Therefore, the first cohort of culinary students from WBL was discharged from the UiTM Penang Branch in 2019. Students are required to spend two semesters (1 year) within the industry, gaining exposure to real-world work environments within well-established food and beverage organizations across the country. In this WBL program, students are required to complete four main modules namely *Culinary Production, Cold Kitchen, Malaysian Cuisine* and *Hospitality Procurement* that focus on culinary skills, while also providing in-depth knowledge in food production, safety, entrepreneurship, and organizational management throughout the course.

An interview with UiTM WBL Coordinator Teku Zarif shed light on critical factors that contribute to the success of the WBL program, including exposure to new industry experiences and job opportunities that follow the WBL module. Teku Zarif (2023) noted that approximately 100 students underwent industrial training from 2021 to 2022, with a minimal failure rate of 1%. Although this percentage is quite low, it highlights underlying issues in the effectiveness of the WBL program. While the majority of students completed their studies on schedule, some faced challenges that caused delays, impacting both student achievement and the faculty's objective of achieving 100% on-time completion. Understanding the factors influencing student engagement and performance in WBL programs is crucial for improving these programs and ensuring timely completion. Despite increased interest in research on student involvement, it remains relatively underdeveloped in comparison to the growing number of students participating in such programs and the policy focus on lifelong learning. Therefore, this study aims to explore challenges faced by UiTM P. Pinang Branch culinary students during the WBL program, specifically focusing on the challenges and problems affecting engagement and performance in WBL programs.

2. Literature Review

Overview of Work-Based Learning (WBL) in Malaysia

WBL stands for "work-based learning." Lewis (2004) defines work-based learning as a learning approach that provides students with firsthand experience of the realities they will encounter in the workplace. In other words, work-based learning is a process that integrates the needs of the employment sector with on-the-job learning and learning through work (Wazli et al., 2015). Work-based learning is commonly linked to the field of education, but it is not yet implemented across all institutions. Currently, the WBL program is acknowledged as a key approach for bridging the gap between education and the workforce. Furthermore, the WBL program is a teaching and learning method that involves students, particularly those in their final semester before graduation, and requires the employee overseeing this aspect to be responsible for both teaching and evaluating the students (Wazli et al., 2015).

Further, the WBL Program gained significant attention when the Malaysian Qualifications Agency introduced guidelines for its implementation across higher education institutions, industries, students, trainers, and other stakeholders involved. These guidelines offer initial insights into the design and methods used in the WBL program (Malaysian Qualifications Agency, 2016). Following this introduction, the guidelines have been adopted by two Public University programs: the Bachelor of Entrepreneurship with Honors at Universiti Malaysia Kelantan (UMK) and the Bachelor of Plantation Management at Universiti Putra Malaysia (UPM). While both institutions follow the same foundational concept, they implement it differently based on their specific timelines, utilizing the 2U2i study model.

The Significance of WBL for Higher Education and Hospitality Industry

WBL offers numerous benefits that positively affect both higher education and the hospitality industry. One key advantage of the WBL program is its ability to enhance students' knowledge and practical skills within the hospitality sector, effectively bridging the gap between theoretical learning and real-world application. During the WBL phase, students have the chance to put their academic knowledge into practice. Additionally, the WBL program supports lecturers in developing students with both creative and technical expertise, aligning with the current demands of the hospitality industry. As the hospitality field evolves rapidly, there is a growing need for individuals with critical thinking skills to thrive in this sector. The WBL program serves as a valuable stepping stone for graduates entering the hospitality industry, with many hotels actively seeking skilled staff who can drive advancements and contribute to the future growth of the industry (Mimi et. al., 2021).

In real-life scenarios, WBL can boost students' confidence in their abilities, deepen their commitment to their education, and enhance their professional knowledge. The outcomes show that these advanced WBL strategies foster students' professional development by providing opportunities to engage in real-world situations and gain practical experiences. This, in turn, strengthens their practical skills and prepares them for their future careers (Stalheim, 2020).

Academics, businesses, and WBL programs face diverse challenges. Academics accustomed to traditional teaching methods struggle with the shift to advising, mentoring, and coaching required in WBL programs. Additionally, organizational culture gaps between external employers and higher education institutions (HEIs) can complicate WBL collaborations. Internal challenges within HEIs, such as organizational structure and resistance to change, further complicate the implementation of WBL programs. Cultural differences between academic institutions and the commercial sector may lead to conflicts between academic standards and practical business needs. Improving communication and fostering a collaborative culture, rather than a competitive one, can help HEIs better align interdisciplinary programs with employer demands and manage these challenges effectively (Doherty et al., 2019).

WBL is a crucial component of culinary arts education, bridging the gap between theoretical knowledge and practical application. The WBL program immerses students in professional kitchens, offering hands-on experience that extends beyond the classroom and aligns with planned learning outcomes achieved through work positions. Self-reflection plays a vital role in this program, allowing students to recognize and learn from their job experiences.

The physical layout of the culinary workspace, the mentor-student relationship, and the overall environment play a crucial role in student engagement. Modern kitchen facilities, well-organized training programs and opportunities for hands-on experience are key factors that positively influence engagement levels (Johnson et al., 2020). On the other hand, Brown et al. (2019) found that insufficient resources, poor mentorship, and disorganized work settings can hinder students' immersion in the learning process.

Several studies have explored the potential link between extensive work commitments and the risk of incomplete studies among culinary students involved in WBL. Sobri et al. (2022) found a notable correlation between increased work hours during culinary internships and a higher likelihood of academic difficulties, such as missed assignments and exams, which can lead to a greater risk of program non-completion. Additionally, the demanding nature of the fast-paced culinary industry, with its irregular hours and high-pressure environment, has been identified as a factor that complicates students' ability to balance work and academic responsibilities (Brown et al., 2019). Maintaining a balance between gaining practical experience and achieving academic success is particularly challenging in culinary education, where students face the rigorous demands of hands-on learning in professional kitchens. To enhance the effectiveness of WBL programs, educational institutions need to address these challenges through strategies like mentorship programs, flexible scheduling, and academic support services to reduce the risk of incomplete studies among culinary students.

Although WBL has been heralded as a revolutionary approach to skill development in culinary education, its effects on the learning progress and completion rates of culinary students have work-based learning programs in culinary education, thereby guaranteeing the comprehensive development and readiness of future culinary professionals.

Student Engagement During the WBL Program

Smith (2012) highlights that active participation is a core element of WBL involvement. By engaging in workplace activities, contributing to projects, and participating in discussions, students can apply theoretical knowledge to real-world situations and gain a comprehensive understanding of their field. Jones (2020) further notes that goal-setting is a crucial factor, with a positive correlation between setting clear learning goals and student motivation. Students who define their objectives are more likely to be engaged in WBL activities and effectively focus their efforts.

Conversely, Brown et al. (2019) argue that reflective activities are essential for bridging the gap between theoretical knowledge and practical application. Regular reflection enhances students' understanding of theoretical concepts in real-world contexts, supporting lifelong learning and skill development. Additionally, Turner and Smith (2022) stress the importance of effective communication skills in professional settings. Their research examines how strong communication abilities impact teamwork and positive workplace relationships, with engaged students developing these skills through their WBL experiences (Smith & Smith, 2024).

Student Performance During the WBL Programme

A comprehensive assessment of student performance during work-based learning (WBL) involves evaluating how effectively students implement and apply their knowledge in real-world contexts (Ossenberg et al., 2020). According to Sudjimat et al. (2019), both theoretical and practical learning significantly impact student performance in WBL. This approach allows students to apply their academic knowledge in real-world hospitality scenarios, enhancing their skills and fostering engagement. It also provides opportunities for gaining insights and improving skills, which are crucial for successful learning and growth.

Performance is assessed using various criteria, including professionalism, skill development, engagement, academic achievement, and the ability to integrate feedback (Ossenberg et al., 2020). Sudjimat et al. (2019) note that WBL offers practical experience that not only develops job-specific competencies but also creates a positive learning environment that motivates students to excel. Success in WBL is measured by how well students apply theoretical knowledge to industry-relevant challenges (Ossenberg et al., 2020).

Proficiency encompasses both technical and soft skills, such as communication, teamwork, and problem-solving, which are vital for professional success (Ossenberg et al., 2020). Increased engagement in WBL

activities and active participation leads to better learning outcomes and skill development (Ossenberg et al., 2020). Additionally, reflective practices and feedback from supervisors are crucial for enhancing student performance (Ossenberg et al., 2020). Professionalism, demonstrated through a strong work ethic, also contributes to performance (Ossenberg et al., 2020). Ultimately, assessing WBL performance involves evaluating outcomes like timely project completion and the achievement of set competencies, which prepare students for future career development (Ossenberg et al., 2020). Greater interaction during WBL activities is linked to improved learning outcomes and skill growth (Ossenberg et al., 2020).

3. Methodology

This research employed a qualitative methodology, gathering data from various sources, including both primary and secondary materials. Interviews were conducted with participants who had experienced WBL in the 4–5-star hotel industry across the state of Malaysia. Prior consent was obtained from all respondents before they participated in the study. The interview protocol instrument was used to gather specific information pertinent to the study's objectives, employing both primary and secondary data collection methods (Wilcox et al., 2012). In 2019, a total of 115 students completed WBL, while 62 students did so in 2020, across Malaysia. Data saturation was achieved by the sixth respondent, after which the interviews were transcribed, coded, and analyzed.

4. Results and Discussion

The demographic profile of the six students from the Work-Based Learning (WBL) program provides valuable insights into their backgrounds and experiences. Aged between 23 and 25, these informants fall within the typical age range for students approaching the completion of their diplomas or advancing their education. They come from various regions across Malaysia, highlighting the program's broad geographic reach. Table 1 below shows the demographic information of the informants.

Table 1: Informants' Profile

Code	Age	Home Address	Organization during WBL	Current Activity
WBL 1	24 years old	Kulim, Kedah	Park Royal Penang	Doing an internship for her degree.
WBL 2	23 years old	Nilai, Negeri Sembilan	Lexis Port Dickson	Working at FnB restaurant
WBL 3	23 years old	Georgetown, Penang	Cititel Penang	Doing an internship for his degree.
WBL 4	23 years old	Kulim, Kedah	Ombak Villa Langkawi	Internship for his degree.
WBL 5	23 years old	Permatang Pauh, Pulau pinang.	Ixora hotel Pulau Pinang.	Working at Ixora hotel Pulau Pinang.
WBL 6	25 years old	Seberang Perai, Pulau Pinang.	Ixora hotel Pulau Pinang	Works in a factory canteen.

The results indicated that all informants completed their WBL at various esteemed hospitality establishments (4 and 5-star hotels), such as Park Royal Penang, Lexis Port Dickson, Cititel Penang, Ombak Villa Langkawi, and Ixora Hotel Pulau Pinang. This range of placements reflects the program's strong industry connections and the diverse learning environments it provides. Currently, the informants are involved in a mix of further education and professional roles. Two are interning for their degrees, one works at an F&B restaurant, one continues at Ixora Hotel Pulau Pinang, and one is employed in a factory canteen. These roles highlight the practical application of their training and the program's effectiveness in aiding their career transitions. Overall, the demographic profile illustrates the WBL program's success in offering varied, valuable industry experiences and supporting students' academic and professional growth.

Table 2 below effectively summarizes the qualitative findings, linking key themes with supporting quotes from the participants.

Table 2: Summary of Qualitative Research Findings on Work-Based Learning (WBL) in the Hospitality Industry

Theme	Key Findings	Informant's response
Understanding of WBL Module	Extensive knowledge is crucial. It reflects the depth of understanding and the practical skills that students gain during their hands-on learning experiences. New skills must be learned, specific knowledge and skills must be applied appropriately, and ways to enhance work with limited guidance should be discovered by students in the workplace (Zehr & Korte, 2020).	Informant 4 *"From what I understand, 4 of the modules consist of Malay cuisine, cold kitchen, hospitality procurement and culinary production. Each of the 4 is a very different thing that we can gain a lot of knowledge from each module".*
Efforts to Complete the Module	Employees consistently perform well and complete tasks given, demonstrating a high level of discipline (Almita et al., 2023). It was mentioned that a great deal of discipline is necessary during the completion of the WBL module.	Informant 1 *"The most important effort I make is a dedication to every task given by the chef because discipline is crucial for students to achieve a good WBL assessment and gain real-world industry experience".*
Challenges during WBL (Assessment)	In the 1970s, sexual harassment at work was a form of violence that needed to be stopped (Maran et al., 2022). This presented the greatest challenge during completing the WBL assessment for the informant.	Informant 3 *"Additionally, sexual harassment remains a serious problem, perpetuated by normalized inappropriate behavior and societal stigmas".*
Problem during WBL	Someone being unfairly treated at work will result in a negative impact on work performance. (BrightHR, 2010). This attitude cannot be held in a workplace, according to the informant.	Informant 2 *"In addition, the management also practices an attitude of injustice in evaluating student performance, where students who should get better do the opposite".*
Participation of Industry in Successful WBL	The monitoring of activities and progress is carried out (What Is Monitoring, 2023). It has been expressed by the informant that monitoring student placement has had a positive impact.	Informant 2 *"In addition, my HR will monitor once a month to see if the student is showing excellent performance during the internship at this hotel".*
Performance Feedback (Industry)	An individual observes or perceives something. (Cambridge Dictionary, 2019). Feedback can improve the performance of a student, according to the informant.	Informant 5 *"Industry also helps, in a way that the chef can reprimand us with what we have to do that can improve our performance".*
WBL Program Overall Performance Rating (Students)	It is expressed as a numerical value to indicate its effectiveness or familiarity (Collins, 2019).	Informant 4 *"We have to realize that in the industry we have to follow the needs and requirements of the industry itself. So, I rate my performance during WBL as 80%".*

Based on the themes retrieved, the inter-rater reliability table was used to establish the first category, which pertains to the factors influencing Work-Based Learning (WBL) Programs. Further to the process, a set of codes is developed, e.g., into a codebook, often by an individual moving back and forth between the data and a working set of codes, merging, renaming, redefining, or removing codes along the way. The codes are then heavily informed by prior literature and thereby largely deductively derived; informed by the data and literature in a cyclical approach and thereby largely abductively developed; heavily informed by the data and thereby largely inductively discovered; or the approach may be at some intermediate position between these distinct points. A sample of the data is then coded by multiple researchers independently before the consistency of their coding is assessed (Stuart et al., 2002).

Figure 1: The Factors Impacting Engagement and Performances Towards WBL Among Culinary Arts Students

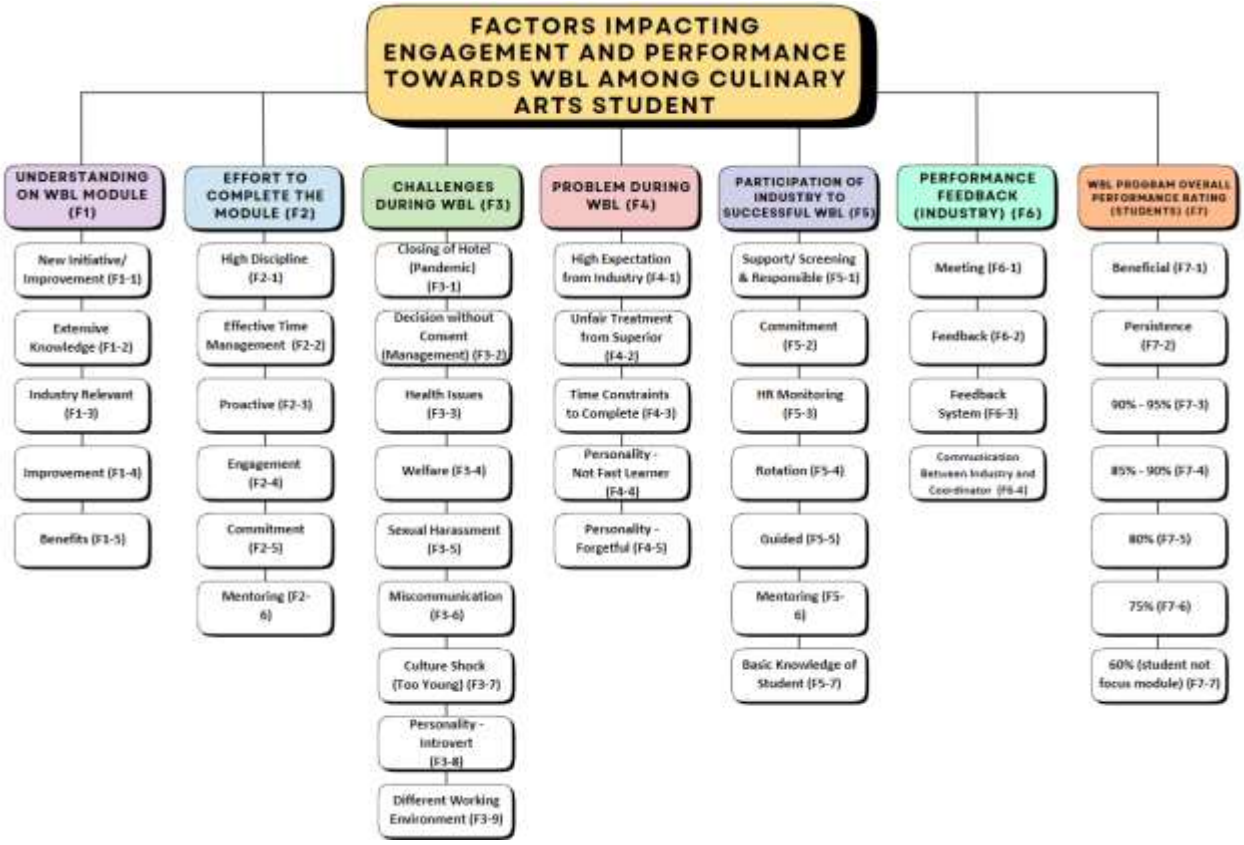


Figure 1 above showed that extensive knowledge was the most frequently reported factor by informants, with 83% indicating its significance. Feedback was the next most common factor, mentioned by 67% of participants. Additionally, both unfair treatment from superiors and performance-related meetings during WBL were each reported by 50% of the informants. The lowest reported factor, at 16%, represented the least frequently mentioned issues impacting the WBL program. A mind map was created using data coded and themed from an inter-rater reliability table, focusing on the factors affecting the WBL program.

Results identified seven factors impacting student engagement in the WBL program, with four factors most frequently cited by informants from the Diploma in Culinary Arts Management at UiTM Pulau Pinang Branch. Extensive knowledge emerged as the highest-rated factor, voiced by 83% of the informants, indicating its critical importance. The WBL program has also implemented strategies to support students' professional growth by providing opportunities to engage in real-world situations and gain practical experience (Stalheim, 2020). Among the six informants, three identified high discipline, effective time management, and proactivity as key factors in completing the WBL module.

According to Smith and Johnson (2021), active participation is the fundamental aspect of WBL involvement. Additionally, Jones et al. (2020) found that goal-setting is a guiding factor, with a positive relationship between goal-setting and student motivation. Students who clearly define their learning goals are more likely to engage in their WBL activities and effectively direct their attention and efforts (Handajani et al., 2024). In this research, the feedback method used to gather performance information was the second most frequently mentioned factor, with a frequency of 67%. However, many informants reported experiencing unfair treatment from superiors in the hospitality industry, with this factor being highlighted by 50% of participants. Additionally, while completing the WBL module, informants faced challenges that led to discomfort, including instances of sexual harassment, this was supported by Sobri et. al., 2022 that found students' negative work-based learning experiences are less likely to deter them from continuing their careers in the hospitality industry.

Moreover, as the hospitality industry expands, so does the demand for educational frameworks that align with market needs and produce skilled professionals. Based on the literature discussed, the essential role of WBL in bridging the gap between theory and practice, emphasizing the importance of a dynamic learning environment, strong mentorship, and adequate resources. The findings indicate that a well-structured WBL program enhances student engagement, learning outcomes, and preparedness for the hospitality industry. Research shows that the quality of the learning environment significantly impacts WBL engagement and performance, with higher levels of engagement linked to modern kitchen facilities, well-organized training programs, and positive mentor-student relationships.

Besides that, challenges such as insufficient resources, inadequate mentoring, and inconsistent work environments can hinder student success. To maximize the benefits of work-based learning and reduce the risk of incomplete studies, the study underscores the importance of addressing these challenges through initiatives like mentorship programs, flexible scheduling, and academic support services.

5. Conclusion

In conclusion, this study provides valuable insights into the factors affecting WBL engagement among culinary arts students. By understanding and addressing these factors, educational institutions can enhance the design and implementation of WBL programs, ensuring the thorough preparation and development of future culinary professionals. These findings contribute to the broader discussion on improving WBL programs, ultimately supporting the growth of the hospitality industry by producing skilled and well-prepared graduates.

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The Perception of Health Belief and Vaccine Valence Towards Domestic Tourist Intention to Travel during COVID-19 Pandemic

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Abstract: This research investigates health risk perception and vaccine valence as factors that affect Malaysian intention to engage in domestic vacations. An online survey was created with Google Forms and distributed to a sample of 265 domestic travellers at least 18 years of age in May and June 2021; this is when the nationwide vaccine program started in Malaysia. The result indicates that vaccine valence risk perception was a significant factor in affecting domestic vacation intention. Only perceived behavioural control and subjective norms mediated the relationship between health risk perception and domestic vacation intention. Overall, vaccine valence risk perception tested significantly with all constructs in this study due to the various factors, especially the timing of data collection where the data collection was carried out amid the national vaccination program. Hence, the vaccine is now perceived as a hope for many as the solution to the current pandemic problem. It indicates that domestic vacationers will return once vaccinated and when tourism sectors are open for business and resume their regular operation. These findings extend the body of knowledge for the theory of health belief and theory of planned behaviour in predicting tourist intention to travel during a pandemic. Findings also indicate the positive impact of vaccine valence on the tourist's intention to travel, which provides a glimpse of future tourist behaviour when facing similar uncertainties.

Keywords: *COVID-19, Health risk perception, domestic vacation intention, vaccine valence*

1. Introduction

Recently, the tourism industry has been affected by the pandemic. The fluctuation in COVID-19 cases throughout the year has created unrest feelings among locals; coupled with the movement control orders, the growth of Malaysia's tourism and hospitality industry has reached a screeching halt (Foo et al., 2020). Such development will only create more problems for the industry, which is struggling to survive. Consequently, the COVID-19 pandemic significantly influences domestic tourists' psychology in this study's scope in Malaysia (Khan & Hashim, 2020).

According to the Department of Statistics Malaysia (2020), Malaysia's domestic tourism expenditure experienced a significant drop, RM 40.4 billion. As a result, 131.7 million domestic visitors were recorded in 2020, with a decrease of 44.9 per cent compared to the previous year in 2019. Consequently, this domestic travelling trend caused unprecedented negative disruption to the tourism economy due to the travel restrictions in the country. Understanding tourist behaviour and the intention to vacation, especially domestic tourism, is essential for tourism management.

This research is a replication of a previous study by Bae & Chang (2020), using the Health Belief Model (HBM) and Theory of Planned Behaviour (TPB) as mediators to investigate travel intention during the pandemic. This study also has integrated vaccine valence as a new dimension into this study to investigate how the introduction of vaccines will change the perception of risk and intention to travel. Currently, Malaysia received the first vaccine in February 2021. The vaccination implementation process under the National COVID-19 Immunisation Program encompasses enrolling target individuals according to the phase's priorities.

2. Literature Review

The Theory of Planned Behaviour (TPB): evolved from the Theory of Reasoned Action (Fishbein & Azjen, 1975). Specifically, the main objective of this theory is to try to understand and predict factors that influence

individual behaviour by looking at people's intentions (Ajzen & Madden, 1986). This theory was applied to the present study to investigate factors contributing to travel intention during a pandemic. In TPB, intention acts as the direct behavioural determinant, and with an accurate measurement, the intention may serve as the best predictor of behaviour (Girish & Lee, 2020).

The TPB has been widely used in different areas, including psychology, nursing, marketing, physical education, and tourism (Gstaettner et al., 2017; Sánchez-Cañizares et al., 2020a). However, researchers tried incorporating additional variables in the TPB to improve their explanatory capacity to predict actions more accurately. For example, variables such as authenticity, the picture of the destination, travel restrictions, the location, and the features of tourists have been introduced to increase understanding of tourism behaviours (Girish & Lee, 2020). In addition, risk-related variables have recently been added to improve the TPB. For example, Quintal et al. (2010b) addressed the effect of perceived danger and perceptive ambiguity on the intention of Korean, Chinese, and Japanese tourists to visit Australia. They have reported that perceived danger affects visitors' attitudes in Korea and Japan. In contrast, perceived uncertainty affects visitors' attitudes in Korea and China and Chinese and Japanese tourists' behavioural management. TPB have three main variables namely attitude, subjective norms, and perceived behavioural control.

Attitude (ATT)

The TBP is one of the most prevalent psychological models for understanding and predicting human behaviour (Chaulagain et al., 2020) and is widely used and tried in various contexts, disciplines, and countries. For example, Ajzen (1991) found that a person's intention to participate in behaviour is decided by their attitude (personal belief and feelings towards that conduct) and the subjective norm (perception of the individual of the success of their prominent references). However, the action largely depends on willpower, which refers to the willingness of the individual to conduct the behaviour. Attitude is the effect of feeling (scary or valence) for the overall evaluation of behaviour. Previous studies have identified several factors that influence tourist attitudes towards travel intention. Besides, the studies of traveller's health risk perception and their protective attitude involved in decision-making for travelling and the researcher found that the level of attitude plays a significant role in determining travel perception and behaviour (Chien et al., 2017) was widely discussed, only a few scholars have studied the effects of COVID-19 on domestic travel intention.

Subjective Norms (SN)

Subjective norm is the perceived social pressure to engage or not to engage in behaviour; it results from how the person perceives the pressures placed on them to perform or not to perform the behaviour (Ajzen & Fishbein, 1975). The crucial role of subjective norms as a predictor of intention has been well recognised (Bae & Chang, 2020; Han et al., 2020; Quintal et al., 2010a). Furthermore, these studies showed that adding a causal association between the normative and attitudinal factors into the TPB made the system more parsimonious, ultimately reinforcing the theory. Based on these findings, the researchers found that today's travellers appear to believe more in peer reviews when choosing tourism products and services rather than business knowledge. With the rise of communication technologies such as the internet, various views on hotels, tourist destinations, and even travel services are shared on the internet from customer usage.

Perceived Behavioural Control (PBC)

The last factor influencing behavioural intention in TPB is perceived behavioural Control (PBC). Perceived behavioural control (PBC) is the degree to which a person believes in controlling personal or external influences that can support or hinder a particular behaviour (Ajzen & Madden, 1986). Ajzen (1986) applied the 'perceived behavioural regulation' construct to his theory of everyday actions as a determinant for both behavioural and behavioural purposes. On a conceptual basis, the perceived behavioural regulation has similar effects for both mechanisms apply to the person's perception that behaviour is governed by it. However, sometimes the ease or complexity of the behaviour is assessed operationally as perceived behavioural control (e.g., 'three times a week I find it difficult to exercise'), and the self-efficiency is operationalised. Like Ajzen's expected behaviour theory, such as Schwarzer et al., (1999) have incorporated perceived behavioural control as a central deciding factor in the motivation and the determining factor for health behaviour.

Health Risk Perception Theory and Tourism: Health risk perception theory consists of environmental risks and cognitive factors (Janmaimool & Watanabe, 2014). While cognitive factors concern the impact of the

surroundings or the environment towards health, cognitive factors, on the other hand, are more focused on the internal conflict individuals face when deciding whether to engage in certain activities. In tourism research, health risk perception is found to be one of the most common predictors of vacation intention as it reflects on how health risk is viewed as a threat to the travellers and whether the exposure to the danger is according to the appropriate level of risk tolerance (Bae & Chang, 2020). Furthermore, the application of health risk theory can be seen in a recent study by Huang et al. (2020), where tourists' health risk perception significantly influences their intention to travel to Tibet and China due to the threat of the COVID-19 pandemic. Other than an intention to travel, this theory is also commonly found in many destination image studies, as perceived safety is one of the common indicators of overall destination image measure (Albattat et al., 2018; Zhu & Deng, 2020).

From the cognitive and internal evaluation standpoint, previous scholars have divided travel risk into two dimensions: overall cognitive and affective risk (Bae & Chang, 2020; Li et al., 2020). For instance, Bae and Chang (2020) investigated the relationship between COVID-19 health risk perception and behavioural intention and suggested that health risk perception is the antecedent of attitude. The pandemic has caused dramatic changes in how tourists view travel and vacation due to the potential exposure to the pandemic and the rapid spread of the disease. A new term such as "intact tourism", for instance, has been introduced in previous research and has become another extension in the health belief model to explain the need for social distancing during vacation, hence leading to an increase in "travel fear" and reduce in intention to engaged in travel vacation and future travel (Zheng et al., 2021).

Risk perception is crucial in shaping protective behaviours, particularly in travel contexts. Studies underscore that health risk perception is a crucial concern for travellers, influencing their decisions. Research by Maulana et al. (2022) identifies health risk perception as the second-highest priority concern for travellers. This perception encompasses worries about potential dangers like terrorism, political instability, or health risks at a travel destination.

The impact of health risk perception on travel behaviour was notably heightened during the pandemic, as evidenced by research in Brazil, which found a negative influence on travel intentions. Conversely, studies in European and Asian contexts have shown that health risk-related variables strongly predict travel intentions (Golets et al., 2023). Study by Zhou et al. (2024) further detail that while perceived susceptibility had minimal impact, health risk perception and risk aversion significantly affected travel intentions. Thus, it indicates that health risks are a significant factor in tourism engagement, with travellers' perceptions of risk playing a pivotal role in their travel decisions.

Vaccine Valence Risk Perception and Vacation Intention: The world is anxiously awaiting a COVID-19 vaccine, the best option for reverting to a "normal" state before the pandemic hits. The use of vaccines to overcome illnesses known to modern medicine has become part of the strategy used to eradicate most of the modern known illnesses. Hence, introducing a vaccine can be seen as a game-changer for international and domestic travellers as it ensures the travellers' safety (Radic et al., 2021). Therefore, the attitude of the travellers towards vaccines will significantly determine the speed of recovery for the hospitality and tourism industry (Akarsu et al., 2020). Valence refers to the level of attractiveness and the averseness of a particular situation, event, or object (Cancino-Montecinos et al., 2018). A previous study on tourist valence suggests that positive valence is associated with the perceived benefits received by tourists exceeding their expectations (Xuefeng et al., 2021). In the case of vaccine valence risk perception, the emotion related to whether the vaccine taken will help to protect tourists and travellers against the pandemic will determine their intention to engage in future travel and vacation. The valence towards the vaccine recently introduced is quite unclear due to various issues surrounding the pandemic. For instance, despite the world's reliance on the vaccine in the past, which has proven to be effective, many uncertainties surround the current situation due to the magnitude of the infection and the rapid evolution of the virus that can potentially lead to the ineffective vaccine (World et al. Office for Europe, 2017). Apart from that, ongoing input about the pandemic from social media has created travel anxiety, potentially leading to negative valence and avoidance towards future travels (Radic et al., 2021). A study by Golets et al. (2020) has presented evidence suggesting that individuals with high or positive valence will respond more strongly to threats regarding COVID-19 and engage more with prosocial self-isolation to prevent the spread of this virus.

Vaccination in post-pandemic plays a pivotal role in meeting health standards and addressing the Health Minister's requirements in Malaysia. Before the pandemic, factors such as perceived vaccine levels and the intention to travel were significant considerations. Further, according to a study by Tay & Chan (2023) Vaccination can play a decisive role in reducing travel risk and rebuilding travel confidence. The study revealed that elements like vaccine trust, travel confidence post-vaccination, travel intention, and actual travel behaviour did not significantly influence travel behaviour. This finding indicates that although vaccination can boost travel confidence, it alone cannot revive the tourism industry in its early stages.

Conversely, the study's findings indicate that subjective norms and perceived risk are critical predictors of attitudes toward COVID-19 vaccines. The results reveal that individuals with a greater desire to travel experience a more substantial influence of their attitudes toward COVID-19 vaccines on their vaccination intentions. The study's findings indicate that travel desire can encourage COVID-19 vaccination intentions (Ekinci et al., 2022). Therefore, it can be argued that vaccination completeness might give them lower pandemic-related risk perception and might significantly alleviate their negative emotions, such as anxiety toward the destination (Nie et al., 2022) A study conducted in Iran found that the effectiveness of Covid-19 vaccination has a significant impact on travel intentions. The study showed that vulnerable vaccination leads to more extreme problem-focused coping, influencing tourists' adaptive behaviours during crises, highlighting the importance of COVID-19 vaccination on travel intention (Qezelbash et al., 2024).

Domestic Vacation Intention: Domestic tourism has also been significantly affected by the COVID-19 pandemic, as the restriction is not only confined by the international borders, but the activities within the domestic has also stopped abruptly. Vacation intentions can be described as the subjective likelihood that a client will or will not take certain tourist-related acts or activities that people want to do or plan during the holiday (Altinay Özdemir, 2020). Previous tourism research in the context of pandemic crises has primarily focused on analysing the impact of infectious disease impact on international travel intention (Altinay Özdemir, 2020) and psychological changes (Li et al., 2020), determining the relative willingness of people to engage in rural tourism in the context of the epidemic (Zhu & Deng, 2020). However, there is minimal information on vacation intention in the coronavirus crisis for domestic tourism-related travel risks.

The spread of the COVID-19 virus, safety concerns, and global travel restrictions led to a change in travel during this time. The results show that the respondents resigned, especially from going abroad for security reasons, choosing to instead stay in the country and other places that, from their point of view, were safer places to rest on a case study in Poland (Jęczmyk et al., 2023). In the same vein, Fan et al. (2023) found that constructs from the Theory of Planned Behavior (TPB) positively impacted respondents' intentions and actions regarding domestic travel. This research highlighted that TPB can provide insights into why people travel. Positive attitudes, motivation, social norms, and perceived behavioural control were linked to increased travel behaviours or intentions in China during the COVID-19 recovery period. Hence, it implies that attitudes towards travel, perceived behavioural control, and subjective norms all had a significant influence on promoting domestic travel. The research discovered that plans to travel within the country were inversely linked to risk perception. Therefore, if people believe that there are more significant risks involved in travelling, they are less likely to be willing to travel within their own country.

Research by Mohamed et al. (2023) indicates that, following the COVID-19 pandemic, university students in Malaysia are much more inclined to travel, both locally and internationally, in the upcoming year. Similarly, a study on Chinese residents' outbound travel intentions after the pandemic, grounded in the Theory of Planned Behavior (TPB), found that attitudes, subjective norms, perceived behavioural control, and previous travel experiences significantly boost their intention to travel (Liu et al., 2021). Thus, the intention to take domestic vacations plays a crucial role in shaping tourist behaviour.

Relationship Between Health Risk Perception and Vacation Intention: Even though perceived health risks have been used in various vacation intention studies, the COVID-19 pandemic is unique due to its impact on the worldwide tourism industry. Hence, current information about vacation intention does not reflect the current situation as previous studies focus more on infectious diseases on tourist arrivals and movements. However, the focus is more on the specific region than the worldwide threat (Wasiul Karim et al., 2020). Given the magnitude of this pandemic and its spreadability, it is still unclear how the attitude and behaviour of future

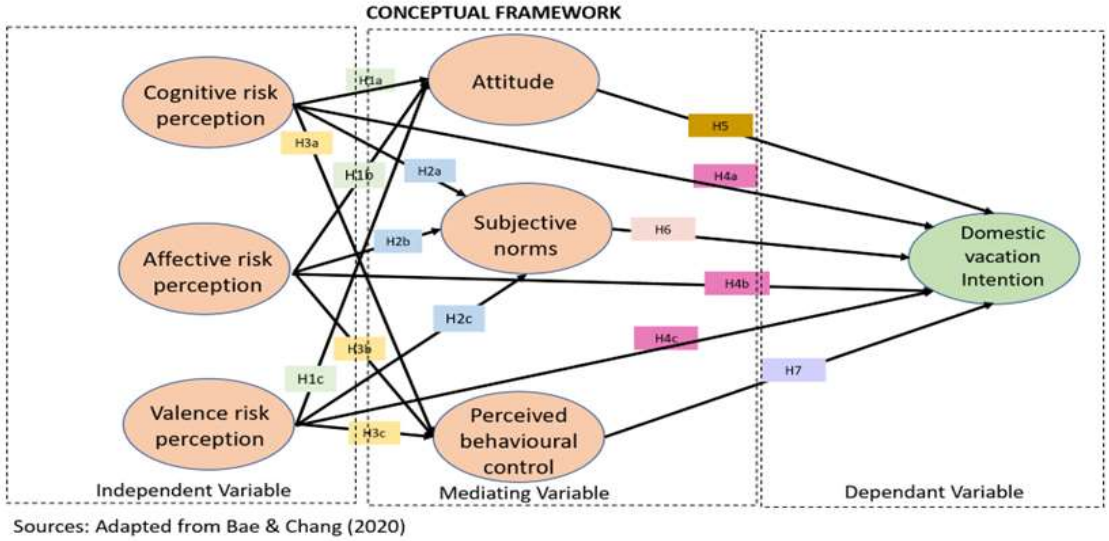
tourists are affected by these issues. Apart from that, strict lockdowns imposed on worldwide and domestic travellers should also significantly impact future travellers' behaviour. The restriction may cause deepened fear towards the pandemic, leading to reluctance to travel, or the strict lockdown can fuel the extreme need to go out or travel even more than ever. At this point, only speculation can be made, as a worldwide pandemic such as this is considered unprecedented and has never been encountered before in this modern time. Thus, when it comes to intention, it is still vague whether tourist trust can be fully restored, as in the pre-pandemic state, due to the self-protection behaviour found among tourists (Essam Janahi, 2011). The literature review section must be analysed and address relevant previous and current studies related to the focus of the research.

Health risk perception can influence individuals' vacation intentions during the post-pandemic era. A study found that COVID-19 has affected tourists' travel habits in the post-pandemic period. Hanafiah et al. (2022) revealed that perceived health risks can negatively impact travel attitudes and decrease future travel intentions in Malaysia. Conversely, Susanto et al. (2021) found that cognitive and affective perceived risks do not significantly influence travellers' attitudes towards post-pandemic travel. Thus, this indicates that contrary to expectations, these perceived risks might not be crucial in shaping travellers' post-pandemic travel attitudes. Similarly, a case study in Vietnam, conducted in the post-COVID-19 context, suggests that once the pandemic is under control, perceived risks, although present, have an insignificant effect on the public's travel intentions (Nguyen et al., 2021). Therefore, it is believed that the perception of health risks influences tourists' behaviour when considering vacation intentions.

Conceptual Framework and Research Hypothesis

This conceptual model tested in this study is adopted from Bae and Chang's (2020) work with the extension of vaccine valence risk perception to investigate whether tourist behaviour has shifted favourably towards vacation intention after vaccination. It is imperative to study the importance of vaccine valence due to the success rate of vaccines in treating other diseases before the COVID-19 pandemic. Thus, the proposed conceptual framework for this study is as follows:

Figure 1: Conceptual Framework



Sources: Adapted from Bae & Chang (2020)

Based on the research framework, seven hypotheses have been developed in this study:

H1a: There is a relationship between cognitive risk perception (CRP) influence on attitude (ATT) towards domestic vacation intention (DVI).
H1b: There is a relationship between affective risk perception (ARP) influence on attitude (ATT) towards domestic vacation intention (DVI).
H1c: There is a relationship between vaccine valence risk perception (VVRP) influence on attitude (ATT) control towards domestic vacation intention (DVI).
H2a: There is a relationship between cognitive risk perception (CRP) influence on the subjective norm (SN)

towards domestic vacation intention (DVI).
H2b: There is a relationship between affective risk perception (ARP) influence on the subjective norm (SN) towards domestic vacation intention (DVI).
H2c: There is a relationship between vaccine valence risk perception (VVRP) influence on the subjective norm (SN) towards domestic vacation intention.
H3a: There is a relationship between cognitive risk perception (CRP) influence on perceived behavioural control (PBC) towards domestic vacation intention (DVI).
H3b: There is a relationship between affective risk perception (ARP) influence on perceived behavioural control (PBC) towards domestic vacation intention (DVI).
H3c: There is a relationship between vaccine valence risk perception (VVRP) influencing perceived behavioural control (PBC) towards domestic vacation intention (DVI).
H4a: Cognitive risk perception (CRP) will exert an influence on behavioural intention.
H4b: Affective risk perception (ARP) will exert an influence on behavioural intention.
H4c: Vaccine valence risk perception (VVRP) will exert an influence on behavioural intention.
H5: Attitude (ATT) will exert a significant relationship to behavioural intention.
H6: Subjective norm (SN) will exert a significant relationship on behavioural intention.
H7: Perceived behavioural control (PBC) will exert a significant relationship to behavioural intention

3. Research Methodology

This study adopts a quantitative research design that aligns with the positivist point of view. The present study employs an online survey method of data collection based on the purposive sampling method. An online survey questionnaire created with Google Forms was distributed to Facebook Groups for travel interests, namely 'Cuti-Cuti Malaysia with 66,160 followers, Kaki Travel Malaysia with 77,000 members and Travel Budget and Backpacker Malaysia with 75,000 members. The target population for this study is domestic travellers in Malaysia. A total of 265 usable responses were obtained. The survey questionnaire was composed of four sections: (a) demographic profile, (b) domestic vacation intention, (c) health risk perception and (d) behaviour. In the four sections, responses were collected using a five-point Likert-type scale. The constructs used in this scale are based on previous research (Bae & Chang, 2020; Watson & Clark, 1985). This study utilised a content expert panel to verify all the items in terms of validity.

Meanwhile, Cronbach's Alpha coefficient was used to measure reliability. Cronbach's alpha coefficient results showed that all items were reliable, ranging from $\alpha = 0.753$ to $\alpha = 0.971$. More specifically, the value of domestic vacation intention was $\alpha = 0.937$; cognitive risk perception was $\alpha = 0.913$; affective risk perception was $\alpha = 0.893$, positive valence risk was $\alpha = 0.831$, negative valence risk was $\alpha = 0.902$, the attitude was $\alpha = 0.941$, the subjective norm was $\alpha = 0.971$, and perceived behavioural control was $\alpha = 0.753$. The current study employed SPSS (v.20) for primary data screening and preliminary analysis and SmartPLS (v.3.2.6) for measurement model and structural model mediation analysis for data analysis. The non-response bias test is covered in this chapter after the response rate. The following section provides a descriptive analysis of the discussed latent constructs. The current study's preliminary analytical results using PLS path modelling are then reported. The first section covers convergent validity and discriminant validity to examine measurement model dependability. Next, the following section describes the structural model assessment, which includes assessing the endogenous latent construct's variance explained, effect size, and predictive significance. Finally, the whole model PLS-SEM analysis was provided for the mediating influence between independent and dependent variables.

4. Results

Demographic Profile: The sample (n=261) comprised 36.8 per cent of the respondents who were male compared to female (63.2%). Most respondents were aged 31 to 35 (22.2%) and 36 to 40-year-old (23.0). Most respondents were Malays (88.9%) and married (67.8%). Regarding academic qualifications, most respondents (33.7%) had a bachelor's degree and worked in government sectors (52.1%). Most respondents were also from the B40 group, with an income of less than RM5000 a month.

Measurement Model: In this study, the research model that has been developed was tested using the partial least square (PLS) technique. The software that has been used to analyse the data is Smart PLS software version 3.2.6 (Hussain et al., 2018). Figure 2 portrays the assessment of the structural model using the SmartPLS 3.2.6.

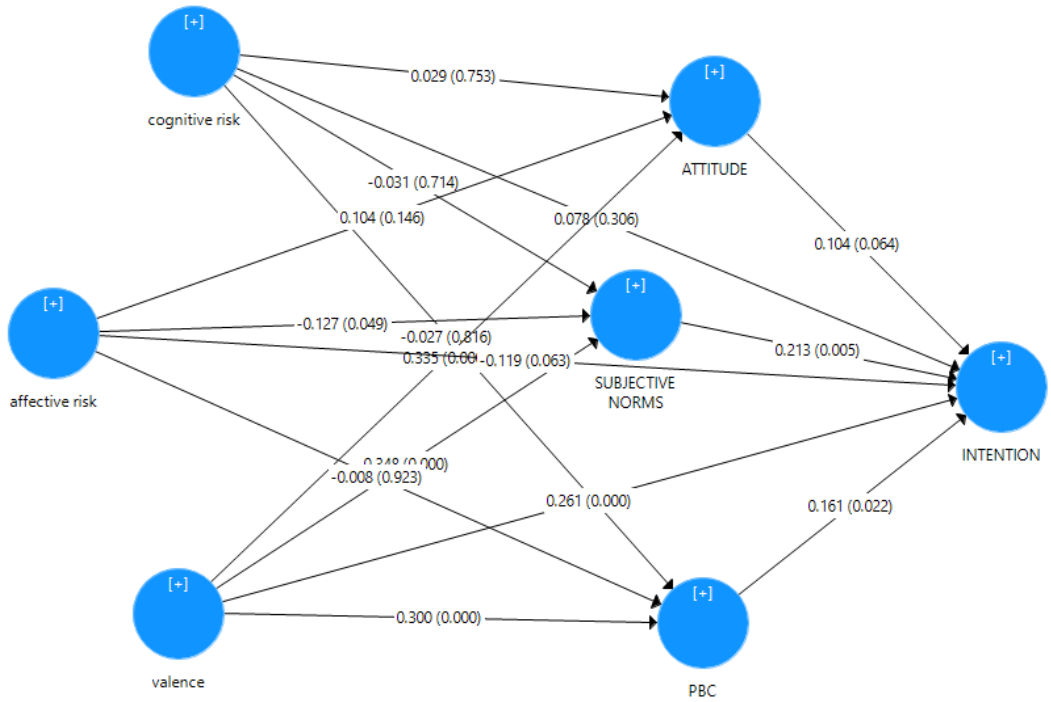
Table 1: Loadings, Composite Reliability and Average Variance Extracted

Main Variable	Indicator	Loading	Cronbach's Alpha	Composite Reliability	AVE
Travel Intention			0.942	0.958	0.852
	B1	0.846			
	B2	0.938			
	B3	0.957			
Cognitive Risk (CRF)			0.893	0.913	0.725
	CRP1	0.869			
	CRP2	0.906			
	CRP3	0.869			
	CRP4	0.753			
Affective Risk (ARF)			0.864	0.902	0.697
	ARP1	0.821			
	ARP2	0.758			
	ARP3	0.861			
	ARP4	0.894			
Negative Valence (NVR)			0.902	0.919	0.535
	NVR1	0.86			
	NVR10	0.628			
	NVR2	0.692			
	NVR3	0.623			
	NVR4	0.81			
	NVR5	0.746			
	NVR6	0.739			
	NVR7	0.765			
	NVR8	0.695			
	NVR9	0.722			
Positive Valence (PVR)			0.939	0.951	0.670
	PVR1	0.86			
	PVR10	0.878			
	PVR2	0.475			
	PVR3	0.564			
	PVR4	0.939			
	PVR5	0.927			
	PVR6	0.917			
	PVR7	0.935			
	PVR8	0.794			
	PVR9	0.655			
Attitude (ATT)			0.932	0.952	0.832
	A1	0.911			
	A2	0.944			
	A3	0.933			
	A4	0.858			
Subjective Norm (SN)	SN1	0.925	0.962	0.973	0.899

	SN2	0.964			
	SN3	0.948			
	SN4	0.955			
Perceived Behavioral Control (PBC)	PBC1	0.683	0.871	0.911	0.720
	PBC2	0.894			
	PBC3	0.918			
	PBC4	0.879			

Convergent Validity: To ascertain the convergent validity, the researcher used the average variance extracted (AVE) of each latent construct per the recommendation of Fornell and Larcker (2016). In comparison, Chin (1998) specified that the AVE value of 0.50 or greater indicates the convergent validity of a latent construct. Table 1 indicated that the AVE values of all latent constructs AVE values had exceeded the minimum criteria of 0.50.

Figure 2: Assessment of Structural Model with Mediation Effect (Full-Model)



After the assessment of the structural model path coefficients, the most widely used measure to assess the structural model is the coefficient of determination, also called the R-squared value (R2 value) (Sarstedt et al., 2020; Hair et al., 2014; Henseler et al., 2009), however, Falk and Miller (1992) suggest 0.10 as a minimum acceptable level of R-squared value. Chin (1998) recommended that PLS-SEM's R-squared values (R2 values) of 0.67, 0.33, and 0.19 can be measured as substantial, moderate, and weak. Table 4.2 provides the R-squared values of the endogenous latent construct of the current study.

Convergent Validity: To ascertain the convergent validity, the researcher used the average variance extracted (AVE) of each latent construct per the recommendation of Fornell and Larcker (2016). In comparison, Chin (1998) specified that the AVE value of 0.50 or greater indicates the convergent validity of a latent construct. Table 4.3 indicated that the AVE values of all latent constructs AVE values had exceeded the minimum criteria of 0.50. Thus, the current study exhibits the adequate convergent validity of the latent constructs (Chin, 1998).

Table 2: Variance Explained in the Endogenous Latent Variable

Latent Variable	R Square	R Square Adjusted
Attitude	0.119	0.109
Intention	0.324	0.308
PBC	0.093	0.083
Subjective Norms	0.150	0.14

As shown in Table 2, the current study research model explained 11.9 per cent of the total variance in the attitude, 9.3 per cent of PBC and 15.0 per cent of subjective norms. Later, the model also explained the 32.4 per cent variance of domestic vacation intention. Therefore, this recommends that the sets of exogenous latent and mediating variables of the current study collectively explain 32.4 per cent of the domestic vacation intention. Therefore, based on the recommendations of Falk and Miller (1992) and Chin (1998), the endogenous latent variable of the current study showed an acceptable level of R-squared value, which was also considered moderate. The construct cross-validated redundancy (Q2) statistics for the four endogenous latent variables of the current study were more significant than zero, signifying the model's predictive relevance.

Discriminant Validity: The current study used these two approaches to ascertain the discriminant validity issues. First, Fornell and Larcker (2016) used the AVE values to determine the discriminant validity. Table 3 exhibits that the AVE values should be greater than the square root between pair constructs. The square root of the AVE is not greater than the correlation among latent constructs, signifying adequate construct discriminant validity (Fornell & Larcker, 1981). Second, the heterotrait-monotrait ratio of correlations (HTMT) criterion was used in the current study to assess the discriminant validity proposed by Henseler et al. (2015).

Table 3: Latent Variable Correlations and Square roots of Average Variance Extracted

	ARF	ATT	CRF	DVI	NVR	PBC	PVR	SN
Attitude	**0.835**							
Intention	0.096	**0.912**						
PBC	0.401	0.028	**0.851**					
Subjective norms	-0.133	0.33	-0.039	**0.923**				
Affective risk	-0.067	0.21	-0.122	0.302	**0.731**			
Cognitive risk	-0.037	0.495	-0.07	0.434	0.201	**0.849**		
Valence	-0.05	0.349	-0.121	0.431	0.686	0.323	**0.819**	

According to Henseler et al. (2016), the HTMT estimates the factor correlation, and to discriminate between two factors (constructs), the HTMT value should be lower than 1. Therefore, if the HTMT value is lower than 1, the correlation between the two factors (constructs) is different; hence it should have differed. Moreover, if the HTMT value is more significant than this threshold, there is a lack of discriminant validity. In addition, some scholars recommended a threshold of 0.85 (Clark & Watson, 2019; Kline, 2015), while others suggested a threshold of 0.90 (Gold et al., 2001; THS Teo et al., 2015). Table 4.4 exhibits the HTMT values for the discriminant validity of the current study constructs. According to Henseler et al. (2016), the HTMT estimates the factor correlation, and to discriminate between two factors (constructs), the HTMT value should be lower than 1. Therefore, if the HTMT value is lower than 1, the correlation between the two factors (constructs) is different; hence it should have differed. Moreover, if the HTMT value is more significant than this threshold, there is a lack of discriminant validity. In addition, some scholars recommended a threshold of 0.85 (Clark & Watson, 2019; Kline, 2015), while others suggested a threshold of 0.90 (Gold et al., 2001). Table 4.4 exhibits the HTMT values for the discriminant validity of the current study constructs.

Table 4: HTMT Correlation Matrix for Discriminant Validity

	ARF	ATT	CRF	DVI	NVR	PBC	PVR
Attitude							
Intention	0.118						
PBC	0.501	0.094					
Subjective norms	0.133	0.349	0.053				
Affective risk	0.082	0.224	0.15	0.318			
Cognitive risk	0.079	0.552	0.114	0.454	0.208		
Valence	0.124	0.382	0.137	0.439	0.738	0.345	

Lastly, the Chin (1998) criterion was used to determine the discriminant validity by comparing the indicator's loadings of each construct with the cross-loadings of other constructs of the current study. Based on the recommendation of Chin (1998), the indicator's loadings should be greater than cross-loadings to achieve adequate discriminant validity (Grégoire & Fisher, 2006). Table 5 compares the indicator's loadings with other construct loadings. Each construct indicator's loadings were more significant than the cross-loadings, thus representing the suitable construct's discriminant validity.

Table 5: Cross Loadings

	ARF	ATT	CRF	DVI	NVR	PBC	PVR	SN
ARF1	**0.822**	0.078	0.432	-0.044	-0.077	0.012	-0.032	-0.133
ARF2	**0.758**	0.144	0.397	0.008	-0.021	0.065	0.017	-0.08
ARF3	**0.861**	0.044	0.278	-0.158	-0.07	-0.06	-0.075	-0.153
ARF4	**0.894**	0.092	0.319	-0.163	-0.047	-0.069	-0.042	-0.147
ATT1	0.09	**0.912**	0.107	0.329	0.184	0.492	0.338	0.329
ATT2	0.09	**0.945**	0.017	0.316	0.173	0.479	0.32	0.324
ATT3	0.094	**0.931**	0.009	0.276	0.227	0.447	0.325	0.284
ATT4	0.074	**0.857**	-0.047	0.28	0.184	0.38	0.286	0.28
CRF1	0.429	0.094	**0.869**	-0.027	-0.092	-0.035	-0.137	-0.108
CRF2	0.288	-0.052	**0.906**	-0.05	-0.138	-0.142	-0.118	-0.133
CRF3	0.354	0.051	**0.869**	-0.007	-0.121	0.005	-0.088	-0.107
CRF4	0.357	0.07	**0.753**	-0.053	0.009	0.041	0.007	-0.044
DVI1	-0.158	0.259	-0.083	**0.846**	0.233	0.311	0.315	0.354
DVI2	-0.117	0.295	-0.035	**0.938**	0.301	0.412	0.422	0.392
DVI3	-0.113	0.291	0.001	**0.957**	0.266	0.405	0.41	0.467
DVI4	-0.115	0.365	-0.039	**0.948**	0.307	0.459	0.431	0.474
NVR1	-0.09	0.158	-0.129	0.257	**0.86**	0.195	0.612	0.223
NVR10	-0.05	0.173	-0.017	0.212	**0.628**	0.168	0.416	0.183
NVR2	-0.011	0.085	0.042	0.145	**0.692**	0.115	0.394	0.187
NVR3	-0.002	0.082	-0.009	0.218	**0.623**	0.094	0.431	0.173
NVR4	-0.056	0.137	-0.079	0.189	**0.81**	0.156	0.527	0.189
NVR5	-0.105	0.15	-0.177	0.233	**0.746**	0.14	0.555	0.22
NVR6	-0.028	0.161	-0.174	0.241	**0.739**	0.211	0.52	0.212
NVR7	-0.012	0.149	-0.04	0.165	**0.765**	0.083	0.471	0.205
NVR8	-0.106	0.215	-0.201	0.283	**0.695**	0.16	0.54	0.219
NVR9	0.024	0.18	0.008	0.208	**0.722**	0.096	0.471	0.132
PBC1	0.026	0.392	-0.12	0.19	0.079	**0.688**	0.177	0.345
PBC2	-0.063	0.448	-0.102	0.407	0.198	**0.894**	0.319	0.742
PBC3	-0.007	0.436	-0.07	0.38	0.164	**0.918**	0.264	0.579
PBC4	-0.051	0.42	0.018	0.433	0.207	**0.877**	0.305	0.564
PVR1	-0.073	0.326	-0.124	0.394	0.509	0.298	**0.878**	0.31
PVR10	0.211	0.332	0.106	0.073	0.302	0.191	**0.475**	0.144
PVR2	0.058	0.263	0.005	0.152	0.361	0.148	**0.564**	0.161
PVR3	-0.141	0.272	-0.167	0.434	0.572	0.288	**0.939**	0.328
PVR4	-0.049	0.311	-0.12	0.405	0.564	0.292	**0.927**	0.344

PVR5	0.069	0.372	-0.063	0.377	0.544	0.313	**0.917**	0.314
PVR6	-0.13	0.266	-0.157	0.409	0.577	0.266	**0.935**	0.323
PVR7	-0.066	0.28	-0.14	0.355	0.91	0.283	**0.794**	0.347
PVR8	-0.069	0.165	-0.078	0.294	0.58	0.183	**0.655**	0.263
PVR9	-0.073	0.297	-0.122	0.458	0.619	0.317	**0.934**	0.376
SN1	-0.141	0.304	-0.103	0.407	0.259	0.581	0.327	**0.924**
SN2	-0.147	0.334	-0.113	0.44	0.276	0.644	0.37	**0.964**
SN3	-0.152	0.314	-0.123	0.465	0.229	0.67	0.335	**0.948**
SN4	-0.168	0.318	-0.144	0.432	0.258	0.677	0.356	**0.955**

Assessment of Significance of the Structural (Inner) Model: After the measurement (outer) model assessment, the current study evaluated the structural model, also called the inner model. The current study used the standard bootstrapping procedure with 5000 bootstrap samples and 261 cases to estimate the significance of the path coefficients, as per the guiding principles of (Hair et al., 2017; Hair et al., 2014; Henseler et al., 2009).

Assessment of Variance Explained in the Endogenous Latent Variable: Table 6 provides the R-squared values of the endogenous latent construct of the current study. As shown in Table 6, the current study research model explained 13.6 per cent of the total variance in the attitude, 10.6 per cent of PBC and 15.6 per cent of subjective norms. Later, the model also explained a 32.8 per cent variance in travel intention. Thus, the sets of exogenous latent and mediating variables of the current study are recommended to explain 32.8 per cent of the travel intention. Therefore, based on the recommendations of Falk and Miller (1992) and Chin (1998), the endogenous latent variable of the current study showed an acceptable level of R-squared value, which was also considered moderate.

Table 6: Variance Explained in the Endogenous Latent Variable

Latent Variable	R Square	R Square Adjusted
Attitude	0.136	0.123
Intention	0.328	0.309
PBC	0.106	0.092
Subjective Norms	0.156	0.143

Relationship between Predictors and Mediating Variables: The assessment of the structural model revealed the structural model path coefficients for the relationships of the current study. The findings presented in Table 7 and Figure 2 disclosed that affective risk (B = 0.104, t = 1.457, p>0.05) and cognitive risk (B = 0.029, t = 0.315, p>0.05) failed to display a significant relationship with attitude. However, vaccine valence risk perception (VVRP) significantly predicted attitude (B = 0.335, t = 5.934, p<0.01), supporting H1c. Likewise, the results, as shown in Table 6 and Figure 2, indicated a significant effect of affective risk (B = -0.127, t = 1.974, p<0.05) and vaccine valence risk perception (B = 0.0.348, t = 5.957, p<0.01) on subjective norms and successfully support H2a and H2c. Lastly, only vaccine valence risk perception showed a significant relationship with PBC (B = 0.300. t = 5.222, p<0.01) and supported H3c.

Table 7: Assessment of Structural Model Direct Relationships and Travel Intention

Hypothesis		B	T Statistic	Sig.	Decision
H1b	ARP -> ATT	0.104	1.457	0.146	Not Supported
H1a	CRP -> ATT	0.029	0.315	0.753	Not Supported
H1c	VVRP-> ATT	0.335	5.934	0.000	Supported
H2b	ARP -> SN	-0.127	1.974	0.049	Supported
H2a	CRP -> SN	-0.031	0.367	0.714	Not Supported
H2c	VVRP-> SN	0.348	5.957	0.000	Supported
H3b	ARP -> PBC	-0.008	0.097	0.923	Not Supported
H3a	CRP -> PBC	-0.027	0.233	0.816	Not Supported
H3c	VVRP -> PBC	0.3	5.222	0.000	Supported

Testing of Mediation Effect: The assessment of the structural model revealed the structural model path coefficients for the relationships of the current study. The findings presented in Table 7 and Figure 2 disclosed that affective risk perception (ARP) (B = 0.104, t = 1.457, p>0.05) and cognitive risk perception (CRP) (B = 0.029, t = 0.315, p>0.05) failed to display a significant relationship with attitude (ATT). However, vaccine valence risk perception (VVRP) significantly predicted attitude (B = 0.335, t = 5.934, p<0.01), supporting H1c.

Table 8: Assessment of Structural Model Direct Relationship and Travel Intention

	Relationship	Beta	T statistic	Sig.	
H4a	ARP -> DVI	-0.119	1.864	0.063	Not Supported
H4b	CRP -> DVI	0.078	1.025	0.306	Not Supported
H4c	VVRP -> DVI	0.261	4.279	0.000	Supported
H5	ATT -> DVI	0.104	1.856	0.064	Not Supported
H6	PBC -> DVI	0.161	2.302	0.022	Supported
H7	SN -> DVI	0.213	2.805	0.005	Supported

Likewise, the results, as shown in Table 4.8 and Figure 2, indicated a significant effect of ARP (B = -0.127, t = 1.974, p<0.05) and VVRP (B = 0.0.348, t = 5.957, p<0.01) on SN and successfully support H2a and H2c. Lastly, only VVRP showed a significant relationship with PBC (B = 0.300. t = 5.222, p<0.01) and supported H3c. Furthermore, the structural model was also assessed, including the mediating variable (value and satisfaction) using the SmartPLS 3.2.6 (Ringle et al., 2015), as shown in Figure 2. According to Table 8, only three predictors showed a significant relationship with travel intention. The significant predictors were vaccine valence (B = 0.261, t = 4.279, p<0.01), PBC (B = 0.161, t = 2.302, p<0.05) and subjective norms (B = 0.213, t = 2.805, p<0.01). These findings only supported H4c, H6 and H7. Besides that, Figure 2 showed that vaccine valence significantly predicted PBC (B = 0.300, p<0.01), fulfilling path 'a' (IV to MV). PBC also significantly correlated with intention (B = 0.161, p<0.05) in path 'b'. In path 'c', vaccine valence had a significant relationship with intention (B = 0.261, p<0.01). The insertion of PBC as a mediation variable in the equation decreased the relationship between vaccine valence and intention (B = 0.048, p<0.05). These results have indicated that PBC partially mediated the relationship between vaccine valence and intention.

To assess the PLS path model's predictive relevance, Stone Geisser's Q2 was estimated (Hair et al., 2017). Estimates were employed using the blindfolding technique to supplant actual data points recursively at an omission distance of 7 (the default omission distance in SmartPLS). Furthermore, the Q2 values were obtained using the cross-validated redundancy approach as per the recommendation of Hair *et al*. (2017). According to Hair *et al*. (2017), "the cross-validated redundancy approach builds on the path model estimates of both the structural model and the measurement model of data prediction" (p. 207). Thus, prediction via cross-validated redundancy fits the PLS-SEM approach perfectly (Hair *et al*., 2017). Furthermore, according to Henseler *et al*. (2009) and Chin (1998), in a structural model, the Q2 values greater than zero for an endogenous latent variable indicate the path model's predictive relevance. Table 9 presents the construct cross-validated redundancy (Q2) test results of the current study.

Table 9: Construct Cross-Validated Redundancy

Total	SSO	SSE	Q2 Statistics (1-SSE/SSO)
Attitude	1,044.00	948.688	0.091
Intention	1,044.00	778.881	0.254
PBC	1,044.00	984.681	0.057
Subjective Norms	1,044.00	916.776	0.122

As indicated in Table 9, the construct cross-validated redundancy (Q2) statistics for the four endogenous latent variables of the current study were more significant than zero, signifying the model's predictive relevance in line with Henseler *et al*. (2009) and Chin (1998).

Discussion

The findings revealed that only perceived behavioural control and subjective norms mediated the relationship between health risk perception and domestic vacation intention. In the tourism industry, COVID-19 is a disruptive factor that influences how travellers perceive the safety of their trip. Therefore, domestic travellers might not perceive travel during the pandemic as a risky decision and a vital decision-making activity in this study. Vaccine valence risk perception is the internal factor, and domestic tourists perceive the benefit of the vaccination program. The decision to travel might change despite the threat of pandemics as the vaccines are viewed as hopeful future travellers travel safely without contracting this disease. Tourists with high vaccine valence risk perception tend to make the decision confidently. Based on the participants' characteristics, they were adult tourists. In this way, the perceived risk did not influence the judgments taken. In this case, decisions were taken considering their maturity, experience, and high vaccine valence risk perception in decision-making, among other factors.

Besides that, attitude in this study was related to social risk and did not capture the whole dimension of risk. The findings differed if the full dimensions of risk, such as security, finance, privacy, performance, time and psychology, were used. Perceived attitude was not an issue for tourists because travel, such as visiting family, has become necessary. It can be concluded that if the domestic vacation tourist perceives the behaviour as risky, there will be hesitation when deciding to travel. Theoretically, if the resisting behaviour were high, the domestic tourist would depend on their vaccine valance decision-making sources. The study showed that PBC and subjective norms influence the relationship between vaccine valance and domestic vaccine travel intention. Theoretically, PBC and subjective norms strongly influenced domestic vacation intention. In this study, if the tourists perceive the decision as risky, it may lead to less confusion. It showed that when the PBC and subjective norms are more significant, vaccine valance dependence on intention is high.

This study sheds light on the impact of COVID-19 on the behaviour of tourists during this unprecedented pandemic. Based on timely data collection and analysis, tourist behaviour has shifted favourably toward vacation intention after vaccination. This study offers several theoretical implications. First and foremost, this study is an academic effort to contribute to tourist literature by evaluating the current worldwide issue that has created significant upheaval in global society and the lives of individuals. It considers the COVID-19 vaccine the best option for reverting to a "normal" state before the pandemic. The findings of this study will be helpful for future longitudinal studies monitoring tourists' short- and long-term behaviour changes, as Bae and Chang (2020) suggested. Secondly, this study applied the extension of vaccine valence risk perception, the emotion related to whether the vaccine taken that helps to protect tourists and travellers against the pandemic has determined their intention to engage in future travel and vacation. However, prior research has focused on vaccine valence risk perception, a protective behaviour based on the health belief model. This study discussed vacation intention after vaccination to indicate a 'new normal' tourism behaviour, allowing people to travel even during a pandemic while reducing perceived health risks. Vaccine valence risk perception significantly predicted tourists' attitudes, subjective norms, and perceived behavioural control toward vacation intention. This health-protective behaviour could be an avenue for future research in post-corona. Third, this study expanded the health risk perception theory with the vaccine valence risk perception variable. In addition, it confirmed the mediating role of attitude, subjective norm and perceived behaviour control between health risk perception and domestic vacation intention. The findings might have differed if the study had been conducted before or after the MCO and the COVID-19 situation had relaxed. Although not all tourists' behaviour factors did not mediate the effect of health belief on vaccine travel intention, it was found to be a significant mediator in the equation. Finally, the issue of safety and risk will be continuously argued. More research on travel intention is expected to be carried out by considering different factors, such as environment, situation, and context.

5. Conclusion

This study offers practical implications for the tourism industry in Malaysia and the global tourism market. From a manager's perspective, this research offers valuable insight; tourism agencies should concentrate on the causes of travel intention, such as information about the risks of travelling. Tourism agencies and the government should refrain from giving unnecessary information or using jargon when introducing a travel spot as some of the technical terms may not be understood by tourism. Therefore, travel agencies must learn to

convey information about their products or brands more straightforwardly and effectively to tourists. Travel agencies and Tourism Malaysia also need to consider vaccine valence risk perception, subjective norms, and perceived behaviour control in travellers' decision-making during travel. The ability to influence the vaccine travellers may help them market the spot and increase travel intention during the pandemic. Tourists may refer to a risk assessment for advice or information hence, travel agencies should provide a convenient and conducive atmosphere to attract tourists and their friends/peers to travel and visit the place and search for the correct information about the services offered. One of the strategies to reduce the tourist fear of travelling was to narrow down the risk of infection from COVID-19 by providing a hygienic and safe travelling spot. Also, travel agencies must explain the function and the importance of each attribute of safety measures taken for the traveller. Besides that, travel agencies can also create a website that provides information to address travellers' risks. If the travel agent fails to take any measure to address the issue of safety and risk, domestic vaccine travellers might experience confusion about the risks and dangers of travel. Addressing domestic travellers' may be time-consuming, but it could be a fruitful approach in the long run.

Limitation of study: This study has several limitations, one of which is that the study was correlational and not causal. As a result, a genuine cause-effect relationship could not be established. Future research should use an experimental design to establish causality, where data can be collected multiple times during the research period. In this way, changes in perception and behaviour related to decision-making can be better understood. Another limitation relates to the generalisability of the results due to the setting and sample selection. Since this study was conducted online, the results may need to be generalisable to other respondent groups in Malaysia. Using the online survey could also compromise the validity of the results. For one, the halo effect could occur. Also, the study could suffer from agreement bias, where participants tend to agree with the questions asked. As this study focused on domestic vacation intention, demographic factors were not highlighted. Future research should consider demographic factors, especially when incorporating a new environment. Previous studies on vacation intention indicated that demographic factors influence vacation intention. Therefore, this study should use these factors as controlled variables. The type of participants is another limitation of this study. The participants of this study were from various industries and backgrounds. Their responses could have been different if the study had been conducted on tourists from the specific industry. Future researchers may study other industries, such as health services, education, agriculture, and airlines. Also, future research should include other ethnic groups to understand how different ethnicities address tourist valence and vacation intention. Other ethnic groups should be considered to reflect the diversity of the Malaysian population.

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The Development of Halal Well-Being Experience Quality: A Conceptual Framework

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Abstract: In recent years, the hospitality and tourism industry has increasingly focused on enhancing the well-being of guests by providing tailored experiences that address their physical, mental, and spiritual health. This shift has spurred the development of Halal well-being experiences, specifically designed to cater to Muslim travelers by aligning services and facilities with Islamic principles. Halal well-being experiences include a range of services such as Halal-certified food, prayer facilities, gender-segregated wellness amenities, and activities promoting spiritual health. These offerings are vital for Muslim travelers who seek destinations and accommodations that respect and cater to their faith-based needs. To address these challenges, a comprehensive framework for Halal well-being experience quality is essential. This framework should include clear guidelines for service provision, training programs for staff, and effective marketing strategies. This research aims to explore the current state of Halal well-being experiences in the hospitality industry, identify the key challenges and opportunities, and propose a framework for enhancing service quality. The study provides insights and recommendations for developing and promoting Halal well-being experiences that cater to the needs of Muslim travelers. The research underscores the importance of seven dimensions of tourism experience quality (TEQ) in influencing tourist well-being: Halal hedonism, Muslim-friendly involvement, local culture friendliness, refreshment experience, meaningfulness experience, knowledge experience, and novelty experience. These dimensions collectively enhance the physical, mental, social, and spiritual well-being of Muslim travelers, promoting a holistic approach to well-being in the tourism sector.

Keywords: *Halal Well-Being, Halal Experience, Tourist Experience Quality, Halal Friendly Tourism*

1. Introduction

Nowadays, Halal-friendly tourism become one of the modern trends in a fast-growing global market (Kusumaningtyas, Latifah, Suprihandari, & Syauqi, 2021; Som, Masutani, & Ahmad, 2016) and continues to evolve, catering specifically to Muslim travelers' needs by ensuring all services and facilities comply with Islamic principles (Halal Trip,2024). Moreover, while the current trend of wellness tourism has seen a significant increase with numerous studies exploring various aspects (Bočkus, Vento, & Komppula, 2024; Chi, Chi, Deng, & Price, 2024; Wang et al., 2024). This trend has given rise to the development of Halal well-being experiences, which cater specifically to the needs of Muslim travelers by ensuring that services and facilities align with Islamic principles (Crescent Rating, 2023). The development of Halal well-being experience quality not only addresses the religious and cultural requirements of Muslim tourists but also contributes to the broader goal of inclusive and sustainable tourism.

Halal well-being experiences encompass a range of services, including Halal-certified food, prayer facilities, gender-segregated wellness amenities, and activities that promote spiritual health (Halal World Institute, 2024). Especially, Southeast Asian countries are well-known for their diverse food and beverage offerings (Ngelambong et al., 2024). The integration of these elements into hospitality services ensures that Muslim guests can maintain their religious practices while enjoying a holistic well-being experience. The importance of such offerings is underscored by the increasing number of Muslim travelers who seek destinations and accommodations that respect and cater to their faith-based needs (Mohsin, Ramli, & Alkhulayfi, 2022). Despite the growing demand, the development of Halal well-being experiences faces several challenges. One of the primary issues is the lack of standardized guidelines and certifications for Halal well-being services, which can lead to inconsistencies in service quality and guest satisfaction (Rahman, Aziz, & Sawani, 2023). Additionally, there is a need for greater awareness and training among hospitality providers to understand and effectively meet the unique requirements of Muslim guests.

Recent studies highlight the significance of incorporating Halal principles into well-being experiences to enhance the overall satisfaction and loyalty of Muslim travelers. For instance, Al-Ansi and Han (2022) found

that the provision of Halal-certified wellness services, such as spa treatments and fitness facilities, significantly impacts the perceived value and satisfaction of Muslim guests. Similarly, research by Zulkifli, Ab Halim, and Abdullah (2023) emphasizes the role of cultural sensitivity and the integration of Islamic values in creating a memorable and fulfilling well-being experience for Muslim tourists.

To address these challenges and capitalize on the opportunities presented by the growing Halal tourism market, it is crucial to develop a comprehensive framework for Halal well-being experience quality. Such a framework should include clear guidelines for service provision, training programs for staff, and effective marketing strategies to attract and retain Muslim guests. By doing so, the hospitality industry can ensure that Halal well-being experiences meet the highest standards of quality and inclusivity. This research aims to explore the current state of Halal well-being experiences in the hospitality industry, identify the key challenges and opportunities, and propose a framework for enhancing service quality. Through a combination of literature review, case studies, and interviews with industry experts, this study seeks to provide valuable insights and recommendations for developing and promoting Halal well-being experiences that cater to the needs of Muslim travelers.

2. Literature Review

Halal-Friendly Tourism Concept

Halal-friendly tourism has become a significant segment in the global travel industry, driven by the growing number of Muslim travelers seeking services that align with their religious beliefs and practices. Halal tourism refers to travel and hospitality services that comply with Islamic law (Sharia) and provide products and services according to Islamic teachings for Muslim use (Han et al., 2019). This form of tourism aims to meet the religious needs of Muslim tourists, ensuring that offerings align with their beliefs and practices (Sánchez & Moral, 2019). Designed to follow Islamic law (Sharia), halal tourism meets the requirements of Muslim travelers while remaining accessible to non-Muslims (Wahyudin et al., 2021). The concept has gained global traction, with both Muslim and non-Muslim countries recognizing its potential and developing this niche market (Satriana & Faridah, 2018). Halal tourism encompasses accommodations, attractions, facilities, services, and overall experiences that comply with Islamic principles (Parhan et al., 2021), creating an environment where Muslim travelers can comfortably practice their faith while exploring various destinations (Battour et al., 2021).

The primary components of Halal tourism include Halal-certified food and beverages to ensure that all food and drinks provided are Halal-certified, free from pork, alcohol, and any non-Halal ingredients (Henderson, 2022), prayer Facilities provide clean and private spaces for prayer, equipped with Qibla direction indicators and prayer mats (Al-Ansi et al., 2023), modesty and privacy as offering gender-segregated facilities such as swimming pools, spas, and gyms to maintain modesty (Stephenson, 2024), and halal entertainment as ensure that entertainment options do not conflict with Islamic values and principles (Battour et al., 2024). Thus, those are elements to ensure that Muslim travelers can maintain their religious practices while traveling (Battour & Ismail, 2022; Ekka, 2023). The availability of halal-friendly options can significantly enhance the good experience and improve the well-being of Muslim travellers (Henderson, 2022).

Halal Tourist Experience Quality

Tourists experience quality (TEQ) is defined as an individual's internal and subjective response to a company's product, service, or brand (Meyer & Schwager, 2007). However, defining customer experience is challenging due to its intricate nature and characteristics (Palmer, 2010). Knutson, Beck, Kim, and Cha (2007) state that customer experience is difficult to articulate because it is an 'elusive and ambiguous term. Various elements of what a customer experiences have been examined to understand it better. Palmer (2010) highlights two dictionary-based perspectives on customer experience: a cognitive one, which involves acquiring knowledge or skills through participation, and an emotional one, which involves feeling emotions or engagement during an event. The concept of tourist experience quality, including the seven dimensions of TEQ proposed by Kim and Ritchie (2014) and Kim et al. (2010), is considered appropriate for investigating key tourism experiences, as supported by several studies on the perceived quality of tourist experiences (Chua et al., 2015; Hosany & Witham, 2010; Huang & Hsu, 2009; Kwortnik, 2008).

The dimensions effectively address both specific aspects of tourist experiences and contextual factors such as emotions and traveler motives. The dimensions of Tourist Experience Quality (TEQ) are defined as follows: Hedonism: the pleasure and enjoyment derived from the experience (Seligman, 2011). Involvement: the level of personal engagement and interest in the activities (Zaichkowsky, 1985). Local Culture Friendly: the quality and impact of interactions with others, including locals and other tourists (Richards, 2018). Refreshment: the sense of rejuvenation and relaxation obtained from the experience (Smith & Puczkó, 2014). Meaningfulness: the personal significance and value attributed to the experience (Seligman, 2011). Knowledge: the educational value and learning opportunities provided by the experience (Falk & Dierking, 2018) and Novelty: the perception of new, unique, or different experiences (Lee & Crompton, 1992).

This study adopts the TEQ dimensions consisting of Halal hedonism, Muslim Friendly involvement, Local culture friendly to Muslims, Refreshment experience, Meaningfulness experience, Knowledge experience, and Novelty experience (Kim & Ritchie, 2014; Kim et al., 2010) to describe tourist experience dimensions and evaluate their relevance in explaining different types of Muslim tourist experiences.

The Link Between Experience Quality and Well-Being Concept

Well-being theory involves both methodological and substantive diversity: positive emotion is a subjective variable defined by individual thoughts and feelings. Engagement, meaning, relationships, and accomplishment have both subjective and objective aspects because one might think they possess these qualities and still be mistaken. Thus, well-being is not solely a mental state; it combines feeling good with having purpose, meaningful relationships, and achievements. Our goal in life is to optimize all five of these elements (Seligman, 2011, p. 36). This approach suggests that Positive Psychology aims to enhance flourishing by increasing positive emotions, engagement, meaning, relationships, and accomplishments, thereby creating a more meaningful existence (Packer, 2008).

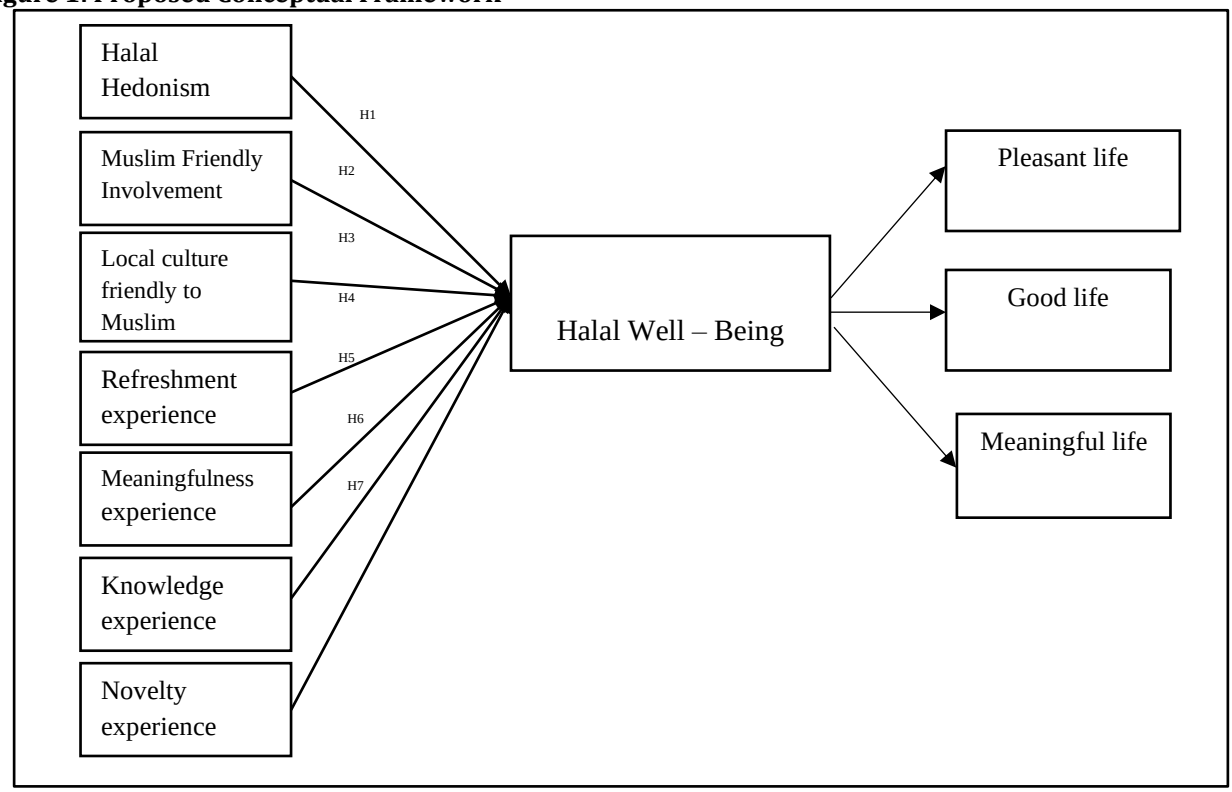
Moreover, well-being is often understood as a measure of the quality of life or the level of hedonic happiness (Fu et al., 2020; Sharpley, 2014). Subjective well-being or life satisfaction is commonly used as an indicator of happiness. Research has demonstrated that tourism or travel involves the pursuit of hedonic experiences, with tourists' happiness varying based on their personality, the types of destinations, and the nature of travel activities they engage in (Bimonte & Faralla, 2014; Chen & Li, 2018; Filep & Research, 2014). A high-quality experience during travel can significantly enhance overall happiness, with social interactions being one of the most critical factors contributing to this happiness (S. Chen et al., 2019). Therefore, well-being is conceptualized within Seligman's (2002) authentic happiness theory, which comprises the pleasant life, the good life, and the meaningful life. The pleasant life emphasizes maximizing enjoyable and positive experiences, involving positive emotions about the past, present, and future. The good life refers to engagement and the realization of one's potential through meaningful activities. A meaningful life involves a sense of purpose and the pursuit of activities that contribute to personal growth and the well-being of others.

In the context of Halal tourism, if stakeholders can provide a high-quality experience during a trip can significantly enhance the well-being of Muslim travelers. Ensuring that dietary needs are met with Halal service and creating an environment that respects Islamic values contribute to the physical, mental, social, and spiritual well-being of travelers (Battour & Ismail, 2016; Henderson, 2022). This research adopted the concept of experience quality that leads to well-being, aiming to develop a conceptual framework for future research adaptation.

3. Conceptual Framework

Figure 1 presents the conceptual framework developed for this study. This framework is based on a comprehensive review of the literature, focusing on examining the quality of the Halal experience and its impact on well-being improvement. It integrates the experience quality theory, which includes dimensions such as hedonism, involvement, local culture, refreshment, meaningfulness, knowledge, and novelty. These dimensions contribute to well-being, conceptualized as comprising a pleasant life, a good life, and a meaningful life.

Figure 1: Proposed Conceptual Framework



Following a figure 1 can be explain about model of experience quality are; 1) Halal hedonism: representing the pursuit of pleasure and enjoyment in tourism experiences positively influences tourist well-being, 2) Muslim Friendly involvement referring to the level of engagement and participation in tourism activities positively that Muslim travelers value immersive and interactive experiences that allow them to actively engage with the destination and its culture 3) Local culture friendly to Muslim representing the authenticity and cultural richness of tourism experiences positively influences tourist well-being, 4) Refreshment experience representing the revitalization and rejuvenation experienced during tourism activities positively influences tourist well-being 5) Meaningfulness experience is a positive influence on tourist well-being, indicating that Muslim travelers value meaningful connections 6) Knowledge experience, representing the acquisition of new information and insights through tourism experiences, and 7) Novelty experience representing the uniqueness and halal friendly of tourism experiences.

Moreover, the Halal well-being context can be explained as a pleasure life that focuses on maximizing pleasurable and positive experiences, good life refers to engagement and the realization of one's potential through meaningful activities and meaningful life as involves a sense of purpose and the pursuit of activities that contribute to personal growth and the well-being of others.

Hypotheses of the study

This research aims to explore the current state of Halal well-being experiences in the hospitality industry, identify the key challenges and opportunities, and propose a framework for enhancing service quality.

H1: Halal hedonism positively influences tourist well-being.
H2: Muslim-friendly involvement positively influences tourist well-being.
H3: Local culture friendly to Muslims positively influences tourist well-being.
H4: Refreshment experience positively influences tourist well-being.
H5: Meaningfulness experience positively influences tourist well-being.
H6: Knowledge experience positively influences tourist well-being.
H7: Novelty experience positively influences tourist well-being.

Directions for Future Research

This future research will focus on Muslim tourists. The study will employ a mixed-method research design, integrating both qualitative and quantitative data. Data collection will involve the use of self-administered questionnaires and in-depth interviews form. The qualitative will be used for content analysis techniques to apply for analyzing the data. Quantitative data will be analyzed using Partial Least Squares Structural Equation Modelling (PLS-SEM). The data analysis process will be conducted in two stages: first, data purification and descriptive analysis; second, statistical analyses will be performed, including evaluation of the measurement model, structural model, and hypothesis testing.

4. Proposed Outcome and Implementation to Develop Halal Well-Being Experience Strategies

The study emphasizes the necessity of a comprehensive framework to ensure high-quality Halal well-being experiences. This framework should encompass clear service provision guidelines, staff training programs, and effective marketing strategies to cater to Muslim travelers' needs. The research highlights seven dimensions that are critical in influencing tourist well-being: Halal hedonism, Muslim-friendly involvement, local culture friendliness, refreshment experience, meaningfulness experience, knowledge experience, and novelty experience. These dimensions collectively enhance the physical, mental, social, and spiritual well-being of Muslim travelers.

The findings of this study have several potential outcomes and suggest directions for future research in the field of Halal well-being experiences within the hospitality and tourism industry:

A. Enhanced Well-being of Muslim Travelers:
Halal Hedonism: By providing pleasurable and enjoyable experiences, destinations can significantly enhance the well-being of Muslim travelers. This could lead to increased tourist satisfaction and loyalty.
Muslim-friendly involvement: Facilitating immersive and interactive experiences that engage Muslim travelers with the local culture can foster deeper connections and enhance their overall well-being.
Local culture friendly to Muslims: Promoting authentic cultural experiences allows Muslim travelers to derive satisfaction from exploring and understanding cultural heritage and traditions.
Refreshment experience: Offering revitalizing and rejuvenating experiences can contribute to the physical and mental well-being of Muslim travelers.
Meaningful experience: Creating meaningful experiences that resonate with the values and beliefs of Muslim travelers can enhance their sense of fulfillment and well-being.
Knowledge experience: Providing educational and informative experiences can enrich the intellectual well-being of Muslim travelers.
Novelty experience: Offering unique and novel experiences can stimulate curiosity and a sense of adventure, contributing to the overall well-being of Muslim travelers.

B. Improved Service Quality and Inclusivity:
Developing a comprehensive framework for Halal well-being experience quality can ensure that services meet the highest standards of quality and inclusivity. This framework can provide clear guidelines for service provision, staff training, and effective marketing strategies.

C. Increased Market Competitiveness:
Destinations that successfully implement Halal well-being experiences can gain a competitive edge in the growing Halal tourism market. This can attract a larger segment of Muslim travelers and potentially increase revenue for tourism providers.

5. Conclusion

The quality of experiences plays a critical role in enhancing well-being. By understanding the various dimensions of experience quality and their impact on physical, mental, social, and spiritual health, service providers can design experiences that promote holistic well-being. Future research should continue to explore innovative ways to integrate well-being into the design and delivery of high-quality experiences across different domains. For example, previous studies have examined Muslim travellers' needs and concerns regarding halal-

friendly attributes when journeying to non-Muslim destinations (Al-Ansi and Han, 2019, Han et al., 2019, Said et al., 2020). Additionally, studies have examined inconveniences experienced by Muslim travellers in non-Muslim destinations (Al-Ansi and Han, 2019).

Additionally, the concept of well-being in Halal tourism is intricately connected to the ideas of a pleasant life, a good life, and a meaningful life. These concepts, rooted in positive psychology and adapted for Halal tourism, provide a comprehensive framework for understanding and enhancing the well-being of Muslim travelers. By incorporating these insights, the hospitality industry can further refine and enhance Halal well-being experiences to better serve the needs of Muslim travelers.

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Managing Complexities in Giant Freshwater Prawn Breeding Facilities in Perak, Malaysia: A Case Study

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Abstract: Malaysia's aquaculture industry has seen significant growth in recent years, with the giant freshwater prawn (Macrobrachium rosenbergii) emerging as a key species of economic importance. This study examines the intricate challenges faced by hatchery owners' breeding facilities in Manjung, Perak, Malaysia as they strive to maintain and improve the brood stock production of this valuable crustacean. The research focuses on the multifaceted, operational aspects of managing giant freshwater prawn (Macrobrachium rosenbergeii) hatcheries. Through a combination of field studies guided by the qualitative methodology, the identification of primary obstacles encountered at the Manjung breeding facilities was evaluated via current management practices. The findings revealed that hatchery owners lack adequate managerial skills in handling operational matters such as budgeting, labor utilization, utilities, marketing, and networking. The most critical factor was the cost-effective sourcing of healthy, brood stock supply from local fishermen. Furthermore, the research underscores the importance of genetic diversity in broodstock populations as hatcheries struggle with inbreeding depression, necessitating the development of more robust breeding programs. From the socio-economic standpoint, a holistic approach to addressing these issues, emphasizes the need for increased collaboration between research institutions, government agencies, and private sector stakeholders. The study provided a comprehensive overview of the complexities inherent in managing giant freshwater prawn breeding facilities in Malaysia. By identifying key challenges and potential solutions, it aims to contribute to the sustainable development of this vital sector of Malaysia's aquaculture industry. The findings have implications for policy-making, industry practices, and future research directions in the field of freshwater prawn (udang galah) aquaculture and food security agenda.

Keywords: *Hatchery management, giant freshwater prawn, broodstock, aquaculture facilities*

1. Introduction and Background

Aquaculture production has shown a significant increase after the pandemic lockdowns to meet the national agenda for food security. Specifically, the Malaysian aquaculture sector produced approximately 411,781 tons of total aquaculture production with an estimated economic value of USD 700 million in 2019 (Tan et al., 2024). Malaysia's giant freshwater prawns, locally known as *udang galah* (*Macrobrachium rosenbergii*), have always remained firm in demand. From aquaculture reports, *udang galah* farming is a lucrative endeavor resulting in many *udang galah* farming ventures, including hatcheries for larvae production. Introduced in the 1970s, this species has gained prominence due to its economic value and cultural significance in local cuisine. The industry has seen steady growth, particularly in states like Perak, Kedah, and Johor, where climatic conditions favor prawn cultivation. However, the sector faces numerous challenges, especially in hatchery management. These facilities, crucial for supplying quality seed stock, grapple with issues ranging from water quality management in Malaysia's tropical climate to disease control, particularly white tail disease and vibriosis. The government has recognized the industry's potential, implementing supportive policies through the National Aquaculture Development Plan and providing research backing via institutions like the Fisheries Research Institute. Despite these efforts, hatcheries continue to face complexities in areas such as nutrition management, genetic improvement to combat inbreeding depression, and adaptation to evolving market demands. Furthermore, the industry must navigate socio-economic hurdles, including labor shortages in rural areas and competition for resources with other aquaculture species. As Malaysia aims to solidify its position in the ASEAN prawn market, understanding and addressing these hatchery management challenges becomes crucial for the sustainable growth and competitiveness of the giant freshwater prawn industry.

Nonetheless, the supply of giant freshwater prawns has been limited for various reasons. *Udang Galah* farmers in Perak Tengah have faced the closure of their business project because of the need for more quality broodstock. Thus, the paper aims to provide insights into the complexities and challenges faced by hatchery owners in Perak Tengah.

2. Literature Review

Food sources and finding alternatives to shorten organic farming for a consistent supply chain of aquaculture products are essential to a country's food security balance. Hence, the aquaculture industry in Malaysia plays an essential role in ensuring supply continuity. Therefore, there is a need to ensure that these entities practice good management strategies for the longevity of the business and sustainable practices. In doing so, there are challenges in aquaculture farming. Thus, this paper aims to showcase the challenges in hatchery management in the *macro brachium rosenbergeii* broodstock production. Challenges abound With any business setup, much so for giant freshwater farming, which requires hatchery owners or managers to diligently ensure that profits are made to cover the operational expenses. (Tambalque et al., 2015).

Aquaculture for Socioeconomic Growth

Aquaculture farming has become critical to a country's economy and community well-being. Fish farming, whether freshwater or sea-based marine animals, has been an entrepreneurial project for decades, but the intensity of aquaculture farming has become prominent after the coronavirus lockdowns from early 2020 to late 2021. Aside from fish farming, other food sources from the water, such as prawns and crabs, have become popular among entrepreneurs. According to Liew et al. (2024), mud crabs, for example, are economically important for aquaculture entrepreneurs. Like other aquaculture production, the domestic seafood demand is higher than the supply making *udang galah* priced above other prawn species. (Liew et al., 2024). Realizing the market potential for giant freshwater prawns as a billion-dollar industry, Brazil's aquaculture production relies on small farms (Valenti et al., 2021). Also, Malaysia can emulate the strategy by pooling resources from small hatcheries in rural areas, such as Segari, Lumut, and Perak.

The potential of Udang Galah (Macrobrachium rosenbergeii) Farming for Sustainability and poverty alleviation

For decades, freshwater prawn farming has been shown to have a significant potential for sustainable socioeconomic Growth and food security (Yasmin et al., 2010). In tropical regions, freshwater prawns can be farmed year-long and outdoors. Hence, the profitability of prawn farming in other developing countries has evidence of economic and environmental success. (Yasmin et al., 2010). The potential for giant freshwater prawn farming has evidenced success for local farmers (Jalil, 2020; Mat Isa, 2022; Urana, 2021).

Agriculture and food production will remain the income staple for most rural communities. However, in the new normal, the Digital Era requires farmers to innovate using technology. For instance, e-commerce will provide pathways to sustainability for poverty, as evidenced in Sub-Saharan Africa (Cordes & Marinova, 2023). Utilization of the Internet and various social media platforms will assist with community inclusion and product marketing for the low-income population. Through digital engagement, rural communities will boost their entrepreneurship skills, innovate, and collaborate with other stakeholders that could provide potential benefits (Cordes & Marinova, 2023).

Many countries evidenced an increase in poverty after the COVID-19 pandemic. As such, it is vital for developing countries, particularly for reversals of fortune for poverty alleviation and shared prosperity. (World-Bank, 2020). Also, in the wake of COVID-19, the study's outcome is relevant to the United Nations Sustainable Development Goal (SDG) to end poverty in all its forms everywhere (UN-SDG, 2017; World-Bank, 2020). Poverty reduction plans and policies need rethinking, implementation, and monitoring of the projects as practiced in Hubei Province and Liupanshui City, China. (Duan et al., 2019). The literature shows that geographic considerations are crucial for wealth creation through the implementation of aquaculture projects in rural areas (Gilson et al., 2023; Singh et al., 2023). As noted by Aanesen et al. (2023), aquaculture's substantial increase in production is currently the fastest-growing food industry globally. Hence Malaysia should heed this strategy by expanding the country's aquaculture projects.

Challenges in aquaculture farming and hatchery management

Like other businesses, managing aquaculture projects is challenging (Liew et al., 2024). In the case of crab farming, some challenges include inadequate seed supply, cannibalism, disease outbreaks, and no commercially formulated feed for the Scylla mud crabs (Liew et al., 2024). As Zhang et al. (2023) pointed out, fish welfare in various aquaculture systems has garnered significant attention. Similarly, for this paper, giant freshwater prawns welfare has been brought to the attention of the relevant stakeholders, but with little effort made to assist rural hatchery owners through private investments. (Banu & Christianus, 2016), innovations and technological advances such as the Internet of Things (IoT) and artificial intelligence (AI) (Khairuddin & Majid, 2023).

The reproduction capacity of the indigenous river species, the *udang galah,* in Malaysia, depends on several environmental factors. Although there have been reports on the dwindling catches by fishermen in Malaysian rivers, the capacity to reproduce the non-indigenous Macrobrachium rosenbergii in estuaries of the Amazon Coast, north Brazil has been favorably sustainable (Iketani et al., 2016). This successful project showed that good environmental conditions would ensure a higher population of giant freshwater prawns in Malaysian rivers.

Another challenge that aquaculture entrepreneurs and hatchery managers must consider is climate change. (Galappaththi et al., 2020). Adapting to extreme weather changes such as global warming is crucial to the continuity of aquaculture projects. Coping mechanisms such as at the local level (for example, water quality management techniques), multilevel adaptive strategies (for example, changing culture practices), and management approaches (for example, adaptation planning, and community-based adaptions) will ensure limited losses. (Galappaththi et al., 2020). Again, in the digital era, technology, such as global information systems (GIS) and remote sensing, will provide the essential cost-effective tools for developing adaptation strategies and responses. (Galappaththi et al., 2020; Iliyasu et al., 2016). However, for rural hatchery owners and inland aquaculture entrepreneurs in Segari, Perak, the budgeting for these contingencies would be an added challenge.

About the district of Manjung, Perak, Malaysia

The Manjung district in Perak, Malaysia, is located in the middle section of the state (Figure 1a & 1b) (PDT-Manjung, 2021). There are five *mukim* (translated meaning township or administrative division) in Manjung, namely, Mukim Beruas (with ten villages), Mukim Lekir (with ten villages), Mukim Lumut (with 11 villages), Mukim Pengkalan Bharu (with 12 villages and, Mukim Sitiawan (with 14 villages) (see Figure 1b). The hatchery for this study is located in Segari, Mukim Lumut, Perak. Manjung's population is 246,977 people.

Figure 1: (a) Manjung district in Perak, Malaysia; (b) The districts in Manjung



Source: maya47.atspace.com and Wikiwand, 2023

3. Research Methodology

Research design

For this study on managing complexities in giant freshwater prawn breeding facilities in Malaysia, a qualitative methodology would be appropriate to gain in-depth insights into exploring the complexities of the challenges and practices (Barclay et al., 2017; Thompson et al., 2024). The case study design justified the focus on specific, multiple hatcheries management practices and farming methods undertaken (Bjørkan & Eilertsen, 2020; Choudhury et al., 2017). To reiterate, the qualitative methodology would allow for a rich, contextual understanding of the complexities involved in managing giant freshwater prawn breeding facilities in Malaysia, providing nuanced insights that might not be captured through quantitative methods alone.

The data collection method for the qualitative approaches was through semi-structured interviews with hatchery managers or owners, discussions with local agency fisheries officials, and researchers from aquaculture-based institutions. Direct observations on hatchery operations were also done from repeated site visits. To ensure data viability, document analysis of hatchery records and industry guidelines obtained from fishery agencies and online were conducted. In addition, secondary data from the Fisheries Department and other available statistics were used to corroborate the research objective: to explore the efficiency of hatchery management in giant freshwater prawn broodstock production. Funding received under the Malaysian Social Innovation (MySI) grant permitted the conduct of the project implementation with the availability of hatchery owners or managers in Segari, Lumut, Perak and Kampung Hujung Rintis, Kota Setia, Perak. Consequently, these project scopes made this a case study investigation. Nonetheless, the goal of the funding is to infuse technology in *udang galah* broodstock farming in a hatchery and monitor the project's success (or failure) for two years. In addition, the study is guided by the theory of management consisting of four elements: planning, organizing, leading, and controlling, with a particular focus on aquaculture management concepts (Meade, 2012).

The sampling strategy used purposive sampling to select diverse hatchery operations varying in size, location, and management practices (Bendassolli, 2013). However, only two, rural located hatcheries in Segari, Manjung, Perak became the key informants for this study as many hatcheries were no longer in operation. Repeated interviews and focus group protocols were applied on-site where regular meetings were held. Open-ended questions covering key areas such as water management, disease control, nutrition, and genetic management were asked. Before these discussions, a pilot testing session of interview guides to ensure clarity and relevance was undertaken. The observational techniques on site involved non-participant observation of daily hatchery operations and the use of field notes and observational checklists

The data analysis from the interviews, documents, and observational notes were thematically analyzed to identify recurring patterns and themes. Before this, the coding of transcripts using qualitative data analysis software (e.g., NVivo). Consequently, the development of conceptual frameworks to illustrate relationships between the themes identified the complex challenges and management practices of the case study. In addition, the trustworthiness and validation of the outputs require triangulation of data sources and methods via member checking with participants to ensure accurate interpretation of their perspectives as well as peer debriefing with other researchers in the field of aquaculture.

In ensuring ethical considerations, informed consent from all participants was obtained earlier in the project timeline and assurance of the confidentiality and anonymity of the information gathered from the hatcheries and individuals adhered to the ethical guidelines for research involving human subjects.

It is important to note that the limitations and reflexivity of the study require acknowledging potential researcher bias and its impact on data interpretation including recognizing limitations in generalizability due to the qualitative and case study method of the project.

In summary, the primary or empirical data were collected through repeated interviews with a hatchery owner cum udang galah broodstock breeder in Segari, Lumut, Perak. The second respondent has a mini hatchery and field ponds at Kampung Hujung Rintis, Kota Setia, Perak. To supplement the aquaculture farming method and infrastructure, a tilapia fish farmer from Kampung Pulau Tiga, Kg. Gajah, Perak was also interviewed. From the

interviews, data saturation was achieved when similar responses were noted. The interview transcripts were read repeatedly, such as through content analysis, to identify themes or categories based on valid inference and interpretation. Also, the explorative process has incompleteness of inductive reasoning in organizational dilemma research projects, as in the case of this study. Ketokivi and Mantere (2010) suggested two practical reasoning strategies, idealization, and contextualization, which can lead to more effective argumentation and evaluation. "Appreciating the methodological incompleteness of both strategies helps distinguish between the method and the policy dimensions of organization-scientific debates" (Ketokivi & Mantere, 2010). Bendassolli (2013) also pointed out that the problem of induction refers to the difficulties involved in justifying experience-based scientific conclusions, which happened to this project. Although theory-building is not proposed for this study, the justification for using inductive reasoning is adequate for the assumptions of undertaking qualitative research methods (Walters, 2001) as the design allows for researchers to seek information from data gathered and analyzed yet do not proceed to a project looking for specific findings. In other words, the findings of this study are informative, with narratives to support the project's objective. Using the inductive reasoning approach, the researchers will genuinely learn from their subjects while remaining empathetic and reflective (Bogdan & Biklen, 1997; Walters, 2001).

4. Findings

The demographic breakdown of the respondents was 100% male owners aged 50 years and above. The hatchery operations are self-funded. The hatcheries were located in a rural area, far from the main road but close to the river. The hatcheries were built on the owner's land. The findings based on the research objective are shown in Table 1. The elucidation of each finding will be done in the next section.

Table 1: Hatchery management challenges

Management element	Challenges	Comments
Planning	No proper strategic plan	Unrecorded and undocumented plans for hatchery operations
Organizing	Routine feeding and infrastructure upkeep	Hatchery owner's helpers include family members and intermittent interns
Leading	Manages hatchery as deemed fit	Self-led
Controlling	Has no control over broodstock supply	Hatchery depends on supplies from local, artisanal fishermen. Diseased *udang galah* broodstock cannot be used. Outsourcing for other broodstock means going outstation. Technical know-how; use of IoT and AI in the broodstock breeding process

Discussion

During the starting phase of the project, the Movement Control Order (MCO) was mandated from early 2020 to late 2021 because of the coronavirus (COVID-19) pandemic (Bernama, 2021). The MCO took almost two years to break the chain of infection, making it impossible to cross the state borders and the hatcheries to operate normally.

The limitation of the study was the focus of two cases in one state. The study was impeded by the pandemic lockdown lasting almost eighteen months resulting in the closure of many hatcheries except for these two. The closure was due to weak operations management, and non-communication with externalities or broodstock suppliers, which led to losses. This is the risk that nobody expected, but after the pandemic, only two *udang galah* farmers continued with the project.

From the research objective, the four elements of management are considered. Firstly, the planning element where the findings showed that the hatchery owners do not have a formal strategic plan; however, the goal of

running the hatchery is to make enough profits to recover the capital expenses and expand the business. For the second element, the hatchery operations are organized daily for feeding and infrastructure upkeep. Family members made up the labor force; however, from time to time, local colleges would send students to intern at the hatchery. After the pandemic lockdowns, no interns were sent as the hatchery could not operate at standard capacity. The third management element is leading; the hatchery manager leads the operations as he sees fit, following the traditional way of running the entity. Lastly, the controlling element sees hatchery owners needing more control over the broodstock supply, which is the major problem for hatcheries to close down. This issue requires intervention from the local Fisheries Department and colleges or universities with marine studies to advise and assist with the supply. Outsourcing for udang galah broodstock from other locations requires proper logistics to keep the marine animals alive when they arrive at the hatchery.

To reiterate, hatchery management needs managers to have the four management skills and experience to plan, organize, lead, and control operations. The hatchery business type is a sole proprietorship. Therefore, the owner bears all the risks (and losses). It is recommended that hatcheries should operate and manage as a partnership or through collaborative efforts with other hatcheries, the private sector, the fisheries department, and the university.

In broodstock production, other external factors need to be considered, such as the consistent supply of healthy, free-range adult prawns. Having a formal agreement with the prawn providers or suppliers should be documented. Oral agreements are not binding as the artisanal fishermen have the right to sell their catches to the ever-ready markets.

Hatchery owners should also practice realistic management by operating within their capacity. There are seven essential control factors in *udang galah* breeding: water management, disease control, feeding and nutrition, larval survival rates, broodstock management, environmental sustainability, and market demand and pricing. (Hashim, 2023). These control factors can be efficiently and effectively managed using disruptive technologies like the Internet of Things (IoT) and artificial intelligence (AI). In fact, during the project timeline, Universiti Teknologi MARA's innovative contribution to the hatchery was by installing a device named SAMS-MKII. This device significantly enhanced the hatchery operations and increased larval production for a short period. SAMS-MKII was able to monitor the water quality (temperature, pH levels, dissolved oxygen, and ammonia levels) using IoT sensors deployed in the breeding containers. SAMS-MKII systems were linked to the server, and real-time data can be seen in a specially-innovated smartphone application with dashboards showing these conditions (see Figure 2). The IoT devices and AI algorithms enabled remote monitoring and control of the hatchery operations, giving the hatchery owner the freedom to travel outstation as he will receive alerts and make the necessary adjustments through a centralized dashboard or a mobile application. This capability allows for efficient management, reduced labor requirements, and prompt addressing of emergencies (Hashim, 2023). For the university project members, the predictive analytics from leveraging historical data on environmental conditions, feeding patterns, and growth rates, AI algorithms can provide predictive analytics to optimize the hatchery's operations. These algorithms can forecast optimal feeding schedules, prawn growth rates, and potential challenges; these insights allow hatchery managers to make informed decisions, streamline resource allocation, and improve overall productivity. (Hashim, 2023). However, SAMS-MKII capability cannot be fully utilized when no udang galah stock is in the containers from exhausted broodstock supply.

During the project's initial phase, implementing the Movement Control Order (MCO) due to the COVID-19 pandemic greatly affected the progress. The MCO, which lasted for nearly two years, aimed to curb the spread of the virus, resulted in restrictions on crossing state borders and disrupted normal operations of hatcheries (Bernama, 2021; Yusoff et al., 2020). This prolonged lockdown created limitations and challenges for the study, as it focused on only two cases in one state. The hatcheries needed help operating and communicating with external suppliers or broodstock providers, leading to financial losses. The unexpected nature of the pandemic made it challenging to recover and rebuild the business after the restrictions were lifted.

The research objective encompassed four management elements. Firstly, in terms of planning, it was found that hatchery owners needed a formal strategic plan. However, they aimed to generate sufficient profits for capital recovery and business expansion. Secondly, organizing the hatchery operations involved daily routine tasks such as feeding and infrastructure maintenance. Family members constituted the labor force, occasionally

supplemented by interns from local colleges. However, the pandemic disrupted the ability to receive interns, further affecting operations. The third management element, leading, relied on the hatchery manager's decisions based on traditional practices. Lastly, the controlling element revealed that hatchery owners had little control over broodstock supply, which became a significant challenge leading to hatchery closures. Moreover, when IoT and AI in aquaculture were introduced, the hatchery in Segari experienced electricity disruption and weak internet access. It is important to have sound control over electricity and seamless internet access. Addressing this issue requires intervention and assistance from the local Fisheries Department, colleges, or universities with marine studies and proper logistics for outsourcing broodstock from other locations.

To emphasize effective hatchery management requires managers with skills and experience in planning, organizing, leading, and controlling hatchery operations. As hatcheries typically operate as sole proprietorships, the owner assumes all risks and losses. It is recommended that hatcheries consider operating as partnerships or through collaborative efforts involving other hatcheries, the private sector, fisheries departments, and universities.

Additional factors must be considered in broodstock production, such as ensuring a consistent supply of healthy adult prawns from free-range sources. Establishing formal agreements with prawn providers or suppliers is essential, as informal oral agreements may not be legally binding, and fishermen can sell their catches in the market.

Hatchery owners should practice realistic management by operating within their capacity. Seven critical control factors in udang galah breeding include water management, disease control, feeding and nutrition, larval survival rates, broodstock management, environmental sustainability, and market demand and pricing (Hashim, 2023). These factors can be effectively managed using disruptive technologies like the Internet of Things (IoT) and artificial intelligence (AI). The introduction of the SAMS-MKII device by Universiti Teknologi MARA significantly enhanced hatchery operations briefly. SAMS-MKII employed IoT sensors to monitor water quality parameters (temperature, pH, dissolved oxygen, and ammonia levels) in breeding containers. Real-time data was transmitted to a server and accessible through a specially developed smartphone application with intuitive dashboards (see Figure 2). This IoT-enabled remote monitoring and control gave hatchery owners flexibility, allowing them to receive alerts and adjust from a centralized dashboard or mobile application. This capability improved efficiency, reduced labor requirements, and enabled prompt response to emergencies (Hashim, 2023).

Additionally, leveraging historical data and AI algorithms, predictive analytics can optimize hatchery operations by forecasting optimal feeding schedules, prawn growth rates, and potential challenges. Hatchery managers can make informed decisions, allocate resources effectively, and enhance productivity using these insights (Hashim, 2023). However, the full potential of SAMS-MKII cannot be realized when there is no *udang galah* stock in the containers due to the exhausted broodstock supply.

Lastly, aquaculture farming will continue to contribute to Malaysia's socioeconomic growth and population well-being. It is important to provide insights into the key challenges, government involvement, and the broader context within Malaysia and the region for aquaculture projects, specifically, farming giant freshwater prawns or *udang galah*. It sets the stage for further studies and a more detailed exploration of the complexities of managing giant freshwater prawn breeding facilities.

Figure 2: SAMS-MKII version 4 dashboard, 2023



5. Managerial Implications and Recommendations

Udang galah or giant freshwater prawns (Macrobrachium rosenbergeii) farming is lucrative if the hatchery is managed efficiently. Using technology to assist with farming will further enhance the business project. Developing a sustainable production system using new technologies, such as simple disruptive innovation, can increase productivity and improve the outputs for the domestic markets. For future studies, it is recommended that hatchery owners from other states in Malaysia be sampled. The comparative analysis of management and operational methods undertaken by these hatcheries would provide new insights into the success of other young, enterprising individuals embarking on aquaculture projects. The complexities in managing hatcheries can be overcome with financial backing from interested parties and to development of sustainable production using technology in collaboration with universities, relevant government agencies, industry partners, and private investors including telecommunication and utilities companies. In this case, the state government can also oversee the Segari, Manjung, and Perak hatcheries by providing adequate, continuous assistance, networking, and monitoring.

As in the discussion section and to reiterate, it is time that aquaculture farming makes use of technology to assist in dealing with the complexities. Another managerial implication of the project is the full utilization of the Internet of Things (IoT) and artificial intelligence (AI). Partnering with local universities and industries would be the way forward in the business project to be sustainable. Schedule visits with other successful prawn farming projects will also ensure new learning and shared experiences for the owners of this case study. From Figure 1.0, SAMS-MKII has been integrated with both IoT and AI. Other entities in aquaculture adopted technology in prawn hatcheries to enhance efficiency, productivity, and sustainability. These technologies are being applied to ensure (Khairuddin & Majid, 2023):

Water Quality Monitoring
- IoT sensors continuously monitor parameters such as temperature, pH, dissolved oxygen, and ammonia levels.
- AI algorithms analyze this data in real-time, predicting potential issues before they become critical.
- Automated alerts notify staff of any deviations from optimal conditions.

Feeding Systems
- IoT-enabled feeders dispense precise amounts of feed based on prawn growth stages and biomass.
- AI algorithms optimize feeding schedules and quantities, reducing waste and improving feed conversion ratios.

Disease Detection
- AI-powered image recognition systems can detect early signs of diseases by analyzing prawn behavior and appearance.

- IoT devices can collect and transmit data on prawn health indicators for rapid response to potential outbreaks.

Environmental Control
- Smart systems regulate lighting, aeration, and water circulation based on real-time data and predetermined optimal conditions.
- AI predictive models adjust these parameters in anticipation of changing environmental conditions.

Genetic Management
- AI algorithms can analyze genetic data to optimize breeding pairs for desired traits.
- IoT devices can track individual broodstock performance and health.

Energy Efficiency
- Smart systems optimize energy use in heating, cooling, and pumping systems.
- AI predictive maintenance schedules prevent equipment failures and reduce downtime.

Data Analytics
- AI-driven analytics platforms integrate data from various IoT devices to provide comprehensive insights into hatchery operations.
- These insights can inform decision-making on everything from production planning to resource allocation.

Automated Sorting
- AI-powered image recognition combined with robotic systems can sort prawns by size or quality, reducing labor costs and improving consistency.

Remote Monitoring
- IoT enables remote monitoring and control of hatchery operations, allowing managers to oversee multiple facilities or respond to issues off-site.

Predictive Modelling
- AI can create predictive models for prawn growth, market demand, and production outcomes, aiding in strategic planning.

While these technologies offer significant benefits, their adoption in Malaysian prawn hatcheries faces challenges such as high initial costs, the need for specialized training, and potential reliability issues in rural areas with limited connectivity. However, as these technologies become more accessible and adapted to local conditions, they have the potential to revolutionize hatchery management practices in Malaysia. (Siddeeg, 2016). Lastly, the way forward for *Udang Galah* hatcheries is to have proper policy initiatives to facilitate the entities towards efficient business processes for expansion and aquaculture commercialization towards a sustainable blue economy.

Conclusion

The objective of this paper was to provide insights through the exploration of the complexities and challenges faced by the giant freshwater prawn hatchery owners in Perak Tengah. The findings revealed that hatchery owners lack adequate managerial skills in handling operational matters such as budgeting, labor utilization, utilities, marketing, and networking. The most critical factor was the cost-effective sourcing of healthy, brood stock supply from local fishermen. Furthermore, the research underscores the importance of genetic diversity in broodstock populations as hatcheries struggle with inbreeding depression, necessitating the development of more robust breeding programs. From the socio-economic standpoint, a holistic approach to addressing these issues, emphasizes the need for increased collaboration between research institutions, government agencies, and private sector stakeholders. The study provided a comprehensive overview of the complexities inherent in managing giant freshwater prawn breeding facilities in Malaysia. By identifying key challenges and potential solutions, it aims to contribute to the sustainable development of this vital sector of Malaysia's aquaculture industry. The findings have implications for policy-making, industry practices, and future research directions in the field of freshwater prawn (udang galah) aquaculture and food security agenda.

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An Integrated Circular Supply Chain Framework to Enhance Malaysian Business Performance

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Abstract: Businesses rely on supply chain management to suit the needs of global and multigenerational consumers. However, the current linear manufacturing and distribution supply chain strategy has been regarded as the source of dangerous waste generation, environmental deterioration, and the global warming phenomenon. In mitigating this issue, circular supply chain management, a practical integration model, is seen as the solution as it helps to reduce material flows and supply chain waste. Unfortunately, the fundamental mechanisms that can support its effective execution have not been comprehensively examined, hindering its complete incorporation into company strategy. Thus, to overcome this knowledge gap and improve organizational understanding, this study uses the systematic reviews and meta-analyses extension for scoping reviews (PRISMA-ScR) procedure to investigate the characteristics, enablers, and barriers of circular supply chain management. The study found five interconnected key structures: government, industry stakeholders, corporate management, end users, and financial institutions, all of which play important roles in the successful implementation of a circular supply chain strategy. As a result, close collaboration across the five identified stakeholders is essential to enable successful implementation. This study's objective is to the United Nations Sustainable Development Goals (SDGs) 8, 9, and 12, which aim to promote peace and prosperity for people and the planet both now and in the future.

Keywords: *Supply chain management, circular supply chain, scoping reviews, PRISMA-ScR, UN-SDGs*

1. Introduction

In place of the unpredictable economic conditions, fierce rivalry in today's business world, and the effect of the COVID-19 pandemic aftermath, organizations are now becoming increasingly cautious when making decisions that could have an impact on their bottom line (Attinasi et al., 2022). These circumstances are further worsened by the rapid changes in consumer demands brought about by the current state of the marketplace due to the deficiency of raw materials. Therefore, to become more flexible, adaptive, and competitive, firms must reorganize their supply chain networks and strategies (Alshahrani & Salam, 2022). To tackle these challenges and the growing depletion of resources, scholars, decision-makers, and business leaders have advocated for the adoption of the circular economy agenda as a means of resolving this predicament (Howard et al., 2022). The implementation of Circular Supply Chain practices, an innovative supply chain structure that is part of the circular economy components is a workable solution to mitigating this problem. Its goal is to ease material flows and lower waste, and contamination generation across the whole supply chain network (Genovese et al., 2017). According to the Ellen MacArthur Foundation (2021), the objective of a circular supply chain is achieving zero waste which requires the integration of regenerative and restorative economic and commercial principles into the circular economy framework. Therefore, unlike the conventional paradigm of disposable goods, the used parts might undergo renovation or a total redesign to mimic the fresh condition of raw materials (Farooque et al., 2019). The integration of circular supply chain practices has operational and strategic benefits, as well as a huge potential for value creation in the economic, corporate, environmental, and societal realms (Jain et al., 2018). Circular supply chain integration is also predicted to enhance companies' attempts to contribute environmentally to the growth of a sustainable economy (Ayati et al., 2022).

Unfortunately, there is a notable dearth of empirical research about the circular supply chain practices adoption within the context of Malaysian businesses. Thus, it is imperative to understand the barrier and enabler underpinning the circular supply practices implementation to ensure its successful adoption, enabling Malaysian businesses to effectively embrace and implement its concept. Henceforth, an extensive empirical study especially within the academic literature on the best approaches to express circular supply chain management in corporate strategy is necessary. This study will conduct a systematic assessment of the current literature on the factors that influence the effective implementation of circular supply chains. Subsequently,

the identification of the factors hindering the expansion of circular supply chain practices will also help to provide critical knowledge and contribute to its future development.

This research is important as the effort is in tandem with the United Nations Sustainable Development Goals (UN-SDGs) which aims to promote peace and prosperity for people and the planet, now and into the future. Through the proposed framework, it is hoped that there will be a shift in the mindset of the industrialists and policymakers to implement the changes from the traditional linear supply chain model which has contributed to environmental degradation, pollution, and climate change to a healthy circular supply chain practice.

2. Literature Review

To meet the demands of today's transnational and multigenerational consumers, supply chain management is widely acknowledged as a critical driver of economic success by businesses (Alshahrani & Salam, 2022). Unfortunately, several studies have linked the existing linear manufacturing and distribution supply chain structures to issues related to hazardous waste, ecological degradation, and global warming (Khan et al., 2022). Circular supply chain management, a practical supply chain integration model is seen as the solution to address this problem. Its goal is to eliminate waste and contamination throughout the supply chain network while also mitigating material fluxes (Genovese et al., 2017). Circular supply chain practices are also predicted to help businesses contribute to the development of a sustainable economy while also encouraging participation in a socially fair society (Ayati et al., 2022).

The significance of circular supply chain practices further deepens with the latest move of Malaysia's biggest trading partners such as the United States, China, Singapore, Japan, and the European Union in translating their net zero pledges into reality. (PricewaterhouseCoopers, 2023). This development will require Malaysia to take immediate resolution in meeting the expectations of the trading partners to keep its competitiveness in trade with other nations in the region. This is because only a limited proportion of Malaysian businesses have progressed beyond waste reduction in their implementation of circular supply chains (Bassi & Dias, 2019). Despite being cognizant of the advantages of a circular supply chain, such as enhanced efficiency, reduced costs, and expanded market opportunities, Malaysian businesses frequently encounter obstacles in the form of financial constraints and talent deficiencies (Rizos et al., 2016).

There is also a shortage of academic studies on the practical methods and tools to support circular supply chain adoption by business entities (Howard et al., 2022). This phenomenon obscures their conceptual bounds and hinders circular supply chain management research and practice. Therefore, this study seeks to help the business to explore the possible methods and tools for managing uncertainty related to circular supply chain management practices. The study aims to bridge the knowledge gap by strengthening the conceptual understanding of circular supply chains and establishing implementation practices, particularly for Malaysian businesses. It is hoped that this study will provide a thorough understanding of the main factors that can improve the effectiveness of circular supply chain management methods. The proposed methodologies and tools will help Malaysian businesses shift away from traditional approaches that prioritize cost, quality, and output towards a new idea of zero waste production based on a regenerative and restorative business model. The strategies proposed will provide crucial components that contribute to the effectiveness of circular supply chain practices. As well as to provide the right tools and tactics to limit the negative implications that it might cause to the operations.

3. Methodology

This study aims to conduct a comprehensive investigation into the complex dynamics of circular supply chains and their adoption by businesses. To achieve these goals, the study uses the scoping review approach to comprehensively analyze published works about circular supply chain management. According to Tricco et al. (2018), a scoping review guarantees a meticulous, clear, and replicable approach at every phase of the review process and serves as an excellent instrument for assessing the extent and thoroughness of academic literature about a specific subject. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) were used as the review protocol in this investigation. The evaluation procedure consists of four clearly defined phases: identification, screening, eligibility, and inclusion. PRISMA-

ScR provides a thorough overview of the existing strategies employed by businesses, as well as the key factors that can affect the practical implementation of circular supply chains. It also facilitates the development of a strong and unified framework, backed by theoretical progress obtained from many data sources (Gibbert et al., 2008).

Through the exhaustive PRISMA-ScR search conducted over the Scopus and Web of Science databases, a total of 188 publications were initially included in the study. However, after a rigorous process of identification, screening, eligibility assessment, and inclusion, only 19 articles that satisfied the selection criteria were chosen and subjected to content analysis. This analysis enabled the study to effectively identify the main stakeholders, as well as the enablers and barriers of circular supply chain adoptions. Several recommendations were put forward, to guide the businesses in the successful implementation of circular supply chain practices to support their waste reduction strategy.

Table 1: Overview of articles fulfilling the inclusion criteria

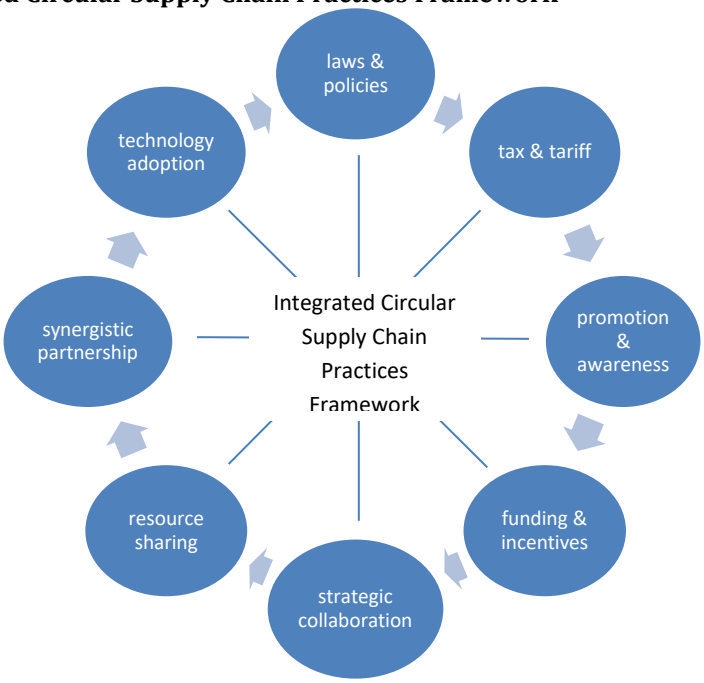
Authors (Years)	Title
Khan et al. (2022)	A grey-based framework for circular supply chain management: a forward step towards sustainability
Chen and Tan (2021)	Exploring the Circular Supply Chain to Reduce Plastic Waste in Singapore
Saroha et al. (2020)	Pressures in the implementation of circular supply chain management (CSCM) for sustainability: An analysis from Indian industries perspective
Tseng et al. (2023)	Causality of circular supply chain management in small and medium-sized enterprises using qualitative information: A waste management practices approach in Indonesia
Bui et al. (2023)	Causality of total resource management in circular supply chain implementation under uncertainty: a context of textile industry in Indonesia
Ciccullo et al. (2023)	Designing circular supply chains in start-up companies: evidence from Italian fashion and construction start-ups
Yan et al. (2022)	Exploring the factors to promote circular supply chain implementation in the smart logistics ecological chain
Tseng et al. (2022)	Healthcare industry circular supply chain collaboration in Vietnam: vision and learning influences on the connection in a circular supply chain and circularity business model
Cao et al. (2022)	Identifying critical eco-innovation practices in circular supply chain management: evidence from the textile and clothing industry
Kayikci et al. (2022)	Analyzing the drivers of smart sustainable circular supply chain for sustainable development goals through stakeholder theory
Bhattacharya and Kalakbandi (2023)	Barriers to the circular supply chain: the case of unorganized tire retreading in India
Mangla et al. (2018)	Barriers to effective circular supply chain management in a developing country context
Milki and Islam (2021)	Barriers to Circular Supply Chain Adoption: A Perspective of Electric Battery Industries of Bangladesh
Lahane and Kant (2021)	Evaluating the circular supply chain implementation barriers using the Pythagorean fuzzy AHP-DEMATEL approach
Saroha et al. (2022)	Identification and analysis of circular supply chain management practices for sustainability: a fuzzy- DEMATEL approach
Khan and Ali (2022)	Implementation of the circular supply chain management in the pharmaceutical industry
Chhimwal et al. (2021)	Measuring Circular Supply Chain Risk: A Bayesian Network Methodology
Tseng et al. (2021)	Modelling hierarchical circular supply chain management enablers in the seafood processing industry in Vietnam under uncertainties
Luthra et al. (2022)	Overcoming barriers to cross-sector collaboration in circular supply chain management: a multi-method approach

The thematic analysis of the papers shows that the effective execution of circular supply chain operations is influenced by five interrelated important entities: government, industry stakeholders, corporate management, end users, and financial institutions. The support from these important entities is further divided into eight interrelated significant structures. The structures include laws and policies, tax and tariff, promotion and awareness, funding and incentives, strategic collaboration, resource sharing, synergistic partnership, and technology adoption.

4. Discussion

The structure described above encompasses a diverse array of factors that are crucial prerequisites for creating a functional circular supply chain practices environment. They serve as crucial components that require support from the government, industry stakeholders, corporate management, end customers, and financial institutions. The model shown in Figure 1 below illustrates the fundamental characteristics that make up the integrated circular supply chain practices framework, which are important for ensuring its successful execution.

Figure 1: Integrated Circular Supply Chain Practices Framework



The research shows that the adoption of circular supply chain approaches depends on the efficient administration of five interrelated important entities: government, industry stakeholders, corporate management, end users, and financial institutions. Governmental practices involve the responsible party creating laws and regulations to encourage and assist their execution. This is because a lack of rule enforcement may hinder the development and adoption of circular supply chain permanent solutions. Thus, strong laws and policies are needed to set up effective tax rules and import tariff systems to implement the necessary actions.

In supporting the government effort, industry backing is also essential for successful circular supply chain implementation. Circular supply chain success requires strategic industrial and management solutions. These initiatives involve investing in smart facilities and technology and creating partner resource-sharing and communication platforms. The industry can improve company operations strategically and environmentally by using circular supply chain approaches. It will also lay the framework for industry participants to implement circular supply chain operations. Industry leaders and government agencies must educate, motivate, and teach stakeholders about circular supply chains' benefits.

The business management teams are the next key framework component. While top management makes key decisions, managers with an unclouded vision and precise goals will drive corporate transformation. Circular supply chain goals must be strategically embedded in the organization's practices to ensure organization-wide adoption. By upgrading technology and improving knowledge and abilities, businesses can accomplish circular supply chain targets. This is because advanced technology improves product quality, reduces energy use, and reduces waste. Thus, equipping workers with technology skills and knowledge is essential for resource efficiency.

In terms of end-user roles, integrating knowledge, and social, cultural, and marketing impacts will help them adapt and adjust their thinking because circular supply chain strategies only function if they are accepted. Customers should be encouraged to buy and refurbish eco-friendly things to foster circular supply chain activity. They should be informed about circular thinking and waste minimization, which can efficiently treat managed waste in the manufacturing and supply process while keeping product integrity and preventing obsolescence. Consumers must be made aware that environmental practices save precious resources and the environment.

The final resource in ensuring the successful adoption of circular supply chain practices is funding. This is because the deployment of a new business strategy will affect the financial commitment of a business. Grants from relevant agencies are an effective way to get industry and business management support. Funding will allow the industry and businesses to invest more in intelligent facilities and technology and build partner resource-sharing and communication channels. This financial support will also enable businesses to begin smart and ecological corporate transformation and smart circular supply chain relationships.

5. Conclusion

This study is important for both academics and practitioners as it is the way to understand the significant contribution of circular supply chains to businesses. The framework developed signifies the important contribution of five interrelated parties, which are the government, industry stakeholders, corporate management, end users, and financial institutions. The integrated circular supply chain practices framework set up in the study was construed through a rigorous and well-structured scoping review methodical procedure aided by the utilization of PRISMA-ScR procedures. This study can help businesses in improving their operations while promoting sustainability to cut costs. Hence, the development of the integrated circular supply chain management practices framework is necessary and timely to ensure service deliveries meet industry standards. This prevents business providers from abusing their position and ensures that services meet customer and industry needs.

The findings offered in this study serve as a basis for future research efforts and promote further intellectual discussions focused on enhancing and examining the suggested propositions. More research is needed to verify and enhance the suggested conceptual framework. Hence, future research can integrate qualitative and quantitative research methodologies to investigate the relationship between the elements. To ensure the precision of the conceptual model, future research should incorporate viewpoints from both practitioners and academia.

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Social and Finance Security on Gig Workers' Well-being with Occupational Satisfaction as an Intervening Variable

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Abstract: The rise in unemployment, digitization, and the flexibility of gig workers have propelled the growth of Malaysia's gig economy. However, the well-being and occupational satisfaction of gig workers can be impacted by social and financial security concerns. This study looks at the well-being of Malaysian gig workers through the role of occupational satisfaction as a mediator, while social and financial security as independent variables. The results of a structured survey administered between November 2023 and February 2024 to 135 gig workers indicate that the well-being of Malaysian gig workers is rather low. This study found that occupational satisfaction acted as a mediator in the relationship between social and financial security and gig workers' well-being. These results highlight how important it is to have both social and financial stability to enhance employee occupational satisfaction and thus, improve gig workers' well-being.

Keywords: *Occupational Satisfaction, Social Security, Finance Security, Well-being*

1. Introduction and Background

There are signs that the workplace of the future will be more and more mediated by digital platforms, with a variety of new and emerging work arrangements (Duggan, Sherman, Carbery & McDonnell, 2020). One arrangement is gig employment, which is rising at a rate of 41% between 2016 and the first quarter of 2023 and is developing globally (World Bank report Sept. 2023). As per the September 2023 report "Working Without Borders: The Promise and Peril of Online Gig Work " by the World Bank, the global online gig workforce stands between 154 million and 435 million individuals, constituting 4.4% to 12.5% of the total global workforce. The presence of 545 online gig platforms globally reflects the growing need for flexible work arrangements facilitated by digital technologies. In the case of Malaysia, gig workers make up about 18% of the labor force in the nation. The expansion of Malaysia's gig economy has been facilitated by the adaptability of gig work, which often entails brief or task-based engagements, technology advancements, and an increase in the unemployment rate in the traditional labor market (Uchiyama, Furuoka & Akhir 2022).

Put another way, there were about 4 million gig workers in 2020 who brought in MYR 254 million (Uchiyama et al., 2022). More specifically, a broad spectrum of individuals in Malaysia acknowledge the existence of on-demand app gig labor. E-hailing services like Grab and MyCar (GOJO) and online meal delivery services like Foodpanda and Grab Food support a large portion of gig employment in Malaysia (Lim, 2021). As of 2019, 42 platforms are officially recognized for e-hailing services, whereas there are about eight platforms for online food delivery (Choong & Lai 2019; Lau & Ng 2019). This technology change provides a new online-based, flexible, and yet possibly precarious form of employment (Huang et al., 2020). The workplace is evolving and may become even more digital in the future, which could have a big impact on employees' perceptions of their jobs from a well-being standpoint. In today's more technologically advanced workplace, this study defines worker well-being as the totality of a worker's satisfaction and health as influenced by their tasks, expectations, stress level, and work environment. In the process, this study focuses on the well-being of low-skilled gig workers in the service industry and takes into account important factors that could affect their well-being. In this context, 'low-skilled' refers to low-barrier-to-entry gig work that is service-based.

Although low-skilled platform-based gig employment is inherently unstable, the literature analysis highlights a deficiency in attention to the well-being of this particular subset of workers (Arnoldi, Bosua & Dirksen, 2021). The literature underrepresents the well-being of gig workers and offers no recommendations for how social

and financial stability, in conjunction with occupational satisfaction as mediation, can enhance gig worker well-being. Therefore, it is imperative to address gig workers' well-being from a comprehensive standpoint, particularly in light of the post-worldwide pandemic and shifting employment and economic landscape. Choudhary and Shireshi (2022) noted that although gig drivers had a positive view of themselves, their life quality was low due to lengthy work hours and intense peer competitiveness. Drawing from the reasoning above, this article investigates the social and financial security aspects of gig workers' well-being before looking at the mediating function of occupational satisfaction. Employee retention is becoming an important parameter in assessing the success of an organization (Aguenza & Som, 2018). One of the most valuable dimensions in an organization is employee retention (Ivana & Chiripuci, 2020). For an organization to be competitive, it has to maintain an experienced and efficient workforce, and employee retention is affected by multiple factors (Kalyanatamitra et al., 2020).

Due to its growing population and longer life expectancy, Malaysia expects to increase healthcare expenditures to improve facilities and services (MIDA, 2020). Figure 1 shows that the number of companies and employees in the pharmaceutical industry continues to grow yearly.

2. Literature Review and Hypotheses Development

Social Security and Well-being: Changes in social security policies have the potential to impact mental well-being through mechanisms operating on both collective and individual scales (Lundberg, Fritzell, Åberg Yngwe, & Kolegård, 2010). Earlier, Ouweneel (2002) studied the role of social security on the well-being of the unemployed in 42 countries and found the welfare of the unemployed declined somewhat in countries that cut back on their social security benefits, but they did not get any better or happier in countries where social security benefits were increased. Rohwedder and van Soest (2006) discovered compelling proof that individuals who overestimated their Social Security benefits experience lower levels of well-being in retirement across various indicators. According to Gnatenko et al. (2020), social security is depicted as a fundamental element of an advanced society, ensuring its citizens' essential requirements, ranging from material necessities to the capability to pursue well-being autonomously. Furthermore, people who engage in many insurance plans or have social insurance are happier (Pak, 2020); social insurance is typically funded by organizations. In this study, it is assumed that when gig workers perform their jobs, they are subject to additional hazards, like car accidents or any uncertain situation. In this case, social insurance can offer gig workers perceptions of security that might influence their feelings at work and their well-being. Thus, the following research hypotheses are put out in this paper:
H1: Social security positively impacts gig worker well-being.

Finance Security and Well-being: The literature commonly defines financial security by assessing the adequacy of an individual's current income, liquidity, and assets to meet both present and unexpected needs. Munyon, Carnes, Lyons, and Zettler (2020) specified financial security as a subjective state indicating the sufficiency and stability of monetary resources compared to financial obligations. This interpretation integrates personal perceptions of income, access to credit, savings, and other assets (e.g., Howell & Howell, 2008), and evaluates their adequacy for current and future financial challenges (Gorgievski-Duijvesteijn, Bakker, Schaufeli & Van der Heijden, 2005). Consequently, individual assessments of financial security implicitly consider current financial holdings, liabilities, as well as anticipated future risks or opportunities that may affect this state (Brief & Atieh, 1987). Brief and Atieh (1987) proposed that financial security plays a crucial role in work-related stress processes, especially as events threaten or enhance financial stability. Binet, Zayas del Rio, Arcaya, Roderigues, and Gavin (2022) theorized that financial insecurity serves as one mechanism through which gentrification could negatively impact health. Additionally, Nelson and Kaminsky (2020) suggested that financial insecurity has led to heightened levels of anxiety, depression, and post-traumatic stress disorder. Consequently, this paper presents the following research hypotheses.
H2: Finance security positively impacts gig worker well-being.

Social Security and Occupational Satisfaction: Social safety and security constitute a crucial concern, with its definition varying across perspectives. Skrabacz and Sulowski (2012) define it as safeguarding the fundamental aspects of human existence, ensuring the fulfillment of individual needs (both material and spiritual) and life aspirations through the creation of conducive conditions for employment, education, health

care, and pension provisions. Such-Pyrgiel and Dzurzyński (2015) emphasize social security as a shield against economic and social hardships, encompassing various social risks such as illness, aging, unemployment, and other circumstances hindering individuals from meeting their needs through work earnings. They argue that social security aims to maintain societal harmony and order, thereby averting conflicts, anomie, and social disintegration within the state. Brusa and Bahmani-Oskooe (2020) discovered that social security enhances employee satisfaction, while Gunawan & Naninsih (2018) demonstrated a significant positive impact of labor social security on satisfaction among employees of PT. Kallarent in Makassar City. Similarly, Patil and Jadhav (2022) observed a notable correlation between social security benefits and satisfaction. This paper posits a positive association between the social security measures provided by companies and the level of occupational satisfaction among gig workers.
H3: Social security positively impacts gig worker occupational satisfaction.

Finance Security and Occupational Satisfaction: Financial security stands apart conceptually from financial need, which delineates the extent to which employees depend on financial compensation to sustain their livelihoods (e.g., Hastert et al., 2019). Locke (1969) posited that occupational satisfaction mirrors employees' ability to achieve their objectives in the workplace. Consequently, employees tend to derive greater satisfaction from their jobs when they accomplish personal and professional goals (Huo & Jiang, 2021). Given that a significant portion of employees pursue work to meet financial needs (see Ochnik & Arzenšek, 2021, for relevant discussion), this study expects that achieving financial security will heighten employee occupational satisfaction. Research indicates that employees perceive occupational satisfaction when their organization ensures financial security, manifested through competitive salary packages or job stability (Sokoya, 2000). Munyon, Carnes, Lyons, and Zettler (2020) proposed that financial security plays a constructive role in bolstering occupational satisfaction. Conversely, the failure to attain financial security may diminish occupational satisfaction as employees find themselves unable to attain this desired state despite their efforts in the workplace. Hence, we posit:
H 4: Financial security positively impacts gig worker occupational satisfaction.

Occupational Satisfaction and Well-being: Occupational satisfaction refers to an individual's contentment with their career achievements, encompassing factors such as overall success, progress toward goals, income, and skill development (Judge, Cable, Boudreau & Bretz, 1995). Assessing occupational satisfaction is based on the alignment between job design and an individual's growth needs within their profession (Greenhaus Parasuraman & Wormley, 1990). Empirical evidence predominantly indicates a positive association between satisfaction and overall well-being (Ortan, Simut & Simut, 2021), albeit the magnitude of this correlation is generally modest. This phenomenon aligns with the spillover hypothesis proposed by Wilensky (1960), suggesting that emotions or attitudes from work spill over into non-work domains of life, implying a positive correlation between satisfaction and well-being. Drawing from previous research findings, Khan, Elahi, and Abid (2021) and Dreer (2024) identified a robust correlation and mutual influence between occupational satisfaction and well-being. Consequently, this paper advances the following research hypotheses.
H 5: Occupational satisfaction positively impacts gig worker well-being.

Occupational Satisfaction as a Mediator: Satisfaction represents an internal state experienced by individuals, reflected in their behavior and responses. Those with high occupational satisfaction levels often display patience and resilience in the face of adversity and stress, demonstrating a strong resolve to confront crises and maintain optimism even in challenging circumstances, striving for personal improvement (Dreer, 2024). Overall satisfaction significantly impacts an individual's work and well-being and has garnered considerable attention from researchers in management and behavioral sciences (Khan et al., 2021; Xu, Guo, Zheng & Zhang, 2023). Meeting employees' needs in organizations is widely regarded as a critical factor in fostering satisfaction.

In the context of this study, gig workers experiencing fair social and financial security are expected to enhance their occupational satisfaction, consequently improving their well-being. According to the expectancy disconfirmation theory, when actual results exceed expectations, positive disconfirmation occurs, leading to satisfaction, whereas lower-than-expected results result in negative disconfirmation and decreased satisfaction (Petrovsky et al., 2017). Fairness preference theory posits that individuals inherently seek fairness (Fehr & Schmidt, 1999). When perceived fairness in social and financial security aligns with or surpasses

expectations, gig workers are likely to evaluate these services positively, contributing to greater occupational satisfaction. Conversely, perceptions of unfairness in social and financial security may lead to negative disconfirmation, disappointment, and dissatisfaction, thereby affecting overall satisfaction and well-being. Based on these insights, it is hypothesized that social and financial security influence occupational satisfaction, subsequently impacting well-being.

H6: Occupational satisfaction mediates the relationship between social security and gig worker well-being.

H7: Occupational satisfaction mediates the relationship between finance security and gig worker well-being.

3. Research Methodology

Sample and Data Collection Procedure

The objective of this research is to examine how social and financial stability influences the well-being of gig workers, with a focus on how occupational satisfaction mediates this relationship. The study utilized a sample of 135 gig workers for analysis. Convenience sampling was chosen as the most suitable method due to its cost-effectiveness, simplicity, and efficiency, as noted by Jager, Putnick, and Bornstein (2017). While convenience samples are known for their limited generalizability compared to probability samples, they are commonly employed in social science research for their practical advantages. The inclusion criteria targeted individuals involved in the gig economy, specifically those active on either Grab Malaysia or Food Panda Malaysia platforms, aged 18 or older, who had completed platform training and commenced actual work. Respondents were required to be currently engaged as gig workers for Grab or Food Panda, excluding former workers.

Data Analysis Procedure

Various software programs were employed for data processing, including Microsoft Excel 2016, SPSS 24, and SmartPLS. Microsoft Excel was utilized for data coding and filtering purposes, while SPSS facilitated descriptive analysis. SmartPLS was employed for conducting structural equation modeling (SEM), allowing for the integration of factor analysis and multiple regression analysis, as outlined by Lowry and Gaskin (2014).

Measurement and Scale

A five-point Likert scale was employed to gauge participants' agreement levels with the measurement items. Respondents were instructed to indicate their agreement level with each statement, ranging from strongly disagree (1) to strongly agree (5), with a midpoint representing neutral agreement. Well-being was assessed using three items sourced from Diener, Emmons, Larsen, and Griffin (1985), encompassing both subjective and objective well-being aspects ($\alpha = .87$). Occupation satisfaction was evaluated using two items devised by Zhao (2020), yielding a Cronbach alpha coefficient of 0.89. Social security measurement utilized a questionnaire based on Qi's (2021) instrument to acquire foundational information about social security ($\alpha = .78$). Lastly, financial security ($\alpha = .71$) was measured through a single-item scale adapted from Lawrence Halbesleben and Paustian-Underdahl (2013).

4. Results

In this segment, we performed a descriptive analysis of demographic factors including gender, age, educational background, and income. The findings are presented in Table 1.

Table 1: Demographic Analysis

STATISTICAL VARIABLES	CATEGORY	PERCENTAGE %
Gender	Man	88.1
	Women	11.9
Age	Between 26-35	16.3
	Between 36-45	46.7
	Between 46-55	27.4
	56 above	9.6
Education	SPM	35.6
	Certificate	7.4
	Diploma	28.1
	Bachelor’s degree	25.2

	Master	3.7
Income	500-100	6.7
	1001-2000	23.7
	2001-3000	38.5
	3001-4000	18.5
	4001-5000	9.6
	5001 above	3.0

It can be seen from Table 1 that the distribution of this survey met the requirements of the sampling survey. In general, the gig workers were mainly middle-aged men, quite well educated, and can be considered low-income. Specifically, the gender results show that men accounted for 88.1% and women accounted for 11.9%. The age results show that most of them were in the age range of 26–50, among which the number of workers aged between 26 and 35 accounted for 16.3%, followed by the workers aged between 36 and 45 (46.7%), and then between 46 and 55 (27.4%), and over 56 (9.6%). Education results show that the number of workers with a certificate and Diploma accounted for 71.1%, and workers with a bachelor's degree or above only accounted for 28.9%. Income results show that the income of the workers was generally low, with most of the monthly incomes reaching less than MYR 4000, and only 12.6% had incomes of MYR 4000 and below.

Well-Being Evaluation Results

Table 2 indicates that gig workers expressed satisfaction with their social security, with an average score of 3.74. However, the average scores for financial security, occupation satisfaction, and overall well-being were lower, at 2.24, 2.66, and 2.92, respectively, suggesting notable dissatisfaction with financial security, occupation, and well-being, with an average score of 2.61. Hence, there is a pressing need to enhance the protection of rights and interests for this demographic.

Table 2: Statistical Results of Gig Workers on Various Variable

Variables	N	Minimum	Maximum	Mean	Std. Deviation
Social Security	135	1.00	5.00	3.7407	.81692
Finance Security	135	1.00	5.00	2.2444	.93415
Occupational Satisfaction	135	1.00	5.00	2.6630	1.02183
Well-Being	135	1.00	5.00	2.2185	.89819

Correlational Analysis

Analyzing the connections among social security, financial security, occupational satisfaction, and well-being revealed a significant positive correlation. The relationship between social security and well-being (r=.642, p<.001), as well as a direct correlation between financial security and well-being (r=.360, p<.001). Additionally, there was a strong correlation between occupational satisfaction and well-being (r=.667, p<.001). These findings indicate that higher levels of social security, financial security, and occupational satisfaction correspond to elevated levels of employee well-being (refer to Table 3).

Table 3: Correlation between Social Security, Finance Security, Occupational Satisfaction and Well-being

Variables	Social Security	Finance Security	Occupational Satisfaction	Well-Being
Social Security	1	.		
Finance Security	.348**	1		
Occupational Satisfaction	.697**	.447**	1	
Well-Being	.642**	.360**	.667**	1

Note: ** denotes p < 0.01

Table 4 displays the path coefficients and significance levels among the variables under study. It was observed that social security had a positive effect on well-being (β=0.188, t=2.245, p<0.05), thus confirming H1. Additionally, the direct impact of financial security on well-being was statistically significant (β=0.311, t=3.106, p=0.002), providing support for H2. Furthermore, there was a significant association between social security

and occupational satisfaction (β=0.168, t=2.015, p<0.05), supporting H3, as well as between financial security and occupational satisfaction (β=0.669, t=10.169, p=0.000), supporting H4. Hypothesis 5, which posited a positive relationship between occupational satisfaction and well-being, was also upheld, with occupational satisfaction exhibiting a significant influence on well-being (β=0.457, t=4.488, p=0.000).

Table 4: Hypothesis Testing on Direct Effect

No.	Relationship	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
H1	Social Security → WB	0.188	0.188	0.086	2.245	0.035
H2	Finance Security →WB	0.311	0.301	0.100	3.106	0.002
H3	Social Security → OS	0.168	0.168	0.083	2.015	0.044
H4	Finance Security →OS	0.669	0.669	0.066	10.169	0.000
H5	OS→WB	0.457	0.466	0.102	4.488	0.000

Note: OS=Occupational Satisfaction; WB=Wellbeing

4.3. Reporting Mediation Analysis

The bootstrapping analysis revealed that both indirect effects (H6 and H7), with β values of 0.177 and 0.306, respectively, were statistically significant, as indicated by t-values of 2.730 and 4.023. The 95% Boot CI Bias Corrected intervals for the indirect effects, [LL = 0.018, UL = 0.298] and [LL = 0.006, UL = 0.426], do not encompass zero, suggesting mediation (Preacher & Hayes, 2008). Therefore, we can infer that the mediation effects are statistically significant, thereby supporting hypotheses 6 and 7. Detailed results of the mediation analysis can be found in Table 5.

Table 5: Hypothesis Testing on Mediation

No.	Relationship	Std. Beta	Std. Error	t-value	LL (BC)	UL (BC)	Decision
H6	Social Security→OS→WB	0.177	0.044	2.730**	0.018	0.298	Supported
H7	Finance Security→OS→WB	.306	0.076	4.023**	0.006	0.462	Supported

Note: *p< 0.05, **p< 0.01, BC = Bias Corrected, UL = Upper Level, LL = Lower Level

Discussion

The findings demonstrated a positive and notable association between social security and the well-being of gig workers. Put differently, an improvement in social security levels was linked to enhanced well-being among gig workers. This outcome can be elucidated by the pivotal role of social security in bolstering the well-being of gig workers. Social security plays a crucial role in the well-being of these workers as it fosters a sense of security, thereby empowering them to lead better lives. In Malaysia, gig workers benefit from various social security programs financed by themselves, such as the Self-Employment Social Security Scheme (SESSS) and the Employees' Provident Fund (EPF) through i-Saraan.

In this study, the correlation between financial security and well-being was found to be both statistically positive and significant. This suggests that gig workers who feel financially secure, regarding income and savings, tend to experience higher levels of well-being. For gig workers in Malaysia, financial security encompasses having the necessary financial resources to lead a stable and secure life. Additionally, maintaining a sense of stability and sufficiency in income is crucial for enhancing well-being. Similar findings can be observed in the literature, as demonstrated by Binet et al. (2022), who underscores the significance of financial security in fostering good health and overall well-being.

The findings also reveal a positive correlation between the social and financial security of gig workers and their occupational satisfaction. Put simply, higher levels of social and financial security among gig workers are associated with increased satisfaction in their occupations. Social and financial security are regarded as foundational prerequisites for establishing the rights of gig workers. Achieving this involves empowering gig workers with both social and financial security, enabling them to plan and act effectively, whether for their benefit or that of their families. The essence of gig workers' lives hinges on the amalgamation of rights and freedoms they are entitled to, safeguarding them from adversities and threats while upholding their dignity and value. This serves to ensure their economic and social well-being, as emphasized by Patil and Jadhav (2022)

and Munyon et al. (2020), who underscored the role of social and financial security in shielding individuals from unforeseen disruptions in their work environment and providing stability in terms of income and savings, ultimately enhancing gig workers' satisfaction in their occupations.

The findings also reveal a positive correlation between well-being and occupational satisfaction among gig workers in Malaysia. This underscores the importance of prioritizing satisfaction aspects among gig workers, as they have the potential to enhance overall well-being. Occupational satisfaction pertains to the level of contentment or satisfaction experienced regarding one's work, representing a positive emotional response felt by employees during their job tasks or while present at work. This study concludes that gig workers who experience occupational satisfaction are likely to influence their health, including their overall well-being positively. Furthermore, these results are consistent with Dreer's (2024) research, which underscored a positive and statistically significant relationship between occupational satisfaction and well-being among employees.

The study's findings suggest that occupational satisfaction, acting as the mediating variable, plays a role in mediating the positive relationship between social and financial security and well-being. This indicates that occupational satisfaction enhances the connection between social, and financial security and well-being. This aligns with previous research by Munyon et al. (2020) and Patil and Jadhav (2022), which identified social and financial security as factors influencing employee occupational satisfaction. Ortan et al. (2021) study also reached a similar conclusion, emphasizing the moral impact of occupational satisfaction on well-being. It can be inferred that gig workers who perceive their financial and social security as assured are more likely to experience occupational satisfaction, thereby enhancing their overall well-being.

In this context, platform firms or governments need to create conditions that foster occupational satisfaction among gig workers, including providing a sense of security in terms of social and financial aspects. However, in Malaysia, gig workers lack legal protection under the Social Security Organization (SOCSO), although they can contribute to the Self-Employment Social Security (SESSS) scheme. Additionally, employers do not contribute to the Employment Provident Fund (EPF), but gig workers can contribute to the Voluntary Contribution with Retirement Incentive (i-Saraan) scheme.

With the expansion of the gig economy, which offers increasing employment prospects globally, there arises a heightened concern regarding the safeguarding of workers. As highlighted by Ghorpade, Abdur Rahman, and Jasmin (2023), addressing many of these concerns entails acknowledging and leveraging the synergies between public and private insurance mechanisms. This involves making thoughtful adjustments to the design features of social insurance programs to render both contributions and benefits better suited to the requirements of gig workers, alongside enhancing outreach efforts to bolster participation in such programs.

5. Conclusion

This study investigated the influence of social and financial security on occupational satisfaction and well-being among gig workers in Malaysia, making a unique contribution to the gig economy literature by examining these factors. The research revealed that both social and financial security significantly impact gig workers' well-being directly. Moreover, occupational satisfaction fully mediates the relationship between social and financial security and well-being. These empirical findings underscore the importance of social and financial security in the gig economy, highlighting their critical role in enhancing gig workers' occupational satisfaction and well-being. To ensure the well-being of gig workers, platform providers or governments must address issues related to social and financial security. In Malaysia, various initiatives have been implemented, such as the Malaysia Digital Economy Blueprint, the MYR 75 million grant for the "Penjana gig," the Social Security Organization (SOCSO) scheme, and the Employee and Retirement Incentives (i-Sarran) Employee Provident Fund (EPF). However, despite these efforts, only a small percentage of gig workers are registered with the self-employment social security scheme, and the regulatory and protective framework for gig workers remains inadequate. This underscores the need for further government action to ensure the protection and well-being of gig workers.

Future research should focus on enhancing our understanding of how social and financial security impacts gig workers' occupational satisfaction and well-being within this specific context. Additionally, exploring how

social and financial security influence gig worker occupational satisfaction could lead to stronger relationships between platform providers, government, and gig workers, ultimately benefiting all parties involved.

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Medicine Wastage in Private Clinics: Drug Suppliers' Perspective on the Causes and Measures to Reduce It

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Abstract: This study examines the issue of medicine wastage in private clinics from the perspective of drug suppliers in Hong Kong. Medicine wastage refers to unused or expired medication along the supply chain, and it poses significant challenges to healthcare systems worldwide. In the private healthcare sector of Hong Kong, there is a notable issue of medicine wastage, resulting in considerable economic costs and environmental hazards. The paper explores the causes of medicine wastage, including the inefficient business model of private clinics, the frequent use of general medicines, the decline in medical tourists, disruptions in the supply chain due to the COVID-19 pandemic, and the lack of medicine recycling policy and facility. Additionally, the paper suggests implementing a centralized medicine procurement and inventory management system, separating medicine prescribing and dispensing, and developing a medicine recycling policy to reduce medicine wastage in Hong Kong.

Keywords: *Medicine Wastage, Private Clinics, Drug Suppliers, Hong Kong.*

1. Introduction

Medicine wastage refers to any medicine that remains unused or expired anywhere along the medicine supply chain (West, Diack, Cordina, & Stewart, 2015). It includes any drug products, including those dispensed by physicians or pharmacies or those purchased by patients over the counter, that are not consumed eventually (Abou-Auda, 2003). Medicine wastage could occur at different levels (prescriber, patient, pharmacist, or even clinic level). For instance, doctors may prescribe excessive quantities of drugs to patients. Sometimes, patients may intentionally or unintentionally fail to take medications as prescribed, thereby resulting in accumulated unused drugs (Bekker, Gardarsdottir, Egberts, Bouvy, & Van den Bemt, 2018). There are also cases in which medicines are wasted because they are left to expire in pharmacies and clinics due to excess inventory. Medicine waste is one of the big challenges to the healthcare system of countries and cities worldwide, including Hong Kong.

Hong Kong has led the world in healthcare and has long been reputed to have one of the best healthcare systems in the world (Kong et al., 2015; Mok, 2001). With a population of 7.4 million, the city's total expenditure on healthcare reached HK$168 billion in 2018. Hong Kong's healthcare system currently operates on a dual-track basis consisting of the public sector and private sector. The public healthcare sector is managed and financed by the Hong Kong government through its Health Bureau (HB). The private healthcare sector is provided by around 5,000 private clinics/hospitals and over 7,500 registered private doctors. However, due to the lack of a centralized procurement and inventory management system for medicines in the private healthcare sector, there are over HK$22 million of medicine wasted in private clinics in Hong Kong each month (Yuen, Cheng, & Wong, 2023).

The medicine wastage in private clinics not only leads to tremendous economic costs to Hong Kong but also poses a hazard to the environment. Many private clinics dispose of their medicines through garbage, toilets, or sinks, creating a high risk of environmental pollution. A study conducted by Hong Kong Baptist University found that leachate from landfills in Hong Kong contained human antibiotics originating from medical wastes (Legislative Council Secretariat of the HKSAR Government, 2021). Besides, some media reports highlighted that medical wastes were found on beaches in Hong Kong, posing a threat to human health in the long run.

This study aims to investigate the causes of medicine wastage in private clinics in Hong Kong from the drug suppliers' perspective. It also explores the possibility, challenges, and worthiness of implementing a centralized medicine procurement platform for private clinics in Hong Kong. Further, it provides suggestions to the Hong Kong SAR Government for reducing medicine wastage in Hong Kong.

2. Literature Review

Medicine waste is a common problem in both developed and developing countries worldwide (Gebremariam, Gebregeorgise, & Fenta, 2018). For example, in New Zealand and the United States, more than 20% of medicines are wasted and returned to pharmacies each year. In Tanzania, over 50% of medicines dispensed are wasted eventually. In the United Kingdom, the annual costs associated with unused medicines are estimated to be £300 million (Bertie & Ross, 2015).

Past studies have identified numerous factors that contribute to medicine wastage. In developed countries, medicine wastage is mainly due to poor compliance, side effects, discontinuation or switching of medication, death of patients, or expiration (West, Diack, Cordina, & Stewart, 2014). In developing countries, medicines are usually wasted due to deterioration or expiration resulting from poor and inefficient medicine supply management systems (Kagashe, Makenya, & Buma, 2014). Medicine wastage also results from the over-stocking of medication and the selection of medicines not using reliable data or supporting evidence (Alemu, Ibrahim, & Argaw, 2023). Other main contributing factors include the provision of near-expiration medicines to clinics or patients, non-participation of clinicians in the quantification and selection of medicines, abrupt change in treatment practices, and lack of accountability for the wastage of medicines.

Studies found that medicines frequently wasted varied across countries. In the United Kingdom, the most commonly wasted medicines were gastrointestinal (12.4%), skin medicines (11.2%), pain medicines (10.5%), and cardiovascular medicines (10.3%) (Trueman et al., 2010). In Egypt, the most frequently wasted medicines were antibiotics (20.2%), gastrointestinal medicines (16.3%), and gastrointestinal medicines (10.7%). In Ethiopia, anti-infective medicines (including antibiotics) were the most wasted medicines (58.3%), followed by endocrine medicines (16.0%) and gastrointestinal medicines (9.1%) (Alemu et al., 2023).

3. Research Methodology

This study employed a qualitative research approach by adopting an in-depth interview technique for the data collection and a content analysis technique to analyze the data. Sales representatives of one of the largest drug suppliers which supply medicines and medical products to private clinics in Hong Kong participated in the in-depth interview. The in-depth interview has several advantages over other data collection methods. First, it allows the respondents to talk freely and express their feelings and beliefs about the topic in detail (Webb, 1992). Second, it helps engage the respondents to share about sensitive or personal topics (Robson & Foster, 1989). Third, it allows greater control over the selection of respondents (Cassell & Symon, 2004). Lastly, it yields higher-quality data because of the opportunity to build rapport and trust with the respondents (Webb, 1992).

4. Results

Based on the interview results, there are several reasons why medicine wastage has become a common issue in private clinics in Hong Kong in recent years.

Inefficient business model of private clinics

Private clinics are medical facilities financed and owned by a healthcare professional (Karadayi-Usta & Bozdag, 2020). In Hong Kong, a private clinic in tradition is owned and run by one practicing doctor. It has to provide both medical consultation and medication to patients. Given that private clinics are operating by themselves and without any support from the Hong Kong government, private clinics have to purchase and manage the inventory of the medicines and drugs themselves. In addition, there is no central procurement or sharing platform in the private clinics market in Hong Kong. Private clinics therefore usually stock more than enough drugs in their clinics to ensure that each patient can get the medication needed after his or her visit. The overstock of drugs causes medicine wastage once the medicines pass their expiry date. The problem has become more serious when the demand for private clinics decreases due to population decline in Hong Kong.

Frequent use of general medicines by private clinics

Medicines fall into two main categories, namely general medicines and specialty medicines. General medicines

are medications that are used to treat common illnesses and symptoms, for example, headaches, colds, flu, and fever. Specialty medicines are medications used to treat complex and chronic conditions, such as cancer, hepatitis C, growth hormone deficiency, and HIV. In Hong Kong, general medicines are not prescription drugs. They also do not require special handling, storage, or disposal procedures. General medicines are usually more frequently prescribed for patients than specialty medicines. Therefore, private doctors in Hong Kong bulk purchase general medicines for their private clinics to achieve lower per-unit costs. Many of those unused general medicines end up becoming waste.

Decline in the number of medical tourists

Medical tourist refers to a person who travels overseas for health care services. The number of worldwide medical tourists has grown rapidly since the late 1990s due to the uneven health resources among countries, the expansion of global travel, and easier access to medical and health information and services. The main sources of medical tourists are people from countries like the United States, China, the United Kingdom, and the Middle East.

With its well-developed and sound private medical system, Hong Kong has long attracted medical tourists from around the world, in particular from China. Each year, many mainland Chinese medical tourists visit private clinics in Hong Kong for vaccination, body check, delivery, and treatment. However, the recent socio-political instability and travel restrictions have significantly affected the medical tourism market, resulting in fewer medical tourists coming to Hong Kong. Therefore, drugs and medical products have become in excess for those private clinics targeting mainland Chinese medical tourists. This eventually leads to medicine wastage.

Disruptions in the supply chain of medicines by COVID-19

The healthcare supply chain is vital in ensuring the availability of medicines and medical products in the private clinic market. The high-performing healthcare supply chain can save budgets and positively influence the quality of private clinics. In Hong Kong, the transportation of medicines for private clinics is mainly carried out by four big logistics companies, namely DKSH, Kerry Logistics, Li & Fung, and DCH Logistics. As these logistics companies have resource advantages, extensive global networks, and good collaboration with pharmaceutical companies, most practicing private doctors rely on them to handle their medical needs. However, the COVID-19 pandemic starting in 2020 in Hong Kong and worldwide has drastically affected the logistics industry and the operation of the four big logistics companies, resulting in an unstable supply chain of medicines in Hong Kong. Many private clinics have to procure excess medicines for just-in-case purposes. This leads to large quantities of medicines being disposed of and wasted.

Lack of Medicine Recycling Policy and Facility in Hong Kong

Many unopened or unusual medicines could be recycled and redistributed to those who need them. Medicine recycling is common and well-supported in Western countries where people can recycle medicines at recycling points or pharmacies. However, the Hong Kong government does not support nor provide facilities for the recycling of medicines in the city. There is no way for private clinics to recycle their excess or unused medicines even if the medicines are in good condition. This results in medicine wastage.

Research participants suggested several measures to reduce medicine wastage in private clinics in Hong Kong.

Introduction of centralized medicine procurement and inventory management system

The Hospital Authority in Hong Kong has adopted a centralized medicine procurement and inventory management system in public hospitals. The system helps to streamline the ordering and supply of medicines, reduce purchasing costs, and track and monitor medicine inventory in each public hospital. It can avoid unnecessary overstocking of medicines and thereby reduce medicine wastage due to expiration, spoilage, or incorrect storage. If a centralized medicine procurement and inventory management system can be introduced to the private clinics market in Hong Kong, it can greatly reduce the medicine waste generated by private clinics and benefit the environment in the long run. However, as the research participants pointed out, introducing such a system in the private clinic market in Hong Kong is not easy and faces various obstacles. First, it is extremely high cost to set up and maintain a good centralized medicine procurement and inventory management system. This requires many new hardware and software components, a secure network, modifications to existing systems, and technical support at each stage of the supply chain. No single drug supplier, distribution company, or private clinic can bear the cost. Second, a centralized medicine procurement

and inventory management system may involve the exchange of data and information about drugs, drug functions, drug formulas, prescriptions, stock levels, inventories, and patients among drug suppliers, distribution companies, and private clinics. Many of these data are sensitive and private, or even a business secret. Third, for a centralized medicine procurement and inventory management system to succeed, it requires the adoption by key drug suppliers, distribution companies, and private clinics. However, some of these players have already established their own procurement and inventory systems, e.g. Quality Healthcare and Town Health. It is not easy to convince them to abandon their system and switch to a new centralized system.

Separation of prescribing and dispensing of medicines

Unlike many other Western countries, in Hong Kong, the prescribing and dispensing of medicines are both done by private clinics. Patients are used to visiting a private clinic for both medical consultation and medication. Private clinics therefore need to stock both common and uncommon medicines for dispensing to their patients. If medicine prescribing and dispensing can be separated in Hong Kong, such that the doctors of private clinics provide medical prescriptions while the pharmacists of pharmacies provide the prescription medicines, private clinics will no longer need to keep and manage their medicines. It can avoid medicine wastage in private clinics and has the benefit of reducing conflicts of interest in medication choice for patients. However, as the research participants believed, it is difficult for Hong Kong to adopt the system of separation of prescribing and dispensing of medicines because most private clinics rely on medicine dispensing as their main revenue source. Many private doctors do not want to release their prescriptions to the pharmacists. They also worry that their prescriptions may be amended by the pharmacists.

Development of medicine recycling policy

The research participants found that part of the medicine waste generated by private clinics in Hong Kong consists of unused medicines. These medicines are unopened, not expired, not damaged, and in good condition. They can be collected and recycled for use by another patient in need. The research participants suggested that the Hong Kong government could develop and implement a medicine recycling policy targeting private clinics in the city. The policy may include a guideline on which medicines can be recycled, the recycling procedure, and the setup of medicine collection points. This could facilitate medicine recycling among private clinics and help reduce medicine wastage in the city. Those collected unused medicines could, later on, be reused and dispensed through the public hospitals. For the medicine recycling policy to be successful, the Hong Kong government could provide incentives, like cash rebates or financing for medical equipment, to those participating private clinics.

5. Conclusion and Limitations

Medicine waste in private clinics is an ever-increasing problem in the healthcare system of Hong Kong. On average, over HK$22 million of medicine is wasted in private clinics in Hong Kong each month. The current study revealed that there are five reasons why medicine wastage is common among private clinics: (a) the inefficient business model of private clinics; (b) frequent use of general medicines by private clinics; (c) the decline in the number of medical tourists; (d) disruptions in the supply chain of medicines by COVID-19; and (e) lack of medicine recycling policy and facility in Hong Kong. To reduce the medicine waste generated by private clinics, it is suggested that a centralized medicine procurement and inventory management system similar to that used in public hospitals should be introduced to the private clinics market in Hong Kong. Such a system will allow private clinics to streamline their ordering of medicines and better manage their medicine inventory. Besides, it is suggested that the Hong Kong government should consider adopting the system of separation of prescribing and dispensing of medicines, thereby reducing the need for private clinics to stock and monitor medicines. This can avoid medicine wastage. Last but not least, the Hong Kong government should develop and implement a medicine recycling policy. With such a policy, unused and unneeded medicines from private clinics can be collected and reused by patients of public hospitals.

The limitation of this study is that it used only a qualitative method to collect information about the causes of medical wastage in public clinics and the measures to reduce it. Empirical research, i.e. survey with a larger sample size, can be conducted in the future to investigate different factors influencing medicine wastage in private clinics. In general, the study is sound for practitioners and governments to develop proper policies and

measures to reduce medical wastage in the private clinic market.

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Assessment Audit: How Artificial Intelligence Affected Audit Quality of Sustainability Report Based on Auditors Perspective

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Abstract: This study aims to analyze audit assessment and the effects of artificial intelligence on the audit quality sustainability reports from the standpoint of auditors who provide audit opinions on audits that are conducted of sustainable financial reports. Certain audit tasks can now be automated by the audit profession thanks to technology. Artificial intelligence (AI) and big data analytics can be used to analyze huge data, one of the technological innovations that need more study than conventional data. The number of 85 auditors of Accountant Public Firms in Medan completed questionnaires that were used in this study to gather data. Following the collection of data from respondents, quantitative descriptive methodologies were used to analyze the data. The audit profession may improve the quality of audits by promoting the use of AI and big data analytics and by supporting auditors in developing their skills to stay current with new technologies. AI can improve audit quality, reduce costs, and eventually replace human workers. People are still required in the audit process, though, as AI cannot make decisions when it comes to providing audit opinions on financial reports. As a result, its contribution to the audit process is minimal. Therefore, it is hoped that this study will shed light on the potential applications of AI in the auditing process.

Keywords: *Artificial Intelligence, Audit Quality, Sustainability Report, Auditors*

1. Introduction and Background

Sustainability reporting has become a mainstream practice in the communication of corporate commitment to and performance on sustainability issues (Fonseca et al., 2014; Hahn & Kühnen, 2013; Junior et al., 2014; Perego & Kolk, 2012). Based on data obtained from one of the Big 4 Public Accounting Firms, PwC stated that in Indonesia, sustainability reports have been mandatory for financial institutions and public companies since 2019 and listed companies since 2020. However, due to COVID-19, its implementation has been postponed to 2021 In the second year of implementation, 88% of listed companies in Indonesia have submitted sustainability reports for 2022. In 2022, 80% of companies studied (in Indonesia) use GRI Standards for sustainability reports (PwC, 2023).

However, there has been a lot of criticism in the research regarding the validity and dependability of sustainability reporting (Cho et al., 2015; Gray, 2010; Milne et al., 2006; Moneva et al., 2006). Increasingly, assurance providers—which might be accounting or consulting firms—are verifying reports to allay these concerns and restore trust in corporate reporting. Since independent auditors, also known as assurance providers, share their conclusions about the quality and reliability of the information disclosed, it is assumed that the assurance process shows that sustainability reports and the reporting practices that support them have been verified (Dando & Swift, 2003; King & Bartels, 2015; Rasche & Esser, 2006).

With the start of the fourth industrial revolution, information and technology have grown more quickly, altering several professional fields, including auditing. Certain audit tasks can now be automated by the audit profession thanks to technology. Big data, which may be analyzed using artificial intelligence (AI) and big data analytics, is one of the technological advances that need more study than ordinary data. The audit profession may improve the quality of audits by promoting the use of AI and big data analytics and by supporting auditors in developing their skills to stay current with new technologies. Artificial intelligence (AI) could eventually replace human workers while also improving audit quality and reducing costs.

This article presents an analysis, based on the content analysis of a large sample of auditors, of the perspective of auditors regarding the audit quality of sustainability reports towards the assessment audit works by using AI.

2. Literature Review

The literature on AI for sustainability tackles environmental challenges and spans a wide range of disciplines and areas. This research and analysis are grounded in several theories and frameworks. The goal of agency theory is to align the interests of principals, like shareholders, and agents, like management, by analyzing their connection. This idea can be applied to audit quality to investigate how AI technologies can lessen information asymmetry, eliminate agency conflicts, and improve management oversight and accountability. The elements influencing people's acceptance and adoption of new technologies are examined using the Technology Acceptance Model (TAM) (Hamza et al., 2023). It can be used to look at the opinions and attitudes of auditors on artificial intelligence as well as their readiness to incorporate new technology into audit processes. The idea of diffusion of innovations can be applied to auditing to better understand the factors influencing the uptake and dissemination of AI technologies among auditing companies, regulatory agencies, and other audit ecosystem stakeholders. Control theory is concerned with the systems and procedures that guarantee an organization meets its goals. This theory can be applied to examine how AI technologies offer improved controls, like automated inspections, real-time monitoring, and data integrity verification, in the context of audit quality and technology adoption. It can look at how these technologies increase audit quality and fortify the control environment (Aitkazinov, 2024). In general, the application of TAM to audit quality has improved knowledge of the dynamics of technology adoption in the auditing industry and offered light on how to effectively integrate technological advancements to improve audit procedures and outcomes.

The Benefit of Artificial Intelligence on Audit Quality

Artificial Intelligence (AI) refers to the ability of computers to solve problems and accomplish tasks. When new technology is introduced and made available for purchase, it is not considered innovative until the intended audience accepts and makes use of it (Mlekus et al., 2020). Target users must be persuaded that new technology will make their jobs easier to complete and produce higher-quality work before they accept and use it (Stancheva, 2018). To do this, businesses should find out how their staff members feel about the new technology's ease of use and utility and make sure that staff members can modify their working methods to accommodate the new technology (Mlekus et al., 2020). Perceived utility (PU) and ease of use (PEOU) of AI by the auditor can be gauged using the components of the Technology Acceptance Model (TAM). According to Janvrin & Bierstaker, (2015), TAM is widely used to forecast technological acceptance behaviors. According to Davis, (1989), two main beliefs influence the acceptance of new technologies: PEOU and PU. The degree to which a potential user believes that adopting new technology will be simple, easy, and user-friendly is known as PEOU. Conversely, PU refers to the user's belief that new technology would improve output and increase productivity. According to Davis, (1989), PEOU and PU establish end users' attitudes and beliefs about new technology, which will determine its adoption and utilization.

The Challenges of Implementing Artificial Intelligence in Producing Sustainability Report

When the Brundtland Commission defined sustainability as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs," the idea began to gain popularity in 1987 (WCED, 1987). According to Davidson (2010), McKenzie Stephen (2004), (Morelli, 2011), and Olawumi & Chan (2018), the three interconnected components that go toward attaining sustainability are the environment, economy, and society.

The quality of the audit may be impacted by the application of AI in the financial statement audit. For example, a board member of the Public Company Accounting Oversight Board (PCAOB) stated that auditors shouldn't rely too much on AI tools because they can't replace the auditor's expertise, judgment, and professional skepticism (Harris, 2017). For auditors, audit quality is vital; it conveys the auditors' credibility and represents objectivity. It is also regarded as the foundation of auditing standards that regulate audit engagements (Abdullah, 1982; Fanani et al., 2021; FRC, 2020). Because AI biases have the potential to affect audit quality, they can be viewed as a barrier to AI's use in audit processes. In the end, AI is composed of codes and is susceptible to reflecting the prejudices of the programmers. Furthermore, the limits of the neural network technology supporting AI's deep learning could magnify AI biases if the coding information is devoid of qualitative features (Janvrin & Bierstaker, 2015; Solaimani et al., 2020).

The Impacts of Audit Assessment by Using Artificial Intelligence Based on Auditor's Perspective

AI is being used in auditing to assist auditors in finding flaws and problems in financial reports more quickly, according to a study. (Gentner et al., 2018). Additionally, it's utilized to support auditors' prediction-making and pattern-finding in data. According to (Nwakaego, 2015), Artificial Intelligence (AI) is transforming the auditing process, and software with AI capabilities can perform complicated audits far more precisely and effectively than human labor can. Furthermore, compared to a human auditor, it can analyze massive amounts of data far more rapidly and efficiently. This implies that AI has the potential to be far more significant in the auditing process and that it will probably grow in significance over time. The application of AI to assist auditors in spotting and preventing fraud was the main topic of Chassignol et al. (2018) Study.

According to Stahl et al. (2017), audit companies are currently investing a lot of money in the creation and application of artificial intelligence. According to PwC, one of the four major audit firms, ongoing investments in artificial intelligence will generate $15.7 trillion in economic development worldwide by 2030. According to reports, these improvements were facilitated by three different forms of AI (Munoko et al., 2020). The first type is referred to as "Assisted AI systems," which replicate jobs that humans now perform to help people make decisions or respond to various situations. Usually, pre-established protocols are followed in the implementation of these assisted AI systems. According to this viewpoint, humans make decisions and machines act. The term "mechanical intelligence" refers to assisted AI systems, which enable AI to do routine activities. (Munoko et al., 2020). The second type is known as "Augmented AI systems," wherein robots perform tasks but cooperative human-machine decision-making is necessary. These systems are referred to as having "analytical intelligence" since they can interact with their surroundings and pick up knowledge from the auditor (Guang-Huan, 2017). AI and auditors collaborate to make decisions in this context. Businesses can now accomplish goals that were previously unachievable thanks to this enhanced AI. (Munoko et al., 2020). We have "Autonomous AI systems" as the third form. These systems are capable of adapting to various situations and acting on their own without the need for auditor interaction (Kokina & Davenport, 2017). The auditor defers decision-making to AI in this scenario. Systems with autonomous AI exhibit "intuitive" as well as "empathetic" intelligence. The AI can adapt to novel circumstances in an inventive and efficient manner thanks to intuitive intelligence. However, empathic intelligence enables the AI to identify personal feelings, react appropriately, and have an impact on people. (Munoko et al., 2020).

3. Research Methodology

Data for this study is being gathered using a questionnaire survey. The questionnaire was divided into three sections: Contribution to Audit Quality (assisted, augmented, and autonomous AI systems); Obstacles of AI on Sustainability Report (weakness analysis, risk assessment, and professional reports); and Usefulness of AI (educational qualifications, professional certificates, and experience). To be more precise, the 21-item surveys are adapted from Davis (1989) and the FCR study on "The Use of Technology in the Audit of Financial Statements" (FRC, 2020), which is then measured and adjusted using two response choices (agree and disagree).

This method analysis is based on descriptive quantitative methods. An online questionnaire will be used to collect data from the research sample. 246 auditors from 20 Medan public accounting firms made up the study's population. Subsequently, the researchers used a purposive sampling strategy, limiting the sample to auditors with at least two years of work experience and those employed by the public accounting firms in Medan. 105 auditors were selected using the sampling technique, and 85 auditors provided input on the questionnaires that were distributed. The research employed data analysis techniques such as data summarization and percentage analysis of the values displayed on the Google form.

4. Results and Discussion

Respondent Characteristics

Table 1: Respondent Characteristics

Variables	Description	Frequencies	Percentage
Gender	Male	58	68
	Female	27	32
Educational Qualification	Bachelor	63	74
	Master and above	22	26
Working Period	2-3 years	32	38
	3-5 years	28	33
	More than 5 years	25	29

Source: Survey Data, 2024

Based on the data above, the number of respondents consists of 68% male and 31% female, 74% with bachelor's degrees 25% master's degrees and above, 38% of respondents have a 2-3 years working period 38% whereas 33% of 3-5 years and 29% working period more than 5 years.

Table 2: Questionnaire Development For Perceived Usefulness of AI

No.	Items for perceived usefulness	Agree	Disagree
1	Using AI systems and tools in auditing jobs could enable me to accomplish tasks more quickly	82,3%	18,7%
2	Using AI systems and tools could improve job performance in auditing	85,7%	14,3%
3	Using AI systems and tools in auditing jobs could increase my productivity	91,3%	8,7%
4	Using AI systems and tools could enhance my effectiveness of the job in auditing	88,2%	11,8%
5	Using AI systems and tools impacts positive risk management and compliance efforts in auditing	76,4%	23,7%
6	I would find AI systems and tools useful in my future job in auditing	94,1%	5,9%

Source: Survey Data, 2024

Table 2 explains that in general, more than 50% of auditors agree that AI provides usability and convenience in the audit process. Moreover, most auditors agree in total 94,1% that AI systems and tools are useful in their future job of auditing. So that the implementation process can produce a quality audit report. The percentage who answered disagree shows the statement that the usefulness of AI is not that significant in the audit process.

Table 3: Questionnaire Development For Perceived Obstacles of AI on Sustainability Report

No.	Items for perceived obstacles	Agree	Disagree
1	AI is useful for input, process, and output but not in developing analysis of sustainability report	71,4%	28,6%
2	The AI function does not yet cover all types of audits, particularly those that call for an examination of all relevant data, both financial and non-financial	85,7%	14,3%
3	AI function in data processing still needs to be maintained regularly to prevent data errors and loss	95,2%	4,8%
4	Using an AI system that groups accounts needs to be grounded on user logic, particularly for accounts about sustainable development	90,5%	9,5%
5	AI offers risk assessments only based on numbers but is unable to provide decisions regarding the company's sustainability for economic, social, and environment	91,7%	9,3%
6	If my organization has integrated AI technologies into our audit processes, I will indicate so. If not, I can articulate the main barriers to	63,5%	36,5%

	integrating AI in auditing.		
7	I can identify the challenges associated with implementing AI in auditing processes.	41,1%	58,9%

Source: Survey Data, 2024

Table 3 shows most of the auditors agree that apart from usefulness, AI also has obstacles to its implementation of audit sustainability reports. The highest percentage is 95,2% which is shown by the statement that data processing still needs to be maintained regularly to prevent data errors and loss. Therefore, using AI for the audit process to build an assessment audit, specifically still needs maintenance for a system and tools to get over data errors.

Table 4: Questionnaire Development For Perceived Contribution To Audit Quality

No.	Items for perceived contribution to audit quality	Agree	Disagree
1	Using AI systems and tools in auditing will automate routine audit processes and procedures, allowing more time to focus on areas of significant judgment	95,2%	4,8%
2	Using AI systems and tools in auditing will deepen my understanding of the entity and its processes	84,7%	15,3%
3	Using AI systems and tools in auditing will facilitate robust risk assessment through the analysis of entire populations	71,4%	28,6%
4	Using AI systems and tools in auditing will facilitate the focus of audit testing on the areas of highest risk through stratification of large populations	54,1%	45,9%
5	Using AI systems and tools in auditing will enable me to perform tests on large or complex datasets where a manual approach would not be feasible	74,1%	25,9%
6	Using AI systems and tools in auditing will improve consistency and central oversight in group audits	85,8%	14,2%
7	Using AI systems and tools in auditing will identify instances of potential fraud	83,5%	16,5%
8	Using AI systems and tools in auditing will identify unusual patterns and exceptions that might not be discernible using more traditional audit techniques	90,5%	9,5%

Source: Survey Data, 2024

Table 4 indicates on average more than 70% of auditors agree that AI contributes to audit quality, particularly in audit processes and procedures, audit testing, and identifying potential fraud. The research conducted by Rosli et al. (2012) Revealed that the acceptability and use of technological tools by auditors are influenced by their perceptions of the ease with which they can be integrated into their work and the perceived benefits of these technologies. Al-Ateeq et al., (2022) State that favorable TAM characteristics and technology adoption have been positively correlated with improvements in audit quality, which include increased data analysis efficiency and more successful risk assessments and decision-making processes.

5. Conclusion

The purpose of this study is to ascertain how well auditors comprehend artificial intelligence (AI) technologies and how they are applied in the context of their professional positions. Artificial Intelligence (AI) is a wide range of technologies that allow machines to perform cognitive tasks that humans perform, like learning, reasoning, and problem-solving. But knowledge of AI goes much beyond its simple definition and explores its many subfields, algorithms, and real-world applications. The practical uses of AI in auditing, such as data analysis, anomaly detection, fraud detection, risk assessment, and predictive modelling in audit financial reports and sustainability reports, should also be known to auditors. Strong knowledge of AI enables auditors to recognize its potential advantages, which include increased audit efficiency, enhanced risk identification, and improved decision-making based on insights from data. They are also aware of the difficulties in implementing AI, such as problems with algorithmic biases, interpretability, and ethical considerations.

In conclusion, auditors may confidently and skilfully traverse the constantly changing terrain of technology-driven auditing with a general understanding of AI. It gives them the ability to effectively use AI technologies and processes, which advances organizational resilience, innovation, and audit quality in the digital age. Furthermore, by using sophisticated analytics approaches, AI can help auditors discover fraud trends that were

previously unknown (Sharma & Kumar Panigrahi, 2012). Through the use of previous data, machine learning algorithms can recognize intricate fraud schemes and uncover questionable activity that conventional audit techniques would miss. With this proactive strategy, auditors can keep ahead of fraudulent activity and take prompt action. AI-based solutions can also instantly identify any fraud and continuously monitor transactions. Artificial intelligence (AI) systems can identify anomalous or dubious transactions in real time, allowing auditors to take swift action by utilizing methods like anomaly detection and predictive analytics. This prompt discovery improves the overall efficacy of audits and lessens the financial impact of fraud. The advantages of AI in auditing have been the subject of numerous research. Our results support those of Noordin et al., (2022), who found that artificial intelligence (AI)-powered methods, like machine learning and natural language processing, can enhance audit quality by boosting the efficacy of fraud detection.

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The Role of Artificial Intelligence in the Halal Industry

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Abstract: The halal industry has developed into a promising business opportunity in the industrial era, and many countries are interested in it. Artificial intelligence (AI) has been used in the halal industry to ensure production processes comply with halal standards, improving the safety and quality of halal products. AI can scan, inspect, and monitor any errors that may occur in a product, providing several potential benefits to the halal industry, including improving halal compliance, streamlining the supply chain, and increasing efficiency and productivity. The development of the halal industry in Indonesia shows a positive trend that is increasingly growing, due to awareness of the importance of halal products as a part of lifestyle. This awareness is not only shared by Muslims but also by non-Muslims. This high awareness of halal products will have a positive impact on business opportunities in the halal industry. The Indonesian government has been active in developing the halal industry to encourage the growth of the halal industry.

Keywords: *Artificial Intelligence, Halal Industry, Halal Cosmetic, Halal Tourism*

1. Introduction and Background

Halal is not just a new trend but has become a new paradigm. Halal is now considered a very important part of Muslim life. When people become more aware of halal products, this encourages businessmen to be more sensitive in running their businesses. Halal business is not only a matter of producing halal goods and services, but also a matter of building a strong business strategy (Utomo et al., 2020). According to a report from the State of the Global Islamic Report (2019), there are around 1.8 billion Muslims as consumers of the halal industry. Consumer opportunities in the halal industry increase by 5.2% every year with total consumer spending reaching USD 2.2 trillion. Indonesia has enormous potential in developing the halal industry. This is due to the large number of Muslim residents in this country. Indonesia accounts for around 12.7% of the total Muslim population in the world. It is estimated that the population in Indonesia reaches 273 million people, which means that around 87.2% of the total population in this country is Muslim (Fathoni, 2020).

The halal industry and artificial intelligence have a very strong relationship in increasing efficiency and productivity and ensuring the halalness of the products produced. Artificial intelligence is part of computer science or computing that produces expert systems, algorithms, and programs to imitate the human brain and make human-like decisions in various situations and circumstances (Dhamija & Bag, 2020). Previous studies have discussed the role of artificial intelligence in various industries. The influence of artificial intelligence in the halal tourism industry in South Korea (Marlinda et al., 2021), the food industry (Kakani et al., 2020; Mavani et al., 2022), the manufacturing industry (Lee et al., 2018), health industry (Gautam et al., 2022), the construction industry (Abioye et al., 2021), the accounting industry (Luo et al., 2018), and the oil and gas industry (Sircar et al., 2021).

Artificial intelligence in the halal industry has a very important role and prospects. Artificial intelligence systems can verify ingredients and products automatically, enabling the certification process to be more efficient. AI can be used to identify haram ingredients in products. Artificial intelligence (AI) can be used to monitor the supply chain of halal products, ensuring the authenticity and sustainability of products throughout the journey from producer to consumer. AI can help manufacturers develop new products that meet halal standards more quickly and efficiently, with analysis of consumer data and market trends.

2. Literature Review

Development of Halal Industry: The halal industry has the potential to make a significant contribution to the economy, especially in countries with large Muslim populations. In Indonesia, the halal industry is seen as a key sector for economic growth, and the government actively encourages its development through policies and regulations. The growth of this industry is also influenced by the awareness of the Muslim community which prioritizes halal products, as well as the increasing demand of non-Muslim consumers who are looking for halal options for health and other reasons. Nowadays, every Muslim is aware of the importance of the halal concept (Handriana et al., 2020; Aoun & Tournois, 2015). Halal assures customers that the product has followed all guidelines by the teachings of the Islamic Religion. The halal industry is not limited to food products but covers various sectors such as pharmaceuticals, cosmetics, tourism, fashion, finance, media, and entertainment.

Artificial Intelligence: Artificial intelligence is a system that can perform various tasks that usually require human intelligence when operated. Artificial Intelligence takes the form of a machine that can imitate human behavior developed with knowledge of human thinking and can carry out human thinking procedures (Disemadi, 2021). Artificial intelligence is divided into two categories, namely narrow artificial intelligence and general artificial intelligence. Narrow artificial intelligence is used to complete simple tasks such as managing business schedules and answering customer questions. Meanwhile, general artificial intelligence can handle complex problems such as driving cars, robotics, and overcoming language barriers (Dhamija & Bag, 2020). The role of Artificial Intelligence has been widely studied by several researchers in various industries, including the food industry (Kakani et al., 2020), Industry 4.0 Based Manufacturing Systems (Lee et al., 2018), Health Industry (Gautam et al., 2022), construction industry (Abioye et al., 2021), Accounting Industry (Luo et al., 2018), Application of machine learning and artificial intelligence in the oil and gas industry (Sircar et al., 2021).

Table 1: Role of Artificial Intelligence in Various Industries

No	Industry	The Role of Artificial Intelligence	Source
1	Food	Improved customer experience New product development Improved product quality	(Khan et al., 2023) (Kakani et al., 2020)
2	Manufacture	Increased efficiency and productivity Improved product safety and quality New product development Improved customer experience	(Kim et al., 2019) (Lee et al., 2018)
3	Health	Increased efficiency and productivity Improving the quality and accessibility of Health services Development of new drugs and treatments	(Al Kuwaiti et al., 2023) (Gautam et al., 2022)
4	Construction	Design and planning Project management Quality control Production Operations and maintenance	(Schia et al., 2019) (Abioye et al., 2021)
5	Accountancy	Data analysis Fraud detection Predict economic trends	(Hasan, 2022) (Luo et al., 2018)

3. Research Methodology

This research is qualitative descriptive research that uses a content analysis approach using secondary data obtained from scientific articles and other relevant documents. The data obtained was then analyzed to produce descriptive explanations in the form of words, images, and symbols related to the object of this research.

Discussion

The Role of Artificial Intelligence in the Halal Food Industry in Indonesia

Artificial intelligence technology in the halal food industry to ensure production processes comply with halal standards (Peristiwo, 2019).

Assisting in the Halal Certification Process

In recent years, the awareness of halal food certification has increased, particularly from consumers' perspective. The increasing attention to halal food certification research is caused by increasing public awareness, concern, and knowledge about halal food (Ab Talib et al., 2017). Artificial Intelligence helps carry out risk analysis of raw materials, production processes, and supply chains to ensure product halal. Artificial Intelligence (AI) also helps the halal certification process by automating verification and validation, as well as speeding up the issuance of halal certificates. Through application development and synergy with related institutions, such as Bank Indonesia and educational institutions, the Halal Product Guarantee Administering Agency (BPJPH) of the Indonesian Ministry of Religion is exploring the use of AI technology for halal services. The application of AI in the halal industry can help reduce costs, improve product safety and quality, and predict trends to accelerate halal certification. (KEMENKOPUKM, 2023).

Monitoring Production Processes

The use of artificial intelligence (AI) in the food industry has experienced growth over the years due to various factors such as food sorting, grade smoking and parameter prediction, quality control, and food safety (Mavani et al., 2022). A knowledge-based system is a computer program that uses knowledge from various sources, information, and data to solve complex problems. There are three main categories in this system, namely expert systems, knowledge-based artificial intelligence, and knowledge-based engineering (Mavani et al., 2022). The food industry has used Expert Systems (ES) for various purposes because these systems have been proven to provide significant benefits, especially in the decision-making process. A knowledge-based expert system has been applied in white winemaking during the fermentation process for monitoring, intelligent control, and data recovery. Expert Systems (ES) can be used to monitor in real-time the food production process so that it remains by halal standards.

Detecting haram materials

Authenticity is an important food quality characteristic. Food mixing has varied from the addition of natural compounds to much more serious cases of contamination with dangerous substances (Syahariza et al., 2005). Many analytical methods have been used for the analysis of food additives such as differential scanning calorimetry (DSC), Fourier transform infrared spectroscopy (FTIR), gas chromatography (GC), high-pressure liquid chromatography or high-pressure liquid chromatography (HPLC), nuclear magnetic resonance (NMR), and DNA-based methods (Syahariza et al., 2005). Artificial Intelligence can be used to detect contamination of haram ingredients such as pork in food using computer vision techniques.

The Role of Artificial Intelligence in the Halal Fashion Industry

Predict Fashion Trends

Artificial Intelligence is used to predict future halal fashion trends based on historical data and Muslim consumer preferences. This helps Muslim fashion designers in determining appropriate designs (Katarya & House, 2022). Some ways to do this include: a) Collect historical data on halal fashion trends over the past few years. b) Analyze trend data such as models, colors, cuts, and textures that are popular each season. c) Studying Muslim consumers' preferences for Muslim clothing from survey results and product reviews. d) Utilize machine learning to analyze historical data patterns and consumer preferences. e) Machine learning then predicts halal fashion trends for the next season based on the detected patterns.

Production Process Automation

Artificial Intelligence can automate Muslim clothing production processes such as cutting, sewing, and quality control so that it is more efficient. Apart from that, AI can also help in production scheduling and logistics (Guo et al., 2011). Some examples of the use of AI in the halal fashion industry include; a) Computer Aided Design

(CAD) - designing clothing designs digitally using computer software. Helping Muslim fashion designers in designing clothing models. b) Cutting - AI and automatic machines are used to cut the fabric according to the desired pattern. Reduces fabric waste and is more accurate. c) Sewing - automatic sewing machines equipped with sensors and cameras can sew clothes automatically following a specified sewing pattern. Reduces stitching errors. d) Quality control - AI cameras and sensors can detect finished product defects such as stitching errors, stains, holes, and others. Ensure product quality is more consistent. e) Scheduling & logistics - AI can help optimize production scheduling and raw material logistics as well as finished product distribution to make it more efficient.

Virtual Try-on

Virtual try-on allows consumers to try on clothes digitally using photos of themselves. This is done by realistically mapping clothing images onto the user's body (Han et al., 2018). Virtual try-on proposes an end-to-end neural network architecture that can accurately predict the wear on the user's body. The result is that Virtual Try-on can place and adjust clothing images to the user's body very realistically in various body poses and types of clothing. VITON opens up the possibility of virtual try-ons for fashion e-commerce purposes, for example visualizing consumers wearing clothes they want to buy online.

Fashion Designing

Artificial Intelligence can analyze fashion trend data from runways, magazines, and social media to inspire themes and colors for new collections. Generative algorithms such as generative adversarial networks (GANs) and variational autoencoders (VAE) have been able to produce clothing designs automatically after being trained with fashion design datasets (Zhou et al., 2016). Fashion designers can determine design boundaries or criteria such as style, dominant color, or motif to the AI algorithm, which then produces hundreds of unique and creative clothing designs. AI can also help develop a fashion designer's initial design into hundreds of design variations by changing details such as materials, motifs, and clothing cuts. AI can also help develop a fashion designer's initial design into hundreds of design variations by changing details such as materials, motifs, and clothing cuts. The fashion design process becomes more efficient and productive with the help of AI, so designers can focus on design creativity and innovation (Zhou et al., 2016).

The Role of Artificial Intelligence in the Halal Tourism Industry

Chatbot for customer service

New technological advances powered by artificial intelligence (AI), such as virtual guides and virtual hosts, Chatbots, smart rooms, and digital personal assistants, have drastically changed the experience in the tourism industry (Battour et al., 2022). A chatbot is a software program often referred to as a robot or bot, which functions to carry out conversations with customers using natural language. This chatbot is a form of artificial intelligence that focuses on the user. The chatbot can answer tourists' questions regarding halal tourist destinations, halal food, and other facilities in real-time (Melián-González et al., 2021). This process can be carried out in text or voice format using special devices such as Google, Siri, Amazon Alexa, computers, and smartphones (Pillai & Sivathanu, 2020). Chatbots have several advantages, including saving time, building social relationships with consumers, building trust with users, and establishing emotional bonds between customers and companies. The great advantage of chatbots lies in their ability to set appointments, set reminders, book tickets, as well as provide up-to-date information about traffic and weather (Battour et al., 2022).

Personalized halal travel recommendations

Artificial intelligence (AI) algorithms can be used to provide personalized halal travel recommendations based on Muslim travellers' preferences and interests. The use of social media has also influenced the perception and reputation of halal tourism in Indonesia, which can be a data source for developing halal tourism recommendation algorithms (Mardiana, 2022). Artificial intelligence (AI) algorithms can be used to provide personalized halal travel recommendations based on the preferences and interests of Muslim tourists (Stephenson, 2014).

Translation of tourism content into various languages

Artificial intelligence (AI) can translate tourism content such as descriptions, reviews, and travel guides into various languages. AI can translate tourism content such as descriptions, reviews, and tourist guides into various languages (Mardiana, 2022). The use of AI in tourism content translation has several advantages, such as: a) Improve translation quality. AI can help create more accurate and relevant translations, taking into account the context and nuances of the original content. b) Reduce costs and time. AI can prevent human errors in the translation process, thereby reducing the time and costs required for this process. c) Improve translation quality. The use of AI in translating tourism content can help provide information that is more accurate and easier to understand for tourists, both local and foreign.

The Role of Artificial Intelligence in the Halal Cosmetics Industry

Cosmetics are any substances or preparations that are intended to come into contact with various external parts of the human body (epidermis, hair system, nails, lips, and external genitals) and with teeth or oral mucous membranes. Cavity with the sole or primary purpose of cleaning, scenting, changing the appearance, and/or protecting or maintaining good condition (Nohynek et al., 2010). The use of artificial intelligence (AI) has become very important in the halal Cosmetics industry. AI is used to ensure the halalness of the ingredients used, automate production processes, analyze consumer data, such as skin type, skin condition, and needs, and improve customer service. Artificial Intelligence can help understand consumer needs and preferences better. Apart from that, Artificial Intelligence can also be used to develop personalization features for halal cosmetic products, such as a color selection feature for cosmetic products that suits the consumer's skin color. With this feature, consumers can feel more satisfied with the products they use (Putu Wahyu Dwinata, 2023).

5. Conclusion

The halal industry can be considered as a new opportunity in the industrial world that is currently of interest to countries around the world. Artificial intelligence has been widely used in the halal food industry to ensure production processes comply with halal standards. Artificial intelligence has succeeded in improving the safety and quality of halal food products by ensuring that they are produced correctly and free from contamination from non-halal products. Artificial intelligence is capable of scanning, checking, and monitoring any errors that may occur in a product.

Artificial Intelligence (AI) provides several potential benefits for the halal industry, including improving halal compliance, streamlining supply chains, and increasing efficiency and productivity. In recent years, the development of the halal industry has shown an increasingly positive trend. This is due to awareness of the importance of halal products as part of a lifestyle. This awareness is not only shared by Muslims but also by non-Muslims. This high awareness of halal products will have a positive impact on business opportunities for business actors in the halal industry. In recent years, the Indonesian government has been active in developing the domestic halal food industry. This is marked by the government's efforts to encourage the growth of the halal industry.

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A Review on Digital Zakat Management Research

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Abstract: Digital zakat management refers to the use of technology to facilitate the collection, distribution, and management of zakat, an Islamic tax on wealth. Digitalization can enhance zakat management by increasing efficiency, transparency, and convenience. However, digital zakat management also poses some challenges, such as the risk of zakat fund transfer failure, sharia compliance risk, and technological information risk. These risks can be addressed through global cybersecurity and fintech advancements. The main objective of this research is to review and analyze the use of digital zakat management research. It found that there are initial research had been done in emerging countries on digital zakat management, as well as authors from respective institutions. It is expected to have a clear view of the impact and benefit of using digital zakat management which then can be tested in empirical studies. An optimal collection of zakat funds is the aim as a result of an effective zakat management system.

Keywords: *Digital, Zakat, Management, Technology*

1. Introduction

Zakat is a worship that has two dimensions, apart from achieving pleasure and hoping for rewards from Allah SWT, zakat is a worship that has a social dimension. Therefore, in Islamic history, zakat has been widely used for social purposes. The manifestation of these social interests can be community empowerment, social security, education, health, and others. Zakat has a very noble social dimension, which indicates that Islamic teachings have thought about solutions to problems of inequality and unequal distribution of income in society (Akhyar Adnan & Barizah Abu Bakar, 2009).

Zakat is a fiscal instrument in economic practice that has been used since the Prophet Muhammad, and based on historical records, zakat has played a very important role in the income distribution mechanism in the economy (Amilahaq et al., 2021; Lubis & Azizah, 2018). This can be realized if the potential of zakat can truly be explored effectively and efficiently.

Digitalization has penetrated all aspects of human life, both from an economic perspective, political, social, cultural, and zakat management is no exception. There are at least three phases passed by zakat managers in all parts of the world, namely digitation, digitalization, and digital transformation (Mutamimah et al., 2021). Digitation means ownership of digital devices. Digitalization is defined as the process of converting physical data into digital data and the existence of digital standardization. Digital transformation is a whole action, process, or form of digital transformation so that the entire process is digitally integrated. Moreover, digital transformation in zakat management means digital integration of processes business to business models in managing zakat. It makes all aspects of zakat management starting from planning, collection, distribution and utilization, reporting, and control of zakat is carried out within the corridor digitalization gradually until being completed. It needs an exploration of research on digital zakat management which can be used as a reference for extensive or empirical research. It is also an exposure to the importance of digitalization in one of the Islamic social finance instruments which must be expanded due to the continuous impact on economic development.

2. Literature Review

Zakat holds significant importance in Islam for various reasons. It is a fundamental pillar of the faith, serving as an obligatory act of worship for Muslims to fulfill a religious duty. Zakat helps those in need by providing financial assistance for their necessities, promoting social justice, and reducing revenue inequality in society. Furthermore, Zakat fosters community bonds, encourages gratitude, and charitable giving, and serves as a way to earn rewards from Allah. It also emphasizes the balance between spiritual and material well-being, reminding Muslims of their accountability to Allah in using their wealth wisely and ethically (Saad et al., 2014;

Owoyemi, 2020). Overall, Zakat plays a crucial role in promoting compassion, social responsibility, and unity within the Muslim community while addressing economic inequality and empowering those in need (Cokrohadisumarto et al., 2020).

Zakat is a vital component of Islam, serving as the third pillar of the faith after the declaration of faith and prayer (Zakiy et al., 2023). It is a mandatory act of worship for Muslims who meet certain eligibility criteria, and its importance extends beyond spiritual growth to have a profound impact on both personal and communal levels (Hasan et al., 2019). The significance of Zakat is underscored in the Quran and Hadith, reflecting core Islamic values of compassion and social responsibility.

The case in Indonesia (one of the Muslim most populations in the world). There are challenges by the zakat institutions in collecting and distributing zakat funds (Kasri & Yuniar, 2021; Mawardi et al., 2023):

Table 1: Aspects and Challenges of Zakat Fund Collection and Distribution

Aspect	Challenges
Planning	National zakat management planning is yet to be integrated completely with the Development Planning System National The lack of understanding of ongoing planning zakat by Amil Need more technical guidance regarding planning for provincial zakat institutions.
Collection	The lack of awareness among zakat payers. The number of unofficial zakat institutions is still high Unhealthy competition between Zakat institutions Security of data on digital platforms is still underdeveloped or needs a systematic and reliable system. Violation of the amil zakat's code of ethics which has an impact on the zakat payer's trust. Collection and distribution are very dependent on economic and social conditions at a certain time, so they become very volatile.
Distribution and Utilization	There is an opinion from some people that zakat distribution is carried out by some of zakat institutions which associated with illegal activities. Slowing economic growth and the emergence of new poor community classes due to potential natural disasters and climate change. Zakat institution's branding as a philanthropic institution is less competitive compared to other financial institutions. There is no comprehensive architecture and blueprint for zakat integration with other economic masterplans.
Controlling	Declining public trust in zakat institutions. Absence of binding regulations between zakat institutions and the government (local or central). Uncontrollable the extensive institutional network (zakat institutions) that oversight effective zakat implementation.
Reporting and Accountability	Less participation (not 100%) in national zakat management Amil's capability in using the Zakat integrated system is still minimal, thus requiring a continuous training program. Unaffordable to pay audit fees by zakat managers

The gap between the potential and realization of zakat collection is room for improvement and acceleration of zakat management performance through various aspects of challenges that need to be answered. Thus, the results of zakat management performance are not only reflected through a single indicator.

Importance of Zakat in Islam

Zakat comes from the purification, growth, and blessing of one's wealth. One should give a set percentage (2.5%) of their wealth based on their yearly earnings and give that percentage to those in need. This is usually set aside as what one expects to give whether through donations to charities or their Masjid. Zakat is a fundamental teaching of Islam, and Muslims must work to ensure those who don't have the means to thrive are given what they need to survive. Generosity is a central theme in Islam that Allah gives to those He loves, and He guides us to refrain from attachment to material wealth.

The Zakat system currently faces several challenges that need to be addressed to ensure its effectiveness in alleviating poverty and supporting the needy. The challenges of zakat management in Muslim developing countries are numerous and complex. Some of the key challenges include (Mawardi et al., 2023; Kamal et al., 2024; Ardani & Pujiyono, 2021; Bin-Nashwan et al., 2020):

Lack of integration with government programs: There is a need for zakat programs to be integrated with government programs, particularly those aimed at poverty reduction, to maximize their impact
Low public awareness: Increasing public awareness about zakat is crucial for its successful implementation and acceptance by the community
Low reporting: Many zakat institutions do not report their zakat management activities, which makes it difficult to track and optimize the collection and distribution of zakat funds
Regulatory issues: The current Zakat Act does not yet integrate zakat as part of state finances, which needs to be addressed to facilitate its use as a source of state revenue
Socialization and community engagement: The community must be educated about the importance of zakat and its role in poverty alleviation
Instrumentation and institutional support: The government needs to establish institutions and instruments to collect and distribute zakat funds efficiently
Trust and transparency: Ensuring transparency in the collection and distribution of zakat funds is essential to build public trust and confidence in the system
Lack of staff and resources: Zakat institutions may face challenges in managing their staff and resources effectively, leading to inefficiencies in the distribution of Zakat funds. The education and training of amil zakat officers is crucial for ensuring professional and capable personnel to manage zakat activities effectively.
Political issues: The integration of zakat as an obligation in the law may raise political concerns, particularly regarding the perception of the country as an Islamic state
Corruption and mismanagement: Ensuring that zakat funds are not misused or misappropriated is a significant challenge, as it requires strong governance and accountability mechanisms
Technological limitations: The use of technology to improve the efficiency of zakat distribution and monitoring is limited, which can lead to issues in tracking recipient information and the distribution process
Governance of zakat institutions: Ensuring the transparency, accountability, and effectiveness of zakat institutions is crucial for maintaining public trust and confidence in the zakat system

To address these challenges, it is essential to strengthen the governance of zakat institutions, improve transparency and accountability, and increase public awareness and education about the importance of zakat in supporting the needy and alleviating poverty. Moreover, the development of zakat has been driven by its potential to address social issues and contribute to the SDGs. It is a significant form of philanthropy that has been adopted globally and has the potential to make a significant impact on poverty, inequality, and other social issues.

Digital technologies used in zakat management include:
Web-based applications: These offer several time-saving services in collecting, distributing, and utilizing zakat services, enhancing the efficiency of the zakat management process
Mobile applications: These can facilitate zakat management by providing online financial reports, online zakat calculators, and online payment facilities, making zakat more accessible and efficient
Blockchain technology: This can be used to create a more open, transparent, and secure online environment for zakat transactions, ensuring the integrity of the process.
Smart contracts: These can automate and simplify zakat management and collection, increasing transparency and accountability, and reducing administrative costs.

Artificial Intelligence (AI): AI can help zakat organizations improve the efficiency, accuracy, and impact of zakat collection and management by analyzing and interpreting data, recognizing patterns, and making predictions or recommendations.
Digital wallets: These can be used to accept and distribute zakat funds, enhancing the efficiency and transparency of zakat transactions.
Online payment services: These can facilitate zakat payments, making it easier for donors to contribute to zakat and for recipients to receive support.
Digital-based information systems: These can manage and track zakat funds, providing real-time updates on zakat collection and distribution, and enhancing transparency and accountability.

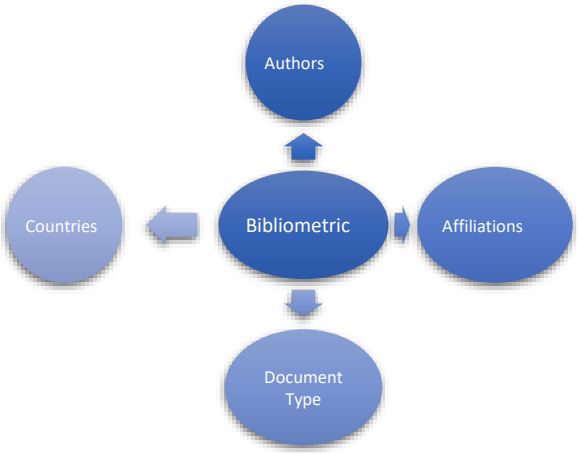
Zakat management systems link several organizations together. These can promote collaboration and address issues of information sharing and inefficient business processes, enhancing the overall efficiency of zakat management. These digital technologies have the potential to improve the efficiency, transparency, and accessibility of zakat management, ultimately enhancing the impact of zakat in addressing social and economic inequalities.

The zakat operator (amil) has its challenges for management zakat itself. Considering the high turnover of amil, this allows a management system The zakat that is built and implemented can change along with changes in the amil's human resources on duty. Thus, things related to prosperity, certainty career path, and merit system from Amil Zakat Management HR need to be completed immediately.

3. Method

This study's thorough bibliometric analysis sought to answer each of the predetermined research topics. Furthermore, bibliometric analysis reveals relationships between the publications. It also shows the development of research on the mentioned subjects in terms of document type, authors' productivity, affiliations, and countries. Below is the flow of bibliometric analysis for this study:

Figure 1: Flow of the Bibliometric Analysis

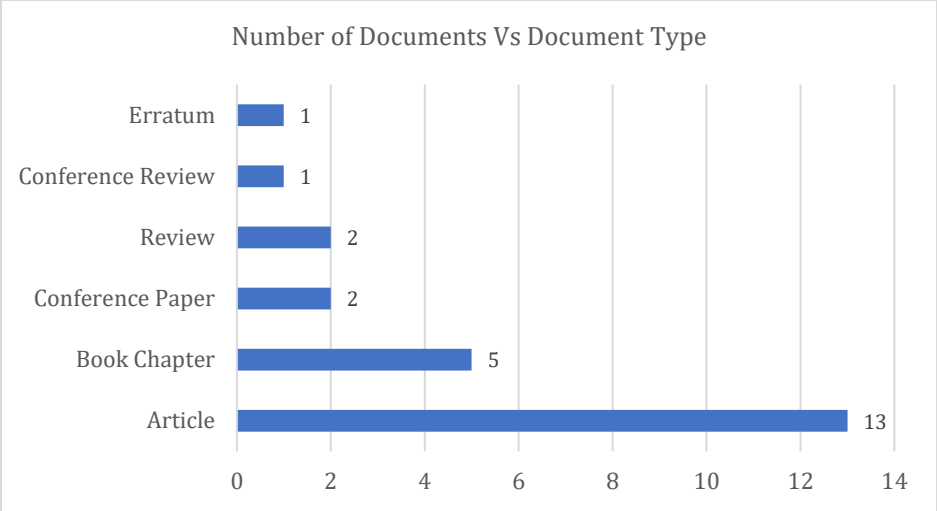


4. Results

Published Document Type

Figure 2 shows that the research output on digital zakat management is mostly written in articles (13 documents) rather than in books, even some published in conference papers. This means that the research on digital zakat management could be explored and become a research interest among academicians/researchers who will publish their outcomes in the research article.

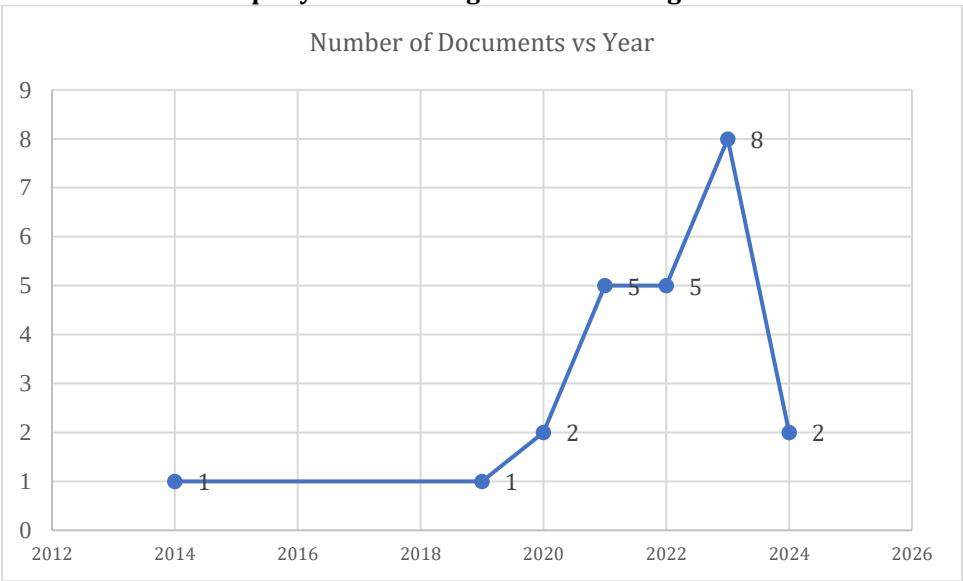
Figure 2: Number of Documents on Document Type



Number of Publications

Figure 3 shows the minimum number of publications appearing in the research of digital zakat management since the year 2014. The highest number of published documents is in the year 2023 with 8 documents. The interest of researchers on the subject is quite low due to the limited discussion by stakeholders on zakat management that see digitalization as one of the solutions to the effective collection and distribution of zakat funds.

Figure 3: Number of Documents per year on the digital zakat management



Most Dominant Author

Table 1 shows the most dominant authors in digital zakat management. The highest published documents are at least 2 papers and mostly with 1 paper. Some opportunities should be filled up by initiating a plan to expand the research works. Both Beik, I.S. and Utami, P. have 2 published documents so far in digital zakat management.

Table 2: A list of Authors who have published documents on digital zakat management

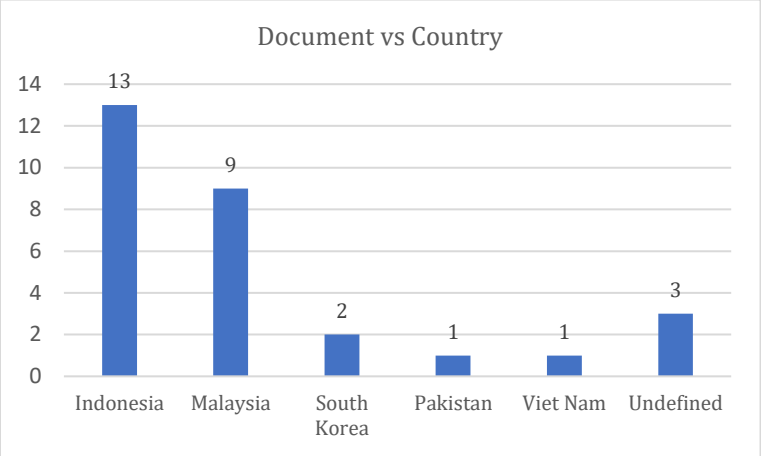
Author	Cited	Author	Cited	Author	Cited
Beik, I.S.	2	Kasri, R.A.	1	Ratnasari, R.T.	1

Author	Cited	Author	Cited	Author	Cited
Utami, P.	2	Khairi, K.F.	1	Riyadi, S.	1
ABDULLAH, N.S.N.	1	Khalidin, B.	1	Rizal	1
Abdullah, L.H.	1	Laili, N.H.	1	Rizkiningsih, P.	1
Abdullah, Z.	1	Lee, Z.O.	1	Robbana, A.	1
Abidin, A.	1	Maman, U.	1	Rosele, M.I.	1
Ahmad, A.	1	Mariyanti, T.	1	Ryandono, M.N.H.	1
Ahmad, S.	1	Md Hussain, M.H.	1	Saad, R.A.J.	1
Ahmad, U.S.	1	Mohammed, M.O.	1	Sabri, H.	1
Alamab, A.	1	Mohd Ariff, A.H.	1	Saoqi, A.A.Y.	1
Ali, A.K.	1	Mohd Nasir, M.H.	1	Septiani, N.	1
Amilahaq, F.	1	Mohd Nasir, N.E.	1	Shafrani, Y.S.	1
Anwar, S.M.	1	Mohd Sharif, M.H.	1	Sukmana, H.T.	1
Ascarya, A.	1	Mubarik, F.	1	Suprihadi, R.	1
BASARUD-DIN, S.K.	1	Muflikh, Y.H.	1	Surawijaya, C.I.	1
Bakar, M.F.A.	1	Muneem, A.	1	Swandaru, R.	1
Basrowi	1	Musa, A.	1	Thaidi, H.A.A.	1
Bedoui, H.	1	Nor, S.M.	1	Tran, M.D.	1
Caraka, R.E.	1	Nugroho, B.	1	Wahid, H.	1
Ghofur, R.A.	1	Pham, V.H.	1	Wijayanti, P.	1
Hadi, R.	1	Rahman, A.A.	1	Yaacob, S.E.	1
Hermawan, A.	1	Rahman, A.A.	1	Yuniar, A.M.	1
Hilyatin, D.L.	1	Rahman, M.F.A.	1	Yusrawati	1
Hudaefi, F.A.	1	Rahman, N.N.B.A.	1	Zaenal, M.H.	1
Ichsani, Y.	1	Rahmawati, E.	1	Zulfikar, T.	1

Most Dominant Country

Figure 4 shows the most dominant countries with highly producing papers on digital zakat management, among others Indonesia and Malaysia with 13 and 9 documents respectively. Indonesia and Malaysia are known as the countries that implementing zakat management for quite some time. There are factors and challenges related to digital zakat management in both countries that need to be explored in continuous research works.

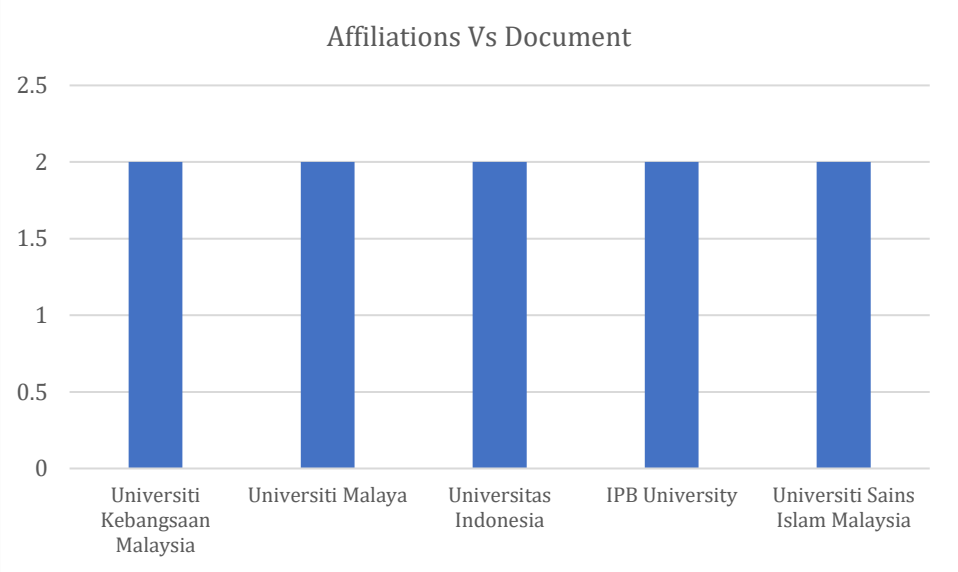
Figure 4: Documents published by Country on Digital Zakat Management



Most Dominant Institutions

Figure 5 shows the most dominant institutions that have published articles on digital zakat management. Five institutions have published 2 documents each. Most of them are located in ASEAN regions like Malaysia and Indonesia. This could be an example to other zakat institutions worldwide to see the best practices of zakat management in both countries as well as the research outcome on the subject.

Figure 5: Affiliations by Published Documents



5. Conclusion

Zakat management cannot be separated from professional human resources (HR). Aspects like planning, implementation, control, reporting, and activities accountability for collection, distribution, and utilization of zakat must be considered and implemented (Müller, 2017). HR is the most valuable asset because it determines a company's success in organization/work. The demands of changing times and policies are also encouraging zakat management to adapt through a more professional paradigm shift. Previously the traditional paradigm allowed zakat management activities to become side jobs, part-time jobs, and unpaid management, but now quality and reliable zakat operators are indeed very crucial. The existing management facilities are something that needs to be abandoned and changed to a modern paradigm. The modern paradigm in managing zakat is

making the amil a full-time profession, having a certain level of quality, and being paid appropriately, so that every potential and competent person is devoted to managing zakat professionally (Kamal et al., 2024).

The purpose of this research is to investigate the topic of digital zakat management through a comprehensive bibliometric analysis and a developmental map of the field. For example, the highest publication on digital zakat management started in 2014. The highest number of published documents is in the year 2023 with 8 documents. While mostly written in articles (13 documents) rather than in books, even some published in conference papers, most dominant authors in the digital zakat management have at least 2 papers and mostly with 1 paper. Greater initiatives should be considered to enhance more research work. Finally, the most dominant institutions that have published articles on digital zakat management are concentrated in two countries Malaysia and Indonesia. The findings demonstrated the most common contributors who have a major influence on digital zakat management and highlighted the growing attention of eminent academics and organizations worldwide in this area. The fact that this study used a single source or database for data collecting and synthesis is one of its drawbacks.

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The Influence of E-Commerce, Motivation, and The Use of Accounting Information Systems in Decision-Making For Entrepreneurship in Accounting Students

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Abstract: In today's digital era, anyone can make buying and selling transactions easily. Buying and selling trade goods can now be done from young to old. Due to the access to conduct all-round transactions in terms of supply of goods, promotion, and finance is also easy. This is because the latest information technology makes it easy to transact efficiently and effectively. An example of current information technology that is developing is e-commerce. Apart from e-commerce, accounting information skills can encourage individuals to develop their businesses. However, the situation in Indonesia is that young people who are entrepreneurs are low. Therefore, this study aims to see whether the variables that have been determined such as E-Commerce, Motivation, and Financial Information Systems can influence decisions in entrepreneurship. The population in this study were accounting students at the Faculty of Economics and Business, Universitas Medan Area. The data used in this study is primary data by distributing questionnaires to respondents using a purposive sampling technique. The analysis used is multiple linear regression analysis. The results of this study are expected to be able to analyze more deeply the students' interest in entrepreneurship. The results of the study will also be presented through tables, figures, and graphs.

Keywords: *Entrepreneurship, E-Commerce, Motivation, Accounting Information System*

1. Introduction and Background

Based on data from the Badan Pusat Statistik in August 2023, the unemployment rate in Indonesia was 5.32% or approximately 14,000,000 of the entire Indonesian population. This is a decrease of 0.54% from August 2022. However, despite the decrease, the unemployment rate is a large number for a country. This is because many people in Indonesia, including young people, want to work in an institution. The Ministry of Cooperatives and Small and Medium Enterprises sees that the number of entrepreneurs is still around 3.47% as of 2022. This number is still far below the standard entrepreneurship ratio for the category of developed countries which has a minimum standard of 12% of the total population. Based on this data, we know that the ratio of entrepreneurs to the population in Indonesia is still far from the minimum number. The government continues to encourage an increase in this ratio so that economic growth will increase. New entrepreneurs are still needed in Indonesia because they are expected to open new jobs to reduce unemployment.

In the current era of digital development, the process of doing business is very easy. According to Marlinah (2020), the digital era makes the use of technology more advanced from year to year, but in Indonesia, this is still not fully utilized by the community. Technological advances should be utilized to start a business to improve the quality of life in the future. But this still cannot be realized because of the low interest of the Indonesian people in technological advances. Therefore, it is very necessary to use or utilize the type of application or information technology to increase competitiveness in the business world, one that is often used is Electronic Commerce (e-commerce). E-commerce can be used by entrepreneurs to create a web on the internet to market the products offered and does not require expensive costs to expand business promotion because it can utilize pre-existing platforms, such as social media. As in the concept of commerce, electronic commerce creates alliances between parties to provide services. The result of such alliances can give rise to rights and obligations that must be fulfilled by the parties involved. Electronic commerce is a model of a sales contract with characteristics that differ from the usual model of buying and selling transactions, especially with a scope that is not only local but also global (Muttaqin, 2011).

According to Mahrom (2022) entrepreneurship grows based on the motivation to earn their income and develop an entrepreneurial self. The emergence of motivation comes from within oneself and from others. Pressure to survive, develop, or show the existence of success can encourage entrepreneurial action. Especially if externally, there are many experiences of the success of others who take the same action. According to

Gerungan (Lubis & Maha, 2021), motivation is an impetus in humans that causes these humans to carry out an activity. So, with strong motivation, students are motivated and decide to become entrepreneurs. And of course, it will increase the number of young entrepreneurs in Indonesia. The level of entrepreneurial success depends on how much motivation is in the student. So, the greater the motivation a person has, the greater the effort to realize the desire for entrepreneurship.

When someone starts a business, they must have a supporting information system to run their business properly. Including the system used in managing finances. According to Nuraibah et al (2021), the most popular information system among entrepreneurs is the accounting information system. According to Rapika (2021), manual data processing is no longer relevant in the modern era as it is today, because there is openness and globalization which requires everything to be processed quickly and accurately. Errors caused by manual data processing can no longer be neutralized because the information produced can cause errors in decision-making. This is what makes the existence of accounting information systems increasingly important and main for a company.

2. Literature Review

Decision for Entrepreneurship

Entrepreneurship is the ability to hone something within oneself to be improved and utilized to be more optimal so that it can improve future living standards (Hendro, 2011). Entrepreneurship is the process of creating a new value in the use of time and effort required and receiving monetary rewards generated for freedom and personal satisfaction. Entrepreneurship is a person's efforts in the creation of a business or venture faced with the risk and uncertainty of profit in business development by exploring opportunities in utilizing the necessary resources (Suharyadi et al., 2007).

E-Commerce

According to Anugrah and Prianthara (2018), electronic commerce is the activity of buying and selling goods or services using the Internet network. Candra and Dadang (2013) explain that electronic commerce is a sales transaction activity or purchase of goods and services carried out between companies using computers with internet networks. Electronic commerce business is a business that has no boundaries between sellers or buyers and there is no distance between anything.

Motivation

According to Hidayat et al. (2023), motivation is defined as factors that direct and encourage a person's behavior or desire to carry out an activity which is expressed in the form of hard or weak effort. According to Alifia and Jojok (2019: 142), entrepreneurial motivation is "a psychological drive that arises from within and outside the individual to do something independently". With the encouragement that arises, the individual will be able to determine what business he will be involved in as well as determine future goals and expectations. Then as stated by Yunal and Indriyani (2013: 142) entrepreneurial motivation is "the driving force/encouragement within that gives rise to enthusiasm for the creation of an activity/job by looking at the opportunities that exist around, acting bravely in taking risks, carrying out innovative activities, and having an orientation towards profit". Then as stated by Maulida & Dhania (2012) entrepreneurial motivation is a state that encourages, drives, and directs the desire of individuals to carry out entrepreneurial activities, by being independent, believing in themselves, being future-oriented, taking risks, being creative, and highly valuing the desire for innovation.

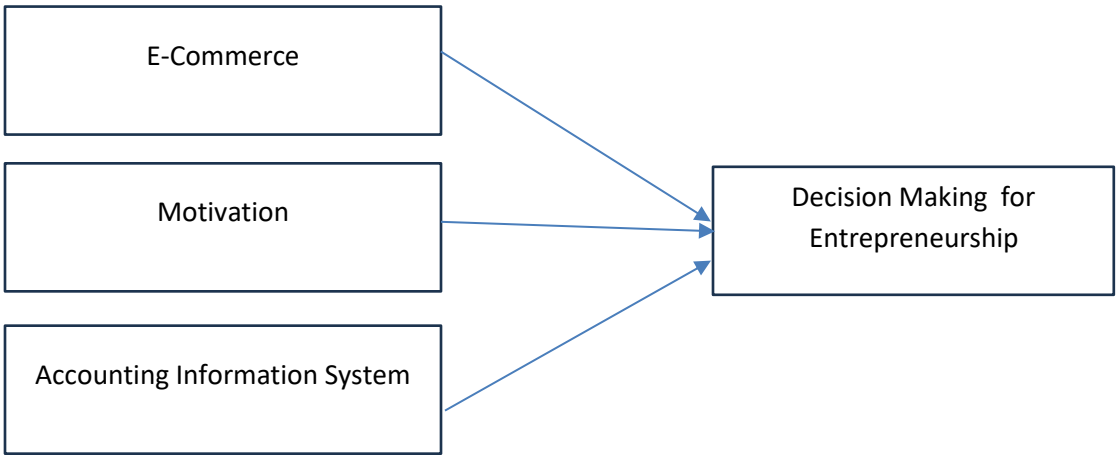
Accounting Information System

According to Kasmir (2020:4) Accounting Information System is a system that processes data and transactions to generate useful information for planning, controlling, and operating a business. Hall (2018) defines an accounting information system as consisting of three main subsystems, namely: a transaction processing system that supports daily business operations with several documents for users throughout the organization, a general ledger reporting system that produces traditional financial reports and a management reporting system that provides management with internal financial reports with specific purposes and information needed for decision making. Mulyadi (2018) Accounting Information Systems are records and reports that are coordinated in such a way as to provide the financial information needed to facilitate company management.

From some of the above definitions, it can be concluded that an accounting information system is a system that processes data and transactions to produce company financial reports in the form of records or reports that are coordinated in such a way as to facilitate company management.

Development Hypothesis

Figure 1: Framework Draft (processed data,2024)



As for the formulation The hypothesis in this research is as follows:
H 1: E-commerce has an influence on decision-making for entrepreneurship
H 2: Motivation has an influence on decision-making for entrepreneurship
H 3: Accounting Information System has an influence on decision-making for entrepreneurship

3. Research Methodology

The type of research conducted in this study uses a type of quantitative research in the form of an associative approach. Quantitative research is research based on the philosophy of positivism, used in research with certain populations or samples, data collection using statistical/quantitative data analysis, and research instruments with the aim of testing predetermined hypotheses (Sugiyono, 2019). The population in this research is all active students of the Accounting Study Program, Faculty of Economics and Business, Universitas Medan Area. The determination of the number of samples is measured using the Slovin formula with a confidence level of 90% and a value of e = 10% to get a sample size of 80 students. Data processing is using SPSS 25 for Windows software. The approach method used in this research is a quantitative research method, with data analysis consisting of classical assumption tests, multiple linear regression analysis, and hypothesis testing.

4. Results

Classical Assumption Test

Normality Test

Table 1 : Kolmogorov-Smirnov Test

One-Sample Kolmogorov-Smirnov Test

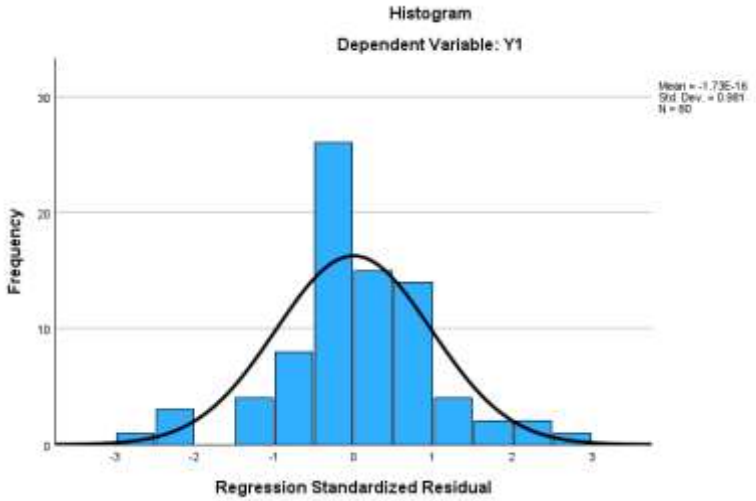
		Unstandardized Residual
N		80
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	1.56872997
Most Extreme Differences	Absolute	.122
	Positive	.100
	Negative	-.122

Test Statistic			.122
Asymp. Sig. (2-tailed)[c]			.005
Monte Carlo Sig. (2-tailed)[d]	Sig.		.005
	99% Confidence Interval	Lower Bound	.003
		Upper Bound	.007

a. Test distribution is Normal.
b. Calculated from data.
c. Lilliefors Significance Correction.
d. Lilliefors' method is based on 10000 Monte Carlo samples with a starting seed of 2000000.

Based on Table 1, it can be seen that the significant value is 0.05. It can be concluded that the data above is normally distributed.

Figure 2: Histogram

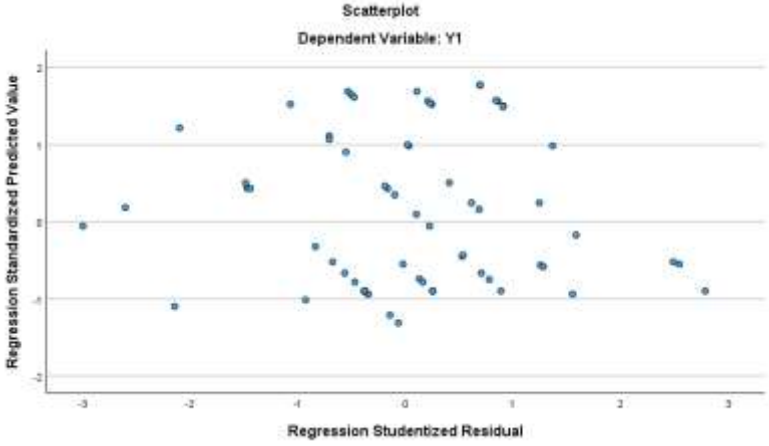


Based on the figure above, that data has normally been distributed.

Heteroscedasticity Test

The following is the data regarding the heteroscedasticity test:

Figure 3: Scatterplot Graphic



Based on the graph above, it can be seen that the dots spread above and below the number 0 on the Y-axis, so it can be concluded that there is no heteroscedasticity in the regression model.

Multiple Linear Regression Analysis

Multiple regression analysis was conducted to determine how much influence the variables of E-Commerce, Motivation, and Accounting Information Systems on the Decision to Go into Entrepreneurship.

Table 2: Multiple Linear Regression Analysis

Model		Unstandardized Coefficients B	Std. Error
1	**(Constant)**	**7.248**	**2.332**
	X1	**.052**	**.101**
	X2	**.145**	**.125**
	X3	**.471**	**.113**

Based on Table 2, multiple linear regression equations can be obtained as follows:
Y = 7,248 + 0,52X1 + 0,145X2 + 0,471X3 + e

The constant value of 7.428 means that without the variables of e-commerce, motivation, and accounting information systems, the decision to engage in entrepreneurship is 7.428.
The X1 regression coefficient value is 0.52, meaning that if the e-commerce variable increases, the decision variable for entrepreneurship will increase, and vice versa.
The X2 regression coefficient value is 0.145, meaning that if the motivation variable increases, the decision variable for entrepreneurship will increase, and vice versa.
The X1 regression coefficient value is 0.471, meaning that if the accounting information system variable increases, the decision variable for entrepreneurship will increase, and vice versa**.**

Hypothesis Test T (Parcial) Test

The following are the results of the t-test:

Table 3: T Test

Model		Standardized Coefficients Beta	t	Sig.
1	(Constant)		3.108	.003
	X1	.052	.513	.610
	X2	.141	1.161	.249
	X3	.497	4.156	,001

Based on the t (partial) test results above, variables X1 and X3 are not significant with Y, but variable X3 is positive and significant with variable Y.

5. Conclusion

In the results of this study, the variable e-commerce and motivation does not affect the decision to entrepreneurship. However, the accounting information system variable has a positive and significant effect on the decision to engage in entrepreneurship. This means that young people in Indonesia will be interested in entrepreneurship if there is convenience in transactions and clear financial records.

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Crucial Factors Influencing the Success of SMEs in the Digital Transformation Era

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Abstract: Small and medium enterprises (SMEs) have an important role as the backbone of a country's economy. However, in the current digital era, there are many challenges faced by SMEs in adopting digital transformation. Assumed limited literature that discusses the success factors of digital transformation in SMEs. Therefore, this research aims to explore the important factors for the success of digital transformation in today's SMEs. The method used in this research is to search for articles relevant to the research topic using the Google Scholar database. The research results show that digital strategic planning, digital maturity, relationship capital, and collaborating with external digital innovation units are the keys to successful digital transformation in MSEs today. The results of this research will provide input to SMEs and the government in making decisions to achieve the success and sustainability of SMEs, as well as enrich the literature that examines digital transformation in SMEs.

Keywords: *SMEs, Digital Technology, Transformation Era, Crucial Factors, Content Analysis*

1. Introduction and Background

Small and Medium Enterprises (SMEs) have become an interesting issue to study to date (Chakma & Dhir, 2023; De Matteis, Elia, & Del Vecchio, 2023; Olazo, 2023; Suzic & Forza, 2023; Verma et al., 2023; Zahoor et al., 2024), plays an important role in the country's economy (Li et al., 2016; Ng & Kee, 2017; Srimulyani et al., 2023; Wattanakomol & Silpcharu, 2023). The contribution of SMEs can be seen in increasing income, employment, and economic growth (Hill et al., 2002; Mittal & Raman, 2021; Restrepo-Morales et al., 2019; Sarwoko & Frisdiantara, 2016), and important contributors in most industries (Li et al., 2016; Ng & Kee, 2017).

The increasingly widespread digital technology has caused rapid and radical changes in business and society today (Scuotto et al., 2021), including SME businesses. Competition is increasingly competitive as a result of globalization and dynamic markets (Ahmad et al., 2022; Huang et al., 2022). The future of SMEs depends largely on their ability to meet customer expectations and remain competitive in the market (Moeuf et al., 2018). Society and business are asked to respond to new circumstances, through flexibility, speed, and adaptability (Ragazou et al., 2022). Krempl and Pace (2001) stated that not responding to technology/globalization can cause failure to achieve important goals.

The digital era provides a new paradigm in managing the SME industry (Moeuf et al., 2018), digital technology can be utilized by SMEs to manage their business operations effectively and provide unique value to their clients in both local and international markets (Teoh, Ahmad, Abdul- Halim, & Ramayah, 2022), affects business processes, operational routines, and company capabilities (Ragazou et al., 2022). However, SMEs face several important obstacles, including a lack of access to information regarding the latest technology (Kergroach, 2020), how to optimally align business strategy with digital technology as a consequence of the ongoing digital technology revolution (Li et al., 2016), limited capital, qualified workforce, and modern technology (Gentile-Lüdecke et al., 2020).

The ability to access and align business strategies with technology is no longer an option but is a key factor for the success and sustainability of SMEs (Bouwman et al., 2019). A previous study conducted by Zhang et al. (2022) revealed that limited resources, capabilities, and the digitalization process of SMEs were relatively slow, and literature discussing digital technology for SMEs was still very limited. Therefore, to fill this gap in the literature, this research aims to find the key factors for the success of digital technology in SMEs.

2. Literature Review

Small Medium Enterprises (SMEs) in Economic Development: Facts show that SMEs are the backbone of the national economy in many countries (London, 2010), playing an important role in the industry in developed and developing countries in today's global economy (Naradda Gamage et al., 2020). However, globally there has been no agreement on the definition of SMEs. Each country has a different definition of SMEs. The common explanation used to explain the classification of SMEs refers to financial size and number of employees (Melo et al., 2023). For example, South American countries such as Brazil require SMEs to have 20 – 249 permanent employees (Melo et al., 2023). In the United States, the criteria for SMEs are determined by the number of employees being less than 500 (U.S.Small, 2018). In Europe, SMEs are defined as businesses that employ less than 250 people and must have an annual turnover of up to EUR 50 million (Malesios et al., 2021). The criteria for SMEs in China are to have 300 – 1000 employees and have a sales turnover of 20 – 40 million Yuan. SMEs in Indonesia have criteria of less than 100 employees, Malaysia with criteria of 5 - 150 employees and an annual sales turnover of 250 - 25 million RM (Abe et al., 2015).

Several pieces of evidence have been revealed by previous researchers that SMEs make many contributions, such as contributing to 90% of business forms and providing employment for 60% of the world's workforce (Munro, 2013), are the most dynamic businesses in the global economy and play an important role in developing human well-being in any country (Naradda Gamage et al., 2020), contributing to poverty alleviation and sustainable economic growth (Asare et al., 2015; Ayyagari, Beck, & Demirguc-Kunt, 2007; St-Pierre et al., 2015; Helping to eradicate poverty, inequality and unemployment in rural areas, helping people with disabilities, women, families, uneducated people and rural communities to contribute (Fiseha & Oyelana, 2015; Stuart, 2011). SMEs realize sustainable development through inclusive economic growth (Fonseca & Carvalho, 2019). SMEs utilize many local resources (Asare et al., 2015).

Contribution to Digital Transformation on SMEs: Digital transformation is a big topic in scientific studies today (Dörr et al., 2023). The term digital transformation is different from the concept of digitization (Melo et al., 2023). Digitization according to Verhoef et al. (2021), is the activity of changing manual information into digital without adding value to the activity. Meanwhile, the terms digital transformation and digitalization are terms that are often used interchangeably and have meaning in broad concepts that affect an ecosystem (Bedell-Pearce, 2018; Reis et al., 2018).

Digital transformation has given rise to a new paradigm in running a business, building relationships with consumers, suppliers, and stakeholders, and encouraging business model innovation and customer value creation (Chatterjee, Chaudhuri, Vrontis, & Thrassou, 2022; Stich et al., 2020; Yang et al., 2023). Digitalization is very important for SMEs in carrying out their role in contributing to a country's economy (Chatterjee et al., 2022; Hadjielias et al., 2022).

Previous research has shown the role of digital transformation in helping SMEs. Some of them; such as providing solutions for SMEs affected by COVID by forming new digital networks with consumers (Ragazou et al., 2022), and helping SMEs to survive by building new business models (Bouwman et al., 2019). Digitalization creates important innovations in marketing and financial performance which are very beneficial for the sustainability of SMEs, especially during the COVID-19 pandemic crisis (Chatterjee et al., 2022; Hossain et al., 2022; Hulla et al., 2021). The results of research conducted by Moeuf et al (2018) by collecting several previous articles revealed that digital transformation in SMEs increases flexibility, reduces costs, increases productivity, improves quality, and shortens delivery times.

3. Research Methodology

To answer the objectives of this research, it collected data/articles related to the topic “Crucial factors influencing the success of SMEs in the Digital Transformation Era” using the Google Scholar database. This is done with the consideration that data/articles that are reputable and easily accessible are generally also indexed on Google Scholar. The search strategy carried out on Google Scholar is as follows:

Strategi Searching Google Scholar	
Keywords	"SMEs in Digital Transformation"
First Searching	205.000 results
Unchecked Citation	172.000 results
Custom Range: 2019 -2024	17.200 results
Title Screening	262 results
Scopus/ WoS	83 results
Abstract Screening	18 results
Full-Text Screening	18 results

4. Results

As a result of searching through the Google Scholar database, it is found 18 articles that were relevant to the aims of this research. The descriptions of the 18 articles are presented below:

Table 1: Year of Publication and Publications per Year

Year	Article
2019	1
2020	2
2021	3
2022	4
2023	4
2024	4
Total	**18**

Table 2: The publisher and number of articles published

Publisher	Article
Elsevier	8
Emerald	2
MDPI	3
IEEE	1
Polska Akademia Nauk	1
Barcelona: OmniaScience	1
Fakultet organizacije i informatike, Sveučilište u Zagrebu	1
No Publisher	1
Total	**18**

Table 3: Countries and number of articles from each country

Country	Article
Italy	**2**
Czech Republic	**2**
India	**1**
Vietnam	**1**
Indonesia	**1**
China	**1**
Turkey	**1**
European	**2**
Spanish	**1**
German	**1**
Others	**5**
Total	**18**

Table 4: Success Factors for Digital Transformation in SMEs

No	Success Factors	Authors
1	Digital maturity	Dutta, Kumar, Sindhwani, & Singh, 2020; Marino-Romero, Palos-Sánchez, & Velicia-Martín, 2024; Melo et al., 2023; Priyono, Moin, & Putri, 2020; Scuotto et al., 2021; Troise, Corvello, Ghobadian, & O'Regan, 2022)
2	Relationship capital	(Manafe, 2024; Pelletier & Cloutier, 2019; Troise et al., 2022)
3	Digital strategic plan	(Červinka, 2023; González-Varona, López-Paredes, Poza, & Acebes, 2021; Marino-Romero et al., 2024; Matarazzo, Penco, Profumo, & Quaglia, 2021; Omrani, Rejeb, Maalaoui, Dabić, & Kraus, 2022; Palade & Møller, 2023; Šimberová et al., 2022; Zhang et al., 2022)
4	Commitment	(Palade & Møller, 2023)
5	Top management involvement	(Palade & Møller, 2023)
6	Educational background	(Clemente-Almendros, Nicoara-Popescu, & Pastor-Sanz, 2024)
7	Collaborate with external digital innovation units.	(Hermann et al., 2024; Manafe, 2024; Priyono et al., 2020)
8	Environmental factor	(Ta & Lin, 2023)
9	Adaptive and innovative mindset	(Manafe, 2024)

Discussion

The research findings indicate an increase in the number of articles from 2019 to 2024 related to the factors of success in digital technology adoption in SMEs (see Table 1). Furthermore, Table 2 reveals that articles on the research topic have been published by leading publishers such as Elsevier, MDPI, and Emerald, which are the top three publishers. Although this research topic has been explored in several countries, the number of published articles is relatively small, with most studies conducted in Asia and Europe (see Table 3). Table 4 highlights digital strategic planning, digital maturity, relationship capital, and collaboration with external digital innovation as the four key factors for successful digital transformation in SMEs. Based on these research findings, the contributions of this study are: First, expanding the study of SMEs, particularly about digital transformation; Second, according to the authors' knowledge, this is the first study that aggregates the success factors of digital technology adoption in SMEs.

5. Managerial Implications and Recommendations

This study provides valuable insights for SME practitioners to focus on the key factors in adopting digital technology to improve SME performance. Additionally, we recommend that future research should broaden its scope to include other countries in Asia and Europe, given the current limitations in the number of available articles. It is also important to empirically evaluate whether the findings of this study can be generalized across different countries.

Conclusion

The results of the research conducted grouped the success factors for digital transformation in SMEs into 9 groups, namely: digital maturity, relationship capital, digital strategic plan, commitment, top management involvement, educational background, collaboration with external digital innovation units, environmental factors, and adaptive and innovative mindset. Of the nine groups, four groups are important for SMEs to adopt for successful digital transformation in their businesses, namely; digital strategic plan, digital maturity, relationship capital, and collaborating with external digital innovation units. The results of this research also

show that 1) there is an increase in SME studies from 2019 -2024, 2) ± 80% of the studies conducted by researchers were published in large publishers (Elsevier, Emerald, MDPI, and IEEE), and 3) studies have been carried out in many countries such as Asia and Europe.

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The Influence of Pentagon Fraud on Fraudulent Financial Reporting in Companies Registered on the IDX BUMN20 Indonesia Stock Exchange for the 2020-2022 Period

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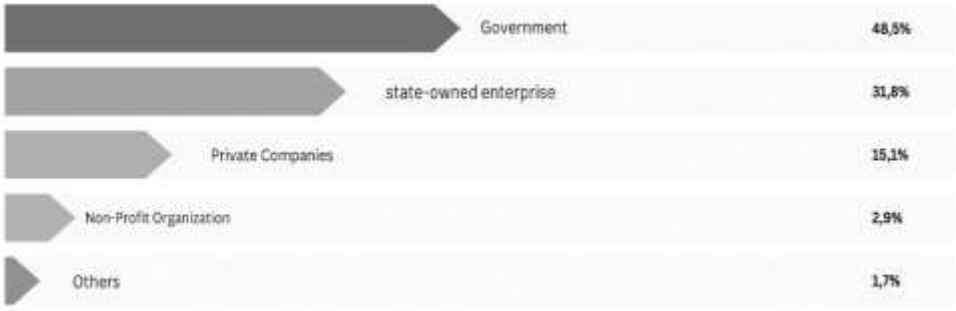
Abstract: Financial Statement Fraud is fraud or manipulation of a company's financial statements to show the best condition of the company so that investors are interested and/or retain the funds owned by the company. This research is intended to analyze the influence of the factors in the fraud Pentagon theory on fraudulent financial reports in companies listed on IDX BUMN20 on the Indonesia Stock Exchange for the 2020-2022 period. The proxy variables used in this research are Pressure proxied by Financial Target and External Pressure, Opportunity proxied by Ineffective Monitoring, Rationalization proxied by Change of Auditor, Competence proxied by Change of Director, and Arrogance proxied by Frequent Number of CEO's Picture and Fraudulent financial reporting measured by F-Score. The data used in this research is secondary data obtained from the annual reports of companies listed on IDX BUMN20 on the Indonesia Stock Exchange for the 2020-2022 period. The number of samples used was 18 samples from companies selected through the purposive sampling technique. The data analysis used in this research is logistic regression analysis. The research results show that the partial test results do not influence each of the independent variables, namely financial target, external pressure, ineffective morning, change of auditor, change of directors, and frequent number of CEO's pictures on fraudulent financial reporting, but the simultaneous test results show that there is an influence the entire independent variable to the dependent variable is fraudulent financial reporting.

Keywords: *Fraud Pentagon Theory, Fraudulent Financial Reporting, Fraud*

1. Introduction and Background

According to the Association of Certified Fraud Examiners (2020), Fraud is from an abusive position To get profit through abusive sources of Power or organizational assets. There is the most detrimental fraud in Indonesia corruption, abuse report finances, and misuse of assets or state and corporate wealth (ACFE, 2020). Meanwhile, fraud acts are reported in finance and are called fraudulent financial reporting. Fraud in report finance is the thing that can bring loss of goods from facet finance and non-financial. Fraud can happen anytime and anywhere, individually or in a group, too with place and time. Fraudulent financial reporting is an act that violates laws implemented by the company for several goals, for example, to maintain and improve a good image for the company, so that investors believe for do investment in the company. Fraudulent Financial Reporting is no Action ethical manipulating companies report finance with on purpose (Prischayani, 2020). Fraudulent Financial Reporting can happen in various countries, including Indonesia. According to the results Indonesian fraud survey in 2019, several Lembaga or organizations are harmed by fraud among them are state companies (BUMN), namely 31.8%, and the following chart institutions or Organizations most harmed by fraud

Figure 1: Type of Organization or the institution that is most disadvantaged because of fraud (ACFE, 2020)



Whereas type The industry most harmed by fraud is industry banking that is amounting to 41.4%. Following the chart type most industries are disadvantaged Because of fraud

Figure 2: Types of industries that are most disadvantaged because of fraud (ACFE, 2020)



Industry banking is the most disadvantaged industry due to fraud, according to data on companies registered on IDX BUMN20 6 (six) companies banks are included in the list, which companies the is company large banking sector in Indonesia. The IDX BUMN20 indexed companies are 20 (twenty) state-owned companies whose shares have become share choices between other state-owned companies.

There have been fraud cases in Indonesia Lots happened, like cases at the company banking There is a case of Century Bank and Citibank Indonesia, companies flight like Garuda Indonesia. Although the government has arranged through regulations and laws regarding fraud, such actions still occur and fraud occurs the consequence function implementation of prevention and detection is Still not enough (Annisya & Asmaranti, 2016).

In Fraudulent Financial Reporting, 5 (five) assumptions are always made in every case. Assumptions the found in the Fraud Pentagon theory. The Pentagon Fraud Theory is a theory put forward by (Howarth, 2011), and a theory that is developed from theories previously namely the fraud triangle and fraud diamond. The assumptions in question in Pentagon fraud theory, namely opportunity (opportunity), pressure (pressure), rationalization (rationalization), competence (competence) and arrogance (arrogance). So, there are phenomena and problems the researcher is interested In fraud report research finances that occur in state-owned companies registered on IDX BUMN20.

2. Literature Review

Fraudulent Financial Reporting

Connection theory with this research is see factor pusher somebody do fraud, because someone who will decide something behavior certain own intention and consideration certain (Ajzen, 1991).

Theory of Planned Behavior

Connection theory with this research is to see factor pusher somebody do fraud because someone who will decide something behavior certain own intention and consideration certain. (Ajzen, 1991).

Agency Theory

Agency Theory is connecting theory between agents with stakeholders, where in practice often happen differences in interest between them so will give rise to agency problems (Jensen & Meckling, 1976). The connection between agency theory and this research is how management as agents gets pressure from

stakeholders to increase performance finances, so the pressure will impact accountants, because accountants There is under control by management, the possibility of the occurrence of fraud in reports finance will the bigger.

Pentagon Fraud Theory

Pentagon fraud theory is a theory expressed by Howarth (2011). This theory identifies factors that push somebody to commit acts of fraud. The elements of the Pentagon fraud are pressure, opportunity, rationalization, competence, and arrogance.

Figure 3: Pentagon Fraud Theory (Howarth, 2011)



Pressure (Pressure), according to SAS No.99 in element sign several types of conditions cause someone to carry out fraudulent actions, namely financial targets, financial stability, and external pressure.

Opportunities, according to SAS No.99, are conditions that create opportunities for fraud namely nature industry, ineffective morning, and organizational structure.

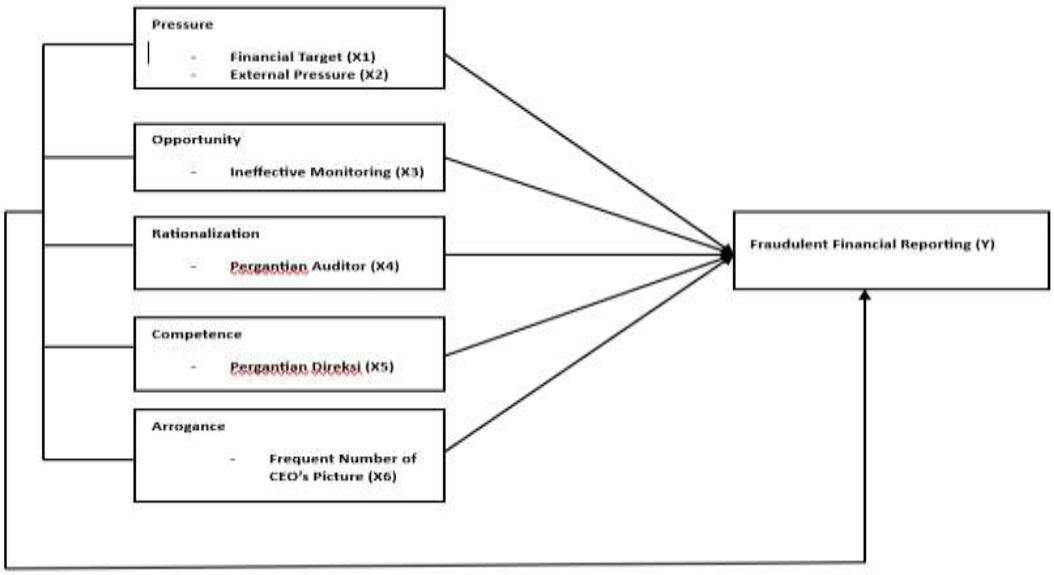
Rationalization, according to SAS No.99, rationalization be measured through changes in the auditor, the auditor's opinion, and also through the state of total accrual shared with the total assets company.

Competence (competence), this element is the ability of somebody to manipulate internal controls, creating strategies for profitability Alone (Howarth, 2011).

Arrogance (Arrogance), is the attitude of superiority of somebody. Elements of arrogance can be measured by the frequency emergence of CEO photos, the style of autocratic leadership, as well the existence of CEO duality (Yusof, 2016).

Development Hypothesis

Figure 4: Framework Draft (processed data,2024)



As for the formulation The hypothesis in this research is as follows:
H 1: Financial targets influence fraudulent financial reporting
H 2: External Pressure affects fraudulent financial reporting
H 3: Ineffective monitoring has an effect against fraudulent financial reporting
H 4: Change of external auditor influential against fraudulent financial reporting
H 5: Change of directors influential against fraudulent financial reporting
H 6: Frequent number of CEO's Picture is influential against fraudulent financial reporting
H7: Financial targets, External pressure, Ineffective monitoring, Change of auditor, Change of directors and Frequent number of CEO's pictures are influential to fraudulent financial reporting.

3. Research Methodology

This research is a study method quantitative, to analyze the influence independent variable, namely Pentagon fraud against variable dependent namely fraudulent financial reporting. A deep sample of this research is reporting finances and reports annual BUMN companies indexed by IDX BUMN20 for 2020 to 2022. The method used is the purposive sampling method. 3 (Three) Criteria in the determination sample study First, the company listed on the IDX BUMN20 index for 2020-2022. Second, the company serves to report finances and reports annually in a way complete during 2020-2022, and third, companies that use Rupiah currency in reporting, so that the criteria measurement marks eye the money The same. So that can conclude this research uses a sample of as many as 17 companies for 3 years of observation. Deep data analysis This research uses analysis descriptive and analytical logistic regression i.e. consists of testing the feasibility of the regression model, testing the entire model, testing the significance of individual parameters (wald test), and using the SPSS application.

The following is a summary of the operational definitions and measurements of the independent and dependent variables in this research:

Table 1: Operational definitions and measurements

Variable Name	Scale	Measurement
	Variable Dependent	
Fraudulent Financial Reporting	Nominal	Dummy variable, if F Score>1 is coded 1, FScore<1 is coded 0(Agusputri & Sofie, 2019)
	Independent Variable	
Financial Target	PRESSURE	
	Ratio	ROA = Net Profit/Total Assets(Quraini, 2018)
External Pressure	Ratio	Leverage = Total Debt/ Total Assets(Bayagub et al., 2018)
	OPPORTUNITY	
Ineffective Monitoring	Ratio	BDOUT = Number of Independent Commissioners/Total Board of Commissioners(Agustina & Pratomo, 2019)
	RATIONALIZATION	
Change of Auditor	Nominal	Dummy variable, number 1 if there is a change in public accounting firm, number 0 if there is no change in public accounting firm.(Agusputri & Sofie, 2019)
	COMPETENCE	

Change of Directors	Nominal	Dummy variable, number 1 changes directors, and 0 does not change directors(Agusputri & Sofie, 2019)
	ARROGANCE	
Frequent number of CEO's picture	Ratio	Frequent number of CEO's picture Ratio Total CEO photos in a company's annual report (Septriyani & Handayani, 2018)

4. Results

Analysis Statistics Descriptive

Table 1: Analysis Results Statistics Descriptive Amount company which has a risk of conducting Fraudulent Financial Reporting

Fraudulent Financial Reporting			
Valid		Frequency	Valid Percent
	Fscore <1	8	15.7
	Fscore >1	43	84.3

Source: data processed by SPSS (2024)

Analysis results descriptive that shows score> 1 then the company own possibility risk carried out a high level of fraudulent financial reporting, whereas in Table 2 it was 84.3% of the total sample study is a company that owns the high risk of fraudulent financial reporting. Whereas If the score is <1 then the company's own possibility risk of low levels of fraudulent financial reporting, table 2 shows there are 15.7% who have low levels of fraudulent financial reporting.

Significance Test of Individual Parameters (Wald Test)

Tabel 2: Wald Test

		Wald	**df**	**Sig.**
Step 1[a]	X1ROA	1,454	1	,228
	X2LEV	2,148	1	,143
	X3BDOUT	,057	1	,812
	X4CPA	,000	1	,999
	X5DCHANGE	,606	1	,436
	X6CEOPIC	1,629	1	,202
	Constant	3,203	1	,074

Source: data processed by SPSS (2024)

With the number of observations as many as (n=51) and the number of independent and dependent variables as many as (k=7), then the degree of freedom (df) = n-k = 51-6= 45, where the level of significance α = 0.05. The table can be calculated using the MS Excel formula with the insert function formula as follows:
t- table = TINV (Probability,deg_freedom)
t- table = TINV (0.05,45)
t- table = 2.014103

Based on Table 2, the results of hypothesis testing using logistic regression analysis can be obtained as follows: The first hypothesis (H1) is that Financial Target has a positive and significant effect on fraudulent financial reporting. The results of the Wald (t) test show that the t-count value is smaller than the t-table (1.454<2.0141)

and the probability value is greater than its significance level (0.228>0.05). Based on the test results, it can be concluded that the financial target states that it does not affect fraudulent financial reporting.

The second hypothesis (H2) is that External Pressure has a positive effect on fraudulent financial reporting. The results of the Wald test (t) show that the t-count value is smaller than the t-table (2.148 > 2.0141) and the probability value is greater than the significance level (0.143>0.05). Based on the test results, it can be concluded that external pressure does not affect fraudulent financial reporting.

The third hypothesis (H3) is that ineffective monitoring has a positive and significant effect on fraudulent financial reporting. The results of the Wald (t) test show that the t-count value is greater than the t-table (0.057<2.0141) and the probability value is smaller than the significance level (0.812>0.05). Based on the test results, it can be concluded that ineffective monitoring does not affect fraudulent financial reporting.

The fourth hypothesis (H4) is that the change of external auditors has a positive effect on fraudulent financial reporting. The results of the Wald (t) test show that the t-count value is greater than the t-table (0.000<2.0141) and the probability value is smaller than the significance level (0.999>0.05). Based on the test results, it can be concluded that the change of external auditors states that it does not affect fraudulent financial reporting.

The fifth hypothesis (H5) is that the change of directors has a positive and significant effect on fraudulent financial reporting. The results of the Wald (t) test show that the t-count value is greater than the t-table (0.606<2.0141) and the probability value is smaller than the significance level (0.436>0.05). Based on the test results, it can be concluded that a change of directors states that it does not affect fraudulent financial reporting. The sixth hypothesis (H6) is that the change of directors has a positive and significant effect on fraudulent financial reporting. The results of the Wald (t) test show that the t-count value is greater than the t-table (0.606<2.0141) and the probability value is smaller than the significance level (0.436>0.05). Based on the test results, it can be concluded that a change of directors states that it does not affect fraudulent financial reporting.

Simultaneous Significance Test (Omnibus Test)

Table 3: Omnibus Test Results

		Chi-square	df	Sig.
Step 1	Step	13,572	6	,035
	Block	13,572	6	,035
	Model	13,572	6	,035

Source: data processed by SPSS (2024)

With the number of observations as many as (n=51) and the number of independent and dependent variables as many as (k=7), then the degree of freedom (df1) = k-1 = 7-1 = 6 and (df2) = n-k = 51-6 = 45, where the level of significance α = 0.05. Then F table can be calculated using the MS Excel formula with the insert function formula as follows:
F Tabel = FINV (Probability, deg_freedom1, deg_freedom2)
F tabel = FINV (0.05,6.45)
F tabel = 2.308273

Based on the table, the F count value can be obtained greater than the F table (13.572> 2.308273) with a significance level (0.03 <0.05), then H7 is accepted. Based on the table above, financial targets, external pressure, ineffective monitoring, Changes in auditors And directors, and the frequency of CEO pictures have a simultaneous effect on fraudulent financial reporting.

Discussion

The influence of financial targets on fraudulent financial reporting
Test result hypothesis (H1) shows that the pressure element is the proxied financial target through ROA value that is not influential against fraudulent financial reporting. These results are in agreement with research

conducted by (Sari & Sukirman, 2013) and (Henny et al., 2015)which shows that financial stability is not influential to fraud report finance.

The influence of external pressure on fraudulent financial reporting
Test result hypothesis (H2) shows that The pressure element is the external pressure that is proxied through leverage not influential against fraudulent financial reporting. These results are in agreement with research conducted by conducted by (Farmashinta & Yudowati, 2019), (Aprilia, 2017)and(Ulfah et al., 2017)

The Effect of Ineffective Monitoring on Fraudulent Financial Reporting
Test result hypothesis (H3) shows that The Opportunity element is proxied to ineffective monitoring with BDOUT no influential against Fraudulent Financial Reporting. These results are supportive of research conducted by (Irfan, 2022)and (Damayani et al., 2017).

Influence Change of External Auditor against Fraudulent Financial Reporting
Testing hypothesis (H4) shows that elements of Rationalization namely change of external auditor No influence against Fraudulent Financial Reporting. These results are in agreement with research conducted by (Damayani et al., 2017), (Quraini, 2018), and (Warsidi, 2018).

Influence Substitution Directors against Fraudulent Financial Reporting
Hypothesis test results (H5) via Wald test show that elements of competence, namely replacement directors Not influential against Fraudulent Financial Reporting. These results are in agreement with research conducted by (Quraini, 2018), (Irfan, 2022), and (Farmashinta & Yudowati, 2019).

The Influence of Frequent Number of CEO's Pictures on Fraudulent Financial Reporting
Test result hypothesis (H6) shows that Arrogance elements are measured with a Frequent Number of CEO pictures with no influence against Fraudulent Financial Reporting. These results are consistent with research conducted by (Agusputri & Sofie, 2019)and (Farmashinta & Yudowati, 2019).

Influence Financial targets, External pressure, Ineffective monitoring, Change of auditor, Replacement directors, and a Frequent number of CEO's pictures against fraudulent financial reporting.
Testing This hypothesis (H7) shows that in a way simultaneous Financial targets, External pressure, Ineffective monitoring, Change of auditor, Replacement directors, and Frequent number of CEO pictures are influential to fraudulent financial reporting. This concludes that if all over variable the done by someone the bigger indication of the occurrence of fraudulent financial reporting. This is also visible from coefficient test results in a way regression (Cox & Snell R Square and Nagelkerke R Square) i.e. of 0.568. That figure can be interpreted together as the independent variable is 56.8% influencing fraudulent financial reporting, meanwhile, the rest amounting to 43.2% was influenced by other variables not used in this research.

5. Managerial Implications and Recommendations

The results of this study indicate that if the independent variables are tested together against the dependent variable, it shows that there is an influence. So in this case, the researcher concludes that if a financial report fraud is not only influenced by one factor, but many factors can influence the occurrence of fraudulent financial reporting. So company management needs to carry out periodic monitoring and evaluation so that no gap for fraud can harm the company.

Conclusion

Research results show that No there is the influence of each variable independent to variable dependent If tested in a way partial, but when carried out tests Simultaneously, all variables independent namely financial targets, external pressure, ineffective monitoring, changing auditors, turnover directors, and frequent number CEO's picture can influence variable dependent fraudulent financial reporting. So you can conclude that Pentagon fraud can affect fraudulent financial reporting if all elements In the Pentagon, fraud is carried out on a massive scale somewhere company.

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Factors Affecting the Intention to Receive Future COVID-19 Booster Vaccines in East Coast States in Malaysia

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Abstract: This conceptual paper is presented to study the factors affecting the intention to receive future COVID-19 booster vaccines in three East Coast states in Malaysia, which has become a concern to the government and health system in the country. It begins by reviewing the literature on associated factors and intentions against the booster vaccination. The Theory of Planned Behavior is used as the basis of the study. This study is driven by the low vaccination rates in Kelantan, Terengganu, and Pahang. Past studies have discussed the acceptance of COVID-19 vaccination in the country, but very few focus on these states. Due to the limited findings on the issues, this study, therefore, attempts to explore the factors influencing vaccination intention using a quantitative method. The survey distribution and data collection focus on the three states' residents. The findings are believed to be able to provide new insight and knowledge, especially to the healthcare providers and government to increase the vaccination rates in these states and prevent the severity of COVID-19 comeback.

Keywords: *COVID-19, Booster, Intention, east-coast states, Malaysia*

1. Introduction and Background

A severe respiratory disease called COVID-19 or Coronavirus disease has marked the world with an unforgotten memory where more than 300 million infected people and exceeded 6 million deaths have been recorded all over the world due to the rapid spreading and fatal infections (WHO, 2022). The disease pandemic not only affected psychological and physical health but also forced and drastically changed people's lives financially and socially including education and occupation (Yahaghi, et al., 2021). During the pandemic, vaccination against the virus was believed as the most effective approach to combating COVID-19 (Fan, et al., 2021). The development of the COVID-19 vaccine in a relatively short period and the administration for the masses around the world was proven to effectively help stop the spreading of the virus, slow down the transmission, and ultimately end the spreading through herd immunity (Duong & Antriyandarti, 2022).

The arrival of a new COVID-19 variant, a sub-variant of Omicron from China in late 2021 has led to the need for the third COVID-19 vaccine dose to previously vaccinated individuals. According to Thye et al. (2021), the administration of the booster dose was believed due to the wane of immunity and the weakening of protection provided by previous vaccines where the third dose is needed to boost immunity, restore the levels of antibodies and increase protection to the people for longer-term protection against the COVID-19. As per Wong et al. (2022), the COVID-19 vaccine booster was demonstrated to boost immunity and to have tolerable side-effect profiles. In mid-October 2021, Malaysia administered their booster vaccination to all vaccinated citizens, and by April 2024 more than 16 million people received at least their first booster dose.

World Health Organization (WHO) refers COVID-19 vaccine as a vaccine that can stimulate the immune system in the body in the instance of exposure to the virus and enables the body to react against COVID-19 infections. It is reported, that until December 2023, 13.64 billion doses of vaccines have been administered and 67% of the global population has been fully vaccinated (WHO, 2022). Malaysia, the National Vaccination program since the early 1950s and over the years has administered vaccines to protect people from vaccine-preventable diseases such as DTP (anti-diphtheria, tetanus, and pertussis vaccine) and BCG vaccine against tuberculosis (Khoo et al., 2020). The Malaysian National COVID-19 Immunisation Programme (NIP) was launched to curb the pandemic and aims to make sure that at least 80% of the adult population has been vaccinated by February 2022 by giving free vaccination to the people. Until August 2024, more than 27 million people (84.4%) had received the two doses of the primary series, and 16 million received their first booster dose. The success of the COVID-19 vaccine administration led the country to shift to the endemic phase from April 1, 2022, however, in recent years, the vaccination rate has shown a downward trend after the first dose, especially for first and

second booster doses (KKM, 2024). The World Health Organization declared that COVID-19 is not over, but it is circulating and, in some countries, the cases are on the rise again (WHO, 2022). Therefore, individuals need to be protected with at least two doses, and the booster dose is important to fight against the new variants.

There has been a great concern lingering on the people's attention especially around Kota Bharu to control and to create herd immunity in the population. Studies conducted from 2019 to 2022 in Malaysia reported a high intention to receive the primary COVID-19 vaccines between 83.3% to 94.3% (Alam et al., 2021; Wong, et al., 2022). Until March 2024, more than 27 million citizens received the primary vaccine. However, the COVID-19 vaccination rate among the people began to drop after the primary doses. Wong, et al., (2022) revealed that only 48.2% have the intent to receive the booster dose in the country. According to KKMNow, an official portal of the Ministry of Health reported that even after three years since the administration of the third dose, only 16 million people received the first booster and less than 1 million received the second boose dose. In addition, among 14 states in Malaysia, the east-coast states which are Kelantan, Terengganu, and Pahang are among the lowest vaccination rates in the country. As of 26 August 2023, Kelantan, Terengganu, and Pahang recorded only 17.8%, 28.3%, and 37.7% respectively for the first booster dose, whereby this percentage value is still comparatively low and far below the rate of global acceptance, which ranges from 54.8% to 88.6% (Jafar, et al., 2022).

The main focus of this study is to enlarge a literature review of factors affecting the intention to receive future COVID-19 booster vaccines in East Coast states in Malaysia. Through carrying out this study, the gap from the existing research can be filled by providing an extension of knowledge for the scanty number of studies on the intention to receive the future COVID-19 booster vaccine in east-coast states in the country. Most previous studies have explored the primary vaccine intention; however, it is essential to provide insight into this future booster dose according to the recent situation. In addition, it should be noted from the existing literature review, however, to the best of the author's knowledge, the local studies have not given great attention to utilizing the Theory of Planned Behaviour to understand these factors (attitude, vaccine knowledge, vaccine hesitancy, subjective norms, and perceived behavioral control) affecting the vaccination intention and this has motivated the present study.

2. Literature Review

Vaccine knowledge: Vaccine knowledge is defined as "detailed information regarding vaccine and immunization" (Voo, et al., 2021). People with adequate knowledge about in particular vaccine can better understand the vaccine's potential, advantages and importance, and this will lead to creating a positive belief about the vaccine at the same time increase trust in vaccination (Zheng et al., 2022). Zheng et al. (2022) also suggested that individual health knowledge and information serve as a significant foundation for the intention to perform health-related behavior such as vaccination. This is because, an individual with adequate knowledge of a certain vaccine can help to understand the vaccine's potential, benefits, and importance to create positive beliefs as well as to strengthen vaccination trust. Mohamed et al. (2021) in his study discovered that low educational background, source of information from peer members, and poor socioeconomic status are the factors contributing to poor understanding of the COVID-19 vaccine among Malaysians. Consistent findings from the research have shown that vaccine knowledge plays an essential role in the intention to get vaccinated for the COVID-19 vaccine (Asmare, et al., 2021; Fan, et al., 2021).
H1: There is a relationship between vaccine knowledge and intention to receive future COVID-19 booster vaccines in East-Coast states in Malaysia

Vaccine Hesitancy: Vaccine hesitancy is a common global phenomenon and is listed as one of the top ten threats to world health by WHO (WHO, 2022). In this paper, the term vaccine hesitancy is referred to as "delay in acceptance or refusal of vaccine regardless of the accessibility of vaccination services" (WHO, 2022). Farhart et al. (2022) further extended the term by suggesting that vaccine hesitancy includes those who receive a few vaccines, however, are still doubt their safety, importance, and effectiveness following the vaccination. Several studies have investigated vaccine hesitancy among Malaysians and have shown inconsistent and contradictory research findings. For example, research by Jian Ng et al. (2022) and Chan, et al. (2022) who explored the COVID-19 vaccine hesitancy found that Malaysian younger age groups are less inclined and hesitant to get vaccinated. In contrast, the study by Wong, et al. (2022) indicated that younger participants demonstrated a

higher acceptance of COVID-19 vaccine booster. Several studies have also consistently associated side effects, attitude, and knowledge can affect the intention to get vaccinated for the COVID-19 vaccine (Geers, et al., 2022; Voo, et al., 2021; Wong, et al., 2022). Vaccine hesitancy is revealed as the factor to reduce the intentions and shape negative attitudes toward COVID-19 vaccination (Lee et al., 2022).
H2: There is a relationship between vaccine hesitancy and intention to receive future COVID-19 booster vaccines in East-Coast states in Malaysia

Attitude: Attitude is defined as the person's attitude towards behavior and represents whether opinions about the behavior are favorable or unfavorable (Servidio, et al., 2022). In this paper, an attitude refers to an individual judgment whether getting COVID-19 vaccinated is positive or negative (Yahaghi, et al., 2021). Positive associations between attitude and intention to get vaccinated have been highlighted in several past studies. For instance, Asmare et al. (2021) in current studied the behavioral intention and its predictors toward COVID-19 vaccination in Ethiopia and concluded that attitude was significantly associated with intention to receive a vaccine, as people cultivate a positive attitude toward the vaccine, they may have great intent to accept it. Similarly, a systematic review and meta-analysis study in predicting vaccination intention against COVID-19 discovered that 92.68% of studies reported people's attitude toward COVID-19 vaccination was the most frequent TPB construct influencing vaccination intention (Limbu, Gautam, & Zhou, 2022).
H3: There is a relationship between attitude and intention to receive future COVID-19 booster vaccine in East-Coast states in Malaysia

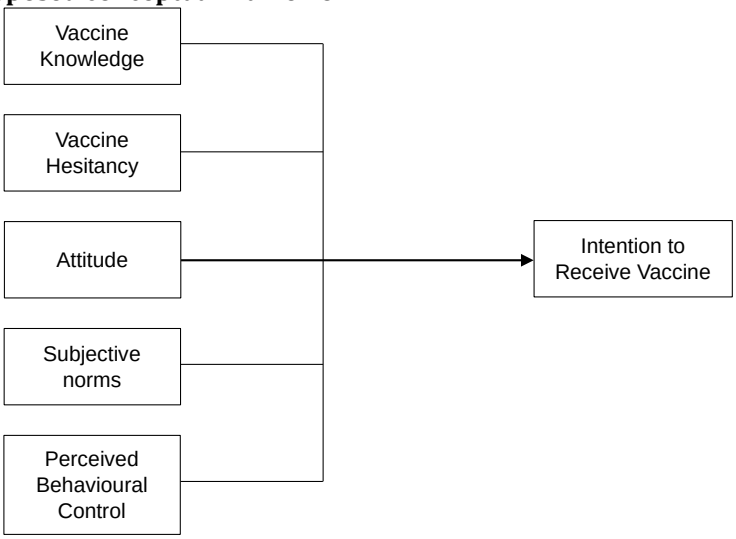
Subjective norms: Subjective norm is the second most salient determinant of intention and drives to perform the behavior of interest (Khayyam, et al., 2022). In general, subjective norms are people's belief of what significant social others think about his/her engaging in a particular behavior, and whether or not they consider it acceptable (Husain et al., 2021). In this present paper, subjective norm (SN) refers to the extent to which people's willingness to receive the COVID-19 vaccine is influenced by whether their significant social others (i.e., friends, family, doctors) agree of them receiving the vaccine or not (Barattucci, et al., 2022). Regarding immunization in recent years, Jian Ng et al. (2022) suggested that social influence, where an individual's perception that those closest to them (friends, family, and members) think they should get vaccinated, can help to increase the intention to vaccinate. According to Mohamad Ismail et al. (2023), some of the most influential societal forces supporting vaccination are members of the short and long-term social networks as well as medical professionals. Alshurman et al. (2021) stated that, from the studies done, the findings consistently agreed that personal recommendations from close ones are the most efficient in convincing people to get vaccinated against COVID-19.
H4: There is a relationship between subjective norms and intention to receive future COVID-19 booster vaccine in East-Coast states in Malaysia

Perceived Behavioural Control: Perceived behavioral control means "the perceived easiness or ability to execute the desired behavior', where when a person has a high level of perceived behavioral control, hence the person will put a great effort into performing the intended behavior (Khayyam, et al., 2022). In the present study, perceived behavioral control would refer to "whether an individual perception of the difficulty or ease to get the vaccine" (Bowyer et al., 2014). Therefore, in other words, it could be understood that the probability of a person performing a particular behavior is higher when he or she has more control over the resources and opportunities (Ajzen, 1991). In real practice, however not all behaviors can be controlled by a person's will, instead, the person will be affected by their external objective environment or other resource constraints. In this study, for instance, the residents in east-coast peninsular may not be vaccinated due to the fear of the side effects from the vaccination. As per Yang et al. (2022) time, cost, and side effects from vaccinations can be reflected in an individual's perceived behavioral control towards receiving the vaccination.
H5: There is a relationship between perceived behavioral control and intention to receive future COVID-19 booster vaccine in East-Coast states in Malaysia

3. Research Methodology

Conceptual Framework
The conceptual framework of the study is constructed as below:

Figure 1: Proposed conceptual framework



Sample

This study focuses on residents of East-Coast states in Malaysia including Kelantan, Terengganu, and Pahang. The target participants are those residents who are currently in the three states, aged 18 years and above and have completed two primary COVID-19 vaccinations. This study will employ a snowball sampling technique to identify and reach the targeted respondents for this study.

Measurement

The present study uses a set of validated self-administered questionnaires that were constructed based on related previous studies for data collection and to measure all variables to be tested in this study. The development of the items is by adopting and modifying existing questions to fit with the purpose of the current study identified from selected literature. The questionnaire consists of six sections, each section for each of the variables to be measured, and one section for socio-demographic profile. All questions for the independent variables will be measured by using a Five-point Likert scale where, 1= strongly disagree, 2= disagree, 3= neutral, 4= agree, and 5= strongly agree. Before boosting the survey, the researcher will conduct a pilot test to check the reliability of the instruments. The questionnaire will be distributed by using convenience sampling and prior data will be collected for analysis. The data collection is important to ensure the reliability of the instruments and method used before the actual research can be conducted.

4. Discussion

This study aims to explore the intention to receive future COVID-19 vaccine booster doses of three East Coast state residents in Malaysia who had completed two primary vaccinations required by the government and to identify the factors that potentially influence the intention. Studies from 2019 until 2022 among the Malaysian general and adult populations reported a high intention for former COVID-19 vaccinations between 83.3% to 94.3% (Wong, et al., 2022). For the booster vaccination, studies by Rajakumar et al. (2023), Khoo, et al. (2024), and Hwang et al. (2024) reported the acceptance rate for the booster vaccination from 55% to 87.6% among people. However, the number of COVID-19 vaccinations among the public began to drop after the second dose of vaccines. As of August 2024, the Ministry of Health of Malaysia, MOH reported the country has reached an 86.2% vaccination rate for the first dose, and 84.4% for the second dose as of August 2024. However, the booster dose uptakes remain relatively lower at 50.1% for the first booster dose and 2.5% for the second booster dose even after almost 3 years since the administration. Data from the official Ministry of Health portal report that three east-coast states recorded the lowest booster vaccination rates with below 40% and 2% for first and second booster doses (KKM, 2024). Shien Teh, et al. (2022) in his study also showed that the east peninsular states (Kelantan, Terengganu, and Pahang) had lower vaccination progress than the rest below 80%. Several factors were associated with influencing the COVID-19 vaccination intention in the country including knowledge, vaccine hesitancy, attitude, influential societal forces, and self-control.

5. Managerial Implications and Recommendations

Years passed by since the unforgotten hit from the COVID-19 pandemic, and the effects of the disease on the individual, society, and economy gradually treated to new norms. Although without the announcements and news regarding the current cases, infections, updates and urges to take vaccination against COVID-19 from the government, the virus is still there, living in the epidemic. According to the official COVID-19 portal of the Ministry of Health (MOH), KKMNow, there is an increase in local cases, with more than 50 confirmed daily cases recorded around the country. However, states on the east peninsular (Pahang, Terengganu and Pahang) had lower vaccination progress compared to other states. Even though full vaccination and boosters have successfully stopped the infections, prevented death and reduced the severity, the country has yet to achieve a full population vaccinated and protected to face the comeback of this virus. Therefore, it is vital for the government specifically to keep reminding and administering this vaccination from time to time. The findings from this study can help the government and healthcare providers to identify factors that contribute to the low vaccination intention among the eastern peninsular states residents to tackle the barriers and create better policies and regulations for COVID-19 vaccination. The implication of this study of the theory of planned behavior, this theory can provide a clear insight into the analysis of the attitude, influences of others, and self-control of the residents toward the vaccination. Other than that, the data findings from this study can also contribute academically to the scholars for future research.

Conclusion

The objective of this paper was to assess the intention to receive future COVID-19 vaccine booster doses from three East Coast state residents in Malaysia who had completed the primary vaccination required by the government and to identify the factors that potentially influence the intention. This study chooses to explore the booster vaccine intention due to the low performance of vaccination rates in Malaysia, especially in the three east-coast states (Pahang, Terengganu, and Kelantan). According to previous research, the acceptance rate of the COVID-19 vaccine among Malaysians was high, however, the study may be in general and yet focus on the concerned states with low vaccination rates. This study, therefore, attempts to investigate the behavior, intention, and related factors that contribute to this situation, and to assist the government and related agencies to plan better vaccination campaigns to overcome this issue.

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Exploring Factors Contributing Towards Purchase Intention of Yogyakarta's Fashion Goods via Digital Marketing

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Abstract: To remain competitive in the VUCA era, Micro, Small, and Medium Enterprises (MSMEs) in Yogyakarta need to strengthen their digital sales strategies to reach a broader customer base. This research investigates the factors influencing local consumers' purchase intentions towards Yogyakarta's products through digital marketing. Grounded in the Theory of Planned Behavior and the Digital Marketing Mix model, data was collected via Google Forms using snowball sampling. The pilot test showed strong reliability (Cronbach's alpha = .97). Exploratory Factor Analysis (EFA) identified six key factors from 47 items: Digital Marketing Mix (28 items; loadings 0.794–0.934), Consumer Engagement (7 items; loadings 0.779–0.856), Perceived Behavioral Control (3 items; loadings 0.905–0.924), Attitude (3 items; loadings 0.858–0.886), Purchase Intention (3 items; loadings 0.847–0.884), and Subjective Norm (3 items; loadings 0.840–0.907). The findings confirmed the scales' reliability and highlighted the impact of digital marketing on consumers' purchase intentions. This study suggests that the Theory of Planned Behavior and Digital Marketing Mix are influential in assessing purchase intentions for Yogyakarta's fashion goods, providing insights applicable to the broader Indonesian market. Based on these findings, MSMEs in Yogyakarta should develop effective digital marketing strategies, optimizing their marketing mix to positively influence consumer purchase intentions. This is crucial for adapting to rapid technological changes that may alter consumer behavior and for ensuring business sustainability.

Keywords: *Digital Marketing, Purchase Intention, Local Product, Exploratory Factor Analysis*

1. Introduction and Background

A sustainability strategy needs to be carried out in a fluctuating and unpredictable global situation that causes volatility, uncertainty, complexity and ambiguity in the global economy, known as the acronym VUCA. Currently, we have entered the VUCA era, where change occurs very quickly, and these changes can create chaos in a system if the people managing it do not innovate in more creative ways (Alwi, 2018). This lack of clarity impacts the challenges of changing consumer behavior, disruptions in every sector, and a rise in competitors that are hard to predict. Tourism is one of the sectors currently facing significant uncertainty, having been greatly impacted by the COVID-19 pandemic since 2020. As an unpredictable global situation, the pandemic has caused the tourism industry to suffer the most, with widespread disruptions and challenges. This situation resulted in a large decrease in foreign tourists who made massive cancellations and local tourists who also experienced a decrease in bookings due to COVID-19 (Bahtiar & Saragih, 2020).

The decline in the tourism sector creates a ripple or multiplier effect, significantly impacting the purchasing power of local product sectors, which are primarily dominated by MSMEs. For example, in Yogyakarta, one of the regions whose economy is supported by the tourism sector, 20 thousand MSMEs in Yogyakarta's tourism and creative economy sectors have been affected, and some have even gone bankrupt (Wicaksono, 2021). Despite the challenges, tourism remains a labor-intensive sector, employing over 13 million workers (Sugihamretha, 2020). Therefore, during a pandemic that has an impact on reducing the number of tourists, MSMEs experience much pressure because their products are not selling well in the market, especially products that are less desirable during a pandemic, such as fashion, handicrafts, and the services sector (Tatik, 2021). However, the fashion sector is one of Yogyakarta's three most popular products. There are three products of micro and small businesses that produce local priority products of the Yogyakarta Government, which are food, craft, and fashion (Wicaksono, 2021). Fashion products are a priority in Yogyakarta because of the large number of MSMEs and batik artisans, so Yogyakarta is known as a city of batik. Fast decision-making is very important in setting the direction and goals of the company in an adaptable situation (Ritter & Pedersen, 2020).

The use of information technology in all fields has grown rapidly. Digitalization in a business is increasingly needed because consumers can make orders and purchases without limitation of place and time, being responsive to the latest information (Xiaohui, 2014). Business expansion has become more flexible, reaching a wider target market, cheaper and more interactive promotional media, clarity of operational cost transparency, digitization of products/services, and streamlining of distribution systems (Li & Hong, 2013). The high number of the internet and technology usage not only affects business activities with more efficient and effective marketing activities but can also affect customer behavior which has an impact on purchasing intention (Indahingwati et al., 2019)

2. Literature Review

The situation during the pandemic made MSMEs experience a lot of pressure because their production did not sell well in the market, especially products that were less interested in the pandemic, such as the fashion, handicraft and service sectors (Ginting, 2021). So many MSMEs have switched to selling food products that are more desirable for consumers to survive (Ginting, 2021). The pandemic is the worst effect after the economic crisis in 2008-2009 and in the future, we cannot predict what the world economy will be like (Setiawan, 2020). Strategies and innovations that must be carried out in this situation are through digital transformation because local brands can reach more markets and attract new customers (Reichstein & Harting, 2018). if you are unable to keep up with the times and the market, it will certainly cause you to be left behind. Changes in customer behavior are important to respond quickly and be implemented in operational activities. However, adaptation to the digital market towards digital transformation in MSMEs has problems because only 17% of the total MSMEs have known technology to develop their business activities (Suyanto, 2020). On average, MSMEs in Indonesia come from the older generation, which finds it difficult to adapt to technology. (Faqir, 2021). Therefore, it is crucial to have a special study regarding the sustainability strategy in the cultural product fashion sector. The products in this sector contribute greatly to maintaining and preserving culture, especially in Yogyakarta which is a city of culture

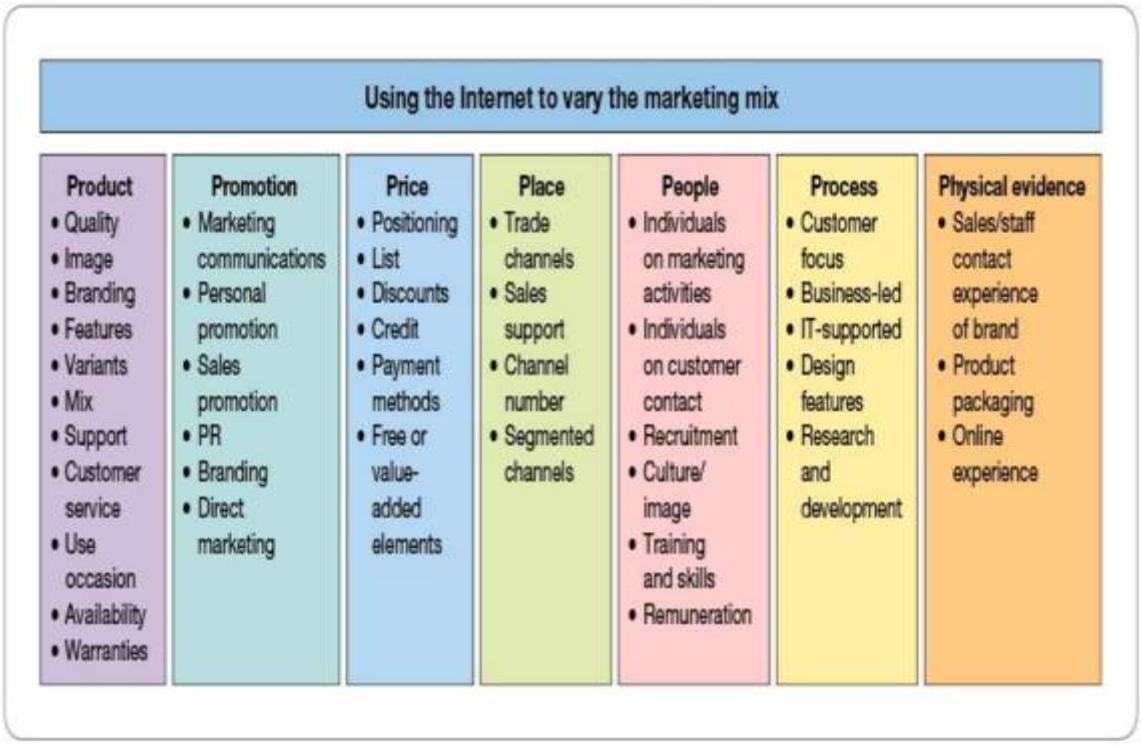
Several previous studies have explored the relationship between the marketing mix and purchase intention across various industries and regions. For instance, research titles such as "The Effect of Marketing Mix Perception on the Intention of Online Merchant Financing (Karambut, 2021)," "Digital Marketing in Mexico: Exploratory Study of the Marketing Mix of SMEs with Trust Seal (Leefmans 2016)," "Assessment of Marketing Mix Associated with Customer Purchase Intention of Dairy Products in Bangladesh: Application of an Extended Theory of Planned Behavior (Farid, 2023)," and "Factor Marketing Mix on Purchase Intention: An Empirical Research in the Fashion Industry, Mojokerto Regency, East Java, Indonesia (Iqbal, 2023)," have investigated these aspects. However, a significant research gap remains. These studies have not focused on cultural fashion products and have continued to employ traditional marketing mix frameworks, such as 4Ps and 5Ps, without incorporating the digital marketing mix. This study aims to bridge this gap by applying more contemporary theories and frameworks, which will be discussed in the following sections.

Digital Marketing Mix on Purchase Intention The marketing mix is one of the elements used by marketers to promote their products and build consumers' purchase intention (Sulistijono & Kadarisman 2019). Initially proposed by Jerome McCarthy in 1960, the marketing mix was divided into Product, Price, Place, and Promotion, commonly known as the 4Ps. However, as the market environment evolved, particularly with the rise of the service industry, there was a need to expand this framework to accommodate the growing importance of customer-centric strategies. In the 1981s, Booms and Bitner added three more elements—People, Process, and Physical Evidence-expanding the marketing mix to the 7Ps. This expansion recognized that the interactions between consumers and service providers, the processes through which services are delivered, and the tangible aspects of a service experience are crucial to building strong customer relationships and driving purchase intentions.

In the context of today's rapidly changing digital landscape, the traditional marketing mix has further evolved to include digital elements, leading to what is now referred to as the digital marketing mix. This strategy is crucial for businesses aiming to remain competitive in an increasingly online market. Digital marketing mix strategies involve the integration of traditional marketing principles with digital channels, tools, and techniques. This includes leveraging social media, search engines, email marketing, and other online platforms

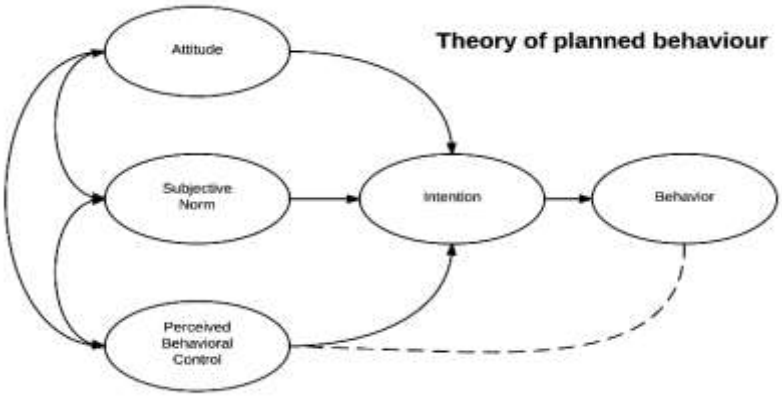
to reach a broader audience and engage consumers more effectively. As Chaffey and Chadwick (2019) highlight, continuously updating and evaluating the digital marketing mix is essential for businesses to capitalize on new opportunities presented by the internet, such as real-time customer feedback, personalized marketing, and the introduction of new product variations tailored to specific online markets.

Table 2: 7Ps Digital Marketing Mix (Chaffey & Chadwick, 2019)



Theory of Planned Behaviour on Purchase Intention The Theory of Planned Behavior (TPB) is an extension of the Theory of Reasoned Action (TRA), developed by Fishbein and Ajzen in 1975, to better explain behaviors over which individuals do not have complete control. Introduced by Ajzen in 1991, TPB highlights that the most immediate predictor of a person's actual behavior is their intention to perform it. This intention is influenced by three key factors: attitude, subjective norms, and perceived behavioral control. Attitude, or personal factors, refers to the individual's positive or negative assessment of performing the behavior, influenced by beliefs about its possible outcomes. Subjective norms, the social factors, consider the perceived social pressure from significant others, like family and friends, to either engage in or avoid the behavior. When an individual believes that important people in their life expect them to perform a certain behavior, they are more likely to form a stronger intention to do so. Perceived behavioral control, on the other hand, relates to the individual's perception of their capability to perform the behavior, taking into account the resources, opportunities, and potential obstacles they may encounter. The greater the perceived control, the stronger the intention to act. While intention is the primary predictor, TPB also recognizes that actual behavior may still be influenced by factors beyond the individual's control. In the context of consumer behavior, Kotler and Keller (2016) link these concepts to purchase intentions, defining it as the consumer's inclination to buy a product based on their experiences, usage, and preferences. The TPB framework helps explain how attitudes toward a product, social influences, and the perceived ease of purchase collectively shape a consumer's intention to buy.

Figure 1: The Framework of Theory Planned Behaviour (Ajzen, 1991)



Consumer Engagement on Purchase Intention Consumer engagement is a relatively new concept in marketing that evaluates how consumers get involved in social activities related to cognitive, emotional, and behavioral aspects, which they perceive positively (Hollebeek et al., 2014). Cognitive engagement refers to the focus and mental effort consumers put into a particular topic, including their attention and deep understanding. Affective or emotional engagement involves feelings of enthusiasm and enjoyment toward the object of their interest. Meanwhile, behavioral engagement relates to how consumers actively demonstrate their involvement, such as by sharing information, learning more, or recommending products to others (Istanto & Salsabila, 2022). Therefore, consumer engagement can be divided into seven sub-dimensions: Enjoyment, Enthusiasm, Attention, Absorption, Learning, Endorsing, and Sharing (Dessart et al., 2015). By understanding these seven aspects, MSMEs can develop more effective strategies to engage consumers and enhance their loyalty to the products or services offered.

3. Research Methodology

Sample and Procedure The data collection method used was quantitative. To validate the scale, a pilot survey of 60 respondents was conducted. The survey results conducted by the tourism department of the Special Region of Yogyakarta in (2021) showed that the highest number of domestic tourists visiting Yogyakarta came from Jakarta, Bogor, Depok, Tangerang, and Bekasi, collectively known as the JABODETABEK area. From these results, it was determined that only residents of the JABODETABEK area who had visited Yogyakarta and had made online purchases were eligible to participate as samples. Furthermore, residents of the JABODETABEK area were considered suitable as samples because they were highly capable of making online purchases, especially for fashion products (Hasibuan, 2020). Given the expansive nature of the sample population, a snowball sampling technique was employed to effectively reach and recruit participants. This technique allowed the study to leverage existing social networks, whereby initial respondents helped to identify and invite further participants within the target demographic. The measurement instrument used in this research was self-designed, initially formulated in English, and subsequently translated into Bahasa Indonesia to ensure clarity and cultural relevance for the final distribution. The questionnaire featured closed-ended questions, utilizing a Likert scale ranging from 1 ('Strongly disagree') to 5 ('Strongly agree'). In addition to the core research variables, demographic information was collected, encompassing gender, age, education, income, marital status, ethnicity, employment background, and living area. Participants were asked to select the most appropriate options to provide a comprehensive overview of their demographic profiles.

The self-developed measures included four (6) main variables based on digital marketing mix theory, consumer engagement theory, and Theory of planned behavior divided into four variables: attitude, subjective norm, perceived behavior control, and purchase intention. The six variables consisted of (28) items on digital marketing mix, (7) items on consumer engagement, (3) items on Perceived Behavior Control, (3) items on attitude, (3) items on Purchase Intention, and (3) items on Subjective Norm. The data were quantitatively analyzed using the Statistical Package for Social Sciences (SPSS) Version 25. To validate the self-developed measures, various analyses were conducted, including Exploratory Factor Analysis and Reliability Analysis.

4. Results

Exploratory Factor Analysis (EFA) is a statistical technique used to identify the underlying relationships between measured variables and to determine the number of factors needed to explain the data (Hair et al., 2010). In this study, EFA was employed to understand the structure of the data and identify the distinct factors that represent the key dimensions of the research. During this process, all measurable variables were linked to specific factors through the estimation of loading factors, which reflect the correlation between each variable and its corresponding factor. The EFA in this study resulted in six distinct factors: Digital Marketing Mix, Consumer Engagement, Perceived Behavioral Control, Attitude, Purchase Intention, and Subjective Norm. These six factors were identified based on their eigenvalues (λ), with all factors exhibiting eigenvalues greater than 0.5, indicating that they account for a significant portion of the variance in the data. An eigenvalue above 0.5 is considered a standard threshold in factor analysis, suggesting that the factor is meaningful and contributes to explaining the underlying data structure. Moreover, the results of the EFA demonstrated that all 47 items used in the analysis were clearly defined and logically associated with their respective factors. This alignment indicates that the items were effective in measuring the constructs they were intended to represent. For instance, items related to digital marketing strategies were grouped under the Digital Marketing Mix factor, while items concerning consumers' perceptions of their ability to make purchases were linked to the Perceived Behavioral Control factor. The clear definition and logical association of all items with their factors not only support the validity of the measurement instrument but also enhance the overall reliability of the study's findings. This means that the factors identified through EFA accurately represent the underlying constructs being studied, such as how digital marketing influences consumer engagement and purchase intentions. The detailed breakdown of the EFA results is provided in Table 3, which presents the factor loadings and shows how each item aligns with its respective factor, confirming the robustness of the factor structure in this research.

Reliability Analysis Reliability analysis is a statistical measure used to assess the consistency of a measuring instrument in evaluating the same phenomenon (Notoatmodjo, 2005). It serves as an index indicating how reliably a set of items measures a particular construct. In this study, reliability testing was conducted using Cronbach's alpha to evaluate the internal consistency of the measuring instruments. A Cronbach's alpha of 0.70 was used as the benchmark, based on the recommendation by Nunally (1978), indicating that a value equal to or greater than 0.70 is sufficient to establish the reliability of the construct. The results of the reliability analysis in this research showed that all six factors achieved Cronbach's alpha values well above the 0.70 threshold, signifying high internal consistency for each factor. The first factor, Digital Marketing Mix, which comprised 28 items, obtained a remarkably high-reliability score of 0.99, indicating an exceptionally consistent measurement of this construct. The second factor, Consumer Engagement, consisting of 7 items, also displayed strong reliability with a Cronbach's alpha of 0.95. The third factor, Perceived Behavioral Control, consisting of 3 items, demonstrated excellent reliability with a score of 0.97. For the fourth factor, Attitude, which included 23 items, the reliability analysis revealed a Cronbach's alpha of 0.93, signifying that the items effectively captured the construct. The fifth factor, Purchase Intention, consisting of 3 items, achieved a reliability score of 0.94, indicating a high level of consistency in measuring consumers' intention to purchase. Lastly, the sixth factor, Subjective Norm, which comprised 5 items, also showed strong reliability with a Cronbach's alpha of 0.92. These results indicate that all six factors have Cronbach's alpha coefficients significantly above the 0.70 benchmark, confirming that the constructs are measured reliably. This high internal consistency suggests that the items within each factor are well correlated and provide a stable measure of the underlying constructs. Furthermore, the variance explained by each factor was also calculated. Factor 1 (Digital Marketing Mix) accounted for 53.68% of the variance, highlighting its substantial contribution to explaining the data. Factor 2 (Consumer Engagement) explained 12.46%, while Factor 3 (Perceived Behavioral Control) accounted for 5.69%. Additionally, Factor 4 (Attitude) explained 5.34%, Factor 5 (Purchase Intention) accounted for 4.12%, and Factor 6 (Subjective Norm) explained 3.03% of the variance. The standard deviations for these factors ranged from 24.21 to 2.30, indicating variability in responses across the different constructs. Overall, these findings demonstrate that the measurement instruments used in this study are highly reliable and capable of consistently capturing the intended constructs. The detailed breakdown of the reliability analysis, including Cronbach's alpha coefficients and the variance explained by each factor, is presented in Table 2, providing further support for the robustness of the research measures.

Table 3: Exploratory Factor Analysis

Factors				Factor Loadings
Factor 1 Digital Marketing MIX	Product	1	The Yogyakarta fashion goods you select should be of good quality.	.93
		2	The Yogyakarta fashion goods you buy should have proper labeling.	.89
		3	The Yogyakarta fashion goods you choose should possess a unique character.	.91
		4	The Yogyakarta's fashion goods you pick should reflect a local identity.	.86
		5	The Yogyakarta's fashion goods should offer a variety of options for consumers.	.90
	Promotion	6	The Yogyakarta's fashion goods you choose should have a compelling advertising campaign	.88
		7	The Yogyakarta's fashion goods should frequently feature attractive promotional offers	.86
		8	The products should be promoted through diverse channels, including social media marketing.	.88
	Price	9	The selected Yogyakarta's fashion goods that sells online is normally cheaper than offline	.79
		10	The prices of the selected Yogyakarta's fashion goods are reasonable	.87
		11	The price for selected Yogyakarta's fashion goods is suitable for their quality	.89
		12	The online Yogyakarta fashion goods you choose offer multiple payment options.	.89
		13	The Selected Yogyakarta's fashion goods have discount prices	.85
		14	The selected Yogyakarta fashion goods come with fixed pricing.	.87
	Place	15	The selected Yogyakarta's fashion goods are readily available to purchase	.86
		16	The selected Yogyakarta's fashion goods is easily accessible online	.88
		17	The selected Yogyakarta's fashion goods is convenient to get when buying online	.84
	People	18	The online sales admin service is good	.84
		19	The courier service in handling Yogyakarta's fashion goods to consumers is very good	.85
		20	Consumers can rate and review products when buying online	.86
		21	Consumers can see the quality of Yogyakarta's fashion goods by watching live shopping	.86
	Process	22	The online customers can make order cancellation	.86
		23	The courier services are on time when delivering goods to consumers	.82
		24	The order accuracy is good when purchasing Yogyakarta's fashion goods online	.86
		25	The customers can track goods when the delivery process	.84
	Physical Evidence	26	The packaging of the product provides information to consumers	.87
		27	The packaging of the product protects goods from damage	.90
		28	The online platforms have several segments or menus for consumers to browse and get information about the company and product details.	.86
Factor 2		29	I feel enthusiastic when purchasing Yogyakarta's fashion	.77

Consumer		goods from online stores.	
Engagement	30	When browsing or purchasing Yogyakarta's fashion goods from online stores. I feel happy	.83
	31	I make time to think when purchasing Yogyakarta's fashion goods from an online store	.81
	32	Time flies when I purchase Yogyakarta's fashion goods from an online store	.83
	33	I share my ideas with my friends or family to purchase Yogyakarta's fashion goods from online stores	.85
	34	I seek ideas or information when purchasing Yogyakarta's fashion goods from an online store	.86
	35	I say positive things about purchasing Yogyakarta's fashion goods from online stores to other people	.82
Factor 3	36	I can purchase Yogyakarta's fashion goods from online stores.	.92
Perceived	37	I have the resources, knowledge, and ability to purchase Yogyakarta's fashion goods from online store	.90
Behaviour Control	38	If I want to, I can easily purchase Yogyakarta's fashion goods from online stores.	.90
Factor 4	39	Purchase Yogyakarta's fashion goods from online stores is a good idea	.85
Attitude	40	Purchase Yogyakarta's fashion goods from online stores is wise	.88
	41	Purchase Yogyakarta's fashion goods from online stores is beneficial to me	.86
Factor 5	42	I would purchase Yogyakarta's fashion goods from online stores to meet my shopping needs.	.88
Purchase	43	I would purchase Yogyakarta's fashion goods from online stores to handle my future shopping needs.	.88
Intention	44	I would strongly recommend others purchase Yogyakarta's fashion goods from online stores.	.84
Factor 6	45	Close friends and family believe it is a good idea for me to purchase Yogyakarta's fashion goods from an online store	.90
Subjective			
Norm	46	People whom I trust can influence my decision to buy Yogyakarta's fashion goods online.	.90
	47	People whose opinions I value would prefer purchasing Yogyakarta's fashion goods from an online store	.84

Table 4: Reliability Results

Factors	Cronbach Alpha (α)	Variance Explained	Standard Deviation (SD)
Factor 1	.99	53.68%	24.21
Factor 2	.95	12.46%	5.67
Factor 3	.97	5.69%	2.49
Factor 4	.93	5.34%	2.60
Factor 5	.94	4.12%	2.54
Factor 6	.92	3.03%	2.30

Discussion

This study aims to determine the influence of digital marketing mix on purchase intention towards Yogyakarta's local products. The findings indicate that digital marketing significantly affects all variables of the theory of planned behavior, which is a theory related to purchase intention. Based on the factor loading results, it is found that Yogyakarta local products with good quality, unique features, and attractive packaging have a significant impact on purchase intention. This aligns with previous research on local products for souvenirs, which found that product quality and uniqueness significantly influence purchase intention (Poli et al., 2015). Farid et al., (2023) applied the same framework to explore consumers' purchase intentions for dairy products

and found that the overall marketing mix could impact the theory of planned behavior, aligning with the results of this research. This study further reveals that consumer engagement plays a role in influencing purchase intention. The reliability tests also confirm that the self-developed scale is consistent and dependable in evaluating the effect of digital marketing on the purchase intentions of local people towards Yogyakarta's products. From the findings of this study, it is essential for MSMEs in Yogyakarta to develop digital marketing strategies, such as marketing mix, which can have implications on purchase intention, to sustain their business in the face of rapid technological advancements that may alter consumer habits. Previously, a study with a model like this had never been conducted in Yogyakarta. This research can not only be utilized to benefit Yogyakarta but also holds potential for other tourist cities in Indonesia that produce many local products

5. Conclusion

Local products from Yogyakarta, primarily produced by micro, small, and medium enterprises (MSMEs), play a vital role in both the local and national economy. With around 340,000 MSMEs in Yogyakarta (Deny, 2024), these enterprises face the need to develop innovative marketing strategies to remain competitive in the current uncertain environment. Previously, MSMEs significantly influenced tourism (Naeruz et al., 2022). However, they must now adapt to the digital marketplace, which offers consumers accessibility at any time and from any location (Biyantoro, 2023). This study's findings highlight that the digital marketing mix, consumer engagement, and the elements of the Theory of Planned Behavior positively influence the purchase intention of local products. For MSMEs in Yogyakarta, these insights underscore the importance of enhancing product quality, setting appropriate prices, devising effective promotional strategies, and ensuring proper placement. By focusing on these aspects, MSMEs can better attract and retain consumers. Additionally, the research offers MSMEs a deeper understanding of consumer preferences, which can guide them in developing new products that align with future market demands. Moreover, the study confirms that adopting a well-planned digital marketing strategy, such as optimizing the marketing mix, is crucial for sustaining businesses amidst rapid technological changes that may alter consumer behavior. This research fills a gap by applying contemporary digital marketing theories to Yogyakarta's MSMEs, providing a model that can benefit other tourist cities in Indonesia by producing local goods. Thus, embracing digital marketing not only supports the growth of Yogyakarta's cultural products but also contributes to the broader economic stability of MSMEs in the region.

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The Mismatch between Individual Values and Organizational Values among Different Generations in the Workplace

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Abstract: Different generations of employees have different characteristics and values that make them unique. Currently, there are four generations of employees at the workplace: Baby Boomers, Generation X, Millennials, and Generation Z. Millennials and Generation Z employees are said to be less loyal. The question is whether the incompatibility of their values and those of the organization makes them less faithful to their organization warrants further investigation. Therefore, the study's objective is to investigate the mismatch between individual values and those of the organization among different generations in the workplace. A focus group discussion (FGD) involving representatives from public and private organizations was organized. The input from the FGD was analyzed using content analysis, and the findings indicate that Millennial and Generation Z employees have differing values that should be given considerable attention by management, which is mainly represented by Generation X. Managerial and research implications are provided in the paper.

Keywords: *Millennials, Generation Z, value congruent, work culture*

1. Introduction and Background

Currently, the workforce in the organization can be categorized into four groups: Baby Boomers, Generation X, Millennials, and Generation Z. These groups of employees have unique characteristics. Research has identified common trends and characteristics associated with different generations. For example, traditionalists are often characterized by strong work ethics and loyalty (Barwińska-Małajowicz, 2022); Baby Boomers focus on career advancement (Altman et al., 2020); Generation X have a desire for work-life balance; Millennials prefer meaningful work (Pasla et al., 2021); and Generation Z is strongly inclined towards technology and social responsibility (Ho et al., 2022).

Numerous studies have investigated generational differences, including characteristics, values, and preferences. These studies can be grouped into a few categories based on their focus. The first category is workplace preferences, including factors like leadership styles, communication preferences, and attitudes toward work. In general, younger generations may prefer more collaborative and inclusive leadership styles, while older generations may be accustomed to hierarchical structures (Kuknor & Bhattacharya, 2022).

The second category of studies focused on technology adoption and usage. Younger generations, such as Millennials and Generation Z, are typically more comfortable with and reliant on technology, influencing their expectations for digital tools and communication in the workplace (Bredbenner, 2020). Older generations of employees are less technology savvy and risk-avoidant. They are always tagged as old school and prefer conventional work methods, including interaction and communication (McVey, 2022).

The third category of studies delves into the motivations and priorities that drive career decisions across generations. Factors such as job security, career advancement, work-life balance, and social impact are often examined to understand the varied preferences of different age groups. Newer employees prefer work-life balance and social impact, while older generations prefer job security and career advancement (Serviss, 2020).

The fourth category of studies investigates the level of organizational loyalty exhibited by different generations. Younger generations may be more prone to changing jobs for career growth, while older generations may value long-term commitment and stability (Ackerman & Kanfer, 2020). Younger generations keep searching for

career growth opportunities in the job market (Barhate & Dirani, 2022). That is why many Millennials and Generation Z employees move from one organization to another just for greener pastures.

The fifth category of research explores how the values of different generations contribute to the overall organizational culture. Not only that, but different generations might also create workplace conflict because of their differences (Rahim & Katz, 2020). Top management is represented by those from older generations and executives, and younger generations represent below-job positions. Understanding these dynamics is crucial for creating inclusive environments accommodating diverse perspectives and preferences.

Although there are abundant studies on generational differences, future research efforts must address gaps in the research. Many studies generalize generational traits, overlooking the considerable diversity within each generation (Rudolph, 2021). There is a need for more nuanced research that considers individual differences, cultural influences, and other factors that shape values within generational cohorts.

Limited attention has been given to intersectionality, which considers the overlapping effects of multiple social categories, such as gender, race, and socioeconomic status, alongside generational differences (Holman & Walker, 2021). Research should explore how these factors intersect and influence values in the workplace. In addition, many studies are conducted in specific cultural contexts, and findings may not be universally applicable (Durlak et al., 2022). More research is needed to understand how generational values manifest in diverse cultural settings and how organizational values may need to adapt accordingly.

Values are not static; they can change over time and in response to changing circumstances. Research should delve into the dynamic nature of generational values and how they adapt to shifting societal, economic, and technological landscapes (Miller, 2023). While there is research on the values of different generations, there is limited understanding of how organizations can effectively adapt and align their cultures to accommodate diverse values. Further exploration is needed in organizational strategies for managing generational differences.

Therefore, the present study used an exploratory research design to examine the mismatch between individual and organizational values among various generations of the workforce. The findings are expected to answer the existing research questions about different characteristics, expectations, attitudes, and other aspects of jobs. The findings of the present study provide some solutions to the problem that management can use to resolve conflicts among different generations of workers.

2. Literature Review

Previous studies have outlined some of the differing characteristics of different generations in the workplace. Traditionalists are said to have strong work ethics and loyalty (Barwińska-Małajowicz, 2022). Baby Boomers focus on career advancement (Altman et al., 2020). Generation X prefers work-life balance. Millennials demand meaningful work (Pasla et al., 2021). Generation Z employees strongly favor technology and social responsibility (Ho et al., 2022).

Those from older generations represent top management of the organization, and executives and below-job positions are represented by younger generations. This disparity could create conflict in the organization, involving different generations of the workforce (Rahim & Katz, 2020). The older generations have developed organizational values based on their values and expectations. When the younger generations of the workforce enter employment, they bring along their values, expectations, and preferences that differ from the values of the organizations. This scenario creates a mismatch between organizational and generational values that warrants further investigation.

Based on existing work on generational differences in the workplace, the present study aims to investigate the differences between individual and organizational values among different generations and propose potential solutions to the problem.

The mismatch between individual values and organizational values

The mismatch between individual and organizational values can be categorized into a few themes to facilitate discussion and understanding. This categorization is based on existing research on generational differences and includes work-life balance, communication style, approach to authority, technological proficiency, career expectations, and commitment and loyalty.

Work-Life Balance: The attitude toward work-life balance is the first factor differentiating younger and older generations. Younger generations, such as Millennials and Generation Z, may prioritize a better work-life balance and flexible work arrangements (Erkılınç, 2023; Serviss, 2020). This can be perceived as incompatible with traditional organizational values emphasizing long hours and dedication. Most organizations value employees who can follow the standard working hours and are physically present in the designated work area (Taheri et al., 2020). Less flexibility was given to employees until the recent COVID-19 pandemic hit the world.

Communication Styles: The second factor that characterizes employees of different generations is communication styles. Different generations may have distinct preferences in communication styles (Mahmoud et al., 2021). For example, older generations may prefer face-to-face communication, while younger generations may be more comfortable with digital communication (Janssen & Carradini, 2021). Older generations prefer detailed information on the task to be performed, but younger generations expect to be given the freedom to decide on the details of the assigned task (Szymkowiak et al., 2021; Warr, 2020). This difference can sometimes lead to misunderstandings.

Approach to Authority: The third factor differentiating older generations from younger generations of employees is their approach to authority. Younger generations, particularly Millennials and Generation Z, may be more inclined to question authority and seek a flatter organizational structure (Murvanidze, 2020). Older generations give full respect to authority and will not question any instructions from top management. Moreover, they value hierarchical structures as they portray the authority the top management holds. Previous studies acknowledge the existence of conflict among different generations and try to provide potential solutions to this occurrence (Gabrielova & Buchko, 2021; Rudolph et al., 2021).

Technological Proficiency: The fourth factor that separates older generations from younger generations is technological proficiency. Younger generations are often more tech-savvy and comfortable with new technologies and may expect organizations to adopt the latest tools (Bredbenner, 2020; Nawaz, 2020). Gen Z is the most proficient in technology compared to other generations (Basantes Andrade et al., 2020). However, they want the organizations to provide adequate rewards and recognition for their talent (Chopra & Bhilare, 2020). This can clash with organizational values that prefer established processes. Older generations are complacent with the existing ways of doing their work. They normally resist change. This is consistent with the adage that we cannot teach new tricks to old dogs.

Career Expectations: Career expectations are the fifth factor that sets older and younger generations of employees apart. Younger generations may prioritize career development, mentorship, and a sense of purpose in their work (Barhate & Dirani, 2022). Older generations prefer job security and stability, recognition and respect, work-life balance, and retirement planning (Serviss, 2020). If an organization does not align with the younger generations' values, it may struggle to retain and engage younger talent. Past research found that intrinsic and extrinsic factors determine Gen Z's career aspirations and Gen Z has well-defined career expectations and career development plans (Barhate & Dirani, 2022). Organizations must address these gaps if they want to create a harmonious work environment.

Commitment and Loyalty: The final factor contributing to generational differences is commitment and loyalty. Older generations of the workforce place a higher value on long-term commitment and loyalty to the organization. In comparison, younger generations are more inclined to change jobs for career advancement or personal development (Seifert et al., 2023). This will create a mismatch between the organizational values and those of younger workforce generations. The organization must create a suitable strategy to retain young talents from leaving. A study found that employee trust and satisfaction strongly impacted employee organizational commitment, and employee organizational commitment impacted employee loyalty (Azzam & Harsono, 2021).

3. Research Methodology

The research design used is qualitative research involving a focus group discussion (FGD). A few representatives from public and private organizations participated in the FGD. They are the National Archive (Arkib Negara) (1), the National Population and Family Development Board or *Lembaga Penduduk dan Pembangunan Keluarga Negara* (LPPKN) (2), Employee Provident Funds (EPF) or *Kumpulan Wang Amanah Pekerja* (KWSP) (1), the Credit Counselling and Debt Management Agency or *Agensi Kaunseling dan Pengurusan Kredit* (AKPK) (2), a legal firm (1), a hotel (1) and the People's Trust Council or *Majlis Amanah Rakyat* (MARA) (2). Altogether, ten individuals were involved in the FGD.

The FGD occurred at one of the famous hotels in Kuala Lumpur in March 2023, and experienced researchers from Universiti Teknologi MARA and Kolej Universiti Poly-Tech MARA moderated the discussion session. The participants were separated into two groups and asked a few questions about the values of different generations in the workplace, the mismatch between the values of different generations and those of organizations, and the strategies used by your organizations to reduce the mismatches between the generational values and those of the organization. The feedback given by the participants was recorded, transcribed, and presented according to the themes for easy understanding.

The data collected was analyzed using a thematic analysis. Thematic analysis helps identify, analyze, and report patterns (themes) within this qualitative data. It allows researchers to capture the essence of the discussions, highlighting key issues, concerns, and perspectives participants share. In addition, thematic analysis can effectively represent participants' voices by identifying recurring themes and directly incorporating quotes or specific language used by participants. This ensures the analysis remains grounded in the data and accurately reflects participants' perspectives.

4. Results and Discussion

Work-Life Balance

From the FGD findings, a few insights can be learned concerning work-life balance. When there is a mismatch between the organizational values and those of the individuals, regardless of the generations, employees are likely to take drastic action to resolve the issue. The representative from MARA said, “At that time, we faced a crisis because many teachers asked for an early pension because they could not cope. Teachers are used to traditional methods. When wanting to adopt a new method of learning, stress levels are high, and mental health is worrying. Teachers who are 50 years old and above become uncomfortable”.

The participant from MARA also added, “Some also quit their jobs because they did not want to move even though they were allowed to be promoted. But when they were promoted to juniors, they became angry”. It shows that younger generations prefer work-life balance, and older generations will also opt for early retirement when they cannot cope with the situation. The finding is consistent with the previous work that work-life balance is crucial for employees regardless of their generation (Erkılınç, 2023; Leslie et al., 2021; Lestari & Margaretha, 2021).

Communication Styles

The findings of the FGD also confirm a difference in communication styles between older and younger generations, aligning with the findings of Janssen and Carradine (2021) and Mahmoud et al. (2021). According to the participant from the National Archive, “Right now, Gen X and Baby Boomers need to adapt like their subordinates. For example, all departmental information must be in infographics to be shared on social media. Gen X and Baby Boomers need to follow Gen Y's lead because they are smarter in this regard. Gen Y is indispensable in this organization because Gen Z is too raw”.

Due to differences in communication styles, conflict will arise. The representative from LKKPN said, “When there is a module manufacturing process, there will be a conflict between Gen Y and Gen X. The contradictions that occur are less professional when Gen Y questions why it is necessary to follow the old employees still and can be changed due to the passage of time, but Gen X gives the reason their actions are correct because they are more experienced. It is difficult to agree between Gen Y and Gen X”. The findings are consistent with those

highlighted by previous studies (Gabrielova & Buchko, 2021; Leslie et al., 2021)

To further support the finding, the participant from the EPF stated, "The Strategy and Investment Group consists mostly of Gen Y and is managed by Gen X. The situation when entering this group area is always serious and focused. It is less in terms of humanity". Therefore, management must find a way to avoid having conflicts between different generations escalating into more significant problems (Rudolph et al., 2021).

Approach to Authority

Regarding the approach to authority, the staff from the National Archive stated, "Gen Y and Gen Z feel that Baby Boomers and Gen X should manage matters in the organization because they are more mature, and this needs to be overcome." It seems that there is an agreement regarding who should manage the organizations. However, there are some concerns regarding the attitude of the younger generations toward the older generations. He added, "Gen X is more respectful when dealing. The softness in Gen X causes Gen Z and some Gen Y to take advantage of".

To further illustrate the value incompatibility between these generations, the participant from the National Archive added, "It becomes the habit in the organization, showing 'good' in front of superiors only but showing a different attitude behind. This matter needs to be resolved to build good personal relationships". The findings confirm that younger generations, particularly Millennials and Generation Z, may be more inclined to question authority and show less respect to the top management (Murvanidze, 2020). Previous studies acknowledge the existence of conflict among different generations and try to provide potential solutions to this occurrence (Gabrielova & Buchko, 2021; Rudolph et al., 2021).

Technological Proficiency

The findings from the FGD also support the earlier assumption that younger generations are more IT savvy than older generations (Bredbenner, 2020; Nawaz, 2020). Furthermore, older generations are less flexible when learning new technology. This is evident when the representative from MARA said, "When there is a system change, a transition occurs. We accept that many teachers at MRSM have resigned because they are unfamiliar with the new system."

To further support the finding, the participant from the EPF said, "Small branches are directed to close and be converted using the 'account' system. Many are fighting on the grounds of unemployment [because they are reluctant to learn new skills]. EPF is parallel with rescaling and upscaling to ensure they can move to new tasks". The findings support the previous research evidence that technological proficiency is critical in organizations. Gen Z is the most proficient in technology compared to other generations (Basantes Andrade et al., 2020). However, they want the organizations to provide adequate rewards and recognition for their talent (Chopra & Bhilare, 2020).

Career Expectations

Regarding career expectations, the findings contradict the earlier expectations that older generations prefer job security and stability, recognition and respect, work-life balance, and retirement planning (Serviss, 2020). Younger generations also prefer job security and stability. The participant from the National Archive said, "Gen Y and Gen Z are not far-sighted and are willing to reject promotion because they do not want to move from their original workplace." He added, "What is happening in the organization now, when hiring, they [Gen Y and Gen Z] promise to be ready for all things that may happen, such as employment in Sabah/Sarawak, but when it happens in the real situation, they present various reasons."

The participant from the EPF provides a different view on career expectations. He said, "The young blood is all fast. They want to show the outcome. When they do not get the desired outcome, they get stressed and feel like they have not achieved anything. So, they skip work and blame old people for the toxic culture that old people do not want to change". The findings provide evidence of the similarities and differences between different workforce generations regarding career expectations. Past research found that intrinsic and extrinsic factors determine Gen Z's career aspirations and Gen Z has well-defined career expectations and career development plans (Barhate & Dirani, 2022).

Commitment and Loyalty

The final part of the findings is related to commitment and loyalty. It is a standard agreement that younger generations are less committed and loyal than older generations ((Seifert et al., 2023). The participant from the National Archive said, "Gen Y and Gen Z cannot be given a big job that involves commitment from outside and inside [of the organization] because it will not achieve the organization's own needs." This view is supported by the representative from the EPF who said, "Gen Y, on the other hand, seems to be objective, but they will look for other alternative ways to ease their work."

Regarding loyalty concerns, the participant from the EPF added, "Gen Z is now too driven by dopamine and wants instant gratification. If they do not see it in a short period, even if there is a 5% increase in salary, they will jump to other organizations." It is confirmed that younger generations of the workforce are less likely to be committed and loyal to their organizations than their older counterparts. The findings are consistent with those of a study in Indonesia that found that employee trust and satisfaction strongly impacted employee organizational commitment, and employee organizational commitment impacted employee loyalty (Azzam & Harsono, 2021).

Possible Solutions to Address the Value Mismatch in the Organization

The participants were also asked about potential solutions to the mismatch between organizational values and those of different workforce generations. They provided several potential solutions.

The participant from the National Archive suggested, "This matter needs to be managed by Gen X and also Baby Boomers regarding understanding in the organization." He added, "In terms of knowledge, things about work need to take time to learn, but in managing activities and programs, we need to train them; otherwise, they will not follow the standards that the organization wants to achieve."

He added, "An Integrity Unit must be established in the organization after Act 17(A) was established to ensure that employees are not involved in wrongdoing". The participant from the EPF supports it, "Integrity starts with giving awareness to the staff in the hope that the staff can understand it from time to time." He added, "We create a program to develop integrity to ensure people follow through. This program has a different approach for each Gen, but the goal is the same".

Regarding technology proficiency, the participant from the National Archive suggested, "We need to align with the government's digitalization wishes. So, the young need to teach Gen X so they can follow the new system. There is a stage where we need to talk with them to accept the current situation slowly".

To create a harmonious working environment, the participant from the National Archive suggested, "The culture of the current generation is very different from the past. Nevertheless, an older generation can still assimilate with the younger generation. Gen X is young at heart. There must be something like that so Gen Y and Z can feel together. There is still respect, just the way of communication".

To facilitate the process of assimilation between different generations at the workplace, the participant from the National Archive suggested, "In the organization, we still strive to build job satisfaction. Give credit even if there are mistakes. The importance of this award is that they are enthusiastic about work. We know that this young person still has shortcomings; in the process, we improve them". "The government created the AKRAB program to overcome the problem."

The participant from LPPKN also supported the view by citing his organization's practices," LPPKN established the Mentor and Mentee program to reduce the gap between new employees and old employees". The participant from the EPF also agreed with the earlier view, "Due to the difference in the environment of these two groups, the establishment of Team Building activities, training for them to come out of their work cocoons. There will be activities at the end of the month, such as sports, to combine the two groups". "This will not happen overnight and needs to be done continuously."

Regarding the approach to authority, the participant from the EPF said, "There are several things applied in leadership building. How to manage a junior who is older than you? How to manage without authority?". He

added, "There will be preparation for the transition from non-exec to exec, the application of management skills so as not to be surprised when it is necessary to manage people". "This program is mandatory for every staff who wants to be promoted to be prepared".

He also suggested, "The way we overcome this matter is by giving the lead to the younger one while we prepare the younger one to bring Gen X together in the journey. It is not easy". He further explained, "Leaders need to be ready to explain to Gen X. It's just that acceptance is required, maybe in stages. They will accept to a certain degree because this raises insecurities for them. After all, they feel victimized".

Concerning the communication styles used by different generations, the participant from the EPF said, "The skill that older people need to learn now is how to bring the conversation down to the other level. We cannot speak in the same way as those of our age. They cannot accept it. So, if we can bring the conversation level to the right level, they will accept it faster."

All these suggestions highlighted by the participants are potential solutions to the value mismatch between older and younger generations of the workforce and those of the organization.

5. Conclusion

Different generations have different values, which may be advantageous and disadvantageous to the organization. Different values may create healthy competition among the employees but may create conflicts among them. This present study sought to examine the mismatch between older and younger employees regarding values and provide some solutions to address this issue. Six themes have been identified to serve as the main topics of discussion: work-life balance, communication styles, approach to authority, technological proficiency, career expectations, and commitment and loyalty. The findings of the FGD confirm the earlier assumptions that younger generations have different values from older generations. The findings provide valuable insights for future researchers to explore the topic further. It is suggested that future research be conducted to confirm the present study's findings using a quantitative research design. In addition, the study's findings provide guidelines for the management of organizations to develop policies and practices to address generational gaps, especially concerning work-life balance, communication styles, approach to authority, technological proficiency, and career expectations. Proper training programs can also assist in reducing these gaps.

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Trend-Driven Innovation for RTE Food Market: A Comparison Study Between Consumers from Malaysia and Indonesia

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Abstract: The ready-to-eat (RTE) food market is growing worldwide. Nevertheless, a limited study was found where researchers compare consumer behavioral intention toward RTE foods between countries. This study compares consumers in Malaysia and Indonesia regarding their food preferences and behavioral intentions toward RTE foods. Using a quantitative cross-sectional approach, the researchers developed an online survey and distributed the survey link to consumers aged 18 years and above from both countries via social media platforms. The dataset comprised 321 responses from Malaysia and 262 from Indonesia. Based on the analyses, findings reported some similarities and differences in consumer preferences and behavior intention between both countries. The highest percentages of Malaysian respondents were recorded for plant-based, genetically modified, gluten-free, and allergen-free foods. Interestingly, the highest percentage of Indonesian respondents reported for insect-based food than the Malaysians. More Malaysian consumers preferred ethnic foods from different cultures than Indonesians. About the same highest percentages of consumers from both countries preferred cell-cultured meat, 3D printed foods, and vegan foods. For Malaysian samples, attitude and subjective norms significantly influenced their behavior intention toward RTE foods. For Indonesian samples, subjective norms and behavioral control significantly influence consumer behavior intention toward RTE foods. Findings are relevant for food producers and marketers to explore the young consumer market and to identify new products to fulfill the market demand. This study broadens and deepens the current understanding of both countries' RTE food trends and consumer behavioral patterns. Food producers should promote RTE food products by highlighting their benefits through marketing channels.

Keywords: *Ready-to-eat food, food preferences, behavior intention, Malaysia, Indonesia*

1. Introduction and Background

Fast-moving consumer goods or consumer packaged goods are growing in the largest group of consumer products. Fast-moving consumer goods are products sold quickly and relatively cheaply (e.g., packaged foods and beverages). Some of the bigger multinational fast-moving consumer goods companies in Malaysia are Nestle, Unilever, DKSH, and General Mill, whereas, for Indonesia, examples of the fast-moving consumer goods companies are Indofood CBP Sukses Makmur, Wings Group, and Mayora Indah (Investinasia, 2023). Statista Research Department (2024) reported that one-fifth of Malaysian household consumption expenditure is spent on the fast-moving consumer goods segment, one of the most essential consumer goods sectors in the country, and the fast-moving consumer goods market is expected to continue growing due to the increase in purchasing power and population size (Statista Research Department, 2024). The improvement in consumer lifestyle, rapid urbanization, and high disposable income are increasing demand for on-the-go convenience foods, fueling the growth of RTE food. Innovative products with functional ingredients, convenience, organic foods, and packaging technology advancements are expected to provide future growth opportunities in the sector (Thakur et al., 2018).

Ready-to-eat (RTE) products are part of the fast-moving consumer goods product category, and the demand for these products is also growing due to the changes in the population structure and the convenience features offered by RTE products. Despite the growing demand for RTE foods and the constant changes in the market in the forms of changing consumer demand and hyper-competition, there is always the need for the food business to make specific changes or innovations to the products to ensure that the products stay relevant in the market. Trend-driven innovation and product development are considered part of the competitive factor for food producers as they give them the edge to stay ahead of the competition. According to Statista (2024a,

2024b), the revenue for RTE foods in Malaysia is expected to reach US$2.15 billion in 2024, whereas for Indonesia is projected to reach US$7.99 billion in 2024. The forecasted revenue for Indonesia is higher than for Malaysia, which may be influenced by the difference in total population between the two countries. As of July 2024, the total population in Malaysia is 34.1 million (DOSM, 2024) versus 283.8 million in Indonesia (Worldometers, 2024). Although the Indonesian market records higher projected revenue, Malaysia's predicted yearly RTE foods market growth rate is 6.75%, slightly higher than Indonesia's (4.72%) (Statista, 2024a; 2024b). Such a situation could occur due to increased RTE food choices and trends in Malaysia.

Nowadays, consumers spend more time in traffic and have longer working hours; hence, RTE products could make their lives easier (Anusha et al., 2020; Basurra et al., 2020). Several researchers confirmed that convenience is the primary motivation for consumers to purchase RTE food products other than saving their time for food preparation and having a variety of RTE food product options (Anusha et al., 2020; Azman et al., 2023; Basurra et al., 2020; Permana et al., 2023; Rosli & Sahak, 2024; Sierkierski et al., 2013). Due to lifestyle changes, the demand for convenience products like RTE foods is increasing. While the RTE foods market is expanding, a limited of research was found where researchers investigating consumer behavioral intention comparing between countries (Siekierski et al., 2013). Therefore, the study aims to (a) compare consumer food preferences between Malaysia and Indonesia and (b) investigate the behavior of consumers from both countries toward RTE foods. By applying the theory of planned behavior, this study will investigate consumer behavior intention toward RTE foods in Malaysia and Indonesia and develop a food profiling for consumers from these two countries.

2. Literature Review

RTE Foods Market

The RTE foods market is among the fastest growing segments as it fulfills the changing lifestyles of the general population. RTE refers to any food typically eaten in its raw state or any other food products that are pre-cleaned, pre-cooked, pre-packaged, and ready for consumption with no or minimal preparation or cooking (Huang & Hwang, 2012). The expression 'further heating or processing' is not intended to include food preparation activities such as washing, slicing, chopping, portioning, or marinating carried out by the consumer by preference to an otherwise RTE food item (Food Standards Agency, 2011). Under this definition, several processed foods can be regarded as RTE products, including biscuits, crisps, bread, pies, sandwiches and rolls, dairy products (milk, cheese, spreads), prepared salads and vegetables, and fruit. The list can be extremely long, and with new products entering the food market nearly every day, the list is getting longer and longer (Fast, 1999). RTE food products are not an invention, but the trend has been growing over the years due to the increasing consumer demand for a modern lifestyle that demands a quick and convenient meal. RTEs are available everywhere in Malaysia, from convenience stores to retail outlets. RTE foods often become a family choice because they are cheaper than dining in a restaurant (Basurra et al., 2021).

Research on RTE Foods

Several studies from various countries investigate consumer behavior patterns from multiple perspectives. A few studies examined consumer motivation to purchase RTE foods (Anusha et al., 2020; Foster, 2020). Sierkierski et al. (2013) compared the RTE food eating habits between consumers in two countries, and they found that consumers from Brazil preferred convenience and taste compared to consumers from Italy, who were concerned about tradition and health. Choi (2022) studied consumers' RTE food purchase behavior intention among college students in Korea and reported that the time for snack consumption and RTE food consumption was similar, which suggests that snacks might replace college students' meals as they consider RTE foods as snacks. In Thailand, Mahasuweerachai et al. (2023) reported that guilt and pride significantly influenced consumer decisions to switch their eating patterns from conventional meat to plant-based protein at restaurants. An earlier study by Thienhirun and Chung (2018) found that Thai consumers liked the RTE food packaging and design to be in a clear container with proper labels for them to see the food inside compared to the Japanese, who liked the colorful design of the food container. Additionally, they found that Japanese consumers favored an authentic Thai taste compared to Thai consumers who favored the adapted taste between Japanese and Thai flavors. Huo et al. (2023) found that consumers' purchase intention in China is positively associated with their attitude, subjective norms, perceived behavioral control, and trust. Meanwhile, Kabir (2023) reported that social norms, attitudes, perceived behavioral control, knowledge of the health

benefits of organic food, and the COVID-19 health crisis significantly influenced organic food consumption behavior among Bangladeshi consumers.

Foster (2020) studied Indonesian consumer intention to purchase RTE products, and they reported that turnaround strategy and packaging strategy influenced the increase in Indonesian consumer intention to purchase RTE products, which aligned with findings by Thakur et al. (2018). Damayanti et al. (2023) investigated the demand for food among Indonesian households. Food prepared at home and away from home are normal goods, but food away from home is more elastic than food prepared at home. More Indonesian households are found to consume food away from home. Another study in Indonesia by Permana et al. (2023) focused on Rendang as an RTE-type food product and found that aesthetic appeal, sensory appeal, quality appeal, and variety appeal affect consumer attitude toward rendang RTE, thus influencing their intention to purchase RTE rendang. Rahayu et al. (2023) reported high demand for RTE foods in Indonesia and evaluated the awareness of consumers toward healthy eating. They reported that from 2016 to 2020, the consumption of RTE foods increased, and consumers did not care about their daily nutritional intake. Therefore, Rahayu et al. (2023) suggest food producers offer healthier RTE products.

Several studies have been found on RTE food consumption in Malaysia. Basurra et al. (2020) examined the consumption practices and the perception of students and employees at one university in Kuala Lumpur. They found that most respondents consumed RTE foods twice to four times a week, mostly during lunch. Additionally, Basurra et al. (2020) found that consumer motivation to purchase RTE foods is convenience, followed by saving time for preparation. Regarding consumer perception towards RTE food, Basurra et al. (2020) reported that when buying RTE foods, consumers always pay attention to the store cleanliness rather than the ingredients of the products and compare the quality of the food packages and producer of the product. Another similar study conducted in Kuala Lumpur by Anusha et al. (2020) found that convenience was the primary motivation of consumers in purchasing RTE foods, and they purchased RTE foods more than twice a week and consumed them for lunch. Each consumer was willing to spend RM20.00 and below for RTE foods (Anusha et al., 2020). Azman et al. (2023) sampled consumers in Kuala Lumpur, Selangor, Melaka, Perak, Johor, and Penang, and they reported that the convenience of RTE foods significantly influenced consumer behavior in addition to health and taste orientation. The latest study by Rosli and Sahak (2024), who sampled 180 consumers in Kuala Lumpur, reported that convenience and price influenced their purchase intention toward RTE foods.

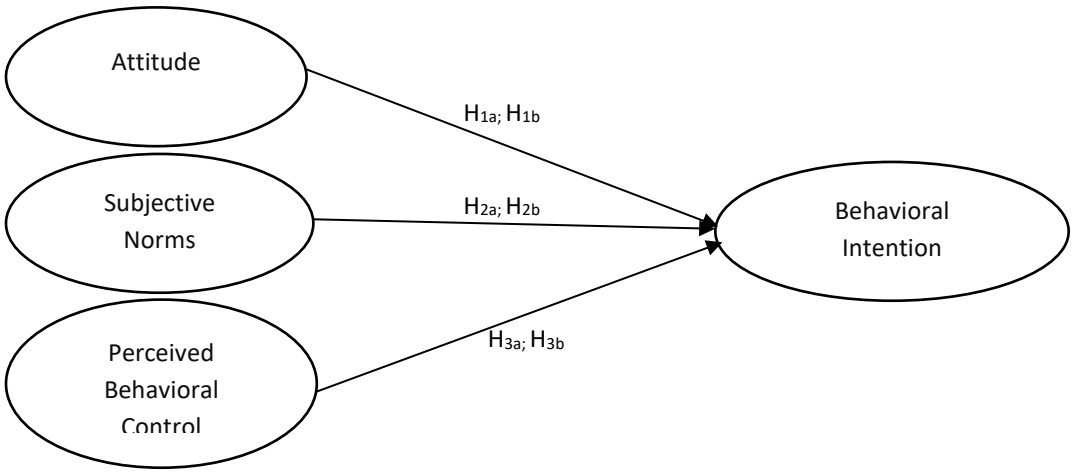
Consumer Behavior on RTE Foods

While there are studies found examining consumer behaviors toward RTE food products, a limited number of studies are found where the researchers utilized the theory of planned behavior in their studies (Sajjad et al., 2023) as more studies are found using descriptive research design (Anusha et al., 2020; Foster, 2020; Rosli & Sahak, 2024; Sierkierski et al., 2013). In consumer behavior literature, the theory of planned behavior is commonly used for examining consumer behavior in terms of attitude, subjective norms, perceived behavioral control, and behavior or purchase intention (Sajjad et al., 2023). An individual's behavior, resulting from intentions, is influenced by attitude, subjective norms, and perceived behavioral control (Ajzen, 1991). Based on an individual evaluation, their attitude can be positive or negative, but a positive attitude is inclined towards behavioral intention. A systematic literature review by McDermott et al. (2015a, 2015b) posited that consumers' behavioral intentions are influenced by their positive attitudes and the perception of people around them. Perceived behavioral control refers to an individual perception of ease or difficulty in engaging in a particular behavior. Subjective norms are described as an individual perception of social influence, whether encouraging or discouraging them to be involved in certain behaviors. The theory of planned behavior is commonly used to predict an individual's behavior intention, potentially leading to an actual behavior. Based on the literature review on RTE foods research, a lack of studies has been found that use the theory of planned behavior to examine consumer behavior intention. In the current study, the researchers aim to compare the behavior intention of consumers in Malaysia and Indonesia towards RTE foods, hence justifying the use of planned behavior as an underpinning theory for this study. Acknowledging the importance of understanding consumer behavior intention towards RTE foods, we developed the following hypotheses:

H1a: Attitude positively influences Malaysian consumer behavioral intention toward RTE foods.
H1b: Attitude positively influences Indonesian consumer behavioral intention toward RTE foods.
H2a: Subjective norms positively influence Malaysian consumer behavioral intention toward RTE foods.

H2b: Subjective norms positively influence Indonesian consumer behavioral intention toward RTE foods.
H3a: Perceived behavioral control positively influences Malaysian consumer behavioral intention toward RTE foods.
H3b: Perceived behavioral control positively influences Indonesian consumers' behavioral intention toward RTE foods.

Figure 1: Research Model



3. Research Methodology

The study employed a quantitative methodology. The questionnaire technique was employed in this study to test the hypothetical research model built based on the study objectives. All variables for the model were established through a detailed literature review. Each variable is rated using a five-point Likert-type scale from strongly disagree (1) to strongly agree (5) and has more than two items measuring each construct. The items on all scales used in the questionnaire were originally in English. The experts then translated these items into Malay using the back translation procedures (Brislin, 1980). The researchers employed a scale created by Verbeke and Vackier (2005) to assess consumer attitude (four items), subjective norms (four items), perceived behavioral control (three items), and behavioral intention (three items). A web-based survey was developed using Google Forms. Web-based surveys are cost-effective and less time-consuming (Braunsberger et al., 2007). A consent form is included to ensure all the participants are 18 years old or older and agree to participate in the study.

A pilot study was conducted in August 2023 for 30 consumers. The Cronbach alpha values of all scales for the pilot study were above 0.70, which is considered reliable according to Nunnally (1978). For the actual data collection, the researchers used a non-probability convenience sampling method and distributed the survey link to various social media platforms between October 2023 and January 2024. Since the researchers did not have access to the target population (Etikan et al., 2016), convenience sampling is the best method to gather samples from the two countries that are willing to participate. Overall, the researchers obtained 321 usable questionnaires from Malaysian respondents and 262 usable questionnaires from Indonesian respondents. For Malaysia samples, attitude (α = 0.788), subjective norms (α = 0.875), perceived behavioral control (α = 0.884), and behavioral intention (α = 0.916). For Indonesia samples, attitude (α = 0.568), subjective norms (α = 0.799), perceived behavioral control (α = 0.689), and behavioral intention (α = 0.714).

4. Data Analysis and Results

Respondent Profiles

More females (Malaysia, 51.2%, *n* = 164; Indonesia, 87%, *n* = 228) answered the survey questionnaire than males (Malaysia, 48.8%, *n* = 156; Indonesia, 13%, *n* = 34) for both Malaysian and Indonesian samples. The study received the highest percentage of young consumers aged 18 to 26 (Malaysia, 61.3%, *n* = 196; Indonesia, 99.2%, *n* = 260). As displayed in Table 1, the highest percentages of Malaysian consumers selected "Yes" for plant-

based foods (66%), genetically modified foods (68.5%), organic foods (77.3%), gluten-free foods (65.7%), and allergen-free foods (62.6%). Meanwhile, for Indonesian samples, the highest percentage of respondents answered "Yes" only for insect-based foods (68.3%). Regarding ethnic foods from different cultures, more respondents from Malaysia responded "Yes" to Japanese (80.7%), Korean (80.7%), Philippine (61.4%), and Spanish (60.4%) foods, compared to the Indonesian samples. Most Indonesian samples answered "No" to all four ethnic foods (Japanese 92%, Korean 91.6%, Philippine 72.5%, and Spanish 78.2%).

Table 1: Food Preferences of the Respondents for Both Malaysia and Indonesia.

Item	Descriptions	Malaysia (N = 321) *n* (%)	Indonesia (N = 262) *n* (%)
Plant-based foods	Yes	**212 (66)**	44 (16.8)
	No	109 (34)	**218 (83.2)**
Insect-based foods	Yes	54 (16.8)	**179 (68.3)**
	No	**267 (83.2)**	83 (31.7)
Cell-cultured meat foods	Yes	146 (45.5)	33 (12.6)
	No	**175 (54.5)**	**229 (87.4)**
3D printed foods	Yes	125 (38.9)	80 (30.5)
	No	**196 (61.1)**	**182 (69.5)**
Genetically modified foods	Yes	**220 (68.5)**	49 (18.7)
	No	101 (31.5)	**213 (81.3)**
Organic foods	Yes	**248 (77.3)**	38 (14.5)
	No	73 (22.7)	**224 (85.5)**
Vegan foods	Yes	142 (44.2)	102 (38.9)
	No	**179 (55.8)**	**160 (61.1)**
Gluten-free foods	Yes	**211 (65.7)**	39 (14.9)
	No	110 (34.3)	**223 (85.1)**
Allergen free foods	Yes	**201 (62.6)**	51 (19.5)
	No	120 (37.4)	**211 (80.5)**
Japanese foods	Yes	**259 (80.7)**	21 (8)
	No	62 (19.3)	**241 (92)**
Korean foods	Yes	**259 (80.7)**	22 (8.4)
	No	62 (19.3)	**240 (91.6)**
Philippine foods	Yes	**197 (61.4)**	72 (27.5)
	No	124 (38.6)	**190 (72.5)**
Spanish foods	Yes	**194 (60.4)**	57 (21.8)
	No	127 (39.6)	**205 (78.2)**

Regression Analysis for Malaysia and Indonesia Samples

The quantitative data from the study was analyzed using the SPSS program. The skewness and kurtosis values of the data were determined to be in the range of -2 and +2 (skewness) and -7 and +7 (kurtosis), which indicates the data is normal (Hair et al., 2010). Also, the sample sizes for this study are over 200; hence, they do not affect the skewness and kurtosis deviations from normality (Tabachnick & Fidell, 2013). Based on this information, the researchers used regression analysis to test the influence of independent variables on dependent variables for both Malaysia and Indonesia samples.

Based on the Malaysian samples in Table 2a, there are multiple correlations (R = 0.744) of the three significant predictors with the criterion (dependent variable). The factors influencing Malaysian consumer behavioral intention are attitude, subjective norms, and perceived behavioral control. These factors have a significant effect size, which explains 55.4% of the variability in behavioral intention. The adjusted R^2 shows that in the population, the three factors account for 54.9% of the variance contributing to the behavioral intention. Table 2b shows this regression is significant (F = 131.090, $p < 0.001$). Two of the three predictors of independent variables are significantly influenced by behavioral intention. Attitude and subjective norms positively influenced Malaysian consumer behavioral intention toward RTE foods, which supported Hypotheses 1a and 2a. The influence of attitude has the highest regression coefficient ($\beta = 0.481$, $p < 0.001$), followed by subjective

norms (β = 0.328, $p < 0.001$). Perceived behavioral control does not significantly influence Malaysian consumer behavioral intention toward RTE foods; hence, hypothesis 3a is rejected.

Based on the Indonesian samples in Table 3a, there are multiple correlations ($R = 0.415$) of the three significant predictors with the criterion (dependent variable). The factors influencing Malaysian consumer behavioral intention are attitude, subjective norms, and perceived behavioral control. These factors have a significant effect size, which explains 17.2% of the variability in behavioral intention. The adjusted R^2 shows that the three factors account for 16.3% of the variance contributing to the behavioral intention in the population. Table 2b shows that this regression is significant (F = 17.916, $p < 0.001$). Two of the three predictors of independent variables are significantly influenced by behavioral intention. Subjective norms and perceived behavioral control positively influenced Indonesian consumers' behavioral intention toward RTE foods, which supported Hypotheses 2b and 3b. The influence of subjective norms has the highest regression coefficient (β = 0.295, $p < 0.001$), followed by perceived behavioral control (β = 0.172, $p < 0.01$). Attitude does not significantly influence Indonesian consumer behavioral intention toward RTE foods; hence, hypothesis 1b is rejected.

Table 2a: Multiple Correlations of independent variables with the dependent variable (Malaysia)

Model	R	R-square	Adjusted R-squared	Standard Error of the Estimate
1	0.744[a]	0.554	0.549	0.70856

a. Predictors: (Constant), Perceived Behavioral Control, Attitude, Subjective Norms.

Table 2b: ANOVA (Malaysia)

Model		Sum of Squares	*df*	Mean Square	F	Sig.
1	Regression	197.443	3	65.814	131.090	< 0.001[b]
	Residual	159.152	317	0.502		
	Total	356.595	320			

a. Dependent Variable: Behavioral Intention
b. Predictors: (Constant), Perceived Behavioral Control, Attitude, Subjective Norms

Table 2c: Coefficients (Malaysia)

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity	
		B	S.E.	Beta (β)	*t*	Sig.	Tolerance	VIF
1	(Constant)	0.028	0.191		0.146	0.884		
	Attitude	0.678	0.072	0.481	9.455	< 0.001	0.543	1.841
	Subjective Norms	0.390	0.059	0.328	6.624	< 0.001	0.574	1.741
	Perceived Behavioral Control	0.022	0.055	0.017	0.395	0.693	0.770	1.299

a. Dependent Variable: Behavioral Intention

Table 3a: Multiple Correlations of Independent Variables with Dependent Variable (Indonesia)

Model	R	R-square	Adjusted R-squared	Standard Error of the Estimate
1	0.415[a]	0.172	0.163	0.72672

a. Predictors: (Constant), Perceived Behavioral Control, Attitude, Subjective Norms.

Table 3b: ANOVA (Indonesia)

Model		Sum of Squares	*df*	Mean Square	F	Sig.
1	Regression	28.386	3	9.462	17.916	< 0.001[b]
	Residual	136.254	258	0.528		
	Total	164.640	261			

a. Dependent Variable: Behavioral Intention
b. Predictors: (Constant), Perceived Behavioral Control, Attitude, Subjective Norms

Table 3c: Coefficients (Indonesia)

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity	
		B	S.E.	Beta	*t*	Sig.	Tolerance	VIF
1	(Constant)	1.056	0.213		4.962	< 0.001		
	Attitude	0.113	0.070	0.096	1.625	0.105	0.917	1.090
	Subjective Norms	0.286	0.059	0.295	4.872	< 0.001	0.874	1.144
	Perceived Behavioral Control	0.165	0.056	0.172	2.926	0.004	0.929	1.077

a. Dependent Variable: Behavioral Intention

5. Discussion and Conclusion

The study was conducted to compare consumer food preferences between Malaysia and Indonesia and investigate the behavior of consumers from both countries toward RTE foods. The analyses show some similarities and differences between consumer behavioral patterns for the two countries. More Malaysian consumers preferred plant-based, genetically modified, organic, gluten-free, and allergen-free foods compared to Indonesians who preferred insect-based foods. In contrast, more Indonesians dislike plant-based, genetically modified, gluten-free, and allergen-free foods. The study found Malaysians like plant-based food more than Indonesians; perhaps the Malaysians are similar to Mahasuweerachai et al.'s (2023) study, where consumers feel responsible for switching their eating patterns from conventional meat to healthier options like plant-based and organic foods. In terms of similarity, many consumers from both countries dislike vegan foods, cell-cultured meat, and 3D-printed foods. Such results might be influenced by the negative perception of consumers towards vegans, and vegans do not eat any food products that come from animals (e.g., dairy products). Also, the term cell-cultured meat and 3D printed foods might affect consumer perception of the food's nutritional values and whether it is safe to consume such products. Health and taste orientation influenced consumer behavior (Azman et al., 2023).

Interestingly, the number of Malaysian consumers who like ethnic foods (Japanese, Korean, Philippine, and Spanish) is higher than that of Indonesians. Such findings reflected the emergence of various ethnic restaurants available in Malaysia, especially those serving Japanese and Korean cuisine. Wan and Yazdanifard (2021) reported that Malaysians are more interested in Korean food like ramen, *chigae*, and *chimek,* while Tey (2018) found that Malaysian consumers choose Japanese cuisine because the food is tasty. In contrast, Thienhirun and Chung (2018) reported that Thai consumers did not like Japanese RTE foods due to their taste and freshness. Based on the results, the demand for ethnic food in Malaysia is still growing; hence, Malaysian food operators could benefit from such findings. For the regression analysis, the findings revealed different results for consumer behavior patterns in both countries. The Malaysian consumer attitude and subjective norms significantly influence their behavioral intention toward RTE foods, and attitude was the main contributing factor. The Malaysians' positive attitude and belief about whether people around them approve of their behavior influenced their intention towards RTE foods. Generally, Malaysian consumers view RTE foods as convenience; hence, convenience is the most important motivational factor influencing RTE food purchase decisions (Anusha et al., 2020; Basurra et al., 2020; Rosli & Sahak, 2024).

On the other hand, for Indonesian consumers, this study found that subjective norms and perceived behavioral control significantly influence their intention toward RTE foods, and subjective norms were the main factor. Therefore, Indonesian consumers' perception of ease in performing their behavior and their belief that the people around them favor their behavior influence their behavioral intention toward RTE foods. In this study, attitude does not significantly influence Indonesian consumer behavior intention, which contradicted Permana et al. (2013), who stated that Indonesian consumer attitude toward Rendang as an RTE-type food product influenced their purchase intention. The current study has proven that the two countries' consumer behavior toward RTE foods is different. Nonetheless, consumers from both countries are similar in terms of their subjective norms when it positively influences Malaysian and Indonesian consumer behavioral intention toward RTE foods. In short, subjective norms are a vital construct influencing consumer behavioral intention in Malaysia and Indonesia. The similarities and differences in food preferences and RTE foods' behavioral intentions between consumers from the two countries are worth investigating. Cultural and societal

perceptions might contribute to such results. To the best of the authors' knowledge, this is the first cross-country study using the theory of planned behavior to investigate the attitude, subjective norms, and perceived behavioral control on consumer behavior intention toward RTE foods between two countries (i.e., Malaysia and Indonesia), thus, justify the novelty of study contribution.

Theoretical and Practical Implications

The research data provides theoretical and practical implications for food producers, food marketers, and academicians working in literature. Firstly, this study developed food profiling for consumers from two developing countries: Malaysia and Indonesia. Secondly, this study offers comparative data between these countries regarding their food preferences and behavioral intentions toward RTE foods. For practical implications, stakeholders such as RTE producers may benefit from the findings to enhance their understanding of consumer behavior that keeps changing occasionally. The comparative data reported in this study benefit RTE food exporters, importers, and producers as they expand their market to potential consumers from the two countries. Findings will help the RTE producers in Malaysia and Indonesia find more opportunities to fulfill the market demand.

Limitations and Future Research Recommendations

This study is not without limitations. Firstly, the study reported consumer behavioral intentions from the two countries (Malaysia versus Indonesia); hence, the findings cannot be generalized to other countries. Therefore, including more countries in a comparison study would be valuable for more beneficial data. Secondly, the study measured how consumer attitudes, subjective norms, and perceived behavioral control influenced their behavioral intention. Other variables, such as consumer perception of food innovation and demographics, might have moderated or mediated the associations between these variables. With that, further studies are needed to investigate additional variables that could influence the associations between the study variables. Thirdly, the study only investigated the behavioral intention of RTE foods from consumer perspectives; thus, future research could explore from other stakeholders' perspectives, such as the RTE producers and marketers, to study the challenges and opportunities of exporting and importing RTE food products. Current and future research findings will also benefit both countries in developing policies related to RTE foods and education initiatives to promote the benefits of RTE foods products.

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A Systematic Review of Organizational Resilience Through Digital Technology Adoption: Trends and Insights in a Decade

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Abstract: Numerous organizations have been compelled to adopt new ways of managing work and the environment because of the pandemic. Understanding the resilience dynamics during the adoption of digital technology is more important than ever considering challenges like terrorism, economic recessions, mass migration, cyberattacks, and a variety of other socio-political and economic trends. Reviewing publications that examine the connection between digital technologies and organizational resilience from 2014 to 2024 is the goal of this project. The PRISMA approach was used to conduct a systematic review. 47 relevant papers were found as a consequence of this, most of which came from the Scopus database. This implies that academics are engaged in the subject. The papers consistently cited the diffusion of innovation (DOI) theory and the technology-organization-environment (TOE) framework, with a bias towards quantitative research methods. Five major themes emerge from the analysis: digital transformation, organizational resilience, business performance, innovation, and adoption of digital technology. By providing new perspectives, the study closes gaps in the literature. It was believed that the Journal of Technological Forecasting and Social Change was a valuable source of information on studies on digital adoption. Based on the results, the report offers recommendations and points up directions for future research to increase organizational resilience by utilizing digital technology. Organizations may leverage digital technology to effectively overcome obstacles and prosper in a constantly changing landscape by implementing these suggested practices.

Keywords: *Organizational resilience, digital technology adoption, systematic review, business performance*

1. Introduction and Background

The concept of organizational resilience is particularly crucial in the current context, marked by rapid and frequent economic, social, and environmental changes on a global scale (Do et al., 2022). The capacity of an organization to bounce back from setbacks and adjust to change is known as organizational resilience (Akpan et al., 2022; He et al., 2022). Businesses and stakeholder groups need to adopt new practices and promote interdependencies to develop stability and adaptation against external shocks (Do et al., 2022). This is essential for systems resilience. Although SMEs are beginning to acknowledge the benefits of circular business practices in fostering resilience (Annarelli et al., 2020), there are still substantial obstacles to their continuous implementation that affect adoption rates. In response to these challenges, business owners are increasingly aware that enhancing organizational resilience can drive organizational growth and safeguard long-term success (Zhang et al., 2021).

To identify knowledge gaps in digital technology adoption and organizational resilience, especially in medium-sized enterprises (SMEs), a thorough study of the literature was conducted. This particular point has not received much attention in earlier research. For instance, Akpan et al. (2022) examined how dynamic capabilities and organizational resilience relate to Nigerian manufacturing enterprises. He et al. (2022) investigated the effects of digital transformation on workers and organizations during turbulent times, as well as how it influences organizational resilience. Xia et al. (2022) investigated how business networks could strengthen organizations' organizational resilience similarly. The relationship between the use of digital technology and organizational resilience is still not well studied despite these measures, especially when it comes to SMEs. To fill this information vacuum and comprehend this recently emerged field of research better, a comprehensive review of the literature was conducted. The present study was informed by the following research questions to create a pertinent systematic literature review as stated below:

- What are the trends of literature related to organizational resilience and digital technology adoption in a decade?

- What research themes will be generated based on the finalized articles on organizational resilience and digital technology adoption in a decade?

The study employs a thorough literature review technique to examine research on organizational resilience and the adoption of digital technologies. This approach is required to comprehend the trends and research results. A review approach called PRISMA Statement (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) was used to assemble the literature from 2014 to 2024. The study is presented, and then the literature on the connection between digital technology use and organizational resilience is thoroughly reviewed. Chapter 3 explains the research technique, while Chapter 4 presents the study's findings. The research topic categorization process is explained in detail in Section 5, and the study's conclusions and possible directions for future research are covered in Section 6.

2. Literature Review

Organizational Resilience

Organizational resilience can be defined as an organization that possesses the "ability to endure significant business disruptions caused by unexpected, unforeseen, or catastrophic events, allowing organizational systems to function beyond their planned capacities without major losses" (Zhang et al., 2021). The concept of resilience, in its various forms, has been increasingly adopted in other disciplines (Tengblad, 2020). For example, in ecology, resilience has become fundamental in understanding how ecosystems can withstand change and stress while maintaining their fundamental balance (Akpan et al., 2022). Over recent decades, experts in organizational and business studies have broadened the application of resilience concepts (Tengblad, 2020). Despite numerous studies on organizational resilience dating back to the 1970s, notably the significant work by Thomson and Lehner (1976), there is no universally accepted theoretical foundation for the concept (Molinillo & Japutra, 2017). Terms like adaptability, agility, flexibility, improvisation, recovery, redundancy, and robustness do not equate to organizational resilience (Molinillo & Japutra, 2017). Resilience refers to how organizations respond to adversity, emphasizing their ability to recover and thrive amid uncertainty, discontinuity, and catastrophe (He et al., 2022; Yang et al., 2021). Therefore, enterprises must take measures to enhance organizational resilience to maintain competitiveness and ensure sustained viability (Annarelli et al., 2020). Consequently, this paper aims to propose a method for evaluating the effectiveness of organizational resilience strategies and associated initiatives within the service sector (Marcucci et al., 2022). Within this broader context, businesses encounter a plethora of emerging digital technology adoptions that are gaining significance, particularly in areas of cybersecurity and digital transformation (Annarelli et al., 2020).

Digital Technology Adoption

Digital technology utilization by small and medium-sized enterprises (SMEs) entails incorporating digital platforms and tools into their operations to increase productivity, efficiency, and competitiveness in the current economic environment (Ayinla & Adamu, 2018). Digital technologies are helping small and medium-sized businesses (SMEs) expand their client base, optimize internal workflows, and enhance internal communications (Skare & Riberio Soriano, 2021). Essential components of digital adoption for small and medium-sized enterprises (SMEs) include digital marketing tools, cloud computing, data analytics, mobile apps, and e-commerce platforms. According to Figueiredo et al. (2021), these technologies aid SMEs in breaking through conventional growth barriers, breaking into new markets, and maintaining their competitiveness in a digitally driven economy. Additionally, digital technology gives SMEs the capacity to swiftly alter their company strategies, enhancing their adaptability, according to Saleem et al. (2023). The literature on innovation emphasizes this point (Egala et al., 2024). In a similar vein, recent research has examined an organization's readiness to adopt new technologies or to digitally modify its ongoing operations (Omrani et al., 2024).

Small and medium-sized enterprises (SMEs) need to be prepared for substantial interruptions to their routine operations, which might endure for several months or even years. The development of efficient procedures that boost productivity and promote sustainability, the production of value for significant stakeholders and consumers, and the broad adoption of data-driven technology-based systems can all lead to these disruptions. These are all aspects of digital transformation practices (Blichfeldt & Faullant, 2021). SMEs require managerial, financial, and technological capabilities to implement such new technology (Blichfeldt & Faullant, 2021).

3. Research Methodology

The Review Protocol – PRISMA

The study used PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses), as its review methodology (Figure 1). As stated by Sierra-Correa and Cantera Kintz (2015) and Shaffril et al. (2017), PRISMA has three primary benefits and is a widely used technique in management research. These advantages include the ability to specify exact research questions for systematic analysis, to establish clear inclusion and exclusion criteria, and to make effective use of scientific literature databases while working under time constraints. To get things started, specific study questions were established by the review methodology. Then, a rigorous approach was put into practice, incorporating rules for eligibility, screening, and identity. The suitability and applicability of the selected articles were then verified by a quality review. The collected data was carefully analyzed and validated once it was extracted from the source to guarantee its correctness and dependability.

Systematic Search Strategy

The papers came from two major bibliographic databases, Web of Science (WoS) and Scopus, and they spanned a decade from 2014 to 2024. The selection of these databases was based on their broad coverage of topics, which includes social sciences, business management, finance, economics, and allied fields. Large repositories of peer-reviewed abstracts and citations are known to be hosted by WoS and Scopus, and these resources are frequently used for systematic literature reviews (Durach, Wieland & Machuca, 2014). The articles that were obtained from these databases were screened and filtered using the UiTM e-database program. Based on previously published research, search terms were determined.

Table 1: The search string used for the systematic review process

Database	Keyword used
Scopus	TITLE-ABS-KEY (("Organization Resilience" OR "Organization" OR "Resilience") AND ("Digital") AND ("Technology") AND ("Adoption") AND ("SMEs"))
Web of Science	TS= (("Organization Resilience" OR "Organization" OR "Resilience") AND ("Digital") AND ("Technology") AND ("Adoption") AND ("SMEs"))

The identified list of keywords was used to create the search string in Table 1. Certain keyword combinations were used in the search process since the review questions were designed with titles and abstracts in mind. A total of 95 articles were produced using this strategy; 35 came from WoS and 60 from Scopus. Five records, however, had to be deleted from the dataset because they were duplicates. After that, the information was transferred to an Excel file for cleaning and sorting. Following an extensive analysis, an additional 20 publications were excluded from the dataset due to eligibility requirements (Table 2). Seventy pieces were thus kept for additional examination.

Table 2: The inclusion and exclusion criteria

Criterion	Inclusion	Exclusion
Literature type	Journal article	Book series, books, book chapters, conference proceedings, editorials, non-research publications, reviews, and opinion pieces
Language	English	Non-English
Timeline	Between 2014 and 2024	<2014
Indexes	Social Science Citation Index, Business Management Citation Index (Web of Science)	Science Citation Indexed Expanded (Web of Science)

Quality of Assessment

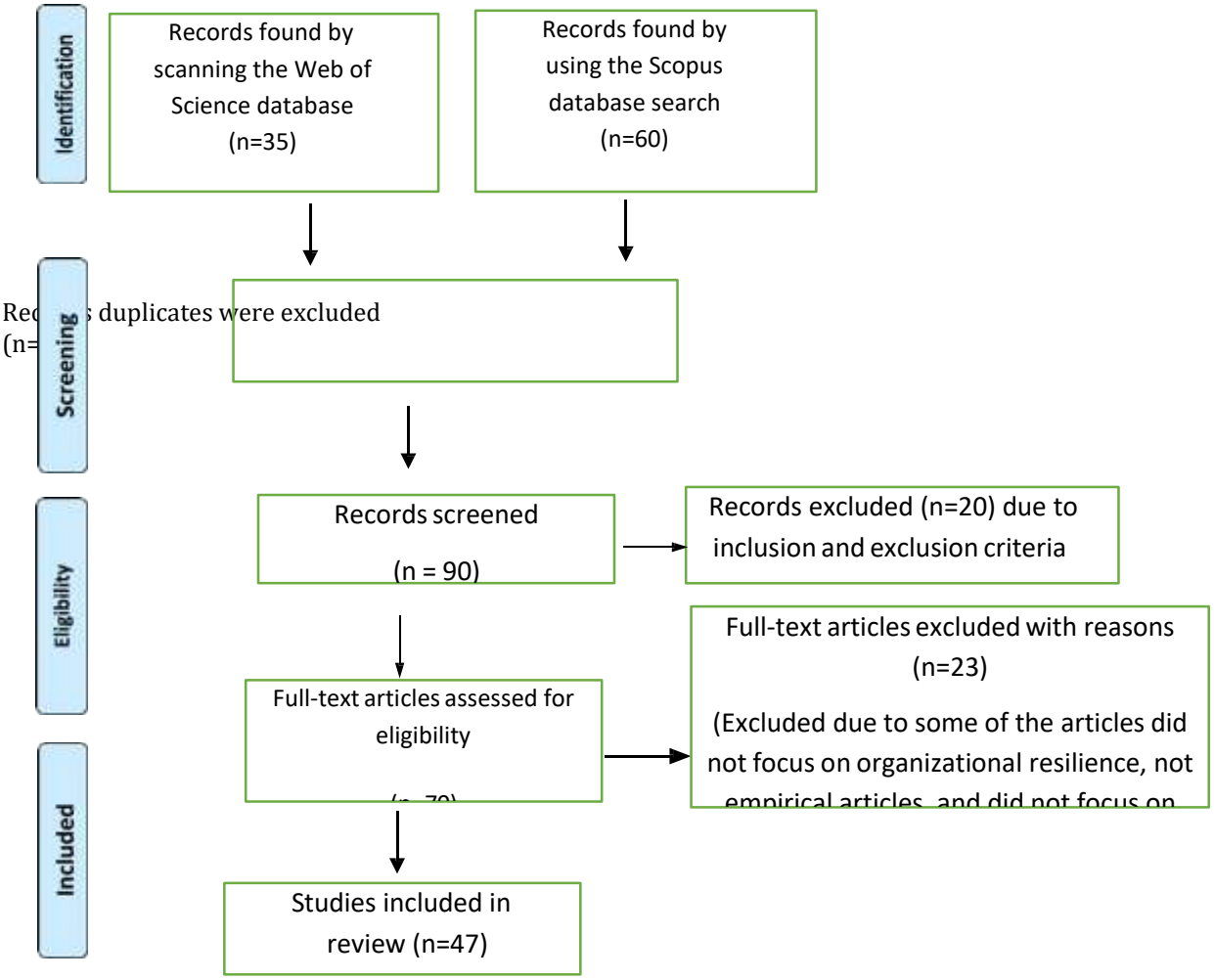
A mixed qualitative and quantitative research assessment method was used by two reviewers to examine 70 publications. After reading the articles, the reviewers classified their quality into three categories: good, mediocre, and poor. Reviewers' consensus over an article's quality led to its inclusion. In situations where there

was disagreement among the other reviewers, a third reviewer was assigned to evaluate the manuscript (Petticrew & Roberts, 2006). 23 studies were determined to be unsuitable for further investigation after this evaluation, leaving the remaining articles for examination.

Data Abstraction and Analysis

Evaluation and analysis were performed on the 47 papers that were still retrieved from Scopus and Web of Science (WoS). Reviewing the abstracts was the first step in the data extraction process. Next, the complete texts were carefully examined to find pertinent themes pertaining to organizational resilience. Researchers conducted a thematic analysis to uncover these themes by engaging in discussions to resolve any discrepancies or differing interpretations of the data until a consensus was reached on the identified themes. Subsequently, themes were refined and renamed as needed, and the details were presented in a structured manner. The classification of research themes is discussed in Section 5.

Figure 1: The flow diagram of the study is adopted from PRISMA

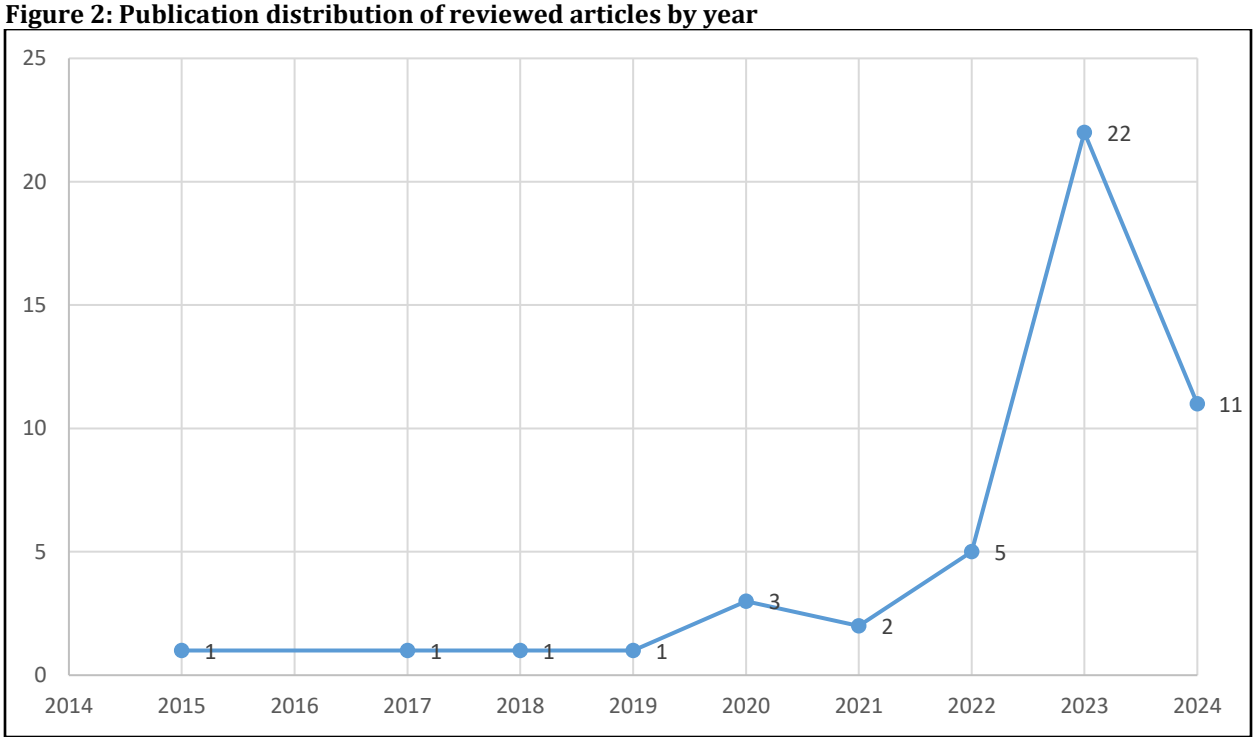


4. Results

An extensive and methodical review of the literature revealed a trend of increasing interest in the field of organizational resilience through the implementation of digital technologies. According to the results, 2023 will have the most articles published in this field. The year 2024, with 11 articles, comes next (Figure 2). In 2015, the research area of organizational resilience through digital technology adoption was just getting started, with only one article published. Organizational resilience (OR) is becoming more and more apparent to business owners as a means of expanding their enterprises and safeguarding their long-term viability

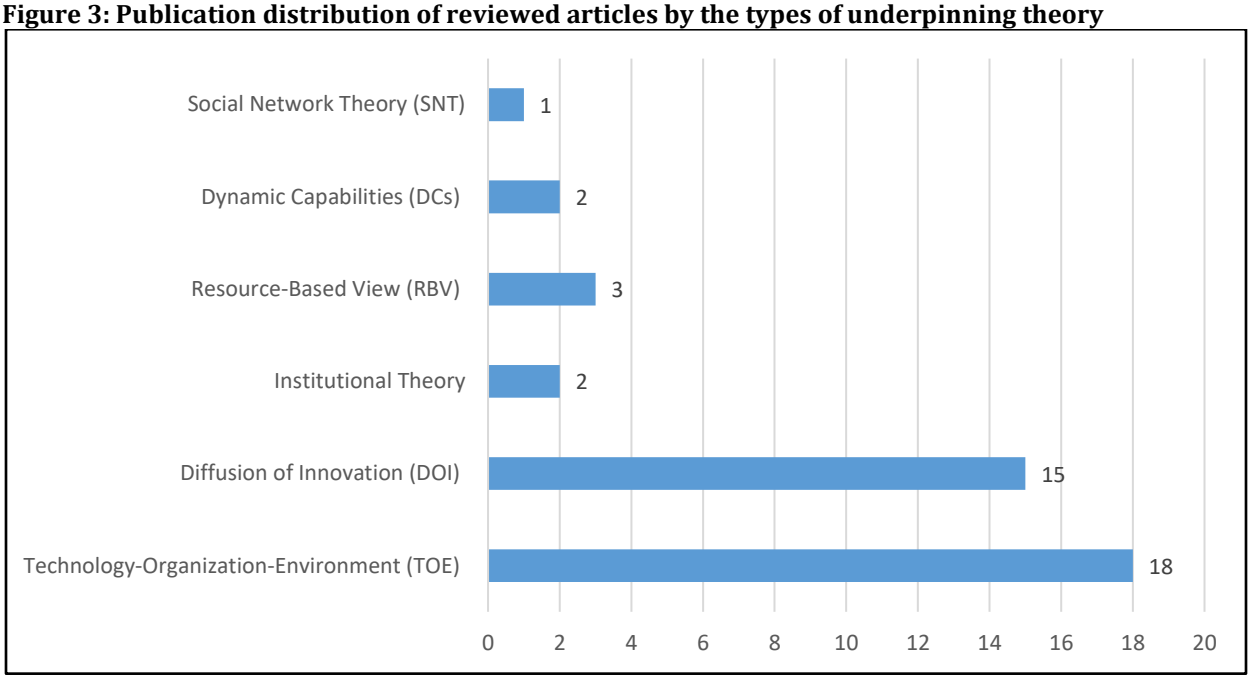
(Canhoto et al., 2021). For example, during COVID-19, numerous businesses were compelled to close their operations due to state-wide mandates from various countries across the world.

Figure 2: Publication distribution of reviewed articles by year



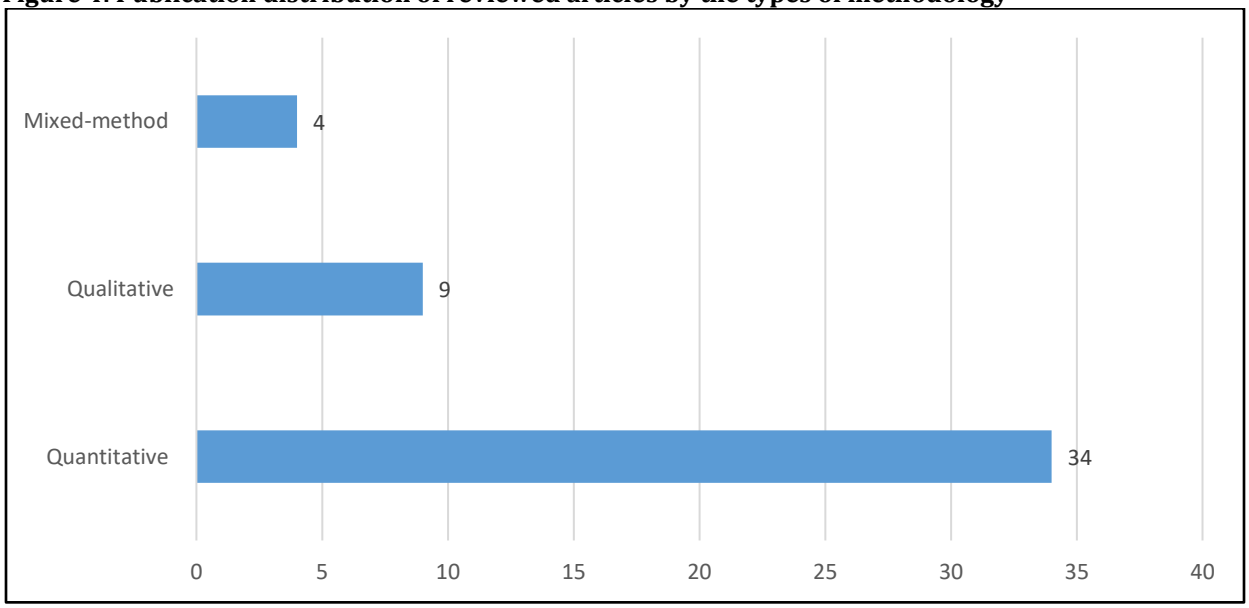
Recently, the Technology-Organization-Environment (TOE) paradigm has become the main underpinning theory in research. This theory was applied in a number of studies, including those by Giua et al. (2022), Branstad and Solem (2020), Makinde et al. (2022), and Skare and Ribeiro Soriano (2021). The information systems industry first developed the Technology Acceptance and Utilization for the TOE framework to illustrate how various factors, including the technology's features, the organizational context, and the external environment, affect new technology adoption and utilization (Ricci et al., 2021). Research on the adoption of digital technologies by Barrenho et al. (2021), Branstad and Solem (2020), Dearing and Cox (2018), and Makovhololo and Batyashe (2017) demonstrates the extensive usage of the Theory of Diffusion of Innovation (DOI) in the past 10 years. However, limited studies focused on organizational resilience. Details are presented in Figure 3.

Figure 3: Publication distribution of reviewed articles by the types of underpinning theory



The research methodology distribution in the papers that were reviewed is shown in Figure 4. About 34 and 9 of the examined papers used qualitative and quantitative techniques, respectively. Only four of the study's publications used a hybrid method. Research examining technology readiness, e-commerce uptake, top management support, and SME performance has been known to employ the quantitative technique (Jiao et al., 2022; Omrani et al., 2024; Roundy et al., 2017).

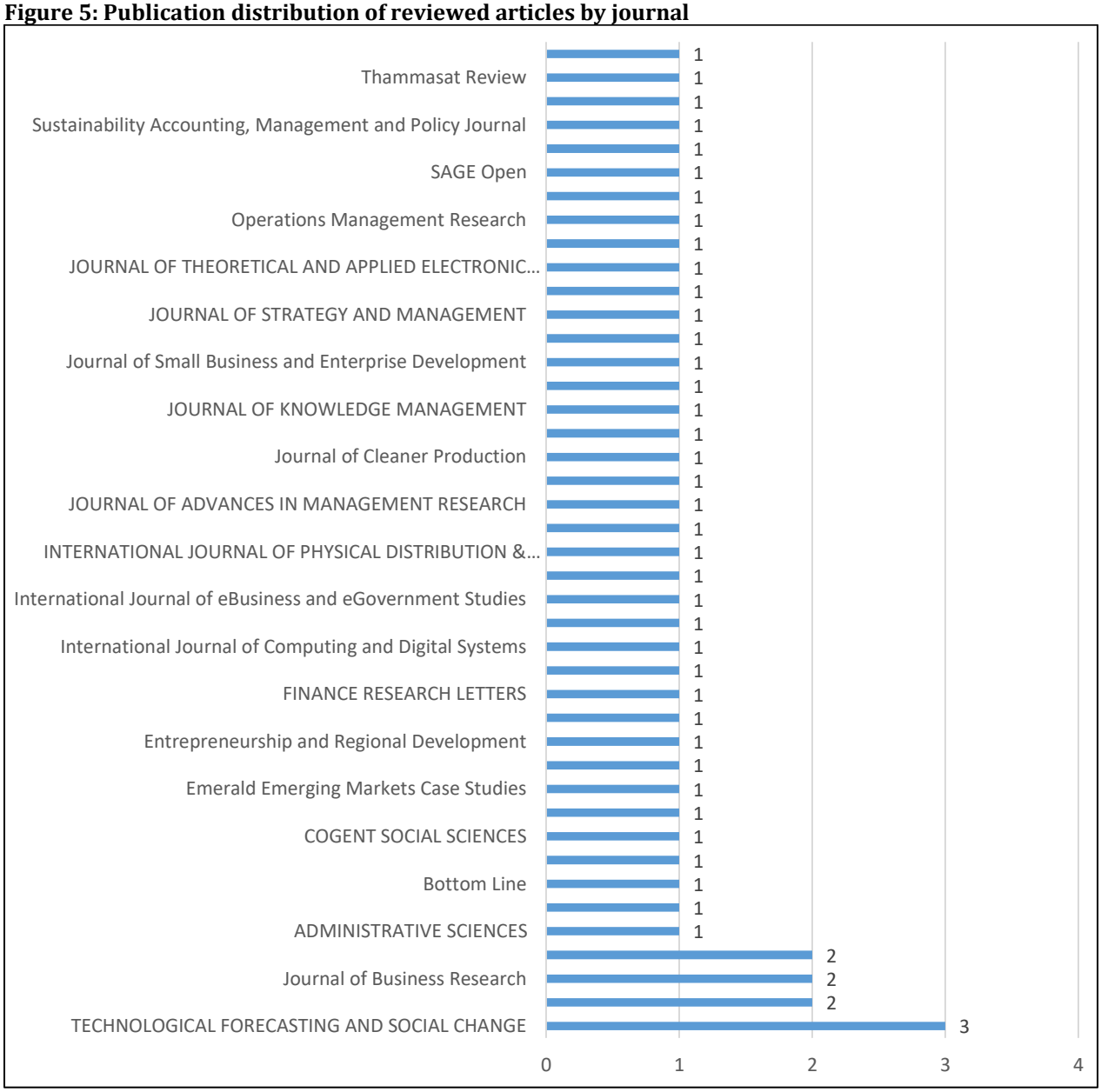
Figure 4: Publication distribution of reviewed articles by the types of methodology



The analysis of journals published on organizational resilience through digital technology adoption from 2014 to 2024 is shown in Figure 5. Based on the assessment, three publications from the Journal of Technological Forecasting and Social Change and two from the Journal of Business Research and Administrative Science indicated that the latter is a major venue for sharing research on digital adoption. Because of its specialized emphasis and established reputation in the field, the Journal of Technological Forecasting and Social Change

(JTFS) has become an essential forum for sharing research on digital adoption. JTFS gives academics a platform to disseminate their most recent studies on societal change, technology forecasting, and the uptake of new technologies. The multidisciplinary approach of the magazine facilitates the examination of several elements of digital adoption, encompassing both the technological and socio-economic dimensions. In addition, JTFS is well known for its comprehensive peer-review process, which ensures the validity and quality of the research that is published. Academics' regard for the publication contributes significantly to its status as a trustworthy platform for exchanging research on digital adoption. Branstad and Solem's 2020 study, which looked at the factors affecting SMEs' adoption of digital technology, demonstrates the significance of JTFS in this sector. Apart from contributing to the existing knowledge base on the topic, the research provided valuable insights into the opportunities and challenges associated with the use of digital technologies. Branstad and Solem (2020) made sure that a large audience of academics, policymakers, and business professionals interested in comprehending and helping SMEs implement digital technology could access their study by publishing it in JTFS.

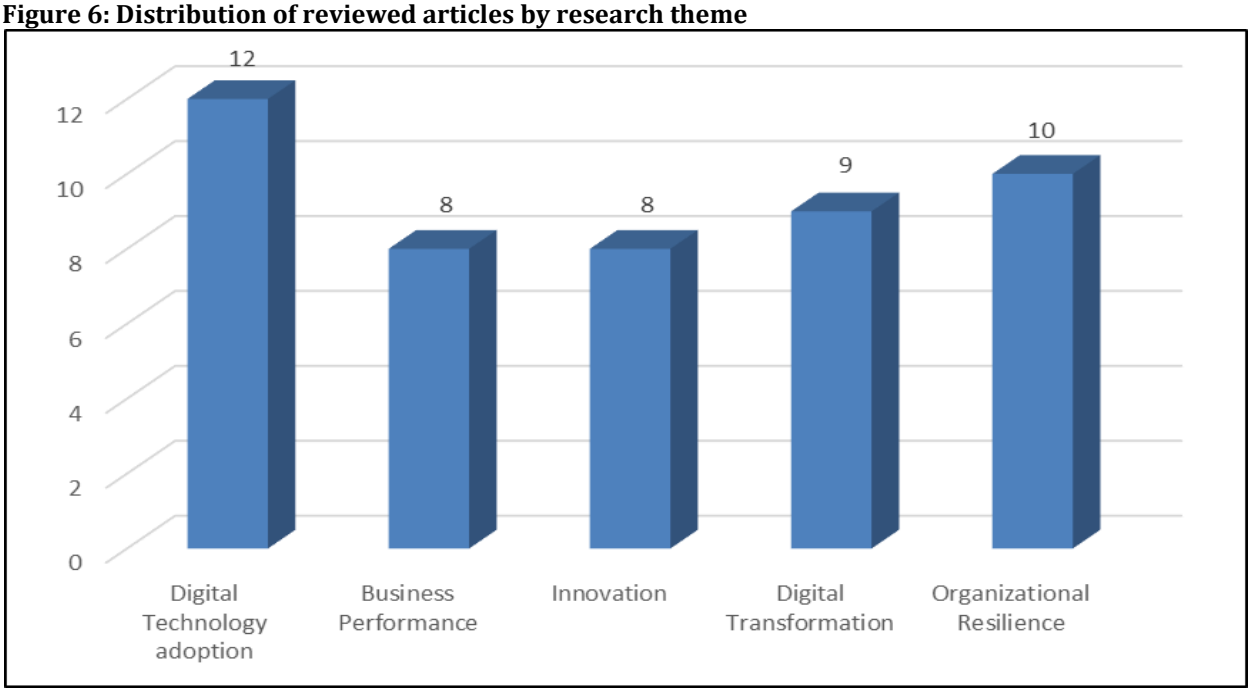
Figure 5: Publication distribution of reviewed articles by journal



Discussion of Research Themes

The primary topics arising from the studies released between 2014 and 2024 are the focus of this section. The themes derived from the completed articles were produced through the application of thematic analysis. Five primary issues emerged from the review: organizational resilience, innovation, digital transformation, business performance, and adoption of digital technology. The findings offer a thorough examination of the adaptation strategies used in organizational resilience nowadays (see Figure 6). Details of the five major themes are discussed below.

Figure 6: Distribution of reviewed articles by research theme



Digital Technology Adoption

Among the 47 studies reviewed, 12 specifically concentrated on digital technology adoption over the decade covered by the article, underscoring a strong interest in examining the dynamics, implications, and strategies involved in this area. Digital adoption refers to the process by which users, including employees and consumers, are trained to efficiently use new technologies—such as software, applications, and websites—so they can fully benefit from digital tools and solutions (Skare & Riberio Soriano, 2021). SMEs, or medium-sized enterprises, are frequently regarded as important players in both established and emerging economies. Information and communication technology (ICT) and e-commerce adoption hurdles have been studied previously in relation to organizational resilience, with a focus on industrialized nations (Makinde et al., 2022). SMEs can leverage digital technologies to modify and synchronize their business strategies.

Business Performance

Evaluating a company's performance is critical to determining if it has achieved its goals (Akbar et al., 2020) and plays a major role in investment choices (Ribau et al., 2017). Researchers frequently look at many aspects that affect the problems or success of businesses. Financial performance, operational efficiency, innovation, adaptability, and market performance are the main areas of attention when analyzing SMEs' performance. Cegarra-Navarro et al. (2016) state that although firm performance is an often-discussed subject, there isn't a single definition for it. In general, it may be seen as either the quantification of a company's operations that lead to goal accomplishment (Cegarra-Navarro et al., 2016) or as an organization's achievement measured against particular criteria (Eikelenboom & de Jong, 2019). Even after a great deal of research, performance is still viewed as a complicated, multifaceted phenomenon (Mubarak et al., 2019).

Innovation

Innovation is crucial for organizations to excel in a dynamic and competitive environment. Embracing innovation promotes growth, increases efficiency, improves customer satisfaction, and enhances overall resilience and market competitiveness (Aizstrauta et al., 2015). By emphasizing innovation, businesses can pave the way for sustained success and longevity. Existing literature highlights the substantial influence of ambidextrous innovation on organizational evolution and adaptation (Branstad & Solem, 2020). Ambidextrous innovation involves traits such as attentiveness to evolving markets, continuous learning and experimentation, and strategic realignment of resources, and capabilities during the innovation journey (Arunachalam et al., 2022).

Digital Transformation

Utilizing information, computers, networking, and communication technologies to integrate internal and external resources is a key component of an organization's digital transformation (Mergel et al., 2019). According to Verhoef et al. (2021), the purpose of this integration is to change the organization's vision, strategy, structure, capabilities, procedures, and culture to better match it with the rapidly evolving digital environment. Scholars have examined in considerable depth the connection between effective organizations and digital technologies. The development of business models (Ebert & Duarte, 2018) and the effect of technical improvements on organizational vulnerability (Verhoef et al., 2021) are often the two primary grounds of dispute when addressing digital transformation. Porfírio et al. (2021) state that experts support the adoption of digital transformation approaches to assist organizations in achieving long-term, sustainable goals by understanding the relationship between digital transformation and the external environment.

Organizational Resilience

However, organizational resilience was the subject of ten of the 47 studies that were examined overall. Organizational resilience is the capacity of an organization to endure significant disruptions in operations caused by unforeseen or catastrophic events. According to this skill, the company can continue functioning outside of its set bounds without suffering significant losses (Herbane, 2019). The idea investigates how companies respond to external risks including natural disasters, diseases like the COVID-19 pandemic, and downturns in the industry or economy (Akpan et al., 2022). The value of organizational resilience in a setting that is uncertain and changing quickly has received a lot of attention lately (Annarelli et al., 2020). Specifically, service organizations need this resilience to be sustainable since they are more likely to be affected by sudden changes in the external environment (Akpan et al., 2022). Consequently, organizational resilience has become an essential element for service-oriented businesses in the current unpredictable economic landscape.

5. Conclusion and Future Research Agenda

To better understand organizational resilience and digital technology uptake among SMEs, this research has thoroughly evaluated the corpus of existing literature. In today's fast-paced and cutthroat business world, understanding organizational resilience is becoming more and more important for a company's survival and growth. 47 pertinent articles have been found after a comprehensive investigation of two databases. The five primary research topics that emerged from the use of the theme analysis approach are innovation, business performance, organizational resilience, digital transformation, and adoption of digital technology.

According to Miranda et al. (2016), the adoption of new technology is often driven by the objective of "altering the organization's current state to pursue enhancements" to provide a product or service that fulfills consumer satisfaction. This is often done in an attempt to promote innovation. Process reorganization is a tactic that businesses are using increasingly frequently to enhance internal resources and achieve cost-cutting goals so they can maintain their competitiveness in the market. However, resilience is seen as a complex idea that deals with how a group of people and an organization react to uncertainty (Do et al., 2022). Most studies on resilience are based on two main viewpoints: (1) emphasizing fixed human qualities and skills, and (2) emphasizing a process marked by ongoing little improvements (He et al., 2022). As per Do et al. (2022), the initial perspective focuses on the present and defines resilience as the capacity to promptly return to pre-crisis performance levels following an unforeseen disaster. Personal qualities have an impact on this skill. According to the second point of view, organizations continuously evolve and become more capable of managing difficult situations by accumulating experiences and the knowledge that comes from those experiences.

Research on other topics including innovation, corporate performance, and digital transformation has been less focused in the last 10 years. Regarding digital transformation, Priyono et al. (2020) proposed that contextual variables might impact the degree to which SMEs adopt digital transformation. Three distinct paths were delineated by them: small and medium-sized enterprises (SMEs) possessing advanced digital capabilities expedite their shift towards fully digitalized operations; those confronting liquidity constraints but lacking digital maturity digitize solely their sales function; and SMEs with limited digital skills but robust social capital support opt for a different path. To boost business performance, Harini et al. (2023) stressed the need to foster entrepreneurial skills and e-commerce adoption for SMEs. They argued that leveraging e-commerce in operational and marketing domains can lead to enhanced SME performance. Lastly, in the realm of innovation, Zhang et al. 2021) underscored its significant impact on organizational growth and adaptation. Meanwhile, Arunachalam et al. (2022) highlighted innovation as attributes of essential elements, such as market responsiveness, continuous learning, and resource reconfiguration, in the innovation process.

While the significance of enhancing organizational resilience through the use of digital technology by SMEs is becoming more widely recognized, several study topics still require further attention. The body of research suggests that 34 papers are primarily quantitative, with 9 qualitative investigations and 4 using a mixed-method approach. Consequently, it is advised that more focus be placed on qualitative or mixed-method approaches in future research. It is necessary to go deeper into case studies and use other inductive or interpretive methodologies to comprehend how and why the adoption of digital technology might strengthen organizational resilience. A deeper investigation of organizational resilience can be accomplished using qualitative designs, which will produce new insights.

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A Preliminary Sentiment Analysis on Digital Barriers among Senior Citizens During Covid-19 Pandemic

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Abstract: Nowadays, digital technology has been an important element in assisting the community in their daily routine. During the COVID-19 era, The Special Committee for Ensuring Access to COVID-19 Vaccine Supply (JKJAV) has been initiated to assist the health and well-being of Malaysian citizens in recovering from the COVID-19 pandemic. *MySejahtera*, a healthcare application technology, has been used by Malaysian citizens for seeking vaccination information as well as updating their health status. While there are benefits to using the application, there is still a challenge in using the technology among senior citizens. This study aims to investigate digital barriers to using a healthcare application, known as *MySejahtera*, among senior citizens in Kelantan. This study also reveals lessons learned regarding the use of technology among senior citizens during the Covid-19 era. Convergent parallel mixed method research design is initiated to produce a sentiment analysis for identifying digital barriers issues and challenges among senior citizens in Kelantan. 5 respondents aged from 60 to 80 years old were interviewed to obtain their sentiments on using digital technology for vaccination information and Covid-19 news. This study highlights issues namely awareness of knowledge, misconception about digital technology, information quality and technology usage among the senior citizens in Kelantan. This study summarizes that there is a need to reduce digital barriers among senior citizens to ensure digital inclusion for their benefit in health and well-being.

Keywords: *Digital Barriers, Senior Citizens, Digital Technology, Sentiment Analysis*

1. Introduction

Nowadays, digitalization has been widely used in various sectors such as education, banking, manufacturing, telecommunication, entertainment, businesses, healthcare, and many more. Digital technology can help the community increase productivity, and improve communication and efficiency for better decision-making. While society is comfortable with using technology, there is still a challenge in adopting technology among senior citizens due to possible factors that may contribute to digital barriers (Kaushik, 2022). To elaborate, the digital barrier can be defined as a digital divide that prevents an individual from accessing information using technology (Calderón Gómez, 2018) whereas another study defines a digital barrier as the difficulty in accessing the resources and inability to use the content online or offline (Uzule & Verina, 2023). In 2020, during the COVID-19 pandemic, digitalization can be considered an important element for obtaining updates on COVID-19 news. In Kelantan, as reported in 16 Mei 2021 (Wahid, 2021), most of the individuals who were not present for the vaccination were senior citizens aged 60 and above thus has affected the wastage of vaccine doses in the community. The State Health Director, Datuk Dr Zaini Hussin has mentioned that the government at national and state levels needs to play its part in mobilizing their efforts towards making the vaccination program a success. Hence, this research will further investigate whether the vaccination information in Kelantan given by the government can be effectively disseminated among the senior citizens in Kelantan by using digital technologies. During the COVID-19 period, the Malaysian government required everyone in the country to install and use the *MySejahtera* mobile application as a digital communication tool to convey health-related information namely vaccinations, infectious disease tracker as well as their current location.

The focus of this paper is to emphasize the implication of digital barriers using the Digital Divide Theory (Coventry et al., 2022). Digital Divide Theory discusses how generational gaps in technology adoption create barriers, as many older adults grew up without digital devices, making them less familiar with modern technology. Their resistance to technology may lead to social isolation, limited access to information and

challenges in accessing essential services (Van Dijk, 2020) like healthcare (Reddy et al., 2022) which are currently increasing in online platforms. By exploring senior citizens' sentiments regarding digital technology, this paper can highlight possible digital barriers to using the *MySejahtera* application among senior citizens in Kelantan. To elaborate, sentiment analysis has grown rapidly in parallel with the development of the Internet.

It has been used not just among researchers but also among businesses, governments, and organizations (Sánchez-Rada and Iglesias 2019). Sentiment Analysis (SA) or Opinion Mining (OM) is the computational study of people's opinions, attitudes and emotions toward individuals, events or topics. These topics are most likely to be covered by reviews (Medhat et al., 2014). Sentiment analysis is widely used in many sectors. For instance, in marketing and customer service, they apply sentiment analysis in analyzing reviews, surveys, and social media to gauge customer satisfaction and identify areas for improvement. In the finance domain, sentiment analysis helps analyze news articles, social media, and financial reports to predict market trends and stock performance. For the healthcare sector, sentiment analysis evaluates patient reviews and feedback on healthcare services to improve patient care and service quality. The findings from this paper will be used to identify possible actions that will be taken to address the issue regarding digital barriers in Kelantan. While there are benefits in using *MySejahtera*, there is still a challenge in using the technology among senior citizens. Therefore, a study has been done to obtain a preliminary finding on the digital barrier situation among senior citizens in the selected area of Kelantan, especially during the COVID-19 pandemic. By producing sentiment analysis, this paper reveals lessons learned regarding the awareness of knowledge, misconceptions about digital technology, information quality and technology usage. Next, Section 2 provides an overview of sentiment analysis and related literature regarding possible factors that contribute to digital barriers to using technology.

2. Related Literature

This section consists of related literature on sentiment analysis and possible digital barriers according to the literature namely awareness of knowledge, misconception about digital technology, information quality and technology usage.

Digital barriers among senior citizens

According to the International Telecommunications Union (ITU), 4.1 billion people were connected to the Internet in 2019 and increasing (del Portillo et al., 2021). According to the Department of Statistics Malaysia (DOSM), the composition of the population aged 65 years and over increased from 7.2% in 2022 to 7.4% in 2023, encompassing 2.5 million people, indicating that Malaysia is experiencing population aging (DOSM, n.d.) while The Malaysian Communications and Multimedia Commission in its Internet Users Survey 2020 report (MCMC, 2020) showed that 11.3% of Malaysians were non-internet users. 51.8% of non-internet users were reported to be aged 60 and above. Based on the report, the common factors of not using the Internet were unconcern on the Internet, too old to learn the Internet and having no device for using the Internet. These factors have been discussed in the Senior Technology Acceptance and Adoption Model (STAM) (Renaud, K., Van Biljon, 2008) where different age factors influence older people's decision to use technology. The elderly population has difficulty in familiarizing themselves with and adopting digital tools and services (Vassilakopoulou & Hustad, 2023). However, a study (Niehaves & Plattfaut, 2010) that used the Unified Theory of Acceptance and Use of Technology (UTAUT) and TAM has reported that the elderly population can be encouraged to use digital technologies. In motivating the elderly population to use digital technologies, they need assistance, and encouragement from their support system to use user interface designs (Guner & Acarturk, 2020).

The digital divide can be described as the incapability to understand technology (Pinar, 2024) and this may lead to digital inequalities, especially in digitalized societies. Digital barriers may exist by gender, geographical location, age group, income and education (Acilar & Sæbø, 2023; Ndoya & Asongu, 2024; Pinar, 2024; Thomä, 2023; Zhao et al., 2023). By looking at the related literature regarding senior citizens and technology, hence, this paper highlights the existence of digital barriers issue which can impact unequal access to various information, and lack of education in a growing digital-based community and thus, this will lead to a feeling of ignorance or felling left out within the digital age.

Overview of sentiment analysis

Sentiment analysis is a research branch of text mining that can be used to analyze opinions from a text document. Sentiment analysis is carried out in many fields such as media social, e-commerce, e-business and many more. Sentiment analysis or opinion mining is subjective since it represents an individual's thoughts and presumptions about everything that occurs (Kumar et al., 2021). Another study mentioned that sentiment analysis is the process of determining an author's viewpoint on a specific subject and can be evaluated based on words, phrases, or texts (Nandwani & Verma, 2021). Various research implementing sentiment analysis has been carried out many times, including research conducted by (Fauziyyah, 2020) about the COVID-19 pandemic. Sentiment analysis is classifying a block of text as positive, negative, or neutral. It is also referred to as opinion mining, an approach to natural language processing (NLP) that identifies the emotional tone of the text. The main objective of sentiment analysis is to analyze people's opinions in a way that can help to improve the organization or process.

Awareness of knowledge

Awareness of knowledge can be defined as the consciousness of the mind about some issues (Collazos et al., 2002). In engaging individuals with health awareness, it is crucial to know the impact of COVID-19 on each individual and to understand how it can get worse. In this case, knowledge and attitude concerning the disease are useful for preventing, controlling, and mitigating infections during the outbreak (Razu et al., 2021). Therefore, the community members need to play their role in helping to reduce any health risks related to Covid-19. However, attitude can also have an impact on perceiving healthcare knowledge. A previous study done by (Frishammar et al., 2023) stated that negative attitudes and technology anxiety are the key barriers that are affecting technology adoption in healthcare technology and education activities are recommended to increase the trust and awareness in using digital healthcare platforms.

Misconceptions about digital technology

Digital and technological solutions are essential for better workplace safety and health outcomes (Gan & Seah, 2024). However, the community usually misunderstands and believes technology is only relevant for advanced medical procedures or specialized care, not daily health management or preventive measures. This misconception usually derives from a lack of awareness about using technology tools and their potential benefits to the individual's health status. There was an initiative made by The Australian Government that introduced an app-based contact tracing to prevent the spread of COVID-19 in April 2020. However, the download and use of the apps were not favorable due to privacy concerns (Thomas et al., 2020).

Information quality

Information quality can be defined as users' subjective judgment of whether the information characteristics meet their own needs and intended use (Jiang et al., 2021). According to Jiang et al., information quality refers to the user's assessment of whether the information meets their requirements and wants. In Malaysia, during the COVID-19 Movement Control Order, senior citizens utilized the Internet to search for relevant information regarding the different types of vaccines to determine which is the most suitable based on their body condition. This is a crucial aspect for them as providing healthcare to the elderly is always a top concern and they are the most vulnerable group because of their weakened immune systems. Consequently, a poor decision about healthcare could hurt their health (Lee et al., 2021).

Nowadays, the Internet has become a functional tool for communication and information searching and is not only used by young adults but also employed by senior citizens. According to (Ahmad et al., 2020), nine out of ten senior citizens use the Internet to get updates on current news rather than seeking health-related information. Previous research in the banking domain stated that fear of financial scams, lack of digital skills and lack of help are the reasons why senior citizens restrain themselves from using the Internet (Thomas et al., 2023).

Technology usage

In recent decades, significant technological advancements across various domains have profoundly enhanced the overall quality of life. The influence of digital technologies has notably improved efficiency in performing everyday tasks and increased awareness of individual health and wellness. Digital technologies offer various innovative solutions and benefits for senior citizens in maintaining and improving their health (Harris et al.,

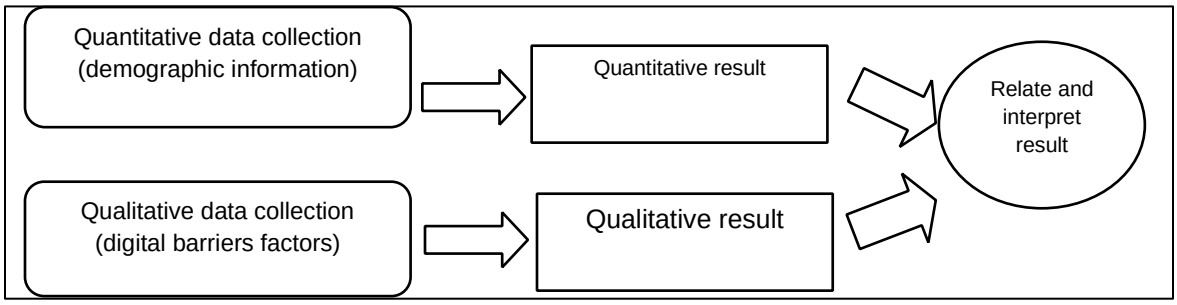
2022). The primary advantage of integrating technology into adult healthcare is remote health monitoring. Through technological innovations, senior citizens can now remotely monitor their health, allowing for the early detection of potential health issues and proactive management of chronic conditions. Utilizing wearable devices like smartwatches and fitness trackers, seniors can effortlessly track vital signs and activity levels, gaining valuable insights into their overall health status. This capability not only empowers older adults to take a proactive stance towards their well-being but also enables healthcare providers to intervene promptly and effectively when necessary (Fowe & Boot, 2022).

The second advantage is in terms of access to information and services. Technology serves as a valuable resource for health education and empowerment among senior citizens. Online health portals, mobile applications, and virtual support groups offer a wealth of information on health topics, disease management strategies, and preventive measures (Lai et al., 2023). By equipping older adults with knowledge and resources, technology empowers them to make informed decisions about their health and actively participate in their care. Furthermore, digital technology provides the best social support and engagement platform. Maintaining social connections is essential for seniors' mental and emotional well-being. Technology facilitates social support and engagement through social media platforms, online communities, and video communication tools. These digital channels enable older adults to stay connected with loved ones, participate in virtual social activities, and access peer support networks, thereby combating feelings of loneliness and isolation (Grey et al., 2024).

3. Research Methodology

This study has used a convergent parallel mixed-method research design to accomplish the research objectives. Figure 1 visualizes convergent parallel mixed method research design.

Figure 1: Convergent parallel mixed method research design



A convergent parallel mixed method research design is initiated to produce a preliminary sentiment analysis for identifying digital barriers issues and challenges among senior citizens in the selected areas of Kelantan such as Kota Bharu and Machang. The convergent parallel design occurs when the researcher uses concurrent timing to implement the qualitative and quantitative strands during the same phase of the research process (Rahman, 2014). This qualitative study that was conducted by using a sentiment analysis process was aimed to investigate digital barriers in using a healthcare application, known as *MySejahtera*, among senior citizens in the selected locations in Kota Bharu and Machang, Kelantan. By investigating digital barriers, this study can reveal a preliminary finding regarding the use of technology among senior citizens during the COVID-19 pandemic.

The research has its limitations in terms of the number of respondents obtained. With the challenging research environment during the Movement Control Order (MCO) in the year 2021, these respondents were selected by using consecutive sampling based on reachable and selected respondents' locations. First and foremost, this research has randomly selected 3 senior citizens located in a suburban area within the Machang area and 2 other senior citizens who are within the Kota Bharu area. Participation in the study was entirely voluntary. Before conducting the study, all respondents were aware of the purpose of the study and the confidentiality of the data. Each person participating in the interview was free to opt out of the session at any time. In this study, demographic data on 5 senior citizens has been quantitatively analyzed to obtain the relationship with the

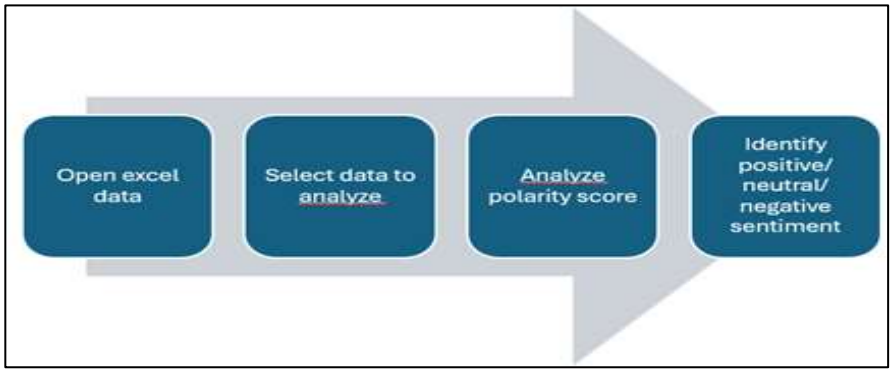
qualitative result. For the qualitative data collection, 5 senior citizens have been interviewed regarding possible digital barriers that they have faced while using the application. The quantitative result and qualitative results are interpreted to produce a preliminary sentiment analysis for digital barriers during the COVID-19 pandemic. Using 5 structured interviews, 5 responses were obtained from five senior citizens aged over 60 years old from Machang and Kota Bharu which represented suburban and urban locations in Kelantan. The interviews were conducted based on a structured set of questions developed by using existing literature which consists of awareness of knowledge, misconceptions about digital technology, information quality and technology usage. The respondents were asked about their opinion towards Covid-19, vaccination information as well as their health status. Convergent parallel mixed method research design results sentiment on digital barriers among respondents during the COVID-19 pandemic. This study has methodological limitations which it has presented qualitative results based on only five healthy respondents and those respondents may or may not have any mobile phones.

4. Results and Discussion

This paper highlights a preliminary finding for identifying digital barriers based on age group, especially among senior citizens aged 60 and above. For sentiment analysis purposes, respondents were chosen from 60 years of age and older with three female and two male respondents. Two of the respondents did not use mobile phones while the remaining three respondents own a mobile phone with *MySejahtera* installed. Regarding the frequency of mobile usage, 2 out of 5 respondents used their mobile phones for less than two hours and the remaining three respondents used the mobile phone within two to eight hours. All of them spent around one to two hours seeking information about COVID-19. According to respondents' feedback, they agree that digital literacy affects awareness of Covid-19 however qualification may or may not influence the awareness of Covid-19 risks. The respondents were asked about their opinions regarding information dissemination on COVID-19. The authors have identified four categories related to digital barriers such as awareness of knowledge, misconception of technology, quality of information and information usage.

In this study, sentiment analysis was produced to quantify the amount of personal opinions, feelings, or personal views contained in the transcribed text from the interview session. The sentiment score and sentiment analysis result were reported as positive, neutral and negative scores. Figure 2 depicts steps to produce the sentiment score by performing the sentiment analysis process.

Figure 2: Sentiment analysis steps for producing sentiment score



According to Lohar et al. (2017), negative sentiment results score below 0.5, while sentiment neutral has a sentiment score equal to 0.5 and positive sentiment results in a sentiment score more than 0.5. By looking at the sentiment score, the study can conclude whether there are digital barriers issues that arose among respondents who have been selected in Kelantan.

Table 1 shows the awareness of knowledge regarding COVID-19 among the community. The questions in Table 1 have led to positive sentiments ranging from 0.69 to 0.97. From the interview session, the respondents felt positive and aware Covid-19 information can be obtained on television and social media platforms such as WhatsApp and YouTube application. Those respondents also agreed that vaccination can help to reduce the

Covid-19 effect. The respondents are also aware of the verified source of information on Covid-19. In summary, the respondents own the knowledge about Covid-19 based on their responses on Covid-19 symptoms and vaccination.

Table 1: Sentiment Polarity for Awareness of Knowledge

Question	Sentiment Score	Sentiment
What is COVID-19? Do you know about COVID-19?	0.84	positive
What are the symptoms of COVID-19?	0.69	positive
How does COVID-19 influence the public?	0.78	positive
What is vaccination?	0.83	positive
What is the effect of vaccination?	0.77	positive
How does the vaccine affect the COVID-19 pandemic?	0.82	positive
Did you know where to get a booster shot?	0.73	positive
What are the things about COVID-19 and vaccines that attract public interest?	0.80	positive
Is television the source of information for rural areas?	0.97	positive
Are you aware that there are verified sources of information for COVID-19 on social media?	0.85	positive

Table 2: Sentiment Polarity for Misconception of Technology

Question	Sentiment Score	Sentiment
Give your opinion how to prevent from getting exposed to COVID-19	0.68	positive
Where does this disease come from?	0.76	positive
Is this vaccine necessary for improving health?	0.62	positive
How do you know whether information about COVID-19 information about vaccines is authentic?	0.66	positive
State your feelings when reading, seeing, and watching COVID-19 on social media/TV or radio.	0.38	negative

Table 2 reveals Sentiment Polarity for Misconception of Technology. This result shows the use of social media is useful in giving information on Covid-19. All the respondents understand and have negative sentiment, with a 0.38 sentiment score, after reading, seeing, or watching about COVID-19 on television or social media platforms. In summary, there is no issue with a misconception of technology since the sentiment on technology to obtain COVID-19 information is understood and the score indicates ranged from 0.62 to 0.76.

Table 3: Sentiment Polarity for Information Quality

Question	Sentiment Score	Sentiment
Did you understand the information given by the government?	0.71	positive
Do you know how the information is obtained?	0.69	positive
Did you trust the information given about COVID-19?	0.72	positive
Do you think the information given is easy to understand?	0.78	positive

Table 3 concludes positive sentiment ranged from 0.69 to 0.78 regarding information quality on COVID-19 and vaccination. They believe that reliable information has been given to the public by using reliable channels on television. In investigating technology usage, the result in Table 4 shows positive sentiments toward the *MySejahtera* application, however, they have some difficulties in using QR code technology which yields a sentiment score of 0.45. This highlights that they accepted *MySejahtera* but they have limited knowledge of QR technology since the technology is new to them and they have no exposure to QR code. Generally, the technology usage is still within positive sentiment.

Table 4: Sentiment Polarity for Technology Usage

Question	Sentiment Score	Sentiment
Do you know what is *MySejahtera*?	0.69	positive
How likely that you will be using a QR code in *MySejahtera*?	0.45	negative
In your opinion, how social media can help to spread more news about COVID-19 and vaccines?	0.66	positive
Are you aware that *MySejahtera* can be utilized for seeking health status?	0.66	positive

In summary, based on Table 1 to Table 4, the authors have elaborated on possible digital barriers among senior citizens. Firstly, in terms of awareness of knowledge, the senior citizens have previously heard about COVID-19, however, they did not know about the symptoms of the disease in detail. Secondly, in terms of the misconception of technology, the senior citizens mentioned that they only read or watch COVID-19 news on television as their news channel even though the social media platforms provide more options for seeking COVID-19 information. This is due to the inability to use and operate a smartphone by themselves.
In terms of information quality, the senior citizens were able to understand the content of the information obtained from either the television or from their family members whereas in terms of technology usage, the senior citizens understand the needs of *MySejahtera* application during the Covid-19 pandemic. However, they have insufficient knowledge regarding the QR code technology that is embedded in the application.

5. Conclusion

Nowadays, technology plays a major role in helping the community to gain information instantly. All generations including the senior citizens are inclusive in the technology adoption. However, there is still room for improvement in educating and supporting senior citizens to self-learn new technology. Proper guidance and tools must be prepared for them to allow ease of use for adopting technology in their daily life. The authors believe that currently there is no issue in accepting technology among senior citizens. Generally, they already understood why such technology is imposed in the current situation during the COVID-19 pandemic. Nonetheless, the caretaker or the community needs to be aware that senior citizens must also be continuously informed about the importance of using current technology such as QR codes to avoid digital barriers and feelings of ignorance. There must be a consistent effort by the community to educate senior citizens in using technology as well as giving them appropriate knowledge on technology for using the right assistive technology. In conclusion, this study summarizes that there is a need to reduce digital barriers among senior citizens to ensure digital inclusion for their benefit in health and well-being from time to time. There is also a plan to further investigate assistive technology for senior citizens to improve digital inclusion in society.

The limitation of this study is that it focuses on the general acceptance of technology among senior citizens without going into detail about the difficulties they encounter in real-world situations. Although the study highlights the value of educating and assisting senior citizens in adopting technology, it might not address individual differences in technological proficiency or the variety of demands of seniors with different levels of cognitive and physical abilities. Furthermore, the study's findings may be limited since it relied more on general observations and assumptions about senior citizens' understanding of technology during the COVID-19 pandemic rather than detailed, empirical data from a variety of senior citizen groups. The usefulness and accessibility of various assistive technologies, which are crucial to digital inclusion, are not given enough attention. Future work should aim to explore these obstacles and evaluate the effectiveness of various assistive technologies to enhance digital inclusion for senior citizens. This involves determining which tools and educational approaches are most effective in overcoming the digital barrier and enhancing usability. The study should also explore personalized support systems that consider individual differences in technological proficiency and accessibility requirements.

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Unpacking the Link Between Big Five Personality Traits and Waqf Participation in The Malaysian Armed Forces

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Abstract: This research delves into the utilization of Personality Traits theory to comprehend the underlying motivations behind Waqf practices among military personnel. Implementing a structured questionnaire as the main tool for data collection, a total of 487 responses were secured. The research tools utilized in this study were derived from prevailing scholarly literature in the realm of personality psychology. The empirical findings of this study validate the substantial influence of personality traits, encompassing behavioral control and environmental components, on the inclination of military personnel to participate in endowment practices. This elucidates the complexities inherent in charitable contributions within this specific cohort. The discoveries underscore the importance of individual personality traits in shaping philanthropic behaviors among military personnel. Elements such as behavioral control and environmental factors play pivotal roles in molding the propensity towards Waqf practices within this distinct demographic. These insights harbor practical implications for policymakers, military institutions, and scholars, furnishing a more profound insight into how personality traits and environmental elements impact endowment behaviors. This investigation emphasizes the necessity of taking into account personality traits when scrutinizing charitable endeavors among military personnel. By comprehending these motivations, policymakers and military entities can more effectively endorse and bolster Waqf practices among their members. Furthermore, these results contribute to the wider discussion on the convergence of personality psychology and philanthropy, enhancing our understanding of charitable behaviors in specialized settings such as the military.

Keywords: *Waqf, Personality Traits, Military Personnel.*

1. Introduction and Background

Waqf has played a distinct role in the field of economics and consistently displays potential. It is perceived as a crucial economic institution that promotes economic activities while ensuring the benefits are directed toward a particular sector of the population. In Islamic tradition, Waqf denotes the practice of allocating resources or advantages for the betterment and welfare of the public, overseen by designated entities such as relatives or organizations to promote societal well-being (S. Ismail et al., 2023) and (Ayatina, 2023).

The evolution of Waqf practices within the Malaysian Armed Forces can be traced back to the inception of the Malaysian Armed Forces Religious Corps (KAGAT) in the year 1985 (Jalal et al., 2019). Nevertheless, according to Kamaruddin et al., (2022), obstacles exist in the execution of waqf reporting methodologies in Malaysia, as issues like the lack of uniform reporting criteria and restricted reporting avenues impact the effectiveness of waqf reporting within establishments. Studies by Sapir et al., (2023) and Abd Mutalib et al., (2019) show that the recognition of waqf in Malaysia, specifically cash waqf, is encountering obstacles attributed to a multitude of factors. Research demonstrates a deficiency in awareness and comprehension of cash waqf within Malaysian society. Moreover, Nor & Sari, (2022) stated the constrained utilization of cash waqf for the advancement of socio-economic aspects is associated with societal norms, insufficient promotion, and a deficient comprehension of this particular type of waqf. Despite the probable advantages of cash waqf in strengthening the Muslim economy, it is vital to deal with the awareness and application gaps to increase waqf acceptance in Malaysia.

2. Literature Review

The Big Five personality traits, regularly alluded to as the Five Factor Model, involve five unmistakable

dimensions: openness, conscientiousness, neuroticism, extraversion, and agreeableness (Stahlmann et al., 2023, Canales-Ronda, 2023 and Ji & Esqueda, 2022).

These characteristics play a significant role in various domains of life, encompassing civic participation, occupational performance, substance abuse, and phenomena such as phubbing. Scholarly investigations suggest that extraversion and conscientiousness wield notable influence in forecasting sales effectiveness and work conduct, whereas neuroticism tends to yield adverse consequences. Moreover, heightened neuroticism, diminished agreeableness, and reduced conscientiousness are frequently linked with substance misuse, with certain nuances in the impact of each trait on distinct forms of substance consumption. In addition, conscientiousness and intellect have been observed to exert a detrimental effect on phubbing conduct among young individuals. A profound grasp of these Big Five personality traits is imperative for grasping individual disparities and actions. The examination of the Big Five Personality Traits by Ismail, (2017) has been conducted in diverse settings, including Islamic financial planning, innovative work behavior within Islamic banks, and waqf commitment. Studies indicate that specific personality traits are influential in shaping behaviors associated with waqf and financial choices. Scholarly works on Islamic financial planning have proven that conscientiousness and openness to experience play a vital role as moderators in the relationship between Islamic financial literacy and financial planning. The results by Haris et al., (2021) imply that individual qualities, such as openness to new experiences, conscientiousness, and potentially additional traits specified in the Big Five model, might affect individuals' outlooks and decisions regarding waqf donations.

Therefore, we propose the following hypothesis:
H1: Extraversion will be positively related to waqf acceptance.
H2: Agreeableness will be positively related to waqf acceptance.
H3: Openness will be positively related to waqf acceptance.
H4: Conscientiousness will be positively related to waqf acceptance.
H5: Neuroticism will be negatively related to waqf acceptance.

Figure 1: Research Framework

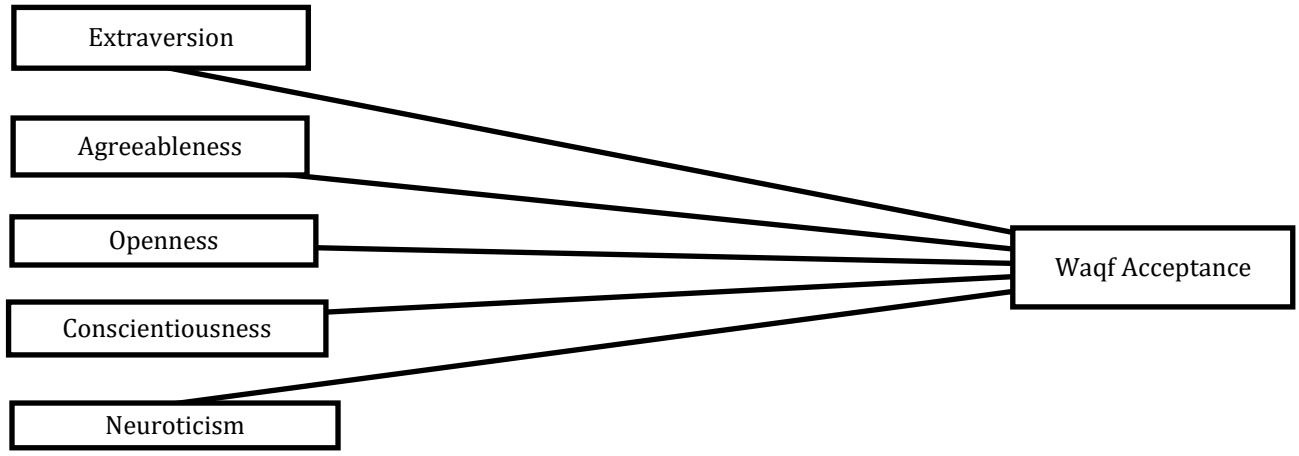


Figure 2: Research Model

3. Research Methodology

The present study examines the big five personality traits of Waqf acceptance among Military Armed Forces personnel in Malaysia. According to Wang et al., (2020) when the examiner chooses to achieve the research objective within a designated timeframe, they must employ a cross-sectional survey design. This approach facilitates an economical and concurrent assessment of the outcomes and exposures of the study subjects. As

asserted by Chang et al., (2010), to mitigate the common method bias, the participants were provided with an assurance of confidentiality and anonymity to elicit truthful responses. As recommended by Eichhorn,(2014), respondents' inclination to answer may be influenced if they encounter ambiguity while completing the questionnaire, which is an unfavorable situation. The current investigation utilized a five-point Likert Scale to gather data by grouping significant objects. In this specific research endeavor, the researcher employed a five-point Likert Scale to collect data, where the objects of substantial importance were brought together.

It is essential to underscore that within this range, a rating of 1 denotes a notable variation in opinions, whereas a rating of 2 suggests disagreement and a rating of 3 suggests impartiality. Conversely, a rating of 4 denotes agreement with the presented stance, and a rating of 5 signifies a strong endorsement or alignment with the viewpoint in question. The choice of the non-probability sampling technique was primarily determined by the absence of a sampling frame that the researcher could access. Moreover, it was also influenced by the confidentiality of the army personnel. The utilization of purposive sampling technique has been employed with great care to select individuals who are currently serving in the armed forces stationed at different camps throughout Malaysia. These selected individuals have been invited to participate as respondents in this research endeavor. Moreover, when considering the G*Power analysis, particularly about the F-Test in Linear Multiple Regression: Fixed model with R2 deviation from zero, it was concluded that a minimum sample size of 138 was advised for this specific research. Nonetheless, it is noteworthy that the investigator managed to recruit a total of 487 participants for the study, surpassing the recommended minimum necessity. The technique utilized for gathering information was Google Forms, which was employed to distribute the survey to the participants. The participants then completed the survey in an Excel spreadsheet, ensuring the exclusion of any inaccurate data and ensuring the accuracy and reliability of the collected data.

4. Results

The research model elucidates about 39 % of the determinants that exert an influence on the engagement of the Malaysian Armed Forces in waqf. The outcomes of the conjectures testing are laid out in **Error! Reference s ource not found.**. The study conducted by H1 analyzed the relationship between extraversion and waqf acceptance, whereas H5 investigated the connection between neuroticism and waqf acceptance. The findings revealed that neither factor made a significant contribution to waqf acceptance. On the other hand, H2 investigated the relationship between agreeableness and waqf acceptance and was found to be significant ($\beta = 0.266$, $p < 0.001$); H3 was also found to be significant with an investigated openness relationship with waqf acceptance ($\beta = 0.110$, $p < 0.05$), alongside H4's conscientiousness relationship with waqf acceptance ($\beta = 0.321$, $p < 0.001$). It can be concluded that H2, H3, and H4 are supported, but H1 and H5 are rejected.

Table 1: ***Multiple Linear Regression Result***

Variable	hypothesis	Beta value	T Statistics	P Values	R^2	Remark
Extraversion	Extraversion will be positively related to waqf acceptance.	-.019	-.414	.679		Not Supported
Agreeableness	Agreeableness will be positively related to waqf acceptance.	.266	4.619	.000		Supported
Openness	Openness will be positively related to waqf acceptance.	.110	2.046	.041	0.390	Supported
Conscientiousness	Conscientiousness will be positively related to waqf acceptance.	.321	4.820	.000		Supported
Neuroticism	Neuroticism will be negatively related to waqf acceptance.	-.001	-.032	.974		Not Supported

Discussion

As elucidated in the literature review section, numerous prior studies have also employed the big five personality traits variables about waqf acceptance. In this investigation, only three out of the five variables scrutinized displayed significant support. The findings support the study by Faturohman et al., (2020) and (Asni & Sulong, 2017) Which shows Agreeableness assumes a notable function in multiple facets concerning waqf. This emerging recognition implies that agreeableness, whether on an individual or societal scale, may impact perceptions towards novel variations of waqf, including cash waqf. The findings support the previous study (Tarchoun & Ghraieb, 2022) which indicates that openness exerts a noteworthy influence on the interconnection among economic advancement, charitable giving, and communal backing within Muslim environments. This finding is consistent with the study by Nordin & Khalid, (2022) which shows Conscientiousness is known to have a notable impact on a range of factors concerning socioeconomic development and personal conduct. Studies indicate a positive correlation between conscientiousness and thriving in the context of high school educators. Nevertheless, it is important to highlight that extraversion and neuroticism did not demonstrate statistically significant associations with Waqf acceptance within this particular framework. Despite the deviation of these results from initial assumptions, they emphasize the intricate complexity of personality effects and the requirement for additional investigation across various environments.

5. Conclusion

This study's ramifications go well beyond academic spheres, offering valuable insights for policymakers, military establishments, and researchers. By acknowledging the influence of individual traits on participation in waqf, policymakers and military organizations can develop specific approaches to effectively encourage and bolster charitable activities among military personnel. Moreover, this research contributes to the wider discussion on the intersection of personality psychology and philanthropy, enriching our comprehension of benevolent actions in specialized environments like the military. It emphasizes the significance of taking into account personal variations when examining and advocating for charitable initiatives. There exist numerous opportunities for forthcoming research to investigate such as conducting a replication of this research across various cultural settings or within diverse sectors of the armed forces has the potential to offer a more thorough analysis of the correlation between personality characteristics and the acceptance of Waqf. Longitudinal research endeavors can monitor alterations in individual characteristics and engagement with Waqf over a period, offering a valuable understanding of the evolving dynamics of these connections.

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Social Media Content among MSMEs: A Content Analysis

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Abstract: This study provides a thorough content analysis of previous research and scholarly works on social media usage and its content by micro, small, and medium enterprises (MSMEs). Understanding the many viewpoints and insights found in the literature is crucial, given the growing impact of social media on business dynamics. This study intends to uncover recurrent topics, approaches, trends, and knowledge gaps regarding MSMEs' social media content strategy through a comprehensive review and analysis of previous research. The goal of this research is to provide a thorough understanding of the opportunities and problems faced by MSMEs in creating effective social media content by combining and critically analyzing the corpus of existing work. The analysis's conclusions not only synthesize the body of knowledge now available but also guide future studies and provide valuable suggestions for improving MSMEs' social media initiatives.

Keywords: *Business performance, consumer engagement, content analysis, social media content.*

1. Introduction

Micro, small, and medium enterprises (MSMEs) are utilizing social media in previously unheard-of ways as the global economic landscape rapidly changes. Innovation, agility, and the strategic use of digital technologies characterize the current social media landscape among MSMEs, which includes increasing sales and cultivating customer connections, as well as leveraging platforms to establish brand presence and engage with varied audiences. MSMEs all over the world are currently acknowledged to be utilizing a variety of social media channels, which offer a wide range of platforms and changing trends to establish their brand, broaden their audience, and prosper in a digital ecosystem that is becoming more interconnected by the day. Apart from that, MSMEs can also promote growth and competitiveness in the digital marketplace by strategically leveraging social media to level the playing field with larger competitors.

In a business environment that is rapidly shifting, MSMEs refrain from participating in the dynamic world of social media and run the risk of falling behind. Without a social media presence, businesses may find it challenging to build their brand, engage with their target market, and stay competitive in a time when digital connectedness is essential to consumer behavior. Loss of visibility, fewer channels for marketing and promotion, and lost chances for consumer interaction might arise from being absent from these platforms. MSMEs not utilizing social media may also find it difficult to adjust to shifting market dynamics as customer tastes continue to move toward online interactions and e-commerce, which could result in reduced market share and growth prospects. Alas, a business's capacity to engage with its customers may be hampered by its absence from the social media sphere, which ultimately jeopardizes its' long-term viability and expansion.

Content analysis is the process of methodically examining written, visual, or auditory material to find themes, patterns, and connections within the information. Therefore, this content analysis paper is part of the effort to understand the pattern of past studies regarding the social media landscape while uncovering the gap that requires further investigation by future researchers.

2. Literature Review

MSMEs' Performance in Malaysia

The COVID-19 pandemic has had a significant impact on Malaysia's MSMEs, causing them to be one of the sectors that have been struck the hardest (Department of Statistics Malaysia, 2023). Entering the endemic phase, in connection with the Micro, Small and Medium Enterprise (MSME) Week, which was held nationwide

from June 10 to July 4, 2022, SME Corporation Malaysia reportedly set a sales target of RM20 million, including through business matches, and anticipated that it would give business owners that have recently been impacted by the unpredictability of the world economy a chance to revitalize and restart ventures through a face-to-face and also online sales process, the MyAssist MSME platform (Bernama, 2022). With MSMEs accounting for 99.2% of all business establishments in Malaysia, food processing is the industry with the highest share of businesses, where micro businesses play a critical role in a nation's prosperity by creating jobs and fostering economic expansion (Zakaria et al., 2022). There are more than 1.15 million MSMEs across the nation, and they account for 97.2% of all business establishments in Malaysia and employ about 70% of the labor force (The Star, 2021).

Given the significant contribution of MSMEs to a nation's GDP, numerous previous research has been carried out to explore the elements that may influence their business performance. To cultivate lasting relationships and promote sustainable business expansion, MSMEs in Malaysia should strive to connect with consumers on a deeper level, extending beyond just sales and marketing efforts. As per Kechik et al. (2023), to successfully transform Malaysia into an entrepreneurial nation by 2030, it is highly encouraged for all MSME business owners to actively leverage ICT technologies, such as social media, to have a strong online presence for their firms. Salam and Hoque (2019) emphasized that MSMEs must prioritize social media to enhance their performance and ensure long-term success. SME Association national president Ding Hong Sing agreed with the government in The Star (2023) that the government is providing incentives and subsidies as part of its effort to prioritize MSMEs in the updated 2023 Budget to assist them in increasing their output and advancing towards automation and digitalization. Among the reasons MSMEs are behind in adopting digital transition is that most of the time, businesses must reconsider and develop new business models (Bouwman et al., 2019).

Additionally, Yin (2023) published in The Star that to reduce reliance on foreign capital, Malaysia should concentrate on growing domestic MSMEs through automation and digitalization which will help offset the decline in foreign direct investment (FDI). Moreover, since digitalization was a game changer in Budget 2023, both the public and private sectors have been urged to continuously work on digitalizing MSMEs, with an emphasis on high-growth industries (The Star, 2022). Budget 2024 also focuses on Malaysia's MSMEs' digitalization with multiple initiatives planned out by the government to increase technological adaptation, and an article in SME Magazine Asia (2023) urges MSMEs to take advantage of these chances by embracing digitalization, automation, and online platforms to turn obstacles into opportunities for development and innovation.

Social Media Content

Pal et al. (2022) agreed that small businesses had few options for promoting their brands before the advent of digital media, which prevented them from growing. The emergence of social media platforms has provided MSME players with exciting new possibilities and avenues for growth (Ikramuddin et al., 2021). Social media has become the modern platform not only for casual social conversations but also for a wide range of other purposes, one of them fostering meaningful interactions between customers and enterprises. Social media enables businesses to communicate openly with their customers, allowing them to have a deeper understanding of their customers' expectations. This understanding motivates businesses to promptly and efficiently address those needs (Tajudeen et al., 2018).

A common definition of content creation frequently emphasized as being extremely significant by numerous sources is content posted on social media networks. However, minimal research has been done to determine the time and resources required for content creation (Kraus et al., 2019). Yu et al. (2023) claimed that social media content attributes including credibility, personalization, informativeness, incentives, and entertainment have the power to impact consumer behavior and attitude, ultimately resulting in engagement. Social media offers businesses an excellent opportunity to connect with customers and build strong relationships. By using interactive content like polls, images, and videos, businesses can engage with their audience and enhance brand awareness and loyalty (Sharma et al., 2024). In the fashion business landscape, Hsiao et al. (2020) found that the popularity of the content creator has a positive correlation with the popularity of the post, indicating that private brand owners can and should leverage well-known content creators to market their products and labels.

Social media also provides a platform for promotion, publicity, brand development, and market research. As mentioned by Salam and Hoque (2019), MSMEs can improve performance through strategic and efficient social media use. In the meantime, Pal et al. (2022) testified that consumers, in general, participated in three categories of social media activities: producing content, contributing to the creation of content, and consuming brand-related content.

Uses and Gratifications Theory

According to Katz and Foulkes (1962), people select media that meets their requirements and satisfies their desires, which allows them to get rewards or compensation, social contact, enjoyment and relaxation, and knowledge improvement. The approach, known as the Uses and Gratifications approach (UGT), deviates greatly from the conventional wisdom which holds that the media may dramatically alter people's views, opinions, and behaviors. UGT is a theory of motivation that places users' goal-oriented behavior and socio-psychological requirements in the context of a technology platform (Maulida et al., 2023). Liu et al. (2023) added that UGT had been used extensively in past research to investigate people's media consumption behaviors and motivations, where people are likely to utilize the same form of media in different contexts and with varying degrees of satisfaction.

Kaur et al. (2020) contributed to an enhanced comprehension of the purchase habits of virtual items through an adaptation of UGT's framework. Dolan et al. (2019) categorized the social media content in their study based on UGT, looking into the impact on consumer engagement. Then, there was an earlier study by the same group of scholars rooted in UGT, on strategies businesses may use to encourage good interaction among social media followers while also discouraging negative engagement (Dolan et al., 2016).

Stimulus-Organism-Response Model

The Stimulus-Organism-Response (S-O-R) Model, discovered by Mehrabian and Russell (1974), explains how stimuli (S) can elicit emotional reactions in individuals or organisms (O), which in turn can result in either acceptance or avoidance behavioral responses (R). In the context of the current study at hand, the stimulus would be the social media content, while consumer engagement acts as organisms' emotional reactions, which ultimately encourage responses that impact organizations' performance.

There are an abundant number of past studies that have adapted the S-O-R Model in their studies. One of them was by Lingling and Ye (2023), who examine, from an S-O-R viewpoint, how digital empowerment affects open innovation. On top of that, Quan et al. (2023) also utilized the S-O-R Model combined with the Commitment-Trust Theory and found that airport service quality does affect customer satisfaction. Meanwhile, Lin and Shen (2023) established a structural model of the consumers' purchasing intents on community e-commerce platforms based on the SOR model.

According to Kumar et al. (2023), an environmental stimulus can affect a person's cognitive and emotional reactions, where the S-O-R framework is used to study how customers behave in response to different retail stimuli. Consequently, the S-O-R paradigm highlights that an organism's internal state acts as a mediator in the interaction between stimulus and reaction rather than a direct cause and effect. It implies that different people may react differently to the same stimulus depending on their innate traits, including personality, beliefs, attitudes, and life experiences. This model aids researchers and practitioners in understanding how different elements combine to affect human behavior.

3. Methodology

Research Question

The research question was developed to proceed with the content analysis in the subject matter: 'How Did Social Media Content and Consumer Engagement Influence Business Performance?'. The research question was formulated to uncover past studies conducted in the area and understand the patterns, findings, and contributions that relate to social media content, consumer engagement, and business performance.

Systematic Search Strategy

The Scopus database was utilized in conducting a systematic search. By including relevant potential synonyms,

the string search yielded 70 documents with the following keywords: 'social media', 'social media content', 'business performance', and 'consumer engagement'. The exact search string using Boolean operators such as AND and OR with wild card characters used where applicable was:

TITLE-ABS-KEY (("social media" OR "social media platform*" OR "social network" OR "social network site*") AND ("social media content*" OR "social media post*" OR "social media publishing*") AND ("consumer engagement" OR "engagement" OR "user engagement" OR "interactive*") AND ("business performance" OR "growth" OR "profit*" OR "sale*"))

However, some documents were unrelated in terms of language, area, and type. Thus, the researcher decided to further filter the search to include only relevant articles. There were 25 publications found when the researcher narrowed the search to include only articles in English on business, management, and accounting. Frequency analysis was done on all 25 articles to identify the keywords that stand out and the pattern of past studies related to the social media scene. The search string after the filter was:

TITLE-ABS-KEY (("social media" OR "social media platform*" OR "social network" OR "social network site*") AND ("social media content*" OR "social media post*" OR "social media publishing*") AND ("consumer engagement" OR "engagement" OR "user engagement" OR "interactive*") AND ("business performance" OR "growth" OR "profit*" OR "sale*")) AND (LIMIT-TO (SUBJAREA, "BUSI")) AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (LANGUAGE, "English"))

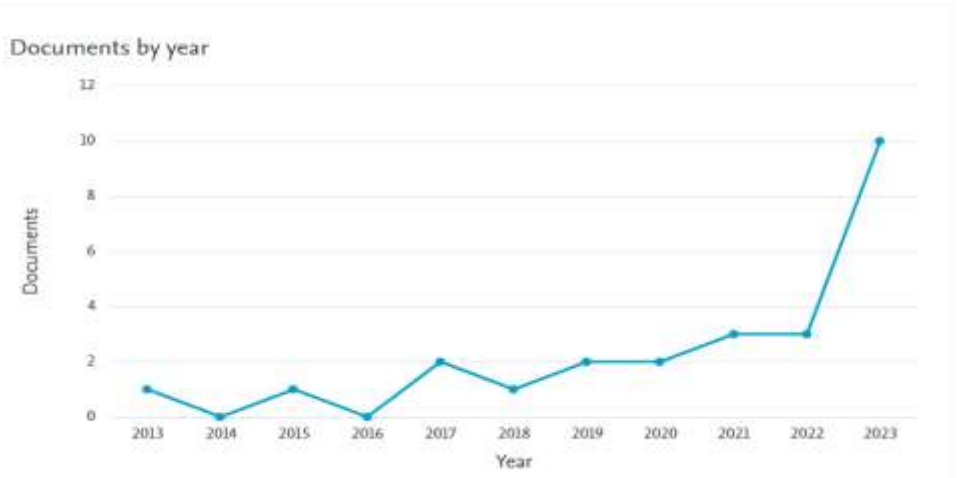
Then, the articles were further filtered, and only articles related precisely to the area the researcher sought were selected. There were only ten articles selected for the final content analysis. Qualitative analysis of the articles was done manually, through thematic analysis that helped categorize the social media content. Results and findings were depicted in tables in the next subsection.

4. Results and Analyses

Descriptive Analysis

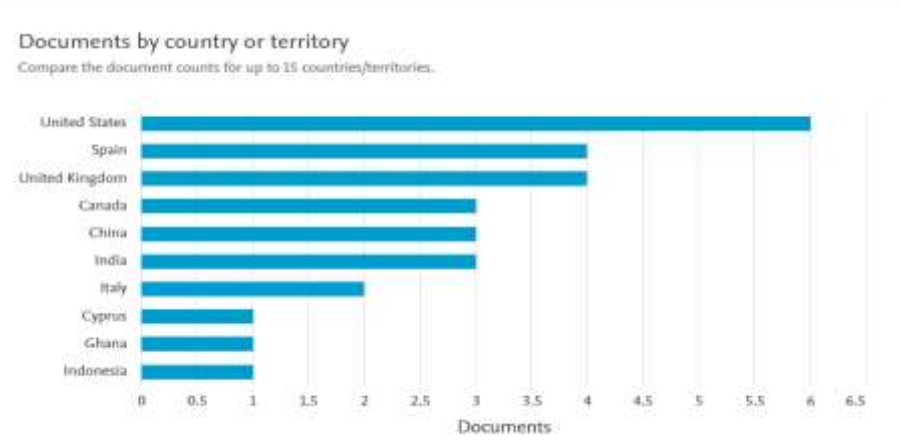
Figure 1 displays the selected articles' publishing year, where the majority of the articles, 10 of them, were published in 2023. Then three were published in 2022 and 2021, while two were published each in 2020, 2019, and 2017. Finally, one article was published in 2018, 2015, and 2013. Since there were limited related articles to begin with, the publishing year was not filtered in the string search.

Figure 1: Articles published by year



Next, Figure 2 portrays the number of selected articles, divided by origin country or territory. Six articles originated from the United States, while four each came from Spain and the United Kingdom, three each from Canada, China, and India. Then, two articles came from Italy, and finally one each from Cyprus, Ghana, and Indonesia.

Figure 2: Articles published by country/territory



Frequency Analysis

From the systematic search done earlier, frequency analysis was done on all 25 articles found to analyze the trends of past studies. The frequency analysis summary is concluded in Table 1.

Table 1: Data analysis on social media content, engagement, and business performance

Code	Frequency of articles	Frequency of repetition in the articles
Social media platform(s)	13	82
Social media content(s)	9	92
Social media post(s)	7	100
Engagement(s)/engage	12	946
Brand loyalty	4	92
Business performance	3	8
Sale(s)	7	346
Consumer/user-generated content(s) (CGC/UGC)	5	366
Firm/marketer-generated content(s) (FGC/MGC)	4	272
SME(s)/MSME(s)	2	97
Stimulus–Organism–Response (S-O-R) framework	1	4
Heuristic/Systematic Model of Persuasion (HSM)	1	15

From the frequency analysis, it was portrayed that engagement(s)/engage has the highest frequency of repetition throughout all 25 articles, followed by consumer/user-generated content(s) (CGC/UGC), sale(s), and firm/marketer-generated content(s) (FGC/MGC). Social media articles were also on the rise as there was quite a high frequency of repetition in terms of platform(s), content(s), and post(s). Surprisingly, only two articles focused on SME(s)/MSME(s), which shows that past studies have only focused on big corporations, thus identifying the first gap in the area.

Next, most articles found were qualitative, which led to only two frameworks/models identified that were used by past quantitative studies. This finding identified the second gap, where the researcher needs to execute further detailed content analysis to pin a theory to work on for the study. Only ten articles that best suited the study were selected for content analysis.

Content Analysis

Table 2 presents the content analysis results conducted on ten selected articles chosen earlier. Major keywords from the articles were identified and organized through thematic analysis. When classifying the keywords related to social media content, a study by Dolan et al. (2019) perfectly fits the researchers' needs, presenting a model that illustrates the connection between social media content and engagement behavior. Hence, the

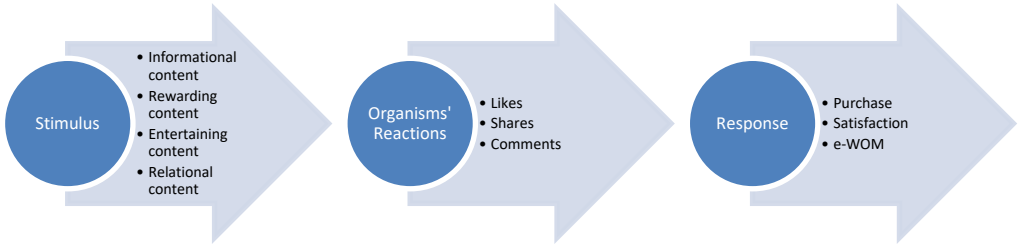
keywords linked to social media content and attributes were categorized into four main categories: informational, remunerative, entertaining, and relational. These four content types align with the essence of the Uses and Gratifications Theory (UGT), which explores how consumers select social media platforms to fulfill their gratifications (Dolan et al., 2019). The classification helps to better understand and analyze the different aspects of social media content affecting other variables.

Table 2: Content analysis on social media content articles

AUTHOR(S)	INFORMATIONAL (IV)		REMUNERATIVE (IV)		ENTERTAINING (IV)		RELATIONAL (IV)			ENGAGEMENT	BUSINESS PERFORMANCE (DV)		
	Product/Service	Functional	Sales campaigns	Contests	Excitement	Pleasure	Personalization	Reviews	Persuasive		Brand loyalty	Rating	Sales
Senanu et al. (2023)	✓	✓	✓	✓	✓	✓		✓	✓	DV			✓
Tyrväinen et al. (2023)		✓							✓	DV	✓		
Xu et al. (2023)	✓									DV			
Liadeli et al. (2023)		✓			✓	✓		✓		DV			✓
Batta et al. (2023)								✓				✓	✓
Gandhi & Kar (2022)	✓									DV			
Feng et al. (2020)	✓									Mediator			✓
Cazorla Milla et al. (2020)		✓			✓				✓	DV			
Lin et al. (2017)	✓	✓	✓	✓	✓		✓			DV			
Goh et al. (2013)	✓							✓	✓				✓

However, the UGT only explained the categorization of the social media content. From the frequency analysis in Table 1, the researchers saw that the Stimulus-Organism-Response (S-O-R) model is the most suitable to explain the whole framework at hand. In this scenario, the social media content (informational, rewarding, entertaining, or relational) serves as the stimulus. The organisms' emotional reactions from consumers, such as likes, shares, and comments, are considered consumer engagement. Ultimately, these reactions would impact an organization's performance, including purchases, satisfaction, and word-of-mouth recommendations. The complete S-O-R Model adaptation is depicted in Figure 3.

Figure 3: S-O-R Model adaptation



To reiterate, as laid out in Table 2, out of the ten selected articles, only two did not focus on engagement, while seven used engagement as their dependent variable, which proves that past studies have been focusing on engagement for quite some time. Meanwhile, only one paper was dedicated to studying engagement as a mediator, calling researchers to conduct future studies in the area. Pal et al. (2022) emphasized that user engagement, which highlights the value of the interaction and the good parts of the experience that contribute to increased application usage, can be used to gauge how engaged users are with a post-reaction.

Apart from that, sales, ratings, and brand loyalty are the three main phrases used in the ten chosen papers to describe a company's performance. As portrayed, it is evident that past studies did not just focus on financial performance, but non-financial performance was also given the same attention.

Discussion

About the chosen related articles, the researcher discovered that previous studies might be categorized into two distinct patterns: those focusing on the influence of social media content on consumer engagement, and those examining the impact of consumer engagement on business performance. Since the researcher aims to look at the direct influence of social media content on business performance, there is still a lack of past studies about the matter.

Nonetheless, from a thorough observation, the researchers noticed a grey area regarding categorizing consumer engagement and business performance among the scholars. For instance, Senanu et al. (2023) included purchasing behavior as part of consumer engagement, while other scholars categorized it as business performance. Scholars in the past have always favored studying business performance because the results may help businesses make improvements. Previous research has employed various terms that ultimately conveyed the same notion: business performance.

Additionally, only Feng et al. (2020) utilized consumer engagement as a mediator, while other studies set it as the dependent variable. Xu et al. (2023) affirmed that to promote consumer engagement, numerous businesses are utilizing social media as a new avenue for marketing. Consumer engagement can be characterized as a mental state arising from consumers' interaction with the business (Kumala & Sijabat, 2022). A study by Liadeli et al. (2023) found that to increase engagement, material should be more emotionally charged; while content that communicates the benefits of a product and is more functional than emotive can increase sales. Measuring user engagement is a straightforward method of evaluating a caption for specific content on an online social media platform, aiding in determining the overall efficacy of a certain piece of promotional content (Pal et al., 2022).

As mentioned earlier in the frequency analysis subsection, only two studies focused on SME(s)/MSME(s), which proves that more future studies should be done on them as they are the spine of a developing nation. Salim et al. (2024) stated that the productivity of MSMEs is closely associated with economic growth, and studies have indicated that the economy's expansion influences the rise in MSMEs' productivity. Apart from that, over the past few years, Malaysia's MSMEs have proliferated, and in 2021, they accounted for 39.1% of the nation's GDP (Murdiati et al., 2023).

Technically, before social media, we are only familiar with marketer-generated content (MGC) or firm-generated content (FGC). Back then, the content was only crafted by organizations to be viewed by consumers. However, as the virtual world evolves, one-way marketing also evolves, allowing two-way communication such as shares, reviews, ratings, parodies, and many more. It was discovered by Goh et al. (2013) that in terms of consumer purchasing behavior, user-generated content (UGC) has a greater influence as compared to marketer-generated content (MGC). The findings call for more future studies on UGC; however, the researcher decided to focus on MSMEs' MGC for now.

5. Conclusion

In a nutshell, this study's thorough content analysis has shown the relevance of social media content for MSMEs. Examining the wide range of content MSMEs post on different social media platforms has revealed important information about their marketing tactics, methods for engaging customers, and general online presence. The

results highlight the critical role that social media plays in increasing MSMEs' competitiveness and exposure in ever-changing market environments while also raising consumer engagement. Additionally, this study provides a basis for further research to improve our comprehension of how MSMEs use the digital sphere to support innovation, growth, and sustainability, affecting their business performance.

While established corporations undoubtedly have a significant impact on the business world, it is important to pay attention to how MSMEs' social media posts impact business performance to comprehend innovation, market dynamics, resource limitations, and grassroots economic development. Furthermore, learnings from the study of MSMEs are frequently transferable to enterprises of all sizes, which makes it a vital field for further investigation. In light of the significant effects that social media practices have on customer engagement, digital inclusion, economic development, and business performance, this article proposes that MSMEs' social media strategy should continue to get attention.

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A Conceptual Analysis of the Relationship Between Knowledge Management Capabilities and Learning Orientation Among Hoteliers in Malaysia

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Abstract: This study focuses on a literature review examining the impact of Knowledge Management Capabilities (KMC) and Learning Orientation (LO) among hoteliers in Malaysia. The tourism industry, one of the fastest-growing sectors, was significantly affected by Covid-19. However, it is now beginning to recover, with tourists adopting different perspectives. To maintain a competitive edge, the industry, including hoteliers, must stay abreast of the latest market trends. This requires both top management and employees to be equipped with adequate and relevant knowledge. Despite this need, some hoteliers are still reluctant to adopt knowledge management practices. Additionally, some are unable to utilize knowledge as part of their learning orientation to address changing market trends and various challenges, both micro and macro, to remain competitive. This research aims to explore how learning orientation is influenced by knowledge management capabilities, based on empirical studies. The conceptual analysis from this study can pave the way for developing a framework and further research analysis.

Keywords: *Knowledge Management Capabilities, Learning Orientation, Hoteliers, Tourism*

1. Introduction

Tourism makes a significant contribution to the gross domestic product (GDP) of many countries, accounting for 10.4% of the total global GDP, which is USD 9.2 trillion, and generating 10.6% (334 million) of all jobs worldwide (WTTC, 2021). In Malaysia, the tourism industry attracted 13 million international tourists from January to August 2023 alone (Ganesan, 2023). This figure is more than triple the 4.33 million tourists recorded during the early stages of the COVID-19 pandemic in 2020 (Malaysian Tourism Ministry, 2021). This demonstrates that the tourism industry has been the fastest and largest growing sector for many decades, serving as a key driver of economic growth and social development (Yu et al., 2023). However, Syed Mohamad et al. (2023) and Weidenfeld (2006) have noted that the industry has reached a saturated market and needs to learn as well as adopt new segmentation strategies such as eco, religious, and nature tourism. Consequently, hoteliers are focusing on specific niche markets such as boutique hotels, Shariah-compliant hotels, and hotels catering to businesswomen (Nor et al., 2012). Bharwani and Mathews (2016) emphasized that the global tourism and hospitality industry has shifted from a product-focused approach to a customer-focused approach to meet tourists' demands and trends based on the learning orientation that is being adopted among them.

In the context of emerging markets, market trends, and tourist demands, knowledge is a crucial element for all companies within the tourism and hospitality industry, including hotels. This knowledge shapes how these companies respond to the needs and demands of their guests and tourists (Syed Mohamad et al., 2023; Muhamad Nor et al., 2019; Nor et al., 2012; Poloski-Vokic, 2008). To navigate changes in the business landscape and remain successful, companies must ensure that all their staff have access to sufficient and relevant knowledge (Mohamad et al., 2022; Poloski-Vokic, 2008). According to Mohd Zahari et al. (2013), the business is already in an era where knowledge is paramount, and employees must manage it effectively as part of their companies' strategies to sustain and thrive in a competitive market.

Syed Mohamad et al. (2023) and Guimaraes et al. (2017) emphasize that companies must strategically identify and develop knowledge to achieve sustainable competitive advantages over their competitors by nurturing learning orientation within their companies' environment. On a macro level, countries must also implement

effective knowledge management systems to support progressive development (Albassam, 2019). Knowledge in the economic sphere needs to be generated, applied, and disseminated among the populace, providing them with a learning orientation that ensures the country's growth (Hamzah et al., 2020).

Problem Statement

The tourism and hospitality industry has reached a saturation point, highlighting the need to explore new markets. The dynamic global business landscape, characterized by rapid changes in consumer trends and preferences, underscores this necessity that needs to be aware of and learned by many industry players. Mohamad et al. (2022) and Payal et al. (2016) emphasized that the service industry depends on knowledge management for modern survival. Without adequate knowledge, skills, and capabilities, companies struggle to achieve and maintain competitiveness (Khan, 2019). Nor et al. (2019) also argued that the industry must explore and learn novel approaches to stay competitive and relevant in the evolving business landscape. One such approach is knowledge management, as noted by Syed Mohamad et al. (2023) and Poloski-Vokic (2008). Strategically implementing knowledge management practices enables the industry to respond effectively to changing customer and guest demands and preferences. Weidenfeld (2006) highlighted the importance of recognizing these changes to identify new market segments. In response to these shifts, Syed Mohamad et al. (2023) and Ngah et al. (2016) advocated for a strategic shift in the services industry towards adopting and implementing knowledge management practices. This strategic move is essential for the industry to learn to adapt and thrive in a highly competitive environment. Albassam (2019) extended this perspective by suggesting that nations, particularly those aiming to remain competitive globally, should establish effective knowledge management systems. A robust knowledge management system and learning orientation are crucial for sustaining competitiveness and aligning with the practices of developed nations.

Another critical issue is the timeliness with which companies adopt knowledge management practices and acquire intellectual resources to stay competitive in their respective industries (Alavi et al., 2005). In today's fast-paced business environment, the ability to quickly implement and integrate knowledge management systems is crucial for maintaining a competitive edge. Companies that are slow to adopt these practices risk falling behind more agile competitors who can leverage knowledge to innovate and respond to market changes more effectively (Chiu & Chen, 2016).

Gold et al. (2001) highlighted the significant challenges involved in establishing and sustaining knowledge management initiatives over time. These challenges can be multifaceted, including organizational resistance, the complexity of integrating new systems with existing processes, and the continuous need for updating and maintaining knowledge repositories. The initial implementation phase requires substantial investment in terms of time, money, and resources (Gotteland et al., 2020). Companies need to develop or acquire technology infrastructure, train employees, and create a culture that values knowledge sharing and continuous learning. Moreover, sustaining knowledge management practices over the long term is equally demanding. Organizations must ensure that their knowledge management systems remain relevant and useful, which requires ongoing assessment and adaptation (Syed Mohamad et al., 2023; Mohamad et al., 2022). This includes regularly updating the knowledge base to reflect the latest industry trends and technological advancements, as well as ensuring that employees remain engaged and motivated to use and contribute to these systems which could be tend to continuously learning orientation.

The dynamic nature of many industries adds another layer of complexity. Market conditions, technological advancements, and regulatory changes can all impact the effectiveness of knowledge management practices (Anjaria, 2020). Companies must be able to adapt their knowledge management strategies to keep pace with these external changes. Failure to do so can result in outdated or irrelevant knowledge and learning processes (Hindasah & Nuryakin, 2020), which can hinder decision-making and operational efficiency. Furthermore, the competitive advantage gained from effective knowledge management is not static. As more companies recognize the value of knowledge management, the bar for competitive advantage is continuously raised. What was once a cutting-edge practice can quickly become a baseline expectation (Hindasah & Nuryakin, 2020). Therefore, companies must not only implement knowledge management practices but also continuously innovate and improve these practices to maintain their competitive edge by nurturing learning orientation within the companies (Anjaria, 2020).

Implementing knowledge management over time can be particularly challenging for smaller companies, especially Small and Medium-sized Enterprises (SMEs). These businesses often operate with limited resources, making it difficult to invest in and sustain comprehensive knowledge management systems. SMEs must constantly adapt to market changes to remain competitive, and they typically do so by leveraging their existing knowledge, resources, and capabilities. According to Randhawa et al. (2020), SMEs tend to rely on what they already possess to respond to market shifts, rather than investing heavily in new knowledge management infrastructure. This approach can limit their ability to fully capitalize on the benefits of advanced knowledge management practices, further complicating their efforts to keep pace with larger, better-resourced competitors.

Preparing knowledgeable and skilled managerial personnel is crucial for achieving excellent performance and business success, particularly within the hotel and tourism sector (Sheresheva, 2016; Stephenson et al., 2010). This emphasis on managerial expertise underscores the pivotal role that capable leadership plays in navigating the complexities of hospitality operations and enhancing guest satisfaction.

Simultaneously, companies must recognize that all employees are essential assets. Poloski-Vokic (2008) emphasized the importance of investing in skilled individuals across all levels of the organization to improve overall performance in tourism and hospitality establishments. Tavitiyaman et al. (2012) further explored the profound impact of skilled employees on hotel management, highlighting their ability to streamline operations and elevate service quality. The recognition of a skilled workforce as a cornerstone for enhancing the standards and efficiency of hotel operations is widely acknowledged within the industry. This acknowledgment reinforces the notion that employees are integral to the overall success and competitiveness of businesses in hospitality.
In this context, fostering a learning-oriented environment becomes crucial (Hamzah et al., 2020). By nurturing continuous learning and professional development among employees, organizations can significantly enhance their capabilities and adaptability. This proactive approach not only improves individual performance but also contributes to organizational agility and innovation. Sheresheva (2016) expands on this perspective by emphasizing the importance of striking a balance between investing in skilled employees and implementing developmental initiatives in developing countries' tourism and hospitality sectors. This balance is critical for these countries to effectively compete with developed nations that boast superior service standards designed to attract both potential and repeat guests to their hotels.

Despite the potential benefits of knowledge management in the tourism industry, its adoption faces resistance, particularly due to the industry's unstable environment (Cooper, 2006). The uncertainty and dynamic nature of the tourism sector make industry players hesitant to fully embrace knowledge management practices, which could otherwise contribute significantly to their adaptability and success. The tourism industry is characterized by fluctuations in demand, seasonal variations, and external factors such as economic downturns and political instability. These elements contribute to a highly unpredictable environment, making it challenging for businesses to commit to long-term knowledge management strategies. Industry players often prioritize immediate operational concerns over strategic investments in knowledge management, fearing that the returns may not justify the costs in such a volatile setting.

In response to these challenges, Tavitiyaman et al. (2012) emphasized the necessity for hoteliers to invest in providing their employees with knowledge. This investment is crucial not only for enhancing the skills of the workforce but also for creating a learning environment that fosters continuous improvement and adaptability. By equipping employees with the right knowledge and cultivating a conducive learning environment, hotels can significantly improve their performance (Hamzah et al., 2020). A well-informed and skilled workforce can better anticipate and respond to market changes, innovate in service delivery, and maintain high standards even during periods of uncertainty. Moreover, a strong emphasis on learning and development can help mitigate the initial resistance to knowledge management by demonstrating its tangible benefits (Meher & Mishra, 2022).

Implementing effective knowledge management practices can address deficiencies in compliance with industry standards and regulations, ensuring that operations run smoothly and efficiently (Meher & Mishra, 2022). Over time, as employees see the positive impact of these practices on their daily work and the overall success of the organization, the resistance to knowledge management is likely to diminish (Hamzah et al., 2020). Ultimately,

by prioritizing knowledge management and fostering a supportive learning environment, hotels can enhance their operational efficiency, improve service quality, and achieve a competitive edge in the market, even amid the inherent uncertainties of the tourism industry.

2. Literature Review

Knowledge Management Capabilities: Knowledge is widely recognized as a crucial asset for organizations, playing a vital role in achieving superior business performance and maintaining a competitive edge. This perspective is supported by various researchers, including Muhamad et al. (2022), Grover and Davenport (2001), and Barney (1991). Bolisani and Bratianu (2018) have defined knowledge as an abstract concept that takes on tangible forms in the real world, underscoring its importance as a valuable resource for organizations. Furthermore, Anjaria (2020) has expanded on this notion by defining knowledge management as a comprehensive array of methods, tools, and techniques that companies use to manage their processes. This definition enhances the understanding of knowledge management, highlighting it as a systematic approach to managing organizational knowledge effectively.

Steward and Waddel (2008) contextualize knowledge management by tracing its development over more than four decades by highlighting its origins and early implementation in organizational settings, emphasizing its evolutionary nature. This perspective underscores how knowledge management has evolved from its inception, blending theoretical insights from academia with practical applications in real-world business environments. The timeline that Steward and Waddel (2008) provided with suggestions for the gradual maturation of knowledge management as a discipline, gaining significant traction, especially since the late 20th century.

On the other hand, Al-Hawari (2004) offered a distinct perspective by defining knowledge management in terms of its practical utility within companies by portraying knowledge as something that can be systematized and utilized to achieve organizational objectives. This perspective shifted the focus from knowledge as an abstract concept to viewing it as a tangible asset that can be codified, understood, disseminated, and effectively applied. By defining knowledge management in this manner, Al-Hawari (2004) highlighted its role in enhancing organizational effectiveness and competitiveness. The combination of these viewpoints enriches the understanding of knowledge management as a dynamic field that bridges theory and practice, evolving to meet the changing needs and challenges of organizations in the modern era.

Syed Mohamad et al. (2023) and, Chiu and Chen (2016) characterized knowledge management capabilities as an ongoing and purposeful process aimed at generating knowledge within an organization. This perspective underscores the active and continuous role of knowledge management in organizational growth. Earlier, Alavi and Leidner (2001) contributed to this concept by defining knowledge management capabilities as encompassing the skills to create, transfer, integrate, and apply knowledge within an organizational framework. Their definition encapsulates the diverse dimensions of knowledge management, encompassing creation, transfer, integration, and application.

The concept of knowledge management represents more than just incremental change; it signifies a profound transformation that profoundly affects the foundational aspects of an organization, such as its assumptions, structures, and value systems. The objective is to reshape and rebuild these elements to foster a knowledge-driven organization. This transformative approach underscores the necessity of sustained organizational support for knowledge management, acknowledging its critical role in improving performance (Hindasah & Nuryakin, 2020).

Additionally, organizations must develop specific capabilities to effectively support knowledge management. It emphasizes that organizations should not only nurture these capabilities but also view them as opportunities for integrating knowledge. This perspective underscores that knowledge management goes beyond mere tools or systems; it requires a strategic and deliberate effort to embed knowledge within the organization. Thus, Zhang et al. (2018) classified knowledge management capabilities into three categories: technological, structural, and cultural. This framework acknowledges the diverse aspects of knowledge management, recognizing its reliance not only on technology but also on organizational structures and cultural dynamics.

This comprehensive approach suggests that successful knowledge management hinges on a blend of technological tools, supportive organizational structures, and a culture that fosters and values knowledge sharing.

However, Gold et al. (2001) and, Lee and Yang (2000) categorized knowledge management differently into two main areas: knowledge infrastructure and knowledge processes. This division underscores the interaction between foundational structures and the dynamic activities involved in managing knowledge. Knowledge infrastructure pertains to essential elements such as systems and tools, while knowledge processes encompass the ongoing workflows and activities central to effective knowledge management.

Knowledge Infrastructure: The concept of knowledge infrastructure can be understood through various definitions and components. According to Wu and Chen (2014), knowledge infrastructure serves as the foundational support that organizations establish to bolster their core operations, encompassing systems and services. This definition underscores the pivotal role of infrastructure in providing essential support for both operational and strategic business needs. In an earlier perspective, Lee and Yang (2000) characterized it as a blend of organizational structure, technology, and culture. This broader view recognizes that infrastructure extends beyond technological elements alone, encompassing organizational structures and cultural dynamics, highlighting their interconnected roles in supporting business operations. Furthermore, Gil-Padilla and Espino-Rodriguez (2008) highlighted the specific impact of technology infrastructure on performance within the hotel industry. They elaborated on how technology infrastructure has evolved into a crucial resource influencing organizational performance, underscoring its pivotal role in the competitive landscape.

The concept of knowledge infrastructure can be understood from various viewpoints regarding its definition and components. According to Wu and Chen (2014), knowledge infrastructure represents the foundation that companies establish to support their core business operations, encompassing systems and services. This definition underscores the essential role of infrastructure in providing crucial support for both operational and strategic aspects of a business.

In an earlier perspective, Lee and Yang (2000) portrayed knowledge infrastructure as a synthesis of organizational structure, technology, and culture. This broader interpretation acknowledges that infrastructure extends beyond mere technological components to encompass organizational structures and cultural dimensions, highlighting their interconnectedness in facilitating business functions. Furthermore, Gil-Padilla and Espino-Rodriguez (2008) drew attention to the specific impact of technology infrastructure on hotel performance within the industry by explaining how technology infrastructure has evolved into a pivotal resource influencing organizational performance, emphasizing its significance in the competitive landscape.
In another perspective, Gold et al. (2001) provided a comprehensive perspective by emphasizing how social capital can be maximized within organizational infrastructure. However, the dimensions of structural, cultural, and technological factors that Gold et al. (2001) highlighted align closely with those identified by Lee and Yang (2000). Thus, Gold et al. (2001) suggested that optimizing social capital, crucial for organizational effectiveness, involves harmonizing organizational structure, culture, and technology.

As part of knowledge management capabilities' dimensions, Mohamad et al. (2022) and Mohannak (2011) examined culture as an integral part of knowledge management capabilities (KMC), highlighting its significant impact on the success or failure of organizational knowledge management initiatives. This underscores the crucial role of a supportive cultural environment in fostering effective knowledge management practices. Furthermore, Syed Muhamad et al. (2023) and, Gil-Padilla and Espino-Rodriguez (2008) emphasized the influence of technological infrastructure and cultural factors on hotel performance in the industry. Building on this, Mohamad et al. (2022) and Gold et al. (2001) expanded the discussion by illustrating how social capital within an organization's infrastructure can be optimized through structural, cultural, and technological dimensions. Furthermore, Gold et al. (2001) also discovered a significant and direct relationship between knowledge infrastructure and organizational effectiveness, reinforcing the notion that a well-developed knowledge infrastructure, encompassing structural, cultural, and technological elements, directly enhances overall organizational effectiveness.

Knowledge Process: Meanwhile, knowledge processes are seen as leveraging organizational infrastructure to enhance performance. Syed Mohamad et al. (2023) and, Nonaka and Takeuchi (1995) characterized knowledge processes as involving the efficient capture, storage, reconciliation, and dissemination of knowledge within an organization. These processes are crucial for transforming knowledge into a competitive advantage. Additionally, Su and Lin (2006) defined knowledge processes as the organization's capability to identify core competencies, along with the corresponding knowledge categories, demands, and requirements. This encompasses identifying business core competencies and involves activities such as knowledge generation, dissemination, and application (Lee & Yang, 2000).

Wu and Chen (2014) provided an in-depth analysis of knowledge processes, categorizing them into creation, transfer, integration, and application. This holistic perspective treats knowledge processes as a cohesive system that fosters knowledge within an organization. Earlier, Gold et al. (2001) had identified key elements of knowledge process capabilities, such as knowledge acquisition, conversion, application, and protection. Thus, these studies highlighted a significant and direct link between knowledge processes and organizational effectiveness.

Learning Orientation: The concept of learning orientation within organizations can be understood from multiple perspectives. Sinkula et al. (1997) described learning orientation as an organizational commitment to learning, a shared vision, and open-mindedness. They further define it as a cultural aspect that promotes the continuous pursuit of new knowledge and ongoing improvement. Hindasah and Nuryakin (2020) added to this by depicting organizational learning as a comprehensive process that includes creating, integrating, learning business processes, and transferring knowledge and skills. These activities are essential elements of the organizational culture and contribute to overall organizational performance.

Furthermore, Anjaria (2020) presented a clear perspective on learning organizations, highlighting two distinct interpretations. Firstly, a learning organization is seen as 'organized learning,' focusing on education, learning, and pedagogy within the organizational context. Secondly, it is viewed as an entity undergoing a developmental process, emphasizing that learning is a dynamic and ongoing aspect within the organizational environment. Therefore, the multifaceted nature of a learning organization encompasses commitment, shared vision, open-mindedness, and a cultural dedication to continuous improvement.

The critical role of learning orientation for organizational survival and success, especially in competitive industries like hospitality and tourism, involves thriving and enduring amidst competition (Baker & Sinkula, 1999; Day, 1994). Ali et al. (2020) supported this view by identifying learning orientation as a key factor in enhancing business performance within the hospitality and tourism sector. From a customer-centric perspective, Su and Lin (2016) suggested that organizations can provide the highest quality products and services by better understanding their customers. This positive outcome is achievable when both organizations and their employees are capable and committed to continuous learning. Tajeddini (2009) concurred, emphasizing that learning orientation is essential for new service development and improving hotel performance.

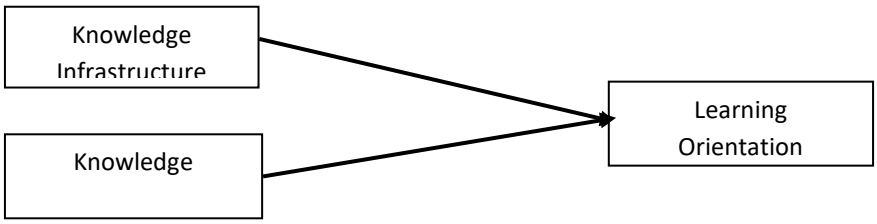
In volatile environments, Hoi and Ngui (2014) contended that learning orientation is essential for modern organizations to innovate, explore new opportunities, and maintain competitiveness. The dynamic nature of industries, particularly amidst uncertainty, requires an organizational culture that promotes continuous learning and adaptability. Moreover, Mohd Zahari et al. (2013) suggested that organizations must facilitate the sharing of knowledge and resources, both internally and externally, to enhance their effectiveness. Learning orientation extends beyond internal practices to include collaborative efforts that involve sharing insights and resources within and outside the organization. This makes learning orientation a critical factor for organizational success and competitiveness, particularly in dynamic and competitive industries such as hospitality and tourism. The positive impact includes improved customer satisfaction, new service development, and overall organizational effectiveness, highlighting the multifaceted benefits that a commitment to learning can bring.

3. The Relationship Between Knowledge Management Capabilities with a Learning Orientation

In the organizational context, numerous studies have explored knowledge management and learning orientation. Wi and Lu (2013) highlighted that learning acts as a mediator between knowledge sharing and tacit knowledge. Additionally, Antunes and Pinheiro (2019) proposed a conceptual link between knowledge management and organizational learning, which is connected to learning orientation within organizations. Moreover, Hindasah and Nuryakin (2020), Ngah et al. (2016), and Hooi and Ngui (2014) found that learning capabilities are positively influenced by organizational capabilities, such as human resources management and knowledge management, ultimately leading to improved organizational performance. This suggests that the effectiveness of human resources and knowledge management in enhancing organizational performance is further amplified by a strong learning orientation.

Similarly, Meher and Mishra (2022) emphasized the importance of individual learning orientation within an organization. They found that individual learning orientation significantly mediates the relationship between knowledge sharing and performance, especially in the service industry, such as IT companies. Their research suggested that the learning orientation of individuals within an organization, especially when influenced by peers, plays a crucial role in facilitating effective knowledge-sharing practices. However, for this research, the primary focus should be on learning orientation as the outcome variable, examining its direct impacts on knowledge management capabilities within the organizational context.

Figure 1*:* The conceptual framework



4. Conclusion

In the context of organizational research, numerous empirical studies have examined the variables of knowledge management and learning orientation from various perspectives, given their significant impact on organizational success. Consequently, this conceptual paper is a vital part of a doctoral research project that focuses on knowledge management and learning orientation among hoteliers in Malaysia. Specifically, the study aims to investigate the relationship between these two variables in three-star hotels and above nationwide. To ensure the study's relevance and accuracy, top management members from these hotels, including managers, managing directors, general managers, and chief executive officers, will be randomly selected to participate and represent their respective organizations.

The anticipated results of this study could have significant implications for hoteliers and companies across various sectors. By exploring the relationships between knowledge management capabilities and learning orientation, the study seeks to offer valuable insights to help organizations develop strategies to enhance their knowledge management and learning practices. This, in turn, can improve overall performance and increase competitiveness within the industry.

Contributions

The framework utilized in this research has been extensively applied by many scholars in previous studies to assess its relevance and applicability in various organizational contexts. However, this conceptual study aims to make a unique and significant contribution specifically within the hospitality industry. It seeks to enhance the existing body of knowledge on management practices and, ultimately learning orientation among hoteliers in Malaysia.

The dimensions of the variables under scrutiny—knowledge management and learning orientation—have the potential to offer a broader perspective on understanding these concepts. This research specifically aims to explain the elements of knowledge management, including knowledge infrastructure and knowledge processes, that significantly influence learning orientation. By exploring these dimensions, the study seeks to provide valuable insights and practical implications for industry professionals and academics alike.

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The Influence of Social Media Marketing Features on Consumers' Purchasing Decisions of Tourism Products

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Abstract: The prevalence of social media usage in Malaysia is apparent, as a substantial 78.5% of the population actively participates in online platforms. This provides the groundwork for an extensive analysis of the influence that social media marketing has on the decision-making process of consumers in the digital domain. Over ten million tourists visited Malaysia in 2022, indicating a steady recovery from the COVID-19 epidemic. This circumstance indicated the need for innovative strategies to strengthen the role of social media and digital marketing in the recovery and long-term growth of Malaysia's tourism industry. This research focuses on analyzing the influence of four specific aspects of social media marketing on consumers' purchasing decisions for tourism products. Interactivity, informativeness, entertainment value and perceived relevance are the elements that must be taken into account. The data was gathered from a diverse group of individuals who have extensive experience with social media. This was done through a thorough and structured online survey. The survey was completed by 142 participants in total and the data was analyzed using SPSS. The findings indicate that factors such as interactivity, informativeness and perceived relevance play a significant role in influencing consumers' purchase decisions. However, it was discovered that the impact of entertainment on purchase decisions is not significant. The findings of this study make an important contribution toward filling the gap in exploring how the tourism industry maximizes social media marketing features as digital marketing in knowing consumers' purchasing decisions. This study has shed some light on how marketers effectively manage and take advantage of social media platforms such as Instagram, Twitter, Facebook and Tik-Tok. Further research comparing with bigger data and other countries or regions will enrich the research findings.

Keywords: *Tourism Products, Social Media Marketing, Social Media, Interactivity, Informativeness, Entertainment, Perceived Relevance, Purchase Decision*

1. Introduction and Background

People have had plenty of exposure to social media because of the increased use of information and communication technology worldwide (Chetioui et al., 2021). The internet and its supporting tools have succeeded in changing how people communicate and socialize (Sharma et al., 2022). Over the past few decades, the use and popularity of social media continues to increase. Data on social media statistics for Malaysia in 2022 published by The Statista Research Department revealed that around 91.7% of Malaysia's population were active users of social media. With very broad coverage and low cost, social media is an appropriate and very powerful tool for connecting consumers and businesses on a regional, national and global scale even international (Almeida & Santos, 2020; Fraccastoro et al., 2021; Lacoste, 2016). Consumers are more likely to spend a significant amount of time on social media, participate in online discussions or share experiences with other consumers. This drives businesses to be more active in cyberspace to execute their advertising and marketing plans (Sharma et al., 2022). These platforms have emerged as a vital channel for information transmission and communication between customers and marketers (Shareef et al., 2019).

Tourism is one of the main service industries and has become an important driver of economic growth in the global economy (Camilleri, 2020). The impact of social media on the tourism industry growth cannot be disregarded, because today the internet and social media platforms are among the most popular information channels used by potential visitors and they have become one of the key sources of online travel information (Chu & Kim, 2018). The tourism industry is one of the right tools for improving the economic progress of the community at both the local and global levels. There is no denying that the tourism industry is an important economic sector because it has rapid growth compared to other economic sectors (Tian et al., 2021). This is also no exception to Malaysia's tourism industry which was affected by COVID-19. It is argued that in this environment, social media provides a cost-effective digital platform for attracting potential customers and

promoting tourism goods and services through direct consumer connections (Gozdegul Baser, 2020). Due to the rise of social media, tourism businesses now have the chance to reach a wider audience through their marketing campaigns (Katsikeas et al., 2020). Consequently, social media can be utilized by any component or aspect of the tourism industry.

Social media marketing implemented by businesses has the power to shape individuals' thoughts and ultimately influence the purchasing decisions of others on a larger scale (Aji et al., 2020). Consumer purchase decisions are likely influenced by their perceptions of a company's products and reputation. To be more precise, consumer choices are frequently impacted by their prior interactions with a company's goods and services (Melović et al., 2021). While some studies have explored the direct impacts of social media marketing, there remains a significant gap in understanding the intricate mechanisms through which specific features, like interactivity, informativeness, entertainment and perceived relevance can shape consumer purchase decisions. This lack of comprehension poses a significant challenge for marketers aiming to enhance their strategies in the dynamic tourism sector.

The foundation for the present study was built upon the UTAUT theory to test the effect of social media marketing on purchasing decisions. The UTAUT theory provides a robust framework for understanding how social media influences consumers' behavior (Venkatesh et al., 2003). Social media enhances performance expectancy by providing valuable information, increases effort expectancy by simplifying the decision-making process, exerts social influence through peer recommendations and influencers, and supports facilitating conditions with integrated tools and resources (Noor & Shahrom, 2021). The visual, interactive and social nature of tourism products makes social media a powerful tool in influencing purchase decisions in this sector.

This research aims to address the gaps in knowledge and gain a deeper understanding of the intricate relationship between social media marketing features and consumer purchasing decisions for tourism products in Malaysia. The outcome of this research contributes to the UTAUT model and provides further insights into how social media marketing features affect consumer behavior in this setting. The goal is to provide tourism marketers, lawmakers and businesses with useful and relevant information so that they can improve their social media strategy, customer experiences and digital adaptation.

2. Literature Review

Social Media Marketing Features

Interactivity: In the context of social media, interactivity denotes the interaction between consumers that facilitates the development of trust and relationships between the communicating parties and the social media platforms (Cheung, Pires, Rosenberger, et al., 2020). In literature, the predominant elements of interactivity are two-way communication, synchronicity and controllability (Shao & Chen, 2021; Mollen & Wilson, 2010). It allows consumers to engage with content, ask questions and dynamically receive instant feedback. Additionally, it has been reported that increased interactivity can increase user engagement which in turn results in more favorable purchasing outcomes as users feel more confident in their decisions. As a result, the following hypothesis was developed:
H1: There is a positive influence between interactivity and consumers' purchasing decisions.

Informativeness: Tourism products are often complex and require detailed information. Informativeness is the deemed depth of product knowledge or information offered through the shopping interface that can increase a consumer's trust, reduce uncertainty and provide consumers with related information to make informed purchase decisions (Kang et al., 2020). Analysis of the information's effectiveness in meeting customer preferences can be done using the concept of informativeness, which is defined as the capacity to inform consumers about different product categories (Ducoffe & Curlo, 2000). The positive influence of informativeness on consumers' purchasing decisions is evident through its ability to facilitate educated decision-making, build trust, address consumer needs, support comparison shopping, reduce buyer's remorse and enhance online visibility. The following hypothesis was constructed based on the idea that when consumers feel knowledgeable, they are more inclined to purchase tourism products:
H2: There is a positive influence between informativeness and consumers' purchasing decisions.

Entertainment: Entertainment refers to the extent to which social media content is emotionally stimulating, engaging and enjoyable for consumers (Muhamad & Shahrom, 2020). Social media platforms entertain by enabling service providers to create memorable experiences for their clients through the creation of humorous and amusing material that satisfies their enjoyment demands (Cheung, Pires & Rosenberger, 2020; Muhamad & Shahrom, 2020). Marketers employ social media as a means of entertaining consumers and satisfying their desire for enjoyment. They do so by sharing photos and news about products, such as Facebook brand pages with video snippets, pictures and stories, which can effectively capture consumers' attention (Cheung, Pires & Rosenberger, 2020; Gummerus et al., 2012). By including entertainment in their promotions, businesses may attract consumers' attention by enhancing the emotional appeals of tourism products, generating good attitudes and eventually drive purchasing behavior. Based on this, the following hypothesis was formulated:
H3: There is a positive influence between entertainment and consumers' purchasing decisions.

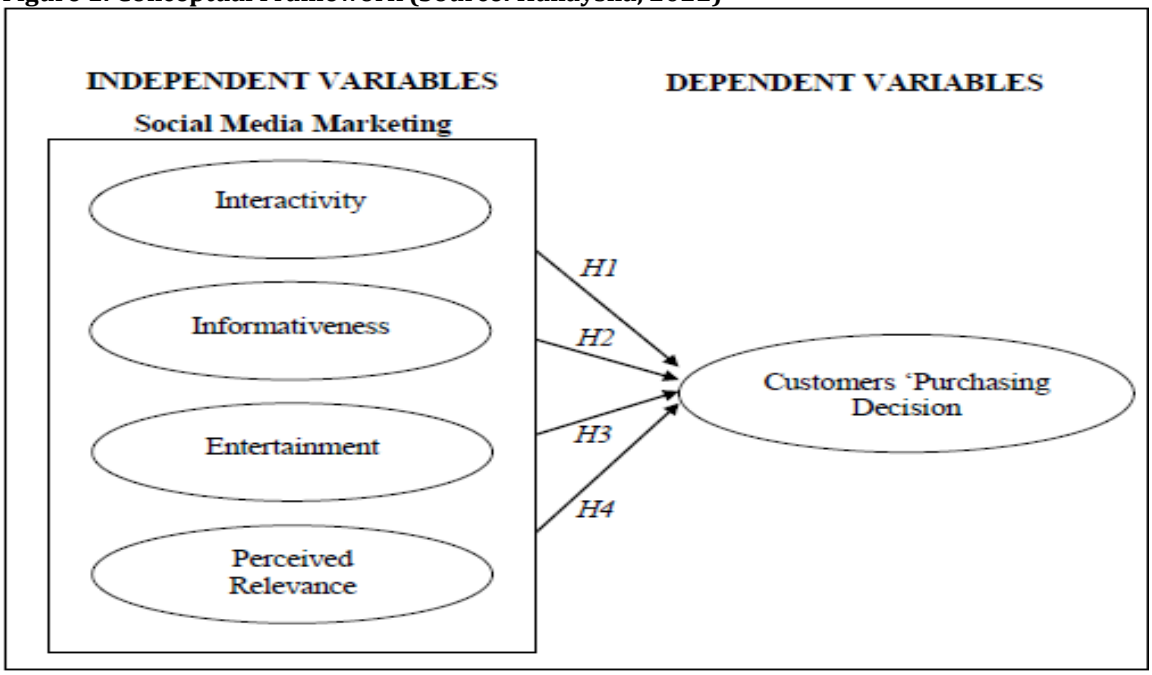
Perceived Relevance

Perceived relevance refers to the extent to which social media advertisements are designed to fulfill the specific needs, interests and expectations of individual customers (Hanaysha, 2022). Based on Zhu and Chang (2016), perceived relevance is the extent to which customers believe a customized advertisement is relevant to them or helps them fulfill their beliefs and goals on a personal level. In online environments, perceived relevance is achieved by tailoring messages to the customers who are being targeted. It is built on its capacity to meet consumers' requirements and preferences, provide personalized experiences, solve problems, match the setting, establish trust and authority and foster emotional relationships. When consumers perceive content as highly relevant, they are more likely to consider it in their decision-making process and proceed to purchase. Consequently, the hypothesis was formulated:
H4: There is a positive influence between perceived relevance and consumers' purchasing decisions.

Consumers' Purchasing Decisions

Understanding the purchase decision is crucial for businesses as they strive to comprehend the intricate process consumers go through when making transactions in the marketplace (Sinoka & Ansari, 2019). Consumers go through a series of phases before making a purchase, which can be seen as the decision-making process (Hanaysha, 2022). These decisions are influenced by consumers' efforts to meet their needs and resolve current issues (Purba et al., 2021; Ramanathan et al., 2017). Understanding consumer purchasing behavior involves analyzing the complex process individuals go through when deciding whether or not to buy a specific product (Qazzafi, 2019). Figure 1 shows the conceptual framework for this study:

Figure 1: Conceptual Framework (Source: Hanaysha, 2022)



3. Research Methodology

The correlational study was used to study the influence between social media marketing features and consumers' purchasing decisions. The sampling frame for this study is active social media users (e.g., Facebook, Twitter, Instagram and TikTok) with an active usage of at least 1 hour a day. The study population comprises social media users residing in Klang Valley, Malaysia and a purposive sampling method was employed to obtain the sample. According to the result of the G-Power Calculation, the minimum sample size for this research is 129 respondents. The G*Power input parameters are set as follows: effect size is 0.15 (medium), alpha is 0.05, power is 0.95, and the maximum number of predictors is 4.

The questionnaire was developed based on a comprehensive evaluation of existing literature and verified through peer review by experts in academia and industry. Before distributing the questionnaire for the real study, a pilot study was undertaken to verify its relevance to the respondents. Through the use of an online self-completion questionnaire, a total of 142 individuals responded to the survey and the data were analyzed using the Statistical Packages for Social Science (SPSS) version 2.0. Descriptive statistics were used to determine the mean score and standard deviation of all study variables. Inferential statistics, including Pearson's correlation analysis and multiple regression analysis were employed to examine the relationship and the influence between the variables of the social media marketing features and consumers' purchasing decisions.

4. Results

Profile of Respondents

Table 1 shows data retrieved from Part A of the survey were analyzed by performing Descriptive Analysis (frequency) to determine the demographic characteristics of the respondents. 142 respondents participated in the survey.

Table 1: Demographic Characteristics of The Respondents

Category	Sub-category	Frequency	Percentage
Gender	Male	66	46.5
	Female	76	533.5
Age	Below 20 years old	4	2.8
	20-29 years old	66	46.5
	30-39 years old	35	24.6
	40-49 years old	27	19.0
	50-59 years old	10	7.0
Ethnicity	Malay	80	56.3
	Chinese	31	21.8
	Indian	25	17.6
	Indonesian	2	1.4
	Bajau	1	.7
	Bidayuh	2	1.4
	Iban	1	.7
Current location state	Selangor	52	36.6
	Kuala Lumpur	53	37.3
	Putrajaya	37	26.1
Education	SPM	18	12.7
	Diploma	36	25.4
	Bachelor's Degree	67	47.2
	Master's Degree	18	12.7
	PHD	3	2.1
Employment Status	Employed	115	81.0
	Un-employed	8	5.6
	Student	19	13.4

Job category	Education	20	14.1
	Law and government	32	22.5
	Health care	11	7.7
	Business and Finance	50	35.2
	Information technology	4	2.8
	Engineering	4	2.8
	Student	21	14.8
Salary	Less than RM1500	3	2.1
	RM1500-RM2500	23	16.2
	RM2500-RM3500	25	17.6
	RM3500-RM4500	29	20.4
	More than RM4500	35	24.6
	None	27	19.0
Types of social media platforms do you often use	Facebook	36	25.4
	Twitter	14	9.9
	Instagram	37	26.1
	Tik-Tok	55	38.7
Average time spent on the social media platform in a day	Less than 1 hour	21	14.8
	2-3 hours	61	43.0
	3-4 hours	24	16.9
	4-5 hours	21	14.8
	More than 5 hours	15	10.6

Normality Analysis

Table 2 presents the outcomes of the normality analysis of this study based on skewness and kurtosis values for each component in the independent variable and dependent variable. According to George and Mallery (2016), with most psychometric applications, a kurtosis and skewness value between ±1.0 is desirable, although, in many circumstances, a value between ±2.0 is also acceptable, depending on the specific application. Table 2 displays the values of Skewness and Kurtosis for each variable, as determined by the normality test results. Based on the results, independent and dependent variables were normally distributed, with Skewness and Kurtosis within the range +/-2, from 0.024 to -0.484.

Table 2: Normality Analysis

Variables	Skewness	Kurtosis
Interactivity	-0.094	-0.101
Informativeness	-0.319	-0.405
Entertainment	0.024	-0.484
Perceived Relevance	-0.195	-0.375
Purchase Decision	-0.04	-0.209

Reliability Analysis

A reliability analysis was performed to confirm the reliability of the measurement used for data collection in this study. The value of Cronbach's Alpha (α) was used as a threshold to determine whether the items in a particular variable had good internal consistency. According to Sekaran (2003), Cronbach's Alpha value should be greater than .700 to indicate good and acceptable reliability. The results of the reliability analysis of each study variable are shown in Table 3 below. As shown above, all the variables are reliable because the values of Cronbach's Alpha for all variables were greater than 0.700. The value of Cronbach's Alpha for interactivity is 0.869 (good), informativeness 0.855 (good), entertainment 0.840 (good), perceived relevance (good) and purchase decision (acceptable).

Table 3: Reliability Analysis

Variables	Cronbach's Alpha	No. of Items
Interactivity	0.869	4
Informativeness	0.855	4
Entertainment	0.840	3
Perceived Relevance	0.851	4
Purchase Decision	0.797	4

Descriptive Analysis

Table 4 presents the mean and standard deviation scores for each variable of social media marketing features (independent variable) as follows: interactivity (M=4.1496, SD=0.54987), informativeness (M=4.3680, SD=0.49884), entertainment (M=4.0446, SD=0.57698) and perceived relevance (M=4.0827, SD=0.60121). Thus, all the variables of social media marketing features were high level. Besides, the mean score and standard deviation for consumers' purchasing decisions (dependent variable) were also at a high level (M=3.977, SD=0.55696).

Table 4: Descriptive Statistics

Variables	N	Mean	Std. Deviation	Level
Interactivity	142	4.1496	0.54987	High
Informativeness	142	4.3680	0.49884	High
Entertainment	142	4.0446	0.57698	High
Perceived Relevance	142	4.0827	0.60121	High
Purchase Decision	142	3.9771	0.55696	High

Pearson's Correlation Analysis

Table 5 displays the analysis of the correlation between social media marketing features and consumers' purchasing decisions. The findings show that there is a positive relationship between interactivity and purchase decision ($r=0.580$, $p<0.01$). It is also proven that there are positive relationships between informativeness and purchase decision ($r=0.520$, $p<0.01$), entertainment and purchase decision ($r=0.487$, $p<0.01$) and perceived relevance and purchase decision ($r=0.690$, $p<0.1$). All the relationships are moderate.

Table 5: Pearson's Correlation Analysis

Correlation	Value of Pearson Correlation	P-Value	Strength of Association
Interactivity > Purchase Decision	0.580	<0.01	Moderate
Informativeness > Purchase Decision	0.520	<0.01	Moderate
Entertainment > Purchase Decision	0.487	<0.01	Moderate
Perceived Relevance > Purchase Decision	0.690	<0.01	Moderate

Multiple Regression Analysis

Multiple regression was employed to examine the influence of social media marketing features (interactivity, informativeness, entertainment and perceived relevance) as independent variables and consumers' purchasing decisions as a dependent variable. The results of multiple regression between social media marketing features and consumers' purchasing decisions are shown in Table 6. The R^2 value of multiple regression analysis is 0.552 indicating approximately 55.2% of the variance in consumers' purchasing decisions can be explained by social media marketing features (interactivity, informativeness, entertainment and perceived relevance). The independent variable collectively plays a crucial role in making consumers' purchasing decisions.

Table 6 shows significant results (<0.01) which means all independent variables (interactivity, informativeness, entertainment and perceived relevance) simultaneously influence the dependent variable (purchase decision).

Table 6: Multiple Regression Analysis (ANOVA)

ANOVA							
Model		Sum of Squares	df	Mean Square	F	Sig.	R^2
1	Regression	24.106	4	6.027	42.057	<.01	0.522
	Residual	19.632	137	0.143			
	Total	43.738	141				

From the path coefficient results, if the significance is lower than 0.05, it indicates that the independent variable influences the dependent variable. On the other hand, if the significance exceeds 0.05, it suggests that the independent variable does not influence the dependent variable. As shown in Table 7, interactivity positively influences consumers' purchasing decisions (β=0.255, p<0.001). Meanwhile, informativeness positively influences consumers' purchasing decisions (β=0.165, p=0.040). For perceived relevance, it also positively influences consumers' purchasing decisions (β=0.413, p<0.001). However, entertainment does not influence consumers purchasing decisions (β=0.040, p=0.569) because the significance is more than 0.05.

Table 7: Multiple Regression Analysis (Coefficients)

Coefficient						
Model		Unstandardized B	Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	0.347	0.318		1.093	0.276
	Interactivity	0.255	0.072	0.252	3.563	<0.001
	Informativeness	0.165	0.079	0.148	2.078	0.040
	Entertainment	0.040	0.071	0.042	0.571	0.569
	Perceived Relevance	0.413	0.074	0.446	5.548	<0.001

Summary of Hypotheses

Table 8 provides the results of the summarized hypotheses for analyzing the influence of social media marketing features on consumers' purchasing decisions for tourism products in Malaysia.

Table 8: Summary of Hypotheses

Hypothesis	Statement	Result	Decision
H1	Interactivity positively influences consumers' purchasing decision	<0.001	Accepted
H2	Informativeness positively influences consumers' purchasing decision	0.040	Accepted
H3	Entertainment positively influences consumers' purchasing decision	0.569	Not Accepted
H4	Perceived relevance positively influences consumers' purchasing decision	<0.001	Accepted

5. Conclusion and Recommendations

This study aimed to examine the influence of social media marketing features on consumers' tourism product purchasing decisions. In general, the three factors of interactivity, informativeness and perceived relevance have been found to have a beneficial impact on consumers' purchasing decisions. However, the influence of entertainment on these decisions is found to be statistically insignificant. The impact of perceived relevance on customers' purchasing decisions is most pronounced when people acknowledge the significance of targeting social media advertisements to match their requirements and expectations. Consumers exhibit a desire for

time-saving measures through their ability to ascertain their specific preferences. This research makes a meaningful contribution to the existing literature by expanding upon previous studies on social media marketing features and consumers' purchasing decisions. Specifically, it delves into the impact of social media marketing on consumers' purchasing decisions within the theoretical framework of the UTAUT theory (Venkatesh et al., 2003), focusing on tourism products. In the context of this study, the performance expectancy of UTAUT is closely related to informativeness and perceived relevance. Higher levels of interactivity on social media platforms, which impact consumer purchase decisions are supported by UTAUT through the effort expectancy construct. Conversely, social media content that is entertaining does not have an impact on its visibility and social influence. This aspect of the research contributes to the understanding of the features through which social media marketing influences the outcomes of consumers' purchasing decisions.

By establishing compelling context on digital marketing platforms, businesses may connect with a wider range of consumers. Thus, today's businesses should create ways to use social media marketing features that can motivate and urge future purchasers to purchase from them. This study focuses on several social media platforms, hence the impact of interactivity, informativeness, entertainment and perceived relevance can vary across different platforms. For example, visual-centric platforms like Instagram might emphasize entertainment more, while platforms like Twitter may focus more on informativeness. This study underscores the need for marketers, business owners, as well as tourism industry to craft and disseminate authentic social media marketing that will influence consumers' purchasing decisions and provide comprehensive information to the consumers. The current findings offer opportunities for the tourism industry to navigate challenges and provide strategies, especially using the right social media platforms to effectively reach and engage with potential consumers. It will guarantee that consumers have a memorable experience. In addition, the findings gained in this study will enhance the existing literature and provide critical evidence to marketers, business owners and tourism industry and other stakeholders by revealing the features of social media marketing that affect consumer purchasing decisions and offering essential guidance to refine marketing strategies as well as consumers' satisfaction.

Future Research

The current study employed quantitative methodology. The researcher utilized an online questionnaire as a survey method to collect the data. For future research recommendations, it may be beneficial to consider utilizing a qualitative data collection method. Various methods can be utilized, such as interviews, observations, focus groups or analysis of textual materials. This approach enables researchers to dig into intricate matters and acquire a more profound comprehension of the intricacies surrounding the research topics. Other than that, social media marketing features are not limited to these four features interactivity, informativeness, entertainment and perceived relevance. Other factors of social media marketing could include platform types, social media influencers and habits that could significantly influence purchasing decisions. In addition, future research may add mediating variables and moderating variables in their research to explore more for the topic. Lastly, expanding research to include larger datasets and diverse geographical areas, including other countries or regions, will enhance the depth and breadth of the research findings. Additionally, conducting subsequent analyses with a variety of populations and industries across different markets and consumer segments will provide a more comprehensive understanding and make new contributions to the related literature. All the recommendations may be used by the researchers for future improvements.

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The Nexus Between Foreign Direct Investment and Economic Growth in Malaysia

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Abstract: In recent decades, Foreign Direct Investment (FDI) has become a significant factor in promoting economic growth. Recent years have witnessed significant discourse regarding the relationship between foreign direct investment and economic growth. This research employed the Autoregressive Distributed Lag (ARDL) methodology to analyze the long-run and short-run relationships between foreign direct investment and economic growth in Malaysia over the period from 1990 to 2022. The findings indicate that foreign direct investment has a positive impact on economic growth in both the short and long term. This aligns with the fundamental principles of endogenous growth theory, which posits that foreign direct investment enhances the transfer of skills that enrich the knowledge base of the host country in both the short and long term. The study provides policymakers with insights regarding the relationship between economic growth and foreign direct investment (FDI).

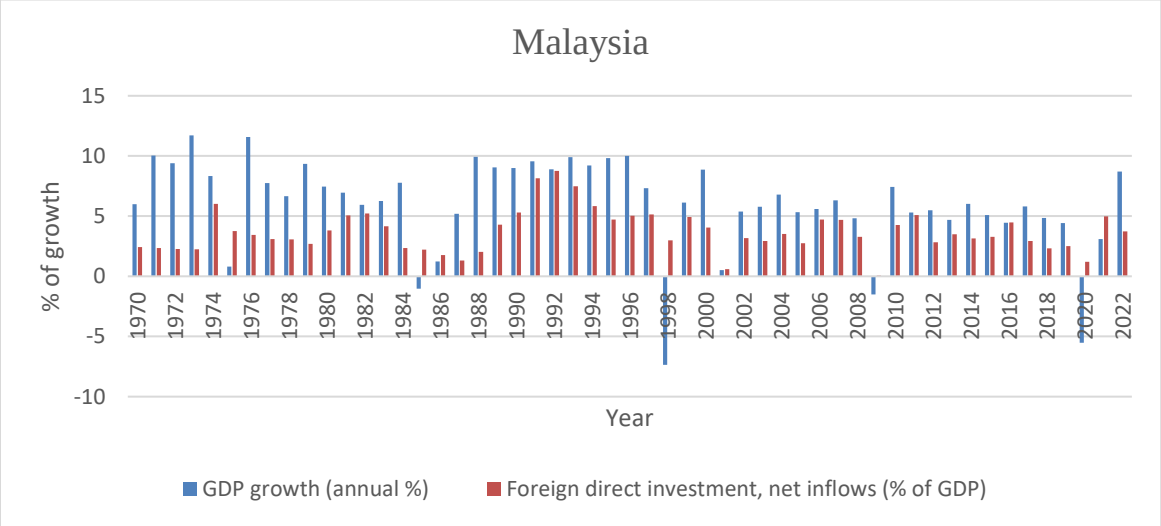
Keywords: *Foreign Direct Investment, Economic Growth, ARDL, Malaysia*

1. Introduction and Background

FDI is a global business approach wherein companies establish a physical appearance in foreign countries by acquiring a productive asset. In simpler terms, FDI occurs when the investor makes an investment in foreign countries to increase their returns, diversify the market for their products, and benefit from economies of scale. The importance of FDI can be seen from various aspects such as technological transfer, introduction of new skills and production techniques, increased competitiveness among domestic and international producers, both import and export including economic growth (Levine, 1997; Borensztein et al., 1998). Regardless of the pattern of FDI that has slightly changed over time, the FDI plays a crucial role in boosting economic growth in the majority of nations. In 2002, the UN's Organization for Economic Co-operation and Development (OECD) highlighted that nations with weaker economies regard foreign direct investment (FDI) as a crucial source of growth and economic modernization. Consequently, governments in developing countries are elected to attract foreign capital (Carkovic & Levine, 2002). Hansen & Rand (2004) assert that foreign direct investment (FDI) significantly enhances short-term economic growth, particularly in 31 developing countries.

Malaysia's economic strategies and policies serve as a yardstick for guiding its developmental journey, steering the nation's economy according to its distinct contours (Ibrahim, 2022). Starting from 1970, Malaysia has witnessed remarkable economic expansion which was accompanied by the adjustment in trade policies to lure FDI into the nation. The inflow of FDI to Malaysia has experienced a substantial increase from 4,453 million (USD) in 1980 to its highest 15,119 million (USD) in 2011 (Rasiah et al., 2017). FDI has evolved into a crucial component as part of the development strategies in the Malaysia Plan. Figure 1 shows that FDI has had a volatile movement and inconsistent trend since the year 1970 and will make unpredictable movements in the future. The graph also shows an inconsistent relationship between FDI and economic growth. The increase of FDI does not contribute to the increase of GDP. The decrease or inconsistent trend of FDI to Malaysia was primarily due to inadequate human capital, corruption, and low level of technological capacity (Abidin, 2010). Moreover, the financial impact of the COVID-19 pandemic outbreak on global economies has made Malaysia’s inflow of FDI decrease from RM32.4billion in 2019 to RM13.3billion in 2020, according to the annual statistics of FDI in Malaysia from the Department of Statistics Malaysia (DOSM).

Figure 3: GDP growth and FDI inflows in Malaysia



Source: The World Bank (2023)

The 1990s marked a period of global economic liberalization and the emergence of economic blocs fostering free trade zones, a trend that extended to Malaysia. The country's engagement with these economic blocs is aimed at establishing a foothold and expanding its presence in the fiercely competitive global market. This involvement is expected to support Malaysia's economy by fostering the growth of local industries and products, avoiding direct competition on a global scale (Ibrahim, 2022). Foreign investments from countries like Japan and Taiwan have helped Malaysia's economy grow, especially when trade with Western countries slowed down (William, 1991).

The relationship between foreign direct investment (FDI) growth and countries has been a subject of being carried out academic debate for several decades. Recent research conducted by Azam et al. (2017) and Mustafa et al. (2021) demonstrates a positive and significant effect of foreign direct investment (FDI) on economic growth. Amyra and Siti (2022) found a negative correlation between FDI and economic growth. The inconsistent findings highlight the complexity of the relationship between foreign direct investment (FDI) and economic growth, suggesting that the impact of foreign investment on an economy is shaped by numerous influences and dynamics. Therefore, identifying the determinants of foreign direct investment (FDI) across various countries is essential.

The objective of this paper is to investigate the short-run and long-run relationship between FDI and economic growth, thus contributing to the existing literature that examines the Malaysian experience from 1990 to 2022. This paper begins with a literature review, followed by the research methodology, findings, and conclusion. The last section of this study will discuss the policy implications and recommendations.

2. Literature Review

According to De Jager (2004), FDI has the potential to increase labor and capital productivity through the introduction of new technologies, which results in more significant returns on investment and external labor growth. Among the others, Barro and Sala-I-Martin (1995) Illustrate a positive relationship between capital accumulation and production, however recent research by Herzer et al. (2008) establishes FDI's role in encouraging economic growth by boosting domestic investment.

Within the exogenous or neo-classical growth model, foreign direct investment (FDI) facilitates economic growth through capital accumulation and the incorporation of foreign technologies and inputs into the production processes of the host country. The neo-classical growth model highlights the role of foreign direct

investment (FDI) in enhancing both the volume and efficiency of investment in the host country, thereby facilitating economic growth. Unlike neoclassical growth models that view technological progress as an external factor, new growth models identify two primary drivers of economic growth: the accumulation of human capital and advancements in technology (Romer P., 1986, 1990; 1994; Lucas Jr, 1988). Nair-Reichert and Weinhold (2001) assert that long-term growth stemming from technological advancements is incorporated into contemporary endogenous growth models. The above-mentioned models provide a framework for FDI to constantly increase the host country's rate of economic growth by facilitating the diffusion, spillover, and transfer of technology. While both endogenous and exogenous growth theories emphasize the significance of capital accumulation for economic growth, they diverge in their approach to addressing technological progress. The first theory relates to the technological advancement as external to the model, whereas the second contends that advancements in technology occur naturally as a result of increased knowledge and innovation (Borensztein et al., 1998; De Mello, 1999; Elboiashi, 2011; Al Naseer, 2010).

The existing theories analyze the role of FDI and economic growth emphasizing the capacity of FDI to promote economic growth through direct and indirect channels. Most of the existing theories are consistent with endogenous growth theory where FDI can enhance the host country's economy by facilitating capital accumulation and the introduction of new products and foreign technologies (Edress, 2017). Furthermore, FDI also contributes to the concept of endogenous growth which facilitates the transfer of skills that improve the knowledge base of the host country (Elboiashi, 2011). Among the others, Herzer et al. (2008) emphasize the significance of FDI for the economic development of host countries through the enhancement of investable capital and the promotion of technology spillovers. Cahyadin and Sarmidi (2019) analyzed the interactions of foreign direct investment, labor, and external debt, emphasizing their individual effects on economic growth in Indonesia and Malaysia. Their research demonstrates a significant connection between labor, external debt, and economic growth. This connection indicates a comparable outcome in both nations. To enhance their efforts for economic growth, they propose two distinct solutions. The initial phase is the creation of a coordinated initiative to draw foreign direct investment inflows. The second aim is to cultivate a highly skilled workforce and human capital while effectively controlling external debt. According to the findings of Ajibola et al. (2018), the only factor that had a substantial positive influence on the economic growth of Nigeria was foreign direct investment in the communication industry. This was demonstrated by using data spanning from 1986 to 2017. The findings indicate that the only significant factor positively impacting Nigeria's economic growth was foreign direct investment in the transportation and communication sector.

A study conducted from 1990 to 2014 examined the relationship between foreign direct investment (FDI) and gross domestic product (GDP) in India, Malaysia, Bangladesh, and Indonesia indicates a persistent relationship between FDI and gross domestic product (GDP), while their Granger causality test yielded inconclusive results. The empirical study conducted by Masturah and Siti (2020) examined the influence of foreign direct investment (FDI) on Malaysia's economic growth from 1975 to 2015, utilizing the ARDL methodology. Their empirical findings demonstrate that foreign direct investment (FDI) has a positive and significant effect on the growth of Malaysia's economy. The conclusion supports the endogenous hypothesis, suggesting that foreign direct investment (FDI) inflows can enhance the economic development of a host nation by generating a spillover effect from foreign investment (Mohamed et al., 2013).

In contrast, an opposing viewpoint asserts that there might not be a long-term equilibrium relationship between FDI and economic growth (Vlatka, 2019). Vlatka (2019) suggested that a surge in foreign investors could potentially lead to slower economic growth due to the advantageous outcomes gained by foreign countries, potentially undermining the nation's competitive edge (Meivitawanli, 2021; Sharma et al., 2020).

3. Research Methodology

This study employs Autoregressive Distributed Lag (ARDL) cointegration to look into the connection between foreign direct investment (FDI) and economic development in both short and long-run relationships from the year 1990 to the year 2022. The ARDL cointegration method is employed to ascertain the presence of a long-term and short-term relationship between foreign direct investment and economic growth. Table 1 provides an overview of the variables used to achieve the objective of the study. Both the results of the tests and the output of the estimations were achieved with the application of Eviews 12.

Eq(1) is presented in ARDL to investigate the long-run model:

$$\Delta \text{InGDP} = \alpha + \sum_{i=0}^{k} \phi \Delta InGDP_{t-i} + \sum_{j=0}^{1} \beta_j X_{t-j} + \mu_t$$

While Eq(2)

$$\Delta \text{InGDP} = \alpha + \sum_{i=0}^{k} \phi In\Delta GDP_{t-i} + \sum_{j=0}^{1} \beta_j X_{t-j} + \psi ECT_{t-1} + \xi_t$$

Where GDP is the dependent variable measured by GDP per capita and ψ is the coefficient of error correction term (ECT), where it shows the convergence of the variables to equilibrium. Table 1 shows the variables used from the theoretical framework by Romer (1986) and Lucas (1988).

Table 1: Research Variables and Source of Data

Variable	Variable Abbreviation	Description	Source
Economic growth	lnGDP	GDP per capita (constant 2015 US$)	WDI
Foreign direct investment	lnFDI	Foreign direct investment, net inflows (BoP, current US$)	WDI
Exports	lnEX	Exports of goods and services (% of GDP)	WDI
Gross fixed capital formation	lnGFCF	Gross fixed capital formation (current LCU)	WDI
Labor force (labor force participation rate as proxy)	lnLFPR	Labor force participation rate, total (% of total population ages 15+) (modeled ILO estimate)	WDI

The theoretical frameworks have been proposed to explain the relationship between FDI and economic growth in the endogenous growth model. Because of some constraints in Solow's exogenous model, Romer (1986) and Lucas (1988) brought in the endogenous growth theory. They introduced this theory as an additional framework to the neoclassical growth model, to give a better and more relevant understanding of growth origins. The endogenous growth model is seen as better for explaining growth drivers. This growth model begins with a basic structure that includes three main components: output (Y), labor (L), capital (K), and technology (A).

We also include export as one of the control variables following the export-led growth theory (Gokmenoglu et al., 2015; Quaicoe et al., 2017; Meyer & Sanusi, 2019). The export-led theory draws its foundations from classical and neoclassical economic perspectives. According to this theory, economic growth is primarily driven by exports. This concept posits that an increase in exports triggers a rise in employment within export-oriented industries, subsequently elevating productivity. This enhanced productivity, in turn, propels economic growth. While the export-led growth theory gained prominence around the turn of the millennium, it has not entirely lost relevance, as ongoing scholarly investigations continue to explore the impact of exports on economic growth.

As the overall productivity factor significantly influences total output which is GDP, it is contingent on both technological advancement and efficiency enhancements for promoting output growth, which follows that the impact of FDI on economic growth could be assessed through the total productivity factor, facilitated by the infusion of capital into host country (Fosu & Mangus, 2006; Yousaf et al., 2011). Therefore, the labor force is included as one of the proxies to measure of productivity factor in the study (Hsu ., 2017).

4. Results and Discussion

This section provides results concerning the relationship between FDI and economic growth in Malaysia. Diagnostic tests were conducted for this model. Table 2 presents the outcomes of the Normality Test, Serial Correlation Test, and Heteroscedasticity Test.

Table 2: Diagnostic Test

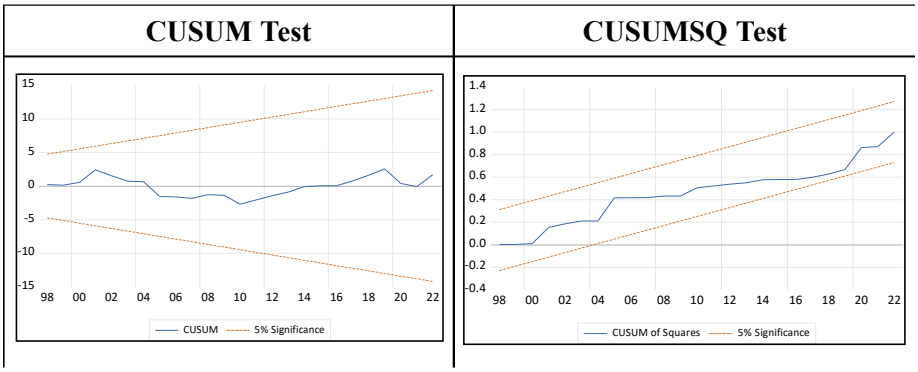
Country	Normality x^2 (p-value)	Serial correlation x^2 (p-value)	Heteroscedasticity x^2 (p-value)
Malaysia	0.5552 (0.7576)	1.4225 (0.2684)	0.8502 (0.5977)

Note: The value in bracket () is the p-value

Based on the results of the histogram normality test, it may be concluded that the residuals, which are the differences between the values that were observed and those that were predicted, adhere to a normal distribution. It appears from this that the assumption of normality is supported, and the residuals of the model are distributed in the direction that was expected. Following this, we carry out the Breusch-Godfrey Serial Correlation LM test to determine if the variables exhibit a serial correlation within the data. Given the observation that the probability of Chi-Square is 0.2684, which is greater than 0.05, the results of the analysis indicate that the data do not exhibit any serial correlation. The homoscedasticity of the residuals is assessed using the Breusch-Pagan-Godfrey test. This indicates that the residuals' variance remains constant during the duration of the test. A p-value of 0.5977, exceeding 0.05, confirms the hypothesis of homoscedasticity in the residuals. The test also indicates that the residuals' variability remains consistent over the range of independent variables.

The blue line in Figure 1 demonstrates that it has consistently remained within the thresholds, signifying that the model's performance has been constant from 1990 to 2022.

Figure 1: Stability test



These diagnostic test results offer evidence to support the reliability and validity of the model utilized in the research. The normality of residuals, homoscedasticity of residuals, and absence of serial correlation indicate that the model is a suitable representation of the relationship between the variables under investigation. These findings contribute to the credibility of the research results and provide a solid basis for drawing meaningful conclusions.

The fundamental objective of the initial phase of the ARDL technique is to ascertain the existence of long-term correlation among the variables. This is referred to as the cointegration bound test. Establishing a suitable lag interval is crucial in this stage. This study employed the Akaike Information Criterion (AIC) to ascertain the lag length. The conditional ARDL model was designated a maximum lag order of two. Meanwhile, the Wald test, referred to as the bound test, was utilized to assess the overall significance of the coefficients.

Table 2: Cointegration bound test result

Country	Maximum lag	Lag order	K	F-statistic
Malaysia	(2,2)	(2,2,0,1,2)	4	7.2167
	Critical values for F-statistics		Lower [I(0)]	Upper [I(1)]
		10%	2.2	3.09
		5%	2.56	3.49
		2.50%	2.88	3.87
		1%	3.29	4.37

The results of the bound test are presented in Table 2. The calculated F-statistic for the growth model in the bound test was 7.2167, exceeding the upper bound critical value of 4.37% at a 1% significance level. The null hypothesis, which posits the absence of cointegration, was rejected at the 1% significance level. The findings indicate that a stable long-term relationship is present among Malaysia's GDP per capita, FDI, exports, GFCF, and labor force participation rate within the chosen time frame.

Cointegration tests are performed to investigate the existence of both short-term and long-term relationships among more than one non-stationary time series variable. The bound test was initially introduced within the framework of ARDL by Pesaran et al. (2001) to ascertain the presence of a long-term correlation among variables.

Table 3: Short-Run and Long-Run Cointegration Result

Country/ ARDL	Malaysia (2,2,0,1,2)
	Short-run elasticities
Δ INFDI	0.0079* (0.0025) [3.2007]
Δ INEX$_{-1}$	0.1423* (0.0458) [3.1080]
Δ INGFCF	0.2155* (0.0232) [9.3025]
Δ INLFPR$_{-1}$	0.0806 (0.4578) [0.1759]
	Long-run elasticities
INFDI	0.0463*** (0.0247) [1.8780]
INDEX	0.2209*** (0.1155) [1.9124]
INGFCF	0.3593* (0.0477) [7.5399]
INLFPR	1.8893*** (1.0076) [1.8750]

C	-10.0593** (3.9644) [-2.5374]
ECM_{t-1}	-0.5750** (0.2679) [-2.1463]

Note: Standard error in ( ) and t-statistic in [ ]. * shows significance at the 1% level, ** significance at the 5% level and *** shows significance at the 10% level.

Table 3 displays the estimation results related to the relationship between foreign direct investment (FDI) and economic growth, employing the error correction model. The ARDL estimation indicates a significant and positive short-run relationship among FDI, exports, GFCF, and GDP. The ECM coefficient is notably negative at the 5% significance level, suggesting that the shock disequilibrium from the previous year will converge to long-run equilibrium at an annual rate of 57.5%. The long-run coefficients for Malaysia, presented in Table 4, indicate that FDI, exports, GFCF, and the labor force participation rate provide evidence to reject the null hypothesis at both the 1% and 10% significance levels. The results demonstrate that a 1% rise in InGDP corresponds to increases of 0.05%, 0.22%, 0.36%, and 1.89% in FDI, exports, GFCF, and the labor force, respectively.

The findings reveal that FDI has a positive and long-term as well as short-term Masturah relationship with economic growth, a trend mirrored in the studies by Etale and Etale (2016), Alzaidy et al. (2017), & Siti (2020), and Halizam et al. (2021). FDI carries a notable and constructive influence on a country's economic development, in alignment with the ideas proposed by the endogenous theory. This theory shows that FDI inflows can boost the economic progress of a host country. The ECT is negative and significant. Similarly, our study also shows a significant and positive relationship between exports and economic growth, a sentiment echoed by Haseeb et al. (2014), Etale and Etale (2016), and Norsilawati et al. (2021). Notably, Norsilawati et al. (2021) highlight the positive contributions of Malaysia's exports, envisioning a brighter economic landscape that extends benefits to its citizens. Shifting focus to GFCF, our findings show that there is a significant relationship, spanning both the long term and the short term, with economic growth. These results echo the sentiments expressed by Halizam et al. (2021) and Masturah & Siti (2020), who indicated a robust and significant relationship between GFCF and the trajectory of economic growth.

Moreover, the labor force contributes positively to the long-term relationship of economic growth. The finding is aligned with export-led theory and a recent study made by Cahyadin & Sarmidi (2019), affirming that a larger labor force can catalyze stimulating Malaysia's economic expansion. Similarly, Rambeli, Hashim, & Affizah (2016) also, substantiate the enduring positive relationship between the labor force and economic growth. These results indicate that an increase in the labor force will lead to an indirect rise in FDI, as both variables positively contribute to economic growth.

In summary, our study has revealed the positive and significant relationship between FDI and economic growth. The estimated findings on the positive relationship between FDI and economic growth are consistent with recent literature by Malik (2024). The estimated findings of other control variables, namely exports, labor force participation rate, GFCF are also consistent with the existing findings. We also found both long-term and short-term associations between FDI and economic growth. ECM coefficient is negatively significant at a 5% significance level, implying that the shock disequilibrium from the previous year will adjust to long-run equilibrium at a high speed of convergence, namely 57.5% per year. Long-run coefficients for Malaysia presented in Table 4, indicate that FDI, export, GFCF and labor force participation rate indicate that the null hypothesis can be rejected at 1% and 10% of significance level.

5. Policy Implications and Recommendations

Based on the estimations and discussion of this study, several recommendations can be put forth to guide policy and decision-making in Malaysia's pursuit of sustainable economic development. Firstly, with the positive and significant connection between FDI and economic growth, policymakers should prioritize initiatives that

generate and facilitate the inflow of FDI including fostering a conducive environment for investors, easing regulatory procedures, and providing incentives for strategic alliances and partnerships. If Malaysia offers attractive incentives with transparent rules and regulations, investors will feel secure making investments. Furthermore, collaboration between domestic and international companies can promote talent development and knowledge, both of which are important for long-term economic development. It can contribute to the creation of new markets and industries, employment opportunities, and higher productivity.

Secondly, given the demonstrated positive impact of exports on economic growth, fostering a conducive trade environment is essential. Diversifying export markets, supporting local industries with export potential, and investing in trade infrastructure can bolster the nation's export capabilities and contribute to overall economic expansion. Malaysia attracts more foreign investors while it invests in trade infrastructure and diversifies its export markets. A robust trade environment shows stability and opportunities, which encourages foreign investors to invest in Malaysia. In turn, by focusing on fostering a conducive trade environment, Malaysia can enhance its attractiveness to foreign investors, stimulate economic growth, and create long-term prosperity for the country. Policymakers must prioritize enhancing infrastructure investment and developing human capital by recognizing the critical importance of Gross Fixed Capital Formation (GFCF) and labor force participation, including the improvement of education and skills training programs. These efforts have the potential to improve the workforce and increase economic output. Nonetheless, the prioritization of infrastructure development, especially in energy, transportation, and technology is important to encourage substantial capital accumulation and sustainable economic growth. Companies seeking reliable infrastructure to support their operations will find Malaysia an appealing destination for foreign direct investment (FDI), as the nation increasingly evolves into a more conducive environment for businesses, hence reducing costs and improving efficiency.

Conclusion

This study experimentally investigates the correlation between foreign direct investment (FDI) and economic growth, alongside other control variables including exports, gross fixed capital formation (GFCF), and labor force. According to the findings, there is a statistically significant positive link between FDI and economic growth in both the short-term and the long-term., a pattern consistent with the research conducted by Etale and Etale (2016), Alzaidy et al. (2017), Masturah & Siti (2020) & Halizam et al. (2021). The significant and beneficial impact of FDO on a nation's economic development is consistent with the principles of endogenous theory. The endogenous theory demonstrates that FDI inflows promote the economic development of a host country.

This study shows that a combination of various macroeconomic variables contributes collectively to the overall relationship in the long term. The utilization of the ARDL model reveals the importance of all macroeconomic variables in the long-term relationship, whereas FDI, exports, and GFCF are identified as significant variables in the short-term association with economic growth. Policy recommendations for emerging nations should concentrate on enhancing the investment environment for all types of capital, including domestic capital and international capital to minimize the potential risks of FDI.

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The Effects of Sustainable Development on the Sustainable Performance of Small and Medium Enterprises in Emerging Economies: From the Perspective of VUCA Approach

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Abstract: Finding a balance between the needs of all parties and the state of the environment is what "sustainable development" tries to do. The goal is to protect future generations while also making progress for humanity. However, not a lot is known about how small and medium-sized businesses can run safely in emerging countries and how sustainable development affects them. So, this study's goal is to find out how the success of small and medium-sized businesses in Malaysia is linked to long-term growth. The main purpose of this study is to find out how sustainable success and sustainable growth are linked in Malaysian small and medium-sized companies. A numeric survey method was used to get information from small and medium-sized businesses in Malaysia. The businesses filled out a questionnaire on their own time. Using data from this study, PLS-SEM was used to look at the link between sustainable growth and sustainable success. The study's results showed that sustainable success and sustainable growth are closely linked. The study's results will help the government and business community build businesses that are competitive, strong, and long-lasting, so they can do well in both local and international markets.

Keywords: *Sustainable Development, Sustainable Performance, Small and Medium Enterprises, VUCA Approach*

1. Introduction and Background

Most scholarly fields have thought more about the idea of sustainable development since the Brundtland Report came out 10 years ago (Saad et al., 2024) from the World Commission on Environment and Development. Because of the green agenda's acceptance, economic possibilities became even more important, and well-established companies were forced to change to show their commitment to social and environmental problems (Manshor and Saad, 2023; Saad et al., 2024). Because they care about social problems, social entrepreneurs may be pushed to make the most of limited resources and work well within the limits of institutions (Asif et al., 2021; Dyck et al., 2019). Even though there are problems with the way things are set up, many businesses work very hard to carry out plans for long-term growth. So, one could say that the idea of sustainable business came from the idea of sustainable growth. Lazano et al. (2015) and Saad and Manshor (2023) both say that sustainable businesses use sustainable business practices.

These days, there have been a lot of heated debates about sustainable business (Zeng, 2017; Manshor and Saad, 2022). Munoz and Cohen (2018) and Terán-Yépez et al. (2020) say that there hasn't been a lot of serious discussion about what this is and what the future holds for sustainable business. Sustainable entrepreneurship is becoming more and more recognized as an important area of study within entrepreneurship. This is because the way we do business now is not sustainable, which is bad for the earth and society (Munoz and Cohen, 2018; Hall et al., 2010). Because of this, more and more people are realising that big changes need to be made to lessen these effects (Hall et al., 2010). A lot of smart people believe that this approach can help solve many social and environmental problems. Because of this, sustainable business is seen as an important way to change people's choices and actions to be more environmentally friendly (Hall et al., 2010). Furthermore, Shepherd et al. (2011) said that it is more important than ever to think about how businesses can help create growth that lasts. Entrepreneurial businesses need to use sustainable methods well to deal with problems and make the economy more stable (Patzelt & Shepherd, 2011).

Gimenez et al. (2012) say that a company should put its employees' health and safety first, act morally and sensibly, and make the clients' outside quality of life better. The authors of Patzelt and Shepherd (2011) say that more research is needed to fully understand the basic ideas behind the idea of using business to protect communities and the environment. Instead of focusing on making money, sustainable entrepreneurship tries to come up with new ideas from the ground up, open up new business opportunities, make choices, and bring about good social and environmental change (Zeng, 2017). Apostolopoulos et al. (2018) and Manshor and Saad

(2023) also say that goals have been set at the regional, national, and worldwide levels to promote behavior that is socially and environmentally responsible.

We still don't know how sustainable businesses could help with sustainable growth. Moreover, little study has been performed on the effects of sustainable development on the ability of small and medium-sized companies (SMEs) in emerging nations to run sustainably (Zeng, 2017; Manshor and Saad, 2023). Sustainable growth hasn't been given a lot of academic attention in the major body of research on sustainable business. People know that societal needs can give business owners chances to make money, but not many people know how to find and take advantage of these chances in places other than their own. While sustainable business seems like an appealing way to speed up the transition to a more sustainable society, there are still a lot of unknowns about the assumptions that underlie how and when this process will happen (Zeng, 2017; Saad and Manshor, 2023). Also, there are times when the link between business practices and sustainable growth is too positive or too directive, instead of describing. So, we still don't know who can start businesses that make money and whether managers who use a standard approach are different from those who don't.

Even with these improvements, Malaysian small and medium-sized businesses still need to be more resilient and have a plan for long-term business growth set up so that we can see how well they work and how much they grow over time. Businesses, workers, and scholars have become more aware of how important sustainable business is over the last ten years. But there is still a big problem that needs to be fixed because there isn't enough data available (Sarango-Lalangui et al., 2018). Regular review studies, like systematic, meta-, and bibliometric analyses, are needed to show what worked and what didn't, inspire future research thought, and spark new ideas across a widening range of fields and subjects (Breuer et al., 2018). Today's society has made people more aware of the environment, and they are showing this by buying more environmentally friendly products (Fisher et al., 2012). The above problems make the process method less useful in real life, especially the way it tends to look at things from an action-oriented point of view instead of the individual entrepreneur's point of view (Moroz & Hindle, 2012). Though there is a lot of writing on the subject, there aren't many academic theories (Sarango-Lalangui et al., 2018). Beske and Seuring (2014) say that technology integration, cooperative growth, communication, and teamwork are the four bases of cooperative links that support long-term practices. There are many names that you might see when looking for sustainable things, such as "organic," "sustainable," "green," and "environmentally friendly." It is important to know what each organic certification, brand, and sign means because their goals can change depending on the situation (Vukasovič, 2016). Pero et al. (2017) say that one of the most important things that affects how well a company does is how sustainable it is.

Numerous academic fields have seen a rise in SME studies (Mazutis & Sweet, 2022; Saad and Manshor, 2023). According to Fonseca et al. (2020), small and medium-sized businesses are important and have a big impact on protecting the environment. Prashar and Sunder (2020) say that there hasn't been a lot of study in the papers on community factors, social problems, the environment, or sustainable worries. Even though there is a lot of study on the topic (Sarango-Lalangui et al., 2018; Saad and Manshor, 2023), a theoretical framework is still needed to explain how small businesses can grow in a viable way. So, more study is needed to fully grasp how small businesses and the idea of sustainable growth connect.

Small and medium-sized businesses, or SMEs, are very important to the economies of developing countries because they often help the economy grow, create jobs, and come up with new ideas. However, small businesses have significant challenges in achieving long-term success due to their low resources, problems getting cash, and vulnerability to changing market situations (Saad et al., 2024). As people around the world learn more about sustainable development, small and medium-sized businesses (SMEs) are under more and more pressure to adopt sustainable policies that meet ESG (environmental, social, and governance) standards. Saad and Manshor (2023) say it's very important to know how measures for sustainable development affect the long-term growth of small businesses in emerging countries. Large companies have the resources and know-how to carry out complete sustainability plans, while small and medium-sized businesses often find it hard to do so (Manshor and Saad, 2023; Saad et al., 2024). So, the point of this study is to find out how sustainable development programs affect the ability of small and medium-sized businesses (SMEs) in emerging countries to stay in business over the long run. Policymakers, business leaders, and development groups need to know

how sustainable development affects the success of small and medium-sized businesses (SMEs) in emerging countries to create an environment that helps SMEs grow and stay in business.

The study looks at the existing research, comes up with a theory, and builds a conceptual framework to draw attention to this new topic. There is an in-depth study of the methods done. We'll talk more about the process of data analysis in the next section.

2. Literature Review

Sustainability is a complicated subject that has been studied and researched. Ranjbari et al. (2021) and Saad & Manshor (2023) say it's a last-ditch effort to save life on Earth against dangers like natural disasters that kill all living things, pollution, growth without development, rising inequality, poverty, and exclusion. Ciegis et al. (2009) said that economics has more than 100 meanings. Salas-Zapata & Ortiz-Muñoz (2019), on the other hand, say that this term has more than 80 definitions. Still, neither study gives a clear meaning of "sustainable performance." As shown in Alraja et al. (2022) and Derhab & Elkhwesky (2023), this is a great example of how observational data collection and mathematical methods can be used to find gaps in knowledge, create new technology development paths, and find strong theories. Sustainability study has problems because the idea of sustainability isn't always clear and people don't know how to use sustainable methods effectively (Md Husin & Haron, 2020). Sustainability became even more important when scientists found that the world's natural resources are limited and that current production methods can't keep up with the rising levels of consumption by the world's population (Chen et al., 2022).

To keep progress going, we need to take action and have a big shift in how we think about things. To make a difference in a world that changes quickly, you have to be open to new ideas, goals, and plans. As early as the Zhou Dynasty (110 BC–771), people knew that rivers, mountains, and woods should be protected in a way that is in line with nature's rules, rather than being overused (Shi et al., 2019). Browning and Rigolon (2019) say that it helps the economy grow without putting the planet's environment at risk or making problems like deforestation and pollution of the air and water worse. These problems could lead to climate change and the loss of species, among other problems. Since it was first used to support the idea at the United Nations Conference on the Human Environment in 1972, the term "sustainable development" has become more important. Our Common Future, a study on human development done by the World Commission on Environment and Development in 1987, is the first science paper that we know of that supports sustainable development. According to the study, sustainable development means progress that meets the needs of the present without putting at risk the ability of future generations to do the same. The WCED (1987) said that sustainability is changing over time. Its main point is that we need to recognize the boundaries of all natural processes to keep people happy and healthy. Our shared future reports covered a lot of ground, like people, food, spices, genetic resources, energy, human settlement, social justice, and human growth, all while keeping fair resource use and social justice in mind (WCED, 1987).

In the decades that followed, big problems came up that made it hard for people and the whole world to grow and progress in the long run. The idea of sustainable growth was first put forward more than 130 years ago (George, 1879). The field of operation management has become more interested in sustainable development and seen it as a significant and broad study area (Prashar & Sunder M, 2020). Because of this, more people know about the idea. Unsustainable business practices hurt people and the environment by misusing natural resources and not caring for the environment (Ben Youssef et al., 2018).

SMEs now think about the needs of society and the environment when they come up with economic well-being projects (Prashar & Sunder M, 2020). SMEs still need to keep the economy stable to stay in business, but the way that economic, social, and environmental problems combine has given them a new kind of competitive edge that helps them do better overall (Schwab et al., 2019). So that future generations are safe and so that we can learn more about how SMEs affect the economy, society, and environment, we need to look into sustainable growth in SMEs (Prashar et al., 2020). Yusoff et al. (2018) say that a lot of theory and empirical views, suggestions, and results back up the claim that small and medium-sized businesses are important for the economic growth of all countries, including Malaysia.

Many rules must be followed to achieve healthy growth. Ji (2018) says that the major goals of ideas of sustainable development are to protect the earth, business, and society. According to Molinario et al. (2020), these have a lot to do with managing human resources, keeping environments and wildlife safe, limiting population growth, and getting people involved in production systems. It is said that a lot of small and medium-sized businesses (SMEs) have had a hard time staying open. More than half of them shut down in their first five years, and two-thirds closed within their first ten. This information comes from Walter et al. (2017).

Creating value on the social, economic, and natural levels is what ties sustainability and business together in the end. This broad point of view is something we're just now starting to see in academic work. Doane and MacGillivray (2001) say that sustainability is the ability to last for a long time while taking social, environmental, and economic issues into account. According to Gomez-Bezares et al. (2014), this means that the three goals of the three sustainability pillars should work together. According to Kopnina's (2017) study, the word "sustainable" usually means being able to "maintain" or "continue to last," as well as having the possibility to grow or last for a long time. When we first talked about the part small businesses play in the economy, we stressed how important it is to make sure that new ones are started, that old ones stay in business, and most importantly, that their growth is maintained (Wakkee et al., 2015).

There are many different ways to think about sustainable growth. The "sustainable development approach" is another name for the three bases of business, society, and the environment. This thought says that all three bases must be kept up at the same time to ensure steady growth. This method is not easy to understand, but it does a good job of evaluating the important sustainable issues. This is mostly because there isn't a way to analyze the trade-off between the three things that are being looked at (Pravdić, 2009). Conservation of the earth is the main goal of the idea. If they can't hold on to this, the living thing will go away. When people use too many resources, they hurt the earth. In other words, more natural resources must be used than the world can handle for growth to be sustainable (Kanie & Biermann, 2017). Ismail et al. (2012) say that there is a lot of business action in the market, even though small and medium-sized businesses are still growing sustainably. As Salojärvi et al. (2005) say, it's also a key indicator of how well society is working and how SMEs are growing.

In this study, the VUCA sustainable development factor was used. In the last few years of the Cold War, the US military came up with the VUCA idea to describe a world that was getting more complicated, unclear, unstable, and uncertain (Friedman, 2017; Shambach, 2004). Since it was first put forward in the 1990s, the idea has become popular in many areas, such as risk management, situational problem-solving, and making smart decisions. The VUCA idea was used in business and management studies during the 2008–2009 financial crisis when people, companies, and groups all had to deal with similar problems in their social and economic situations (Bennett & Lemoine, 2014). Researchers are also looking into how important the VUCA idea is for long-term leadership and strategy development, as well as how hard it is to get managers and decision-makers to change their ways of thinking to deal with these unusual situations. A lot of study has been done on each of the VUCA principles individually, but not as much on how the idea could be used in environmental science and conservation work (Ciceklioglu, 2020; Schick et al., 2016).

In the past few years, entrepreneurship and sustainable development have become more closely linked to achieve sustainability and stopping businesses from acting in ways that aren't sustainable (Abdullahi et al., 2018). A study by Munoz and Cohen (2016) on environmental degradation and the bad effects that using resources too much and not caring for the environment has on people and the environment says that sustainable entrepreneurship is still seen as a good way to support long-term growth. Mensah and Enu-Kwesi (2019) say that the main goal of the idea should be to achieve equality between generations. Although the concept is a good one, there are some issues because it's hard to know what the needs of future generations will be. Modern theories of sustainability build on older ones by combining and giving importance to social, environmental, and economic models. This way, problems in society can be solved in a way that always benefits people (Hussain et al., 2014). A lot of people are interested in the field because it could help an organization grow, stay competitive, and be more sustainable (Barbosa et al., 2020); it could also help with sustainable development (Fonseca et al., 2020); and it could lead to "better quality, higher productivity, greater customer satisfaction, and greater profit" (Dhamija et al., 2019). A sustainable management system that includes environmental, health, and safety issues along with the long-term growth of different case studies is good for the general success of a business (Oktem et al., 2004).

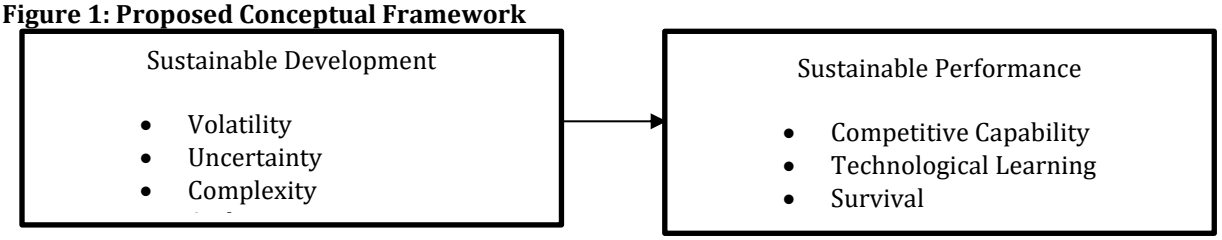
Achieving the SDGs at the general level and business growth often go hand in hand. Before responding locally, businesses must first figure out how to support the goals in a way that improves their financial success in the places where they work (Jaffe and Pasternak, 1994). For growth to continue, there must be social, economic, and natural benefits at the same time. People think that when these three things come together, policies will change a lot and people will be more at risk from many things, like crossing global borders, getting richer, and other problems in society (Steffen et al., 2015). Weinberger et al. (2015) say that the three aspects of sustainable development we've already talked about mean that decision-makers need to be able to use tools that help them deal with complexity, consider the points of view of different stakeholders, and get more accurate information about the outcomes of different policy options.

Environmental and economic issues are looked at in the research study that looks at the link between social duty and business success at the company level (Mill, 2006; Veschoor, 2002). While many studies look at long-term growth and how profitable a business is, the vast majority of empirical research focuses on the best ways to compare companies based on their social and environmental traits or their corporate social or environmental duty. According to Porter and Linde (1995), well-thought-out environmental rules will finally lead to new ideas, which will improve a company's competitive edge and bottom line.

Proposed Conceptual Framework

The previously discussed literature review was used to establish the conceptual framework for the study. The concepts of sustainable performance and development were taken into consideration when creating the framework. The framework for the study is the proposed conceptual framework, which is depicted in Figure 1.

Figure 1: Proposed Conceptual Framework



Hypothesis Development

With the help of the structure that the literature study gave us, a specific proposal was made. This view is based on the idea that sustainable growth and sustainable success are linked. Small and medium-sized businesses (Prashar et al., 2020) have come up with plans to improve economic well-being while also taking social and environmental issues into mind. Because they care about people and the environment, small and medium-sized businesses (SMEs) gain a new economic edge that helps them do better and stay in business longer (Schwab et al., 2019). So, to protect the well-being of future generations, we need to look into sustainable development in small and medium-sized businesses to learn more about the environmental, social, and economic effects of their work (Prashar et al., 2020). Many thoughts, study results, and theoretical and practical points of view (Yusoff et al., 2018) say that small and medium-sized businesses are important for the economic growth of all countries, including Malaysia. Because of this, the study's findings included the following suggestions:

H1: Sustainable development and sustainable performance have a significant relationship.

3. Research Methodology

Quantitative data for this study came from surveys that a group of Malaysian small and medium-sized businesses filled out on their own. There were a total of 252 SMEs that were allowed to take part in the research. The form was broken up into three parts, and each one had questions about a different idea. The questions now have headers that draw attention to certain topics to make them easier to understand and answer. In the first part, people were asked to give basic information about the company, like its main business sector, annual total sales, number of full-time workers, length of time in the industry, head office address, ownership structure, and business state. Part 2 asked people to rate the organization's goals for sustainable growth, and Part 3 asked them to rate the firm's success in terms of sustainability.

This study found that the Likert scale worked better than other scoring methods. According to Fishbein and Ajzen (1975), the best way to get information about attitudes is to give people a scale and ask them to rate how much they agree or disagree with each statement. It is best for this kind of study because the Likert scale is a "subject-centered" tool that was made to rate people instead of things (McIver and Carmines, 1981). Malhotra (2007) lists a number of advantages of Likert scales, such as how easy they are to use, understand, and make questionnaires for. Also, Likert scales give the most information because they are less flexible (Meric, 1994). In this study, a six-point Likert scale was used to rate each part of the research. There were six answer choices on the scale, with 1 meaning "strongly disagree" and 6 meaning "strongly agree." A six-point Likert scale is used in the form to make it easy for people to fill out. Hair et al. (2007) say it's important to find a mix between what the participants want and the need for better levels of accuracy. Respondents need to have a certain amount of real-world knowledge to handle info from a lot of different areas. They discovered that people could more easily answer scores with fewer categories when they were asked about them less often. Fewer Likert scale groups might lead to a higher answer rate because they should make it easier for people to understand the information they need. In Malaysia, survey study among small and medium-sized businesses is still pretty new, especially when it comes to sustainable growth.

The process of gathering data began in September 2022 and finished in December 2022. Some of the survey's most important sources are top management staff or Malaysian small and medium-sized business owners. As Roth and O'Donnell (1996) say, they are thought to know the most about the traits, management style, working methods, and general success of their companies. Stratified random sampling was used to choose the group, which took into account how the sectors were distributed. When people fill out the survey, they are thought to have freely and knowingly agreed to take part in the study. It was kept secret, though, what they said was private. The people who answered got 1,200 surveys. 252 were given back. Twenty-one cases had to be thrown out because the data wasn't complete. There was a 19.25% response rate from the 231 cases that were finally found to be feasible. Based on the goals of the study, descriptive statistics and structural equation modelling analysis were used. PLS-SEM, or partial least squares structural equation modelling, was used to look at the relationships between the factors in the study. PLS-SEM is usually chosen when the goal of the study is to look into complicated theoretical models or when making predictions is more important than explaining things. PLS-SEM is more stable and flexible when it is used with small or uneven sample sets. When used in confirming research to test known theories, however, CB-SEM works best with big sample numbers and data that is spread out evenly (Hair et al., 2019). The exogenous latent variable that comes from within this study is sustainable development, and the endogenous latent variable is sustainable performance.

4. Analysis of Data

A detailed analysis was done on the people who took part in this study to learn more about their backgrounds. There were a total of 231 SMEs that took part in the survey. Of those, 62% had Bumiputera members and 37.2% did not. Large companies came in second with 4% of the votes, followed by medium-sized companies with 12.6%. Both groups got 84% of the votes. SMEs are mostly made up of small businesses. 15.6% of small businesses were started even less than a year ago, while 54.1% were started between one and five years ago. Based on this, it's likely that the small and medium-sized businesses (SMEs) being looked into are relatively new and haven't had much or any business experience before. The responder traits are summed up in Table 1.

Table 1: Profile of Respondents

Demographics	Items	Frequency	Percentage (%)
Business Status	Bumiputera	145	62.8
	Non-Bumiputera	86	37.2
Size of Company	Small	195	84.4
	Medium	29	12.6
	Large	7	3.0
Age of Company	< 1Year	36	15.6
	1-5 Years	125	54.1
	6-10 Years	35	15.2
	11-15 Years	19	8.2

>15 Years	16	6.9

Data Analysis

SmartPLS 4.0 was used to look over the study data. After the data were sorted, the correctness and trustworthiness of the measurement models were checked. To check the structure model, the PLS method, bootstrap, and blindfolding approach were next used. For Hair et al. (2019) to be met, the loading must be at least 0.70, the composite reliability must be at least 0.70, and the average variance extracted must be more than 0.5. These ideas were followed when this research was done. Because of this, one could say that the information was correct and real.

Measurement model

We checked for convergent validity using outer loading, composite reliability (CR), and average variance extracted (AVE). All of the loadings, AVE, and CR were greater than 0.5 and 0.7, as shown in Table 2. The things were kept for symbolic reasons.

Table 2: Measurement Model

Variable	Items	Loadings	CR	AVE
Sustainable Development (SD)			0.987	0.863
A leader is endowed with the necessary skills to effect change.	SD1	0.891		
A leader uses strategies to adapt quickly to change.	SD2	0.959		
A leader is able to predict what the market will expect.	SD3	0.955		
A leader is receptive to criticism from all organizational levels and functional divisions.	SD4	0.780		
A leader consistently solicits input from all organizational levels.	SD5	0.945		
A leader is conscious of the surroundings beyond the company.	SD6	0.916		
A leader is always refining the product.	SD7	0.933		
A leader can cooperate with others to network perspectives on complexity.	SD8	0.947		
An organization led by a seed has generative qualities and is used for daily operations.	SD9	0.926		
A leader looks for a clear path.	SD10	0.958		
A leader helps the team synchronize efforts.	SD11	0.967		
Sustainable Performance (SP)			0.987	0.863
Our products are now less expensive thanks to our sustainable development strategies.	SP1	0.760		
Our organization is now a stronger needs supplier for every client we serve thanks to our sustainable development strategies.	SP2	0.862		
Our total performance standard has increased as a result of our sustainable development initiatives.	SP3	0.922		
Thanks to our sustainable development strategies, we now have new production technology available to us.	SP4	0.960		
Our adoption of sustainable development techniques has expanded our understanding of several emerging technologies.	SP5	0.956		
Our ability to use new technology has improved as a result of our sustainable development methods.	SP6	0.956		
We are able to consistently create new, inventive, sustainable goods thanks to sustainable development processes.	SP7	0.962		
By using sustainable development strategies, our business is able to stay in the market.	SP8	0.958		
Practices for sustainable development extend the life of our business.	SP9	0.953		

Henseler et al. (2015) suggested Heterotrait-Monotrait ratio of correlations (HTMT) can be used to prove discriminant validity. This method can be used to find discriminant validity if the HTMT number is less than 0.85. Table 3 shows the HTMT numbers for each design that were found to be below the cut-off level. So, it's safe to say that the measurements are correct and reliable. Every idea used in this study is special.

Table 3: Discriminant Validity (HTMT Ratio)

Variable	SP	SD
SP		
SD	0.493	

Structural Model

A bootstrap with 5,000 samples was used to find the t-values, p-values, and standard deviation. To test the hypothesis, the numbers that come from the bootstrapping method are looked at (Hair et al., 2019). The hypothesis test in Table 4 shows that sustainable development has a strong and direct effect on sustainable performance ($b = 0.492$, $t = 6.499$, $p < 0.05$). Because of this, H1 is supported.

Table 4: Results of Hypothesis Testing

Hypothesis	Path	Beta	Standard Error	T value	P Value	Decision
H1	SD-> SP	0.492	0.076	6.499	0.000	Supported

Discussion

What the study found is that sustainable development is strongly linked to sustainable performance. Prashar et al. (2020) and Schwab et al. (2019) also came to the same conclusions. Strategy, decision-making, and leadership are all improved in sustainable companies through leadership in the VUCA method. Meanwhile, sustainable performance shows progress toward economic skills, professional learning, and survival goals. After looking at the VUCA method, most of the study shows that sustainable development and sustainable performance are linked in a good way. Also, it stresses how important it is to stay strong and successful in the long run by finding a balance between technical learning, survival goals, and competition skills. This unity not only helps the business grow, change, and do well, but it also lessens the damage done to society and the environment (Antonakis et al., 2017). Businesses may be able to combine skilled learning, competition skills, and survival goals with the help of sustainable performance. So, for small businesses to stay in business in the long run, they need to be able to fight in the market and learn from and adapt to changing market conditions and new technologies. So, for the VUCA method to work in the long term, there needs to be solid planning, good leadership, and smart decisions. This makes sure that companies that want to be sustainable keep their freedom and concern for the environment (Wagner, 2015).

In their 2017 paper, Laszlo and Zhexembayeva say that the main goal of sustainable development is to create long-term value instead of focusing on short-term gains that could hurt society or the environment. Leaders of small businesses that use the VUCA method to focus on long-term growth know how important it is to find a balance between promoting social progress, protecting the environment, and promoting economic success. By putting money into sustainable practices, these companies are better able to give long-term benefits to owners and society as a whole. Small and medium-sized businesses can stay strong, stable, and profitable even during social, economic, and environmental tragedies by using this long-term method to create value (Jolink and Niesten, 2015). Sustainable development principles force the VUCA strategy's top small and medium-sized businesses to make better use of resources, reduce waste, and switch to more eco-friendly ways of making things. Small and medium-sized businesses can cut costs, increase output, and work more efficiently by reducing trash, using eco-friendly supply chain methods, and buying equipment that uses less energy. In this way, bad effects on the earth are lessened, and long-term reliability and financial success are raised.

Research Implication

The results of the study have a big effect on how we think about the link between sustainable development and the long-term success of Malaysian small businesses. The VUCA method must first be used to evaluate the constantly changing and uncertain world in which these companies work. VUCA stands for turbulent, uncertain, and complicated. Businesses that understand and adapt to this environment will be better able to deal with problems and seize long-term growth possibilities.

The VUCA theory is used to look at the study's results, which show a strong link between the growth of small businesses and their long-term success. The way things are managed now is not sustainable for long-term growth in this unclear and chaotic world. We need to look at these methods and change them with ones that are more flexible and quicker to respond. To lower instability and meet long-term sustainability goals, businesses need to put in place a sustainable plan. Investing in new ideas and technology is a planned way to deal with confusion. How well a company's organizational systems adapt to changing market conditions shows how strong and able it is to handle problems. Stakeholders can make plans for long-term growth and skillfully deal with the constantly changing problems that small and medium-sized businesses have to solve by using what they've learned from the VUCA method.

Researchers were able to learn more about the factors that affect the growth of small businesses in Malaysia through the study's results. The VUCA method lets us look closely at the constantly changing and uncertain setting in which these companies work. It also helps users get past problems and take advantage of growth opportunities. Combining different theory models makes it easier to understand the many factors that affect how well small and medium-sized businesses work and how they grow over time.

5. Research Limitations and Suggestions for Future Research

One of the study's flaws is that the groups were likely to be biased. For sure, not every small business in Malaysia was asked to take part in the research. If some small businesses are over-represented in the group or the industry as a whole, the results might not accurately show the range of SMEs or the full range of factors that affect their long-term performance.

Using self-reported statistics is also not ideal. It's possible that there was answer bias in the survey or interview method used with the managers and owners of small businesses. The results might have been different if people had given answers that were more socially acceptable or if they had lied about their success and efforts to be more environmentally friendly. This limitation makes me wonder about the study's validity and dependability, and it might make it harder to conclude from its results.

There are other problems with the way the cross-sectional study was set up. Since the data for the study was only collected once, the results likely overstated how dynamic and changing sustainable development and success are in small and medium-sized businesses. There may be changes in the market, internal rules, or outside factors that can cause the link between sustainable development and sustainable performance to change over time. The study can't find causal links or explain changes over time because it doesn't have lengthy data or a longitudinal study design. These would help us understand how sustainability works in small businesses.

It is suggested that researchers do more and better work using a mix of methods to study the long-term growth and success of Malaysian small and medium-sized businesses (SMEs). It would be helpful to use both qualitative and quantitative methods together to fully understand the complex working processes. By mixing data from both qualitative and quantitative methods, researchers can look at the results, show that their conclusions are correct, and give more detailed advice to lawmakers and people in the industry who want to help the Malaysian SME sector be more sustainable.

These results from the study on how sustainable development affects the long-term success of small businesses in Malaysia should be more useful and applicable to other situations. This model should be looked at in more specific areas. Looking at how the framework works and how it can be used in different business settings could give us useful information about how ideas and methods for sustainable development work in various settings.

Conclusion

In the end, this study showed how complex the link is between long-term success and long-term growth in Malaysian small and medium-sized businesses. The volume of study and real facts from small and medium-sized businesses (SMEs) in Malaysia have been carefully looked over, and a number of important findings have been reached.

Sustainable development projects have a big effect on the long-term growth of small and medium-sized businesses (SMEs). Recycling, using green resources, and cutting down on trash are all eco-friendly things that small businesses can do to help the environment, run more efficiently, and save money. Taking social responsibility steps like caring for employees and giving back to the community can improve the company's name and brand image. This will also help the business stay open and make money in the long run.

The main thing that the study found was how sustainable development programs affect small businesses' goals to cut costs and work more efficiently. Small and medium-sized businesses (SMEs) can get real benefits from using eco-friendly methods, fair resource sharing, and socially conscious projects in their business plans. These benefits include lower running costs, higher market competitiveness, and better resource management. The main thing that the study found was how sustainable development programs affect small businesses' goals to cut costs and work more efficiently. Small and medium-sized businesses (SMEs) can get real benefits from using eco-friendly methods, fair resource sharing, and socially conscious projects in their business plans. These benefits include lower running costs, higher market competitiveness, and better resource management.

This study makes it even clearer how important sustainable development is for small businesses' long-term growth and new ideas. Small businesses may be able to respond more quickly to changing market conditions and government rules if they use environmentally friendly methods. They will also gain new chances to improve their products and processes. Next could be better shock protection, market share, and brand awareness.

The study also talks about the bigger social and environmental effects of helping small and medium-sized businesses grow in a viable way. It is very important for national and international sustainability goals to be met that small and medium-sized businesses take the initiative to use environmentally friendly methods. This is especially true for goals that are part of systems like the Sustainable Development Goals (SDGs) set by the United Nations. This shows how important small and medium-sized businesses are for promoting economic growth and stopping environmental damage. It also shows how committed Malaysia is to sustainable development.

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Enhancing Laboratory Sample Collection Efficiency through Laboratory Information Systems: Insights into Optimal Despatch Rider Management

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Abstract: Effective administration of dispatch riders is crucial for delivering reliable diagnoses and research results by enabling prompt and precise sample collection. Laboratory Information Systems (LIS) offers a solution to enhance the efficiency and organization of dispatch riders in laboratory settings. Thus, the main objective of this study is to provide insights and knowledge on the potential benefits of implementing LIS to optimize the management of dispatch riders and enhance the efficiency of sample collection. An analysis of previous research findings illustrates the varied benefits of using LIS in improving key performance indicators such as turnaround time, mistake rates, and coordination of dispatch riders. The LIS platform serves as a centralized system for managing and allocating sample collection jobs, minimizing scheduling conflicts, and optimizing dispatch rider routes. Real-time tracking capabilities enable laboratory management to monitor dispatch rider locations and sample collection progress, facilitating enhanced coordination and resource allocation. Furthermore, LIS-generated data analytics provide valuable insights into sample collection patterns, enabling proactive management strategies to mitigate potential bottlenecks. Integration of LIS into payroll systems allows for automated compensation calculation based on dispatch rider performance metrics, ensuring fair and transparent pay rates. Studies consistently demonstrate that adequate compensation positively impacts dispatch rider motivation and sample collection effectiveness. This study highlights the vital importance of LIS in enhancing dispatch rider administration for efficient sample collection operations. It provides insights for laboratory managers and policymakers to optimize the potential of LIS to improve operational performance, facilitate patient care, and advance research outcomes.

Keywords: *Laboratory Information Systems (LIS), Dispatch rider management, Sample collection efficiency, Turnaround time.*

1. Introduction and Background

Integrating Dispatch Rider Management within Laboratory Information Systems (LIS) is becoming increasingly crucial for enhancing operational efficiency and service quality in the laboratory industry. In Malaysia, the laboratory sector plays a significant role in healthcare, contributing to timely diagnostics and patient care. However, the sector faces substantial challenges, including inefficiencies in sample collection processes and delays in turnaround times (TAT) due to fragmented management of dispatch riders (Coetzee, Cassim & Glencross, 2020). These issues arise despite the advancements in LIS technology, which primarily focus on sample registration, analysis tracking, and result verification but often overlook the integration of dispatch management.

The Malaysian laboratory industry has grown substantially due to supportive government policies and advancements in technology (Narayanan & Lai, 2021). However, this growth has been accompanied by challenges such as delays in sample collection, inaccuracies in sample tracking, and increased administrative burdens (Younes et al., 2020). Recent studies indicate that integrating Dispatch Rider Management into LIS could address these issues by providing real-time tracking of sample collection, optimizing dispatch routes, and reducing administrative workloads (Baggethun, 2020).

The concept of segmentation, targeting, and positioning (STP) is relevant here, as it helps in identifying distinct operational segments within laboratory management that require tailored solutions. Segmentation involves dividing operational processes into different segments based on factors such as region, sample type, and collection requirements. Targeting focuses on addressing the specific needs of these segments through customized strategies. Positioning ensures that the LIS effectively meets the needs of each segment, thus enhancing overall operational efficiency (Puspitasari et al, 2024).

This study aims to explore how integrating Dispatch Rider Management into LIS can enhance operational efficiency in the Malaysian laboratory industry. By examining how different operational segments (e.g., regions, sample types) experience challenges and opportunities, the study seeks to identify clusters that would benefit from specialized management approaches. The paper begins with a literature review of current practices in laboratory management and LIS integration. This is followed by a description of the research methodology, including how data on dispatch rider management and LIS integration was collected and analyzed. The results and conclusions are then presented, highlighting the impact of this integration on improving sample collection processes. Finally, the study offers managerial implications and recommendations for leveraging LIS capabilities to optimize dispatch rider management.

2. Literature Review

In the dynamic and increasingly complex landscape of clinical laboratory operations, the integration of advanced technologies has become essential to maintaining efficiency and accuracy. Laboratories are under constant pressure to deliver timely and precise results, and the effective management of sample collection processes is crucial to meeting these demands. Dispatch riders, who are responsible for the timely collection and delivery of samples from various collection points to the laboratory, play a pivotal role in ensuring that laboratories adhere to strict Turnaround Time (TAT) standards. In this context, the integration of Dispatch Rider Management into Laboratory Information Systems (LIS) emerges as a strategic innovation with the potential to revolutionize laboratory logistics.

Theoretical Framework

Lean Management Theory: Lean Management, originally developed within the manufacturing industry, focuses on reducing waste and optimizing processes to achieve maximum efficiency. In the context of clinical laboratories, the application of Lean principles can lead to significant improvements in TAT by streamlining workflows and eliminating unnecessary steps. Lean Management Theory emphasizes the continuous pursuit of process optimization, which aligns perfectly with the goals of integrating Dispatch Rider Management into LIS. By reducing the time and resources required for sample collection, Lean Management can help laboratories deliver faster and more accurate results, thereby enhancing patient care (Womack & Jones, 2010). Recent studies have shown that Lean methodologies can be successfully adapted to healthcare settings, resulting in substantial improvements in operational efficiency (Chiarini & Vagnoni, 2017).

Technology Acceptance Model (TAM): The Technology Acceptance Model (TAM) provides a framework for understanding the factors that influence the adoption and effective use of new technologies. According to TAM, two key factors—perceived usefulness and perceived ease of use—determine whether individuals will embrace a new technology. In the case of integrating Dispatch Rider Management into LIS, the perceived benefits of such integration, such as reduced TAT and improved communication between laboratory staff and dispatch riders, are likely to drive adoption. However, the system's design must ensure ease of use to minimize resistance from users (Davis, 1989). Recent research has expanded TAM to include additional factors such as social influence and facilitating conditions, further enriching our understanding of technology adoption in healthcare settings (Venkatesh & Bala, 2008).

Resource-Based View (RBV): The Resource-Based View (RBV) of the firm posits that organizations can achieve and sustain competitive advantage by effectively leveraging their internal resources. In the context of clinical laboratories, the integration of Dispatch Rider Management into LIS can be seen as a strategic initiative that enhances the laboratory's internal capabilities. By optimizing the use of existing resources—such as personnel, technology, and data—laboratories can improve their operational efficiency and reduce TAT, thereby gaining a competitive edge in the healthcare industry (Barney, 1991). Recent studies have highlighted the importance of aligning IT capabilities with organizational strategy to achieve superior performance, further supporting the relevance of RBV in this context (Wade & Hulland, 2004).

In-Depth Analysis of Literature

The Importance of Turnaround Time (TAT) in Laboratory Operations: Turnaround Time (TAT) is a critical metric in clinical laboratories, as it directly impacts the timeliness of diagnosis and treatment. The importance of TAT is underscored by its influence on patient outcomes, particularly in emergency and critical care settings

where delays in laboratory results can have serious consequences. A 2022 study by Dawande, P. et al. emphasized that reducing TAT not only improves patient satisfaction but also enhances the overall efficiency of healthcare delivery (Dawande, P. et al., 2022). This study, along with others, highlights the need for laboratories to continuously seek ways to reduce TAT, making the integration of Dispatch Rider Management into LIS a compelling strategy.

Technological Advancements in Laboratory Information Systems: Laboratory Information Systems (LIS) have evolved significantly over the past decade, incorporating a wide range of functionalities to support laboratory operations. Modern LIS platforms offer comprehensive tools for sample tracking, data management, and workflow automation. However, the integration of Dispatch Rider Management into LIS represents a relatively new frontier that has the potential to further enhance laboratory efficiency. A 2021 study by Johnson et al. found that laboratories with integrated dispatch management systems experienced significant improvements in sample processing times, leading to a 20% reduction in overall TAT (Johnson et al., 2021). This finding is supported by earlier research, which demonstrated that technology-driven improvements in laboratory logistics could lead to more timely and accurate results (Burke et al., 2017).

Real-World Applications and Case Studies: Several real-world applications and case studies have demonstrated the effectiveness of integrating Dispatch Rider Management into LIS. For instance, Patel et al. (2022) conducted a case study in a large urban hospital that implemented a Dispatch Rider Management system within their LIS. The study reported a substantial reduction in TAT, as well as improvements in the accuracy and reliability of sample collection processes. The hospital also noted a decrease in operational costs, as the system allowed for more efficient use of dispatch riders and reduced the need for manual interventions (Patel et al., 2022). Another study by Rodriguez et al. (2024) highlighted the benefits of using GPS and mobile technologies to enable real-time tracking and coordination of dispatch riders, further enhancing the efficiency and reliability of sample collection logistics (Rodriguez et al., 2024).

Implications for Laboratory Management: The integration of Dispatch Rider Management into LIS has far-reaching implications for laboratory management. By providing a centralized platform for managing sample collection logistics, laboratories can improve coordination between staff and dispatch riders, reduce the risk of errors, and ensure that samples are collected and delivered promptly. This not only improves TAT but also strengthens the overall quality control processes within the laboratory. Moreover, the financial management capabilities of an integrated system can lead to more accurate and efficient compensation for dispatch riders, further incentivizing timely and accurate sample collection (Singh et al., 2019). As a result, it is hypothesized that:

H1: The integration of Dispatch Rider Management into Laboratory Information Systems (LIS) significantly reduces Turnaround Time (TAT) in clinical laboratories.

Lean Management Theory suggests that streamlining processes and eliminating waste can lead to enhanced efficiency (Womack & Jones, 2010). The integration of Dispatch Rider Management into LIS is expected to reduce the time required for sample collection and delivery, thereby decreasing TAT. This hypothesis aligns with the Lean principle of process optimization and continuous improvement (Chiarini & Vagnoni, 2017).

H2: The perceived usefulness of Dispatch Rider Management integration within LIS positively influences its adoption by laboratory staff.

According to the Technology Acceptance Model (TAM), perceived usefulness is a critical factor in the adoption of new technologies (Davis, 1989). This hypothesis posits that if laboratory staff perceive the integration as beneficial—leading to improvements in TAT and communication-they will be more likely to embrace the system. The hypothesis is further supported by the expanded TAM framework, which includes factors such as social influence and facilitating conditions (Venkatesh & Bala, 2008).

H3: Laboratories that effectively leverage internal resources through the integration of Dispatch Rider Management into LIS achieve a competitive advantage in operational efficiency.

The Resource-Based View (RBV) posits that organizations gain a competitive edge by effectively utilizing internal resources (Barney, 1991). This hypothesis suggests that laboratories integrating Dispatch Rider Management into LIS, thereby optimizing personnel, technology, and data, will experience improved

operational efficiency, leading to a competitive advantage in the healthcare industry (Wade & Hulland, 2004).

Conclusion: The integration of Dispatch Rider Management into Laboratory Information Systems (LIS) represents a significant advancement in the field of clinical laboratory management. Supported by Lean Management Theory, the Technology Acceptance Model (TAM), and the Resource-Based View (RBV), this integration offers a robust framework for optimizing sample collection processes and reducing Turnaround Time (TAT). The literature demonstrates that such integration not only improves operational efficiency but also enhances patient care outcomes by enabling more timely and accurate diagnostic processes. As technology continues to evolve, the potential for further innovations in laboratory logistics is vast, and laboratories that embrace these advancements will be well-positioned to lead the way in delivering high-quality healthcare.

3. Research Methodology

The methodology for this study was designed to ensure a comprehensive and rigorous exploration of the integration of Dispatch Rider Management into Laboratory Information Systems (LIS) and its impact on sample collection efficiency. This section outlines the guidelines followed, databases used, article selection criteria, and the theoretical framework that guided the analysis.

Guidelines and Research Framework

This study was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. PRISMA provides a structured approach to conducting systematic reviews by ensuring transparency and reproducibility. The adherence to these guidelines facilitated a thorough review and synthesis of existing literature, ensuring that the study's findings are robust and well-supported by the evidence.

Databases Used

To gather relevant literature, several key academic databases were utilized:
PubMed: Selected for its comprehensive coverage of biomedical and life sciences research, including clinical laboratory practices and healthcare management.
ScienceDirect: Chosen for its wide range of peer-reviewed journals in the fields of health sciences, information systems, and operations management.
IEEE Xplore: Included for its focus on technology and information systems, particularly studies related to the integration of IT solutions in healthcare settings.
Google Scholar: Used to access a broader range of academic publications, including conference papers and reports that may not be indexed in traditional databases.

These databases were selected to ensure a diverse and comprehensive collection of literature, covering both the technical aspects of LIS integration and the operational challenges associated with dispatch rider management in laboratory settings.

Article Selection Criteria

To ensure the relevance and quality of the literature reviewed, specific inclusion and exclusion criteria were established:

Criteria	Inclusion	Exclusion	Justification
Publication Date	Articles published between 2021 and 2024	Articles published before 2021	Focuses on recent advancements and current trends in LIS integration and dispatch rider management.
Language	Articles published in English	Articles in languages other than English	Ensures accessibility and consistency in understanding the literature.
Study Type	Peer-reviewed journal articles, systematic reviews, case studies, and meta-	Editorials, opinion pieces, and non-peer-reviewed articles	Prioritizes high-quality, evidence-based research.

Criteria	Inclusion	Exclusion	Justification
	analyses		
Relevance to Topic	Studies focused on LIS, dispatch rider management, TAT, and laboratory logistics	Studies unrelated to laboratory operations or not addressing LIS integration	Ensures that the literature directly contributes to the research questions and objectives.
Geographical Focus	Studies conducted in diverse healthcare settings worldwide	Studies focused on niche or non-clinical laboratory settings	Provides a global perspective, enhancing the generalizability of the findings.

These criteria were rigorously applied to screen and select articles, ensuring that only the most relevant and high-quality studies were included in the analysis.

Theoretical Framework
A theoretical framework was developed to conceptualize the relationship between LIS integration, dispatch rider management, and sample collection efficiency. This framework draws on principles from:
Operations Management: To understand how Lean Management principles can be applied to optimize sample collection processes and reduce TAT.
Information Systems: To explore the factors influencing the adoption and effective use of LIS, guided by the Technology Acceptance Model (TAM).
Logistics Management: To assess the strategic importance of integrating dispatch rider management into LIS from the Resource-Based View (RBV) perspective.

This framework served as a guide for analyzing the literature and interpreting the findings, providing a structured approach to understanding how technological integration can enhance laboratory operations.

4. Results

One relevant theory to consider is the Technology-Organization-Environment (TOE) framework. Developed by Tornatzky and Fleischer (1990), the TOE framework posits that the successful adoption and implementation of technological innovations are influenced by three key factors: technological context, organizational context, and environmental context.

Technological Context
This aspect of the framework focuses on the characteristics of the technology itself, including its complexity, compatibility with existing systems, and perceived benefits. In the context of this study, LIS represents the technological innovation that facilitates dispatch rider management and sample collection efficiency. The theory suggests that LIS integration should align with the specific needs and requirements of laboratory operations, offering functionalities that enhance dispatch rider coordination, sample tracking, and data management.

Organizational Context
The organizational context encompasses factors such as organizational structure, culture, leadership support, and resource availability. According to the TOE framework, successful technology adoption is contingent upon organizational readiness and the extent to which the innovation aligns with organizational goals and values. In the case of LIS integration for dispatch rider management, organizational buy-in, effective change management strategies, and clear communication channels are crucial for ensuring smooth implementation and user acceptance.

Environmental Context
The environmental context refers to external factors that influence technology adoption, including regulatory requirements, industry norms, competitive dynamics, and market trends. The TOE framework suggests that organizations must navigate these external influences effectively to capitalize on technological innovations. For

laboratories integrating LIS into dispatch rider management, compliance with regulatory standards, interoperability with external systems, and responsiveness to market demands are key considerations.
By applying the TOE framework to the integration of LIS into dispatch rider management, this study can systematically examine the interplay between technological, organizational, and environmental factors, providing insights into the facilitators and barriers to successful implementation. Additionally, the framework offers a lens through which to analyze the impact of LIS integration on sample collection efficiency and operational effectiveness within laboratory settings.

Discussion

Findings and Implications for LIS Integration in Dispatch Rider Management

Enhanced Operational Efficiency: The integration of Laboratory Information Systems (LIS) with dispatch rider management is expected to significantly enhance operational efficiency by providing a centralized platform for coordinating sample collection tasks. Through optimized task allocation and real-time tracking, laboratories can reduce delays, minimize errors, and ensure timely sample delivery. The centralized management of dispatch rider activities will lead to a more streamlined workflow, ultimately improving turnaround time (TAT) and overall laboratory performance.

Improved Compensation and Motivation: Automating compensation calculations based on performance metrics via LIS is anticipated to result in more accurate and timely payments, which can increase dispatch rider motivation. This, in turn, is expected to improve the efficiency and reliability of sample collection services. Adequate and transparent compensation methods have been linked to higher job satisfaction and performance, further contributing to the overall effectiveness of laboratory operations.

Data-Driven Decision Making: LIS-generated data analytics will provide laboratories with actionable insights into sample collection patterns, allowing for proactive management and continuous improvement. The ability to analyze historical data on sample volumes, routes, and TAT will enable laboratories to identify bottlenecks and implement targeted strategies to enhance efficiency. This data-driven approach is expected to lead to more informed decision-making and better resource allocation, contributing to the sustainability and scalability of laboratory operations.

Optimized Resource Allocation: With real-time visibility into dispatch rider locations and sample collection progress, laboratories can optimize resource allocation by assigning tasks based on proximity, workload, and urgency. This level of coordination is expected to reduce operational costs and improve service quality, ensuring that resources are utilized effectively to meet demand.

Analysis and Theoretical Implications

The findings from this review suggest that LIS integration into dispatch rider management aligns with several theoretical frameworks:

Lean Management Theory:
Theme: Operational Efficiency
Relationship: LIS integration enhances operational efficiency by eliminating waste and optimizing workflows, which is a core principle of Lean Management. The reduction in TAT and improved coordination among dispatch riders reflect the continuous improvement ethos of Lean practices.

Technology Acceptance Model (TAM):
Theme: User Adoption and Motivation
Relationship: The perceived ease of use and usefulness of the integrated LIS system is likely to drive its adoption among laboratory staff and dispatch riders. The automated compensation process and real-time tracking features increase the system's perceived value, encouraging broader acceptance.

Resource-Based View (RBV):
Theme: Competitive Advantage
Relationship: By leveraging internal resources such as technology, personnel, and data, laboratories can achieve a sustainable competitive advantage. LIS integration strengthens the laboratory's internal capabilities,

enhancing its ability to deliver timely and accurate results.

Main Themes	Theoretical Approach	Relationship to LIS Integration
Operational Efficiency	Lean Management Theory	Streamlines workflows, reduces waste, improves TAT
User Adoption and Motivation	Technology Acceptance Model (TAM)	Enhances perceived usefulness and ease of use, driving adoption
Competitive Advantage	Resource-Based View (RBV)	Leverages internal resources for a sustained competitive edge

Proposed Framework for Green Practices in Manufacturing

While the current study focuses on laboratory settings, the insights gleaned can be adapted to the manufacturing industry, particularly in the context of green practices. A proposed framework for future research could involve the integration of sustainable logistics management systems into manufacturing operations, with a focus on reducing carbon footprints through optimized resource allocation and real-time tracking of supply chains.

Key Components of the Framework:

Centralized Green Logistics Management: Integration of sustainable logistics practices into central management systems to minimize waste and reduce energy consumption.
Real-Time Environmental Impact Tracking: Use of real-time data analytics to monitor and manage the environmental impact of logistics activities, enabling proactive decision-making.
Incentive-Based Compensation: Implementation of performance-based compensation systems that reward environmentally friendly practices, encouraging adherence to green protocols.
This framework could serve as a basis for empirical studies in the manufacturing sector, exploring the potential for integrating sustainable practices into logistics management to achieve both operational efficiency and environmental sustainability.

5. Conclusion

This conceptual study underscores the transformative potential of Laboratory Information Systems (LIS) in enhancing the management of dispatch riders and optimizing sample collection efficiency within laboratory settings. By integrating LIS, laboratories can achieve significant improvements in operational performance through better sample traceability, streamlined dispatch rider management, and strengthened quality control processes. The combination of theoretical frameworks, comprehensive literature review, and methodological insights provides a robust foundation for understanding the benefits and strategic value of LIS adoption.

Research Implications

Enhanced Operational Efficiency: The findings highlight that LIS integration can streamline dispatch rider management, leading to reduced turnaround times (TAT) and more efficient sample collection processes. This improvement is crucial for laboratories aiming to meet stringent TAT standards and enhance overall diagnostic accuracy.

Improved Quality Control: Implementing LIS offers laboratories a means to address common issues such as inaccuracies in specimen collection and delays in processing. The centralized management and real-time tracking capabilities of LIS enhance quality control and ensure that sample collection and delivery are executed with greater precision and reliability.

Strategic Resource Allocation: The integration of LIS enables more effective allocation of resources by optimizing dispatch rider routes and managing workloads based on real-time data. This strategic resource management supports operational efficiency and reduces costs associated with sample collection and delivery.

Limitations and Future Research

Scope and Generalizability: This conceptual study primarily relies on theoretical frameworks and literature review, which may limit the generalizability of the findings to various laboratory settings. Empirical research is needed to validate the hypotheses and assess the practical implications of LIS integration in diverse laboratory environments.

User Acceptance and Training: The successful implementation of LIS depends significantly on user acceptance and the effectiveness of training programs. Future research should explore strategies for enhancing user engagement and ensuring that laboratory staff are adequately trained to utilize LIS functionalities.

Longitudinal Studies and Case Analyses: To gain deeper insights into the long-term effects of LIS on dispatch rider management and sample collection efficiency, longitudinal studies and detailed case analyses are necessary. These studies can provide empirical evidence on the sustained impact of LIS integration over time.

Socio-Demographic and Organizational Factors: The study highlights the importance of addressing socio-demographic elements and organizational circumstances that may affect LIS adoption. Future research should examine how these factors influence the effectiveness of LIS and identify strategies for overcoming barriers to successful implementation.

Green Practices Framework: As an extension, researchers could explore the development of a framework for incorporating green practices within laboratory operations, especially in the context of dispatch rider management. This could include evaluating the environmental impact of LIS-driven optimizations and proposing sustainable practices for future research.

In summary, the integration of LIS into dispatch rider management represents a dynamic and evolving area of research with the potential to significantly enhance laboratory operations. By addressing the identified limitations and pursuing further empirical studies, laboratories can continue to refine their approaches, optimize sample collection processes, and ultimately improve patient care and research outcomes. Through ongoing innovation and collaboration, the healthcare industry can leverage LIS to advance its capabilities and meet the growing demands of modern laboratory settings.

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Conceptualizing the Antecedents and Individual Impact of Business Intelligence in the Public Sector: The Technology-Organisation-Authoritative Framework

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Abstract: Business intelligence (BI) refers to a technological tool and process that transforms large and fragmented data into well-informed graphical insights to aid managerial decision-making. Recognizing the significant benefits of BI in leveraging extensive amounts of data, governments have been progressively investing in BI tools to improve efficiency in public offices. Nevertheless, despite a significant body of knowledge related to BI adoptions and their advantages, there is a dearth of theoretical understanding of how the effective use of the system affects employees' work performance, particularly among civil servants who have distinctive work natures compared to businesses. Most studies have also ignored external and institutional factors that influence individual usage, whilst studies on the effective use of BI tools remain limited. The paper thus proposed a new conceptual framework for examining the factors that influence the effective use of BI and its impact on individual job performance. The suggested propositions could provide a theoretical contribution by integrating technological, organizational and authoritative dimensions that are novel and unique to the public sector. It would also contribute to practical understandings for public managers and policymakers in ensuring the investment made on BI is worthwhile. Ultimately, the paper seeks to bridge the gap in BI studies related to public organizations.

Keywords: *Business Intelligence, Public Sector, Effective Use, Individual Impact*

1. Introduction and Background

With the advent of big data in business processes nowadays, translating the data into valuable insights that can support managerial decisions is paramount. Business Intelligence (BI), a technological tool and process that analyses and transforms enormous and fragmented data into coherent and practical information, has become an essential tool in modern business operations (Phillips-Wren et al., 2021). Through graphical reporting, BI enables managers and executives to swiftly discern trends and patterns and make well-informed decisions (Jha & Jha, 2022).

Acknowledging the notable advantages, governments worldwide have also been progressively investing in BI technology to improve efficiency and effectiveness in public offices (Merhi & Bregu, 2020). Nevertheless, pouring substantial resources into organizations by integrating advanced technology does not automatically guarantee positive returns. As pointed out in the literature, many public organizations face challenges at various levels of the adoption process, including a lack of data literacy, cultural resistance, technological issues and inefficient system use (Ain et al., 2019; Alkraiji, 2020; Merhi, 2021). In Malaysia, introducing the BI tool in the electronic human resources management system (e-HRM) that manages the human resources aspect of public service in the country is a noteworthy step in modernizing the administration. Nonetheless, how the system impacts job performance remains elusive, which motivates the present study.

Through preliminary studies and a literature review, several issues are observed. In the technological context, the information's reliability and trustworthiness may be inadequate to support the decision-making process. In addition, usability and poor system performance remain the subject of concern (Al-Okaily et al., 2023; Merhi, 2021; Torres & Sidorova, 2019; Trieu et al., 2022). Further, considering BI is a workplace system, studies highlighted institutional obstacles that can impede the efficacy, such as deficient leadership and a lack of shared values to embrace data-driven decision-making (Alkraiji, 2020; Hmoud et al., 2023; Merhi, 2021; Trieu, 2023). Moreover, in the context of the present study, where the system is developed, managed, and governed by a single authority, challenges such as lack of training and unsupportive assistance are also discussed in the literature (Ain et al., 2019; Al-Okaily et al., 2023; Mudau et al., 2024).

Accordingly, the paper seeks to address these issues by proposing a new conceptual framework for measuring the factors that influence the effective use of BI and its impact on individual job performance in public organizations. The following section reviews previous studies on BI usage and its impact on individuals, followed by research gaps related to this work. The theoretical model and proposed hypotheses are discussed in the fourth section. Next, the theoretical and practical significance of the study is presented, followed by the conclusion in the last section.

2. Literature Review

Several empirical studies have investigated the impact of BI usage on the individual level, as summarised in Table 1. Besides technological factors, the studies deliberately highlighted the significance of organizational dimensions in influencing individual usage, such as top management support (Trieu et al., 2022) and culture and resources (Trieu, 2023). Literature also shows recent studies have advanced into more objective construct to examine the system's utilization on post-adoption usages, such as effective use (Trieu et al., 2022), system dependence and infusion (Trieu, 2023) and advanced use (Mudau et al., 2024). However, determinants affecting system usage and the subsequent impact on users are still inconclusive (Jeyaraj, 2020b), with mixed results in BI research (Gonzales & Wareham, 2019; Kapo et al., 2021). Therefore, further investigation in this area is required.

Table 1: Prior Studies in BI Usage and Individual Impact

Author(s) / Year	Research focus	Key Finding(s)
Mudau et al. (2024)	Impacts of routine and advanced use of BI among accountants in South Africa.	Advanced use is a crucial predictor in determining individual impact and IS success.
Trieu (2023)	Impacts of organizational factors on the actual use of BI among managers in the United States.	Complementary organizational resources (CORs) significantly influence the actual use of BI, resulting in improved decision-making.
Candra and Nainggolan (2022)	Determinants of BI success among business managers in Indonesia.	BI usage significantly affects decision-making quality and increases user satisfaction and job performance.
Trieu et al. (2022)	Contextualisation of Theory of Effective Use (TEU) in BI context among managers.	The study emphasized the value of system quality, data integration and evidence-based culture in promoting effective use of BI.
Kapo et al. (2021)	Investigating user satisfaction, BI usage and job performance among employees in Bosnia and Herzegovina.	BI usage positively impacts employees' job performance, and acquiring profound comprehension at the individual level is crucial. Future studies should integrate managerial support and training.
Montero and Lind (2020)	Examining the efficacy of BI by analyzing information use among senior managers in the United States.	Information use is strongly reliant on the information and system quality, while system maturity moderates the quality and success of the system.
Gonzales and Wareham (2019)	Evaluating the individual impact of BI by assessing system dependence in Peru.	System usage is an essential indicator of IS success in obligatory and voluntary contexts.

Despite the significant advancements in BI studies, a thorough literature examination reveals several research gaps. First, prior research on BI has predominantly focused on the initial acceptance of the system, neglecting more perspicuity on post-adoption usage. The lack of said attention hinders the comprehension of the actual impact of the system (Trieu, 2023; Trieu et al., 2022). Second, empirical studies produced inconsistent results between BI usage and individual job performance (Gonzales & Wareham, 2019; Kapo et al., 2021). Third, although BI technology has been adopted in the public sector, there is a dearth of comprehensive examination in this domain, which has distinctive characteristics and challenges compared to the private sector (Di Vaio et al., 2022; Kaasalainen, 2020; Merhi & Bregu, 2020).

Further, most BI research solely focuses on organizational impact, with little attention given at the individual level (Ain et al., 2019; Talaoui & Kohtamäki, 2021). Since BI is primarily designed to aid decision-making, researchers indicate that the system's success largely depends on the end users (Kapo et al., 2021; Trieu et al., 2022). In addition, given that BI is a workplace system, various scholars have underlined the significance of incorporating institutional factors that may alter individuals' attitudes towards the usage, such as organizational leadership and culture (Paradza & Daramola, 2021; Trieu, 2023; Venkatesh et al., 2016). Finally, most existing studies on BI are conducted in developed nations (Ain et al., 2019; Purnomo et al., 2021). Expanding the research to other regional contexts will allow a more diverse and profound understanding of the topic. Objectively, the present study aims to address these gaps while achieving the research objectives through a new conceptual framework discussed below.

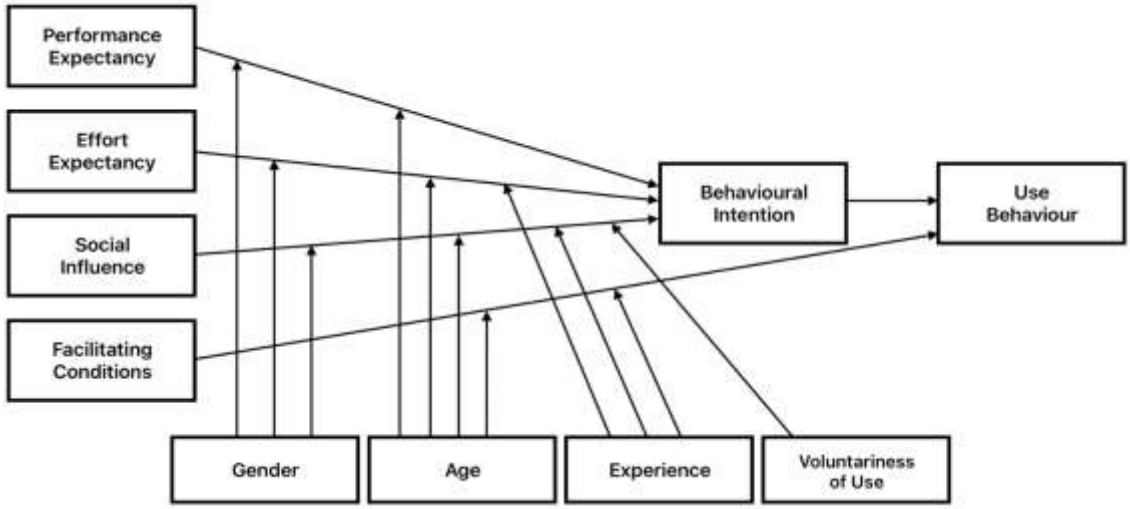
3. Theoretical Foundation

The theoretical foundation of the proposed framework is grounded on two prominent models of IS adoption, namely the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) and the Updated DeLone and McLean Information System Success Model (ISSM) (DeLone & McLean, 2003), as elaborated as follows:

Unified Theory of Acceptance and Use of Technology

UTAUT is an integrative model incorporating eight prior theories on technology acceptance, aiming to predict users' behavioral intentions and usage (Alturas, 2021). UTAUT consists of four predictors: performance expectancy, effort expectancy, social influence, and facilitating conditions, which are influenced by four moderators: gender, age, experience, and voluntariness of use, as illustrated in Figure 1. Recent studies in BI indicated that the UTAUT application is gaining prominence among researchers for assessing users' behavior, such as among banking employees (Zitha & Ajigini, 2023) and remote workers (Kašparová, 2023). It is a notable, mature technology adoption model that has been extensively tested and validated in various contexts, making it a suitable theoretical basis for developing the framework (Venkatesh et al., 2016).

Figure 1: UTAUT (Venkatesh et al., 2003)

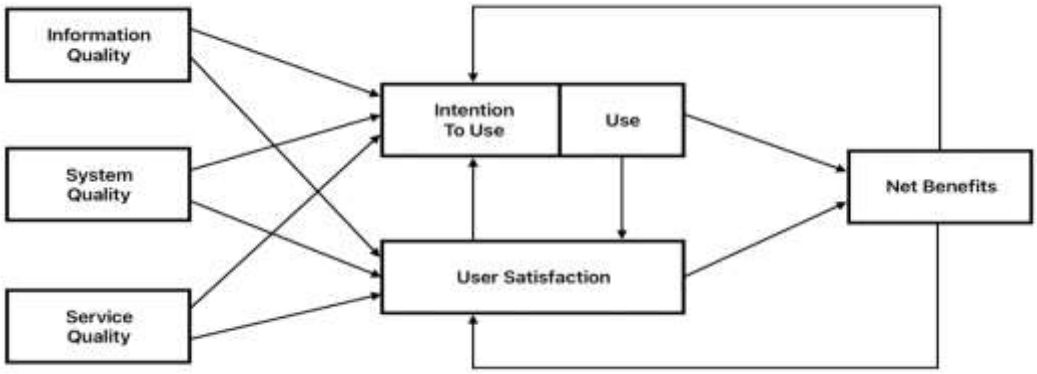


Updated DeLone and McLean Information System Success Model

The Updated ISSM (Delone & McLean, 2003) proposes that information system (IS) success is determined by six dimensions: system quality, information quality, service quality, intention to use or use, user satisfaction, and net benefits. The determinant of system quality refers to the technical features of the IS, such as its performance, dependability and usability. Information quality is measured by the semantic quality the user gains from using the IS, while service quality is the caliber of support and services offered by the service providers (DeLone & McLean, 2016). The model offers several strengths, such as providing a holistic view of IS success, particularly at the individual level, a multidimensional approach and adaptability to various contexts

of IS (Sabeh et al., 2021), including the public sector (Elazzaoui & Lamari, 2022). In addition, it is the most widely used model in BI studies (Ain et al., 2019), making it an appropriate model for this study.

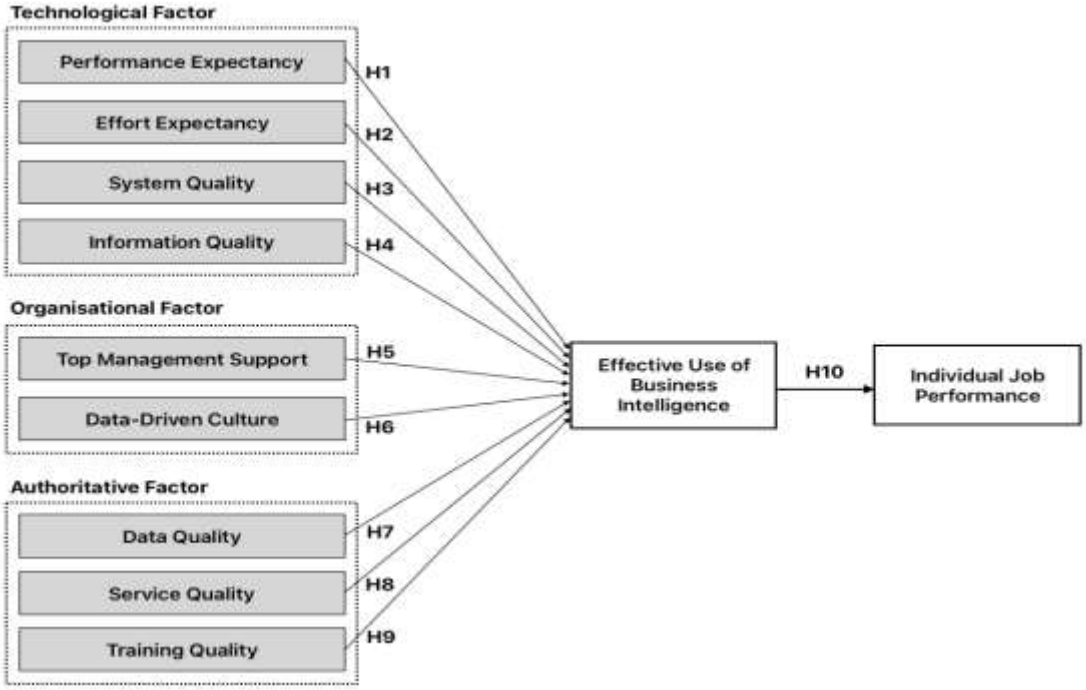
Figure 2: Updated ISSM (DeLone & McLean, 2003)



4. Conceptual Framework and Proposed Hypotheses

Both models abovementioned have been extensively validated in various IS contexts (Blut et al., 2022; Jeyaraj, 2020a). Based on the issue, gaps and recommendations from prior research, new variables are integrated into the concept: top management support, data-driven culture, data quality and training quality. In addition, the study proposes effective use as the mediating variable in recognizing the necessity to go beyond broad and oversimplified methods in measuring system usage (Burton-Jones & Grange, 2013; DeLone & McLean, 2016; Petter et al., 2008; Trieu, 2023). For systematic comprehension, the variables are grouped into three attributes: technological, organizational, and authoritative factors. The authoritative dimension is a unique characteristic of the public sector since it refers to the central governing body that implements, directs, monitors and manages the BI system and associated data for use by multiple public agencies, as is the case in Malaysia. All the independent variables are conceptualized as determinants of the effective use of BI and consequently impact individual job performance, as illustrated in Figure 3. The following subsections discuss each construct and outline the proposed hypotheses.

Figure 3: The Proposed Technology-Organisation-Authoritative (T-O-A) Framework



Technological Factor

Performance Expectancy: Performance expectancy (PE) refers to the degree to which a user perceives that using a particular technology will provide advantages or positive consequences when executing specific tasks (Venkatesh et al., 2003). Several BI studies highlighted PE's significance in influencing users' behavioral intention to use the system (Alkaabi & Kassim, 2023; Kašparová, 2023; Zitha & Ajigini, 2023). However, when it comes to obligatory use, such as mandated in many public organizations, the dynamics of PE are expected to be reduced (Brown et al., 2002). Nevertheless, this study asserts that if users believe using the BI will improve their work performance, their motivation to use the system effectively will increase. Thus, the following hypothesis is formulated:

H1: Performance expectancy will have a positive influence on the effective use of BI.

Effort Expectancy: Effort expectancy (EE) is the extent to which a user believes using a particular technology will be easy and effortless. It is a pivotal factor that affects initial acceptance (Venkatesh et al., 2003) and subsequent system usage and satisfaction (Wixom & Todd, 2005). However, prior BI studies have shown contrary results on the relationship between EE and behavioral intention (Kašparová, 2023; Zitha & Ajigini, 2023). Similarly, empirical studies on other information systems discovered that EE does not positively affect system usage (Ayaz & Yanartaş, 2020; Zha et al., 2022). Nonetheless, several studies highlighted the importance of a well-designed interface and user-friendliness as key factors toward continuance usage of IS (Chhabra et al., 2020; Choudhury et al., 2022; Daud et al., 2022). Accordingly, the following hypothesis is proposed:

H2: Effort expectancy will have a positive influence on the effective use of BI.

System Quality: System quality (SQ) refers to the desirable technical characteristics of the IS, such as the system's availability, reliability, accessibility and performance (DeLone & McLean, 2016). SQ is crucial as it directly impacts how effectively users can extract, analyze, and utilize data for decision-making, as empirically revealed in several BI studies (Baig et al., 2021; Hmoud et al., 2023; Torres & Sidorova, 2019). The shred of evidence thus leads to the following hypothesis:

H3: System quality will have a positive influence on the effective use of BI.

Information Quality: Information quality (IQ) represents the quality of the output or content produced by the system to users (DeLone & McLean, 2016). In the context of BI, IQ is paramount as it directly impacts decision-making processes by providing accurate, pertinent, and timely insights (Wixom & Todd, 2005). Much empirical evidence has shown that IQ significantly influences BI usage (Alkaabi & Kassim, 2023; Hmoud et al., 2023). On the contrary, a study found that although IQ influences user satisfaction, it does not affect the intention to use BI (Candra & Nainggolan, 2022). While the evidence is mixed, the study implies that IQ is the primary goal for utilizing BI. Thus, the following hypothesis is formulated:

H4: Information quality will have a positive influence on the effective use of BI.

Organisational Factor

Top Management Support: Top management support (TM) toward IS usage refers to the level of leadership commitment in fostering technological enthusiasm among the employees, which includes strategic vision, involvement and provision of necessary resources (Ragu-Nathan et al., 2004). Prior research has empirically supported the significant influence of TM on BI adoption (Baig et al., 2021; Bordeleau et al., 2020; Hmoud et al., 2023). It has also been revealed that TM plays a crucial role in determining the effectiveness of data utilization in public organizations (Merhi, 2021). These evidence thus allow the following hypothesis:

H5: Top management support will have a positive influence on the effective use of BI.

Data-Driven Culture: Data-driven culture (DC) refers to the collective beliefs, standards or practices among individuals in an organization that prioritizes using factual data in their decision-making processes (Ali & Miah, 2018; Alkraiji, 2020). Various studies have demonstrated that organizations cultivating DC have increased employees' confidence to make informed decisions using data (Kiu & Chan, 2023; Medeiros et al., 2020; Triono et al., 2023). However, studies on the relationship between DC and the effective use of BI remain limited (Trieu, 2023). Consequently, the proposed hypothesis is:

H6: Data-driven culture will have a positive influence on the effective use of BI.

Authoritative Factor

Data Quality: Data quality (DQ) refers to the fitness of available data stored in a data warehouse and leveraged for analysis and reporting (Wixom & Watson, 2001). BI studies indicate that DQ is critically important as it directly affects information accuracy, credibility and trustworthiness, eventually impacting decisions (Al-Okaily et al., 2023; Torres & Sidorova, 2019; Trieu, 2023). A recent empirical study shows that DQ positively affects BI usage and subsequently influences user performance (Mudau et al., 2024). These conclusions thus allow the following hypothesis:

H7: Data quality will have a positive influence on the effective use of BI.

Service Quality: Service quality (SVQ) pertains to the quality of support and assistance given by the authority that oversees and manages the BI system, either in technical or administrative aspects. It includes responsiveness, professionalism and corresponding skills (Delone & McLean, 2003; DeLone & McLean, 2016). Research shows that SVQ positively affects users' intention to use BI (Alkaabi & Kassim, 2023) and system usage (Mudau et al., 2024). Therefore, the hypothesis proposed is:

H8: Service quality will have a positive influence on the effective use of BI.

Training Quality: Training quality (TQ) is defined as a process of educating users to enhance their knowledge, skills and proficiencies in using the system (Merhi, 2021). Literature reveals that insufficient, unsuitable, and poor trainers are reasons for user resistance to BI usage (Ain et al., 2019). Since BI is a dynamic system involving various user characteristics, TQ is essential in motivating and influencing system usage. Thus, the study proposed:

H9: Training quality will have a positive influence on the effective use of BI.

Effective Use and Individual Job Performance

System usage has become an essential dimension in numerous IS studies and is a significant predictor of IS success (DeLone & McLean, 2016). Recent studies have emphasized the need to transcend beyond simplistic measures and proposed a more comprehensive method for measuring system usage (Trieu, 2023; Trieu et al., 2022). Consequently, the overall success of an organization relies on each individual's job performance in achieving the goals and objectives. In the context of BI, individual job performance is described as the extent to which the system impacts decision-making quality and enhances overall work performance (Mudau et al., 2024; Trieu, 2023). Nevertheless, prior studies examining the relationship between system usage and individual impact yield inconclusive findings (Jeyaraj, 2020b). In addition, measuring the effective use of BI remains understudied (Torres & Sidorova, 2019; Trieu, 2023). Asserting that the actual rewards and benefits of IS can only be achieved through the effective use of the system, thus the proposed hypothesis is:

H10: Effective use of BI will have a positive impact on individual job performance.

5. Implications

The proposed conceptual framework, developed through extensive literature analysis, would pave the way for validation through future empirical examination. The discussion and propositions of the framework offer a fresh theoretical perspective on BI studies. It also fills the research gaps and addresses prior research suggestions, particularly on post-adoption usage and individual impact. Practically, by focusing on the public sector, this research could provide valuable insights for policymakers, administrators, and system developers to reflect and formulate more effective strategies to ensure that the investment of IS made in public organizations is fully optimized and yields beneficial impacts.

Conclusion and Recommendations

The emergence of big data has prompted many governments, including Malaysia, to invest in BI technologies in public offices to obtain the advantages. Unfortunately, the adoption often faced obstacles in reaping the actual benefits. The topic has also gained considerable concern among scholars, highlighting the issues and gaps in the research. Hence, grounded on robust theoretical models, the paper thus presents a new conceptual framework for examining the determinants and impact of effective use of BI at the individual level in the public sector. The novelty of the model would provide a fresh foundation for ongoing empirical validation to expand the knowledge in the field while also offering practical insights to stakeholders. The limitations of this article include its inability to draw definitive conclusions on the effectiveness of the proposed model, which will

require further validation through empirical research. As highlighted in the gaps, future research on BI should prioritize understudied areas, such as examining the end-user level, post-adoption usage and unexplored domains like the public sector.

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A Conceptual Framework of the Retirement Savings Behavior among Civil Servants in Malaysia

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Abstract: The feasibility of maintaining a comfortable standard of living for civil servants in Malaysia is frequently questioned due to their reliance on pensions as the primary source of retirement funds, which may not suffice to cover the rising retirement costs. To address this issue, civil servants could consider accumulating savings during their working years instead of solely depending on pension disbursements. This academic discourse examines the effect of the independent variables of attitudes towards retirement savings (financial risk tolerance, past behaviours, and subjective norms as psychological elements) and financial considerations (tax incentives) on retirement savings behaviour. Additionally, the research also explores the moderating role of perceived government policy and perceived behavioural control with its antecedents, namely financial literacy, self-control between the independent variables, and retirement savings behaviour among civil servants in Malaysia. Drawing from the extended interactive theory of planned behaviour, amalgamated theories comprising the interactive theory of planned behaviour, rationale choice theory, and the behavioural economic model and existing literature, this article introduces a conceptual framework detailing the determinants influencing the RSB of civil servants in Malaysia. The proposed framework has the potential to benefit various stakeholders, particularly civil servants seeking to prepare adequately for their retirement years.

Keywords: *Extended Interactive Theory of Planned Behaviour, Retirement Savings Behaviour, Civil Servants, Conceptual Framework, Malaysia*

1. Introduction

Research Background: Almost half of Malaysians cannot save more than RM1,000 for emergencies due to a lack of financial planning knowledge (News Straits Time [NST], 2024). Additionally, 48% of Malaysians do not have any emergency savings (Murugiah, 2021). A survey by Perbadanan Insurans Deposits Malaysia (PIDM) in 2023 reported that many Malaysians cannot withstand financial shocks, as indicated by 55% of the survey respondents who admitted they have less than RM10,000 in available savings to withdraw in the event of an emergency. The financial distress worsened when it was reported that civil servants accounted for approximately 10% to 13% of new bankruptcy cases (The Star, 2024). Although the statistics from the Malaysian Department of Insolvency (MDI) (2023) reported a decreasing number of bankruptcies among civil servants, including pensioners, this group continues to be exposed to bankruptcy because of failure to manage their finances (Tan & Singaravelloo, 2020).

The pensioners' savings for their retirement planning continued to decrease further when the government announced that public service officers could redeem Cash Awards in place of Leave (GCR) while they are still in service compared to the previous policy in which GCR could only be paid after retirement. This measure may affect public service retirement savings because civil servants are inclined to make the withdrawal similar to the early withdrawal of their Employee Provident Fund (EPF). Malaysia's government is expanding the measures to civil servants on GCR's early withdrawal, while scholars are still debating on the pre-retirement withdrawal of EPF and the issue of the inadequacy of retirement savings (Md Yusuf et al., 2014).

The public service retirement savings were further affected by the government's announcement on 13th July 2023 that the July pension and derivative pension for civil servants who retired before and from 2013 will be paid using the original pension amount. The retirees will no longer receive an annual increment of 2%. This is following a Federal Court decision, which involved pension payments for civil servants who retired before 2013 being reverted to the December 2012 amount, while those who retired from 2013 onwards will have their pension payments reverted to the original amount at the time of their retirement.

The difference between the current pension amount and the original figure will continue to be paid in the form of a special aid known as Special Recognition for Retirees, which allows pensioners to receive the same amount as the one received in June 2023. However, the special aid cannot be sustained as it has legitimate expectations. Another recent policy was announced on the introduction of the Employee Provident Fund's (EPF) Account 3, or Flexible Account, as one of the institution's alternatives to meeting the emergency needs and funds of its contributors in tackling life's challenges before retiring (Bernama, 2024). The initiative to have a flexible account contradicts the aim to increase savings for retirement; the function of Account 3 is similar to any existing personal bank account.

Issues such as increasing poverty among the elderly (DOSM, 2023), low replacement rates (Jaafar et al., 2019; Park, 2009), and insufficient savings for retirement planning (Bank Negara Malaysia, 2022) continue to be major concerns in Malaysia's social security system. The government needs to take immediate action to reduce the burden on public servants during their retirement, especially for pensioners who may receive the lowest pension amount of RM1000 effective from 1 January 2018 (Public Service Department [PSD], 2023). Public retirees receive pension payments based on a formula that calculates 60% of their final salary. However, the replacement rate is not sufficient to maintain their standard of living from the pre-retirement period. Thus, to address the shortfall in retirement savings, it is recommended that a certain percentage of their income should be placed into long-term savings.

This research analyses the impact of various factors on retirement saving behaviour among civil servants in Malaysia. Previous studies have highlighted demographic and psychological factors influence retirement savings behaviour (Hershey & Mowen, 2000; Yusof & Sabri, 2017; Tomar et al., 2021). Additionally, this study explores the potential moderating role of perceived government policies in retirement savings behaviour, building on previous research, which found that perceived government policies moderated the relationship between retirement goal clarity and financial planning for retirement (Ghadwan et al., 2023). However, there has been limited investigation into whether PGP moderates the associations between attitude towards retirement savings, subjective norms, perceived behavioural control, and financial factors such as tax incentives and retirement savings behaviour. In this regard, using the extended interactive theory of the planned behaviour model helps to provide insight and a better explanation of factors influencing civil servants' behaviour to increase their retirement savings.

2. Literature Review

Interactive Theory of Planned Behavior: To address the issue of inadequate retirement savings behaviour among civil servants in Malaysia, it is imperative to comprehend the chronology of the extended interactive theory of planned behaviour (ITPB). It expands upon the interactive theory of planned behaviour (TPB) by integrating supplementary variables (Ajzen, 2020). Within the realm of ITPB, it is theoretically anticipated that perceived behavioural control will moderate the impact of attitude and subjective norms on intentions. Nevertheless, due to the complexity of the interaction effects (i.e., moderation), most empirical examinations of the TPB have solely reported additive effects. Recent investigations have begun to unveil noteworthy ATT x PBC and SN x PBC interactions. The current iteration of the ITPB illustrates the model with the proposition (Ajzen, 2019). Limited research has been conducted on ITPB concerning retirement saving behaviour (RSB).

In the context of this study, the extended interactive theory of planned behavior was developed based on integrated theories and models, comprising the interactive theory of planned behaviour, rational choice theory, and behavioural economics model. The purpose of the ITPB is to obtain a comprehensive understanding by incorporating additional variables and dimensions from the integrated theories and models. The conceptual framework aims to provide a better understanding of human behaviour, allowing for more accurate predictions and targeted interventions to address the issue of inadequate retirement savings among civil servants in Malaysia.

Rational Choice Theory: The evolution of rational choice theory (RCT) can be delineated by pivotal references that have substantially contributed to its advancement and utilisation across a variety of fields. The inception of the notion of maximising benefits within rational choice theory can be attributed to the work of American sociologist George Homans in 1961, establishing the basis for comprehending decision-making processes

grounded in rational assessments of costs and benefits (Hiep & Tram, 2020).

Rational choice theory offers a method for comprehending social phenomena based on the assumption that individuals or entities act purposefully to accomplish their objectives. This involves making decisions according to their preferences, constraints, and rational thinking to maximise benefits or utility within specific limitations (Lovett, 2006; Sato, 2013). The fundamental assumptions of RCT encompass the presence of distinct purposeful actors, the application of utility theory to elucidate choices, and the rationality exhibited by these actors in optimising their decision-making processes. Conversely, another scholar proposed that the theory has two primary processes: individual choices and the shift from individual actions to broader social consequences. It is posited that individuals prioritise their preferences according to the utility or payoff they anticipate, ultimately selecting the alternative perceived to offer the greatest utility (Sato, 2013).

Within the domain of perceived governmental policies concerning retirement savings behaviour, RCT serves as a framework for elucidating how individuals reach decisions regarding retirement savings based on rational assessments of costs and benefits (Askari et al., 2019). This theoretical perspective implies that individuals logically pursue objectives geared toward advancing their interests, which, in turn, impact their attitudes toward retirement savings (Askari et al., 2019). During retirement preparation, effective decision-making necessitates individuals to comprehend the pension mechanisms, portfolio distribution, anticipated benefits, contribution records, and associated risks (Fleishman-Mayer et al., 2013).

The governmental rules might influence retirement savings behaviour through diverse channels, such as grants and automated deposits into retirement accounts (Chetty et al., 2012). These policies shape individuals' decisions by offering incentives or prompts that steer their decision-making process (Chetty et al., 2012; Halpern & Sanders, 2016). Encouraging individuals to save money through saving policies could also be more cost-effective for the government, leading to higher increases in household savings at a lower fiscal cost compared to tax subsidies (Chetty et al., 2013). Moreover, the configuration of retirement saving mechanisms, such as providing concise information with beneficial recommendations, could modify retirement planning decisions (Cardella et al., 2021). Applying principles of choice to retirement savings causes the structure of retirement plans to significantly impact saving rates and investment choices (Benartzi et al., 2007).

RCT is crucial in comprehending individuals' choices concerning retirement savings behaviour and their views on government policies in this context. Contrary to the expectations of RCT, which imply that annuities would be appealing because they mitigate the risk of outliving income, studies show that not many individuals opted to annuitize a portion of their assets (Benartzi et al., 2011). The inconsistency between theory and behaviour underscores the intricacy of retirement savings choices. Government policies could shape retirement savings behaviour through diverse means. For example, measures such as price subsidies and automatic deductions from salaries into retirement accounts influence individuals' saving choices (Chetty et al., 2012). Behavioural economics also brings insight into retirement savings behaviour, underscoring bounded rationality and self-control as factors affecting low-saving households. This circumstance suggests that certain individuals might benefit from support in making saving decisions (Thaler & Benartzi, 2004).

In essence, rational choice theory serves as a significant instrument for comprehending decision-making processes within the realm of public policy. Policy formulators could leverage this framework to pinpoint challenges and formulate remedies that motivate individuals to engage in behaviours that promote collective welfare. Nevertheless, it is vital to acknowledge the restrictions of this framework and consider various other aspects that could impact decision-making processes. The integration of insights derived from behavioural economics and governmental directives is pivotal in shaping the retirement savings behaviours of individuals and their perspectives on government interventions. Through comprehensive scrutiny of these theoretical constructs and their policy implications, stakeholders could devise more productive approaches to foster sufficient retirement savings among public sector employees in Malaysia.

Behavioural Economics Model: The behavioural economics model integrates insights from psychology and economics to understand how individuals make financial decisions. It recognises that individuals do not always act rationally and are influenced by cognitive biases and emotional factors. The theory emphasises the importance of understanding human behaviour in economic decision-making, including retirement savings

behaviour (RSB). In contrast, traditional economics theories often assume rational decision-making and overlook the psychological and behavioural aspects of financial choices (Knoll, 2010). However, behavioural economics recognises the importance of psychological aspects, such as financial literacy and self-control, in influencing individuals' retirement savings behaviour (Sekita et al., 2022).

Thaler and Benartzi (2004) introduced the "Save More Tomorrow" (SMarT) programme, which utilised behavioural economics principles to increase employees' savings. The programme's key findings revealed a high enrolment rate and a significant increase in the average saving rates of participants over time (Thaler & Benartzi, 2004). This outcome demonstrates the effectiveness of behavioural economics strategies in influencing retirement savings behaviour (RSB). Nevertheless, the study suggested future research to focus on the effectiveness of automatic escalation plans and explore the impact of behavioural economics on retirement savings. Another study on behavioural economics principles, as well as the use of matching contributions and commitment mechanisms to promote savings behaviour, found that deposit frequency and amounts were higher in the first intervention year than in the second year. Higher match incentives led to increased deposit frequency but not to a higher amount of savings (Wang et al., 2018).

In essence, behavioural economics is employed in the Malaysian government's initiative to increase retirement savings behaviour (RSB) among Malaysian civil servants and to tackle and revisit existing policies, such as tax incentives and matching contributions, the independent variables of this study. Therefore, further investigation on the long-term impact of economic empowerment interventions on savings and consumption behaviours is justified.

Furthermore, Duckworth et al. (2018) highlighted the impact of self-control failures on retirement savings, emphasising the role of behavioural control in financial decision-making. Behavioural economics provides insights into how external interventions, such as incentives or penalties, can be designed to facilitate people making choices that align with their long-term interests without needing to rely solely on willpower (Duckworth et al., 2018). Hence, behavioural economics is pertinent in understanding self-control issues and challenges hindering civil servants from committing to retirement savings.

In summary, behavioural economics theory provides an invaluable understanding of retirement savings behaviour by acknowledging the influence of psychological and behavioural factors. The theory recognises most individuals' psychological matters, such as financial literacy and self-control (Sekita et al., 2022), incentives (Duckworth et al., 2018), matching contributions (Wang et al., 2018), and tax incentives (Sabri et al., 2019) as factors influencing RSB.

Retirement Savings Behaviour: Previous research offered limited insights into retirement savings behaviour (RSB), defining it based on individual interpretations and viewpoints. Various studies have outlined their understanding of RSB, emphasising psychological, behavioural, financial, and economic aspects. For example, a study by Benartzi and Thaler (2007) delved into how individuals make decisions regarding saving for retirement, encompassing participation in savings plans, contribution amounts, investment strategies, and the utilisation of incentive schemes like tax benefits, matching contributions, and programmes such as Save More for Tomorrow. Meanwhile, Sass (2016) discussed the choices people make regarding saving for retirement, including the decision to save, the amount saved, and the chosen saving mechanisms.

According to Weaver (2019), retirement savings behaviour (RSB) entails a series of actions throughout one's career, involving entry into the retirement system, asset accumulation, and eventual asset utilisation during retirement. Studies concurred that these factors, such as governmental incentives, individual attitudes toward retirement savings, and the impact of social influences and cultural norms, significantly shaped retirement savings behaviour. RSB entails the financial decisions individuals undertake to secure their future, influenced by their attitudes towards retirement saving, prevailing social standards, and their confidence in post-retirement saving capabilities, including the amount saved and the chosen saving mechanisms (Magwegwe & Lim, 2021). RSB is also known as resource allocation for future needs, particularly in the post-employment phase (Alkhawaja & Albaity, 2022).

Researchers in Malaysia view retirement savings behaviour as how individuals strategize and allocate funds

for their financial requirements post-retirement. This involves depositing funds into designated retirement accounts, such as the Employee Provident Fund (EPF) and making informed investment decisions to ensure adequate coverage for living expenses, medical bills, and unforeseen circumstances during their retirement years (Ibrahim et al., 2012). The concept of retirement savings behaviour revolves around the systematic allocation of financial resources in preparation for the cessation of full-time employment, taking into account the management of escalating living expenses and healthcare costs (Nga & Yeoh, 2018). However, one study delved into the realm of retirement savings funds rather than focusing specifically on retirement savings behaviour. This study defined such funds as financial schemes enabling individuals to set aside savings for retirement, while incentives like tax benefits or subsidies promote active participation and boost contributions. Importantly, these funds are established voluntarily, with individuals opting to save in them to secure a financially stable retirement, in addition to any government pension schemes or obligatory retirement savings plans they may be enrolled in (Sabri et al., 2019). In conclusion, retirement savings behaviour is putting aside certain income after considering all necessary expenditures during working or productive life for retirement or non-productive years. Understanding retirement savings behaviour may help researchers in the development of a comprehensive framework for RSB among civil servants in Malaysia.

Attitude Toward Retirement Savings: Ajzen (2019) postulated that individuals' attitude emanates from behavioural beliefs, specifically determined by whether the anticipated outcomes or experiences are perceived as positive or negative, ultimately impacting the behavioural outcome. Chee et al. (2011) generally characterised attitude towards saving as individuals' positive or negative perceptions regarding the practice of saving money, influenced by their beliefs about the consequences of saving and the personal assessment of such outcomes. This attitude significantly shapes the inclination to save by fostering a mindset that prioritises the advantages of saving over immediate expenditures. Initially, the decision-making process regarding retirement savings was influenced by individuals' beliefs about such behaviour, social influences exerted on them, and their perceived level of control over these savings determinations (Croy et al., 2012). Subsequently, scholars defined the attitude towards retirement savings as the emotional, cognitive, or perceptual stance individuals adopt towards the notion of setting aside money for the post-employment phase. A positive attitude signifies a recognition of the importance of saving and a propensity to save more, whereas a negative attitude may indicate a reluctance to save adequately for retirement (Tomar et al., 2021).

Attitude toward retirement savings behaviour refers to how individuals feel about saving for their retirement, including their willingness to plan and save and how they perceive the importance and benefits of having financial security in their later years. This attitude significantly influenced their actual savings and planning actions for retirement (Yusof & Sabri, 2017). Attitude toward retirement savings behaviour refers to how individuals feel about saving money for their future after they stop working, which includes their willingness to invest in retirement plans and their belief in the importance of financially preparing for retirement (Afthanorhan et al., 2020). It also refers to individuals' positive or negative evaluation of the act of saving money, which is influenced by their beliefs, feelings, and intentions regarding saving for future needs (Wahab et al., 2022)

Previous research also investigated the effect of financial risk tolerance (FRT) on attitude towards retirement savings behaviour. When a person feels comfortable with the possibility that an investment may not perform as expected, it means that they accept potential loss when deciding on an investment, including retirement savings (Mutlu & Özer, 2022). Ghadwan et al. (2023) referred to FRT as individuals' willingness or ability to handle uncertainty and potential loss in investment value while aiming for higher returns. Past behaviour (PB) also affects attitudes, whether to react positively or negatively. Past behaviour refers to actions or decisions individuals have made in the past, which influence their future decisions, often without being fully aware of this influence (Albarracín & Wyer, 2000). Meanwhile, Habibah et al. (2018) described PB as the frequency with which individuals or households have previously engaged in a specific action, such as making mental budgets, which influences their current intentions and behaviours towards that action.

Financial risk tolerance or past behaviour helps in tailoring retirement savings behaviour that matches individuals' comfort level with risk, aiming to maximise satisfaction from their savings choices. Attitude towards retirement savings is the most important independent variable in shaping retirement savings behaviour among civil servants in Malaysia. Ahmad et al. (2020) revealed that financial risk tolerance (FRT)

was correlated with attitude, with risk attitude being a significant factor influencing risk tolerance. The study suggested that risk attitude directly influenced investors' financial risk tolerance, indicating a strong correlation between the two factors. Psychological characteristics, like attitude towards money, financial self-efficacy, and financial risk tolerance, positively influence personal financial management behaviour (Goyal et al., 2023).

Prior research also confirmed that past behavioural biases positively impact attitudes toward investment, supporting the hypothesis that it plays a crucial role in investment decision-making (Raut et al., 2018). PB is a critical factor that may influence both intention and future behaviour. Different forms of PB, such as experience with behaviour, frequency of behaviour, and habits, have been studied and shown significant effects (Sommer, 2011). Another study indicated that past financial experiences influenced how students currently manage their finances (Ameliawati & Setiyani, 2018). Recent studies' findings were consistent in that past experiences, or PB, correlate with attitude. Past experiences have a direct correlation with individuals' attitudes toward risk, uncertainty, and preventive measures. Experience plays a vital role in influencing people's intentions to adopt self-protective behaviours, such as purchasing insurance and safety devices (Innocenti et al., 2023). Past disastrous experience directly influences the attitudes of strategic decision-makers (SDMs) towards disaster planning (Sahadev et al., 2024). Meanwhile, open-experience individuals are more likely to accept products of new technologies, suggesting a positive relationship between openness and attitude (Grassini & Koivisto, 2024).

Attitude towards retirement savings reflects how important individuals perceive saving for retirement to be. A positive attitude indicates a strong belief in the necessity and benefits of saving for the future. Previous researchers widely use attitudes toward retirement savings to investigate the relationship between attitudes towards retirement savings (ATRS) and retirement savings behaviour (RSB). For example, in Malaysia, ATRS is positively correlated with retirement preparation among Gen Y in Selangor, Malaysia (Kumaraguru & Geetha, 2021). Furthermore, attitudes towards retirement and retirement behaviour significantly influenced retirement security for Malaysian civil servants (Ishak et al., 2022). Another study in Vietnam found that financial attitudes positively affected individuals' likelihood to save money (Nguyen & Doan, 2020). In the USA, attitudes towards retirement savings, such as the importance of a long planning horizon, setting specific financial goals, and risk tolerance, were found to significantly impact individuals' intention to save for retirement. The model developed in the study shows that psychological factors, including attitudes, not only influenced the calculation of retirement savings needs but also contributed to the ownership of individual retirement accounts (IRAs). The research highlighted a clear relationship between individuals' attitude towards retirement planning and their retirement saving behavior, emphasising the importance of fostering positive attitudes to encourage proactive retirement savings behaviour (Magwegwe & Lim, 2021).

The above discussions on the relationships between financial risk tolerance, past behaviour, and attitude suggest that they have been widely investigated, and the findings consistently agree that the relationships are still relevant. The relationship between attitude towards retirement savings and retirement savings behaviour has also been highlighted in a few prior research. Thus, in the context of retirement savings behaviour among civil servants in Malaysia, the current study proposed the following hypotheses:
H1: There is a significant positive relationship between financial risk tolerance and attitude towards retirement savings behaviour.
H2: There is a significant positive relationship between past behaviour and attitude towards retirement savings behaviour.
H3: There is a significant relationship between attitude towards savings and retirement savings behaviour.

Subjective Norms: There are two types of normative beliefs; firstly, the injunctive norms refer to what others consider desirable and acceptable in a particular situation; these norms suggest what should or should not be done. Secondly, descriptive norms refer to how people typically act or think in specific contexts based on empirical evidence (Ajzen, 2020). Individuals are prone to acknowledging and reacting solely to the concept of saving for retirement when individuals of significant importance and proximity exert influence on them to allocate funds towards their retirement savings. Scholars in the realm of social sciences widely concur that subjective norms encompass perceived societal pressure to either engage or refrain from specific behaviours, indicating that individuals are more likely to save money if those significant to them endorse the notion of

saving (Satsios & Hadjidakis, 2018). Various studies consistently underline the pivotal role of close and influential persons in motivating individuals to save for the future (Thomas & Subhashree, 2020; Magwegwe & Lim, 2021; Kumaraguru et al., 2022; Wahab et al., 2022; She et al., 2023), SN pertains to the influence of individuals who hold importance to a person, such as family or friends, and how their endorsement or disapproval influences the person's decisions regarding retirement savings. It concerns facing social pressure to conduct oneself in a specific manner owing to the expectations of others.

The primary individuals with the most significant impact on shaping the SN and promoting saving for retirement are the family members (Jamal et al., 2016; Puspasari et al., 2018), as well as close friends or peers (Kumaraguru & Geetha, 2021). Families play a crucial role in influencing students' behaviour, demonstrating that favourable and encouraging families results in more robust subjective norms among students, consequently enhancing their saving habits (Puspasari et al., 2018). Mutlu and Özer (2022) posited that financial attitudes are not inherently innate but are influenced by family and close acquaintances. This view was corroborated by Hartono and Isbanah (2022), who discovered that parental upbringing and peer pressure have a positive effect on the financial literacy of individuals. This illustrates the interconnected nature of individual variables, where SN intertwine with attitudes toward saving for retirement.

A positive and significant relationship exists between subjective norms and the intention to act, which in turn affects saving behaviour (Puspasari et al., 2018). SN, which entails the opinions of friends and family, have a strong influence on one's financial decisions (Bongini & Cucinelli, 2019); for instance, they significantly impact risky investment intention (Sobaih & Elshaer, 2023). Studies have highlighted that financial planning behaviour, including retirement savings behaviour, can be influenced by subjective norms such as financial socialisation, where societal expectations around financial planning are internalised through interactions with family, friends, and colleagues (Yeo et al., 2023).

Relationships between social influence and retirement planning were significantly and positively associated (Afthanorhan et al., 2020). If the SN in their environment leans towards the importance of retirement planning, individuals are more likely to adopt similar behaviours (Tomar et al., 2021). The influence of SN is evident in how individuals engage in proactive behaviours, such as saving more or investing wisely, based on the financial behaviours and opinions of their peers or society at large. This suggests that a supportive social environment that values financial preparedness could encourage better retirement-saving behaviours (Ugwu & Idemudia, 2023).

Subjective norms play a crucial role in shaping individuals' intentions and behaviours regarding retirement savings. Understanding this relationship could help financial advisors and educators design more effective strategies to encourage retirement planning and saving. Therefore, this study suggests the following hypothesis:
H4: There is a significant relationship between subjective norms and retirement savings behaviour.

Tax Incentives: Although psychological factors were recognised as determinants of retirement savings behaviour, several studies applied tax incentives in their framework of retirement savings and reported tax incentives according to the context of their studies. For instance, tax incentives for retirement savings were most utilised by older/high-income individuals. Tax incentives in this study refer to government policies designed to encourage individuals to save more for their retirement by offering benefits like reducing the taxes on the money they save in pension plans. These incentives work by increasing the after-tax return on savings, meaning people get to keep more of the money they earn from their investments in retirement accounts after taxes are taken out (Ayuso et al., 2019). Sabri et al. (2019) described tax incentives as government concessions, rebates, credits, subsidies, or contributions, either directly or through employers, which support individuals' retirement income savings. The aim is to encourage savings for retirement by offering tax advantages like tax deferral or performance-based incentives.

In the context of retirement savings behaviour, tax incentives are defined as a government subsidy, which can be front-loaded where the tax benefit is received when the contribution is made, or back-loaded where the tax benefit is received upon withdrawal during retirement (Cuccia et al., 2019; Fadejeva & Tkacevs, 2022). Cuccia et al. (2019) examined how these tax incentives, whether they are given at the start (front-loaded) or the end

(back-loaded), impact taxpayers' decisions on which retirement savings plans to choose, highlighting that people's choices were influenced not just by economic factors but also by their attitudes and preferences. Tax incentives also refer to the government's policy allowing individuals to deduct contributions to private pension funds and life insurance plans, up to 10% of their annual income, from their income tax base. These incentives are designed to encourage people to save more for their retirement by offering them a tax break, which means they pay less tax if they save money in specific ways.

However, earlier research found that these incentives are designed to have a delayed effect, contrasting savings by making saving in a voluntary retirement fund more appealing through tax benefits. The study suggested that tax incentives do not directly trigger additional savings but reduce the individual burden for a supplementary pension, acting as a facilitating condition that affects perceived behavioural control rather than directly influencing saving intentions (Sabri et al., 2019).

Economic policies, like tax rebates, could significantly influence corporate behaviour towards achieving dual economic and environmental benefits. Similarly, tax incentives could influence individual behaviour by making retirement savings more appealing, thereby improving personal financial security (Zhang & Song, 2022). The application of tax incentives as a medium to induce or stimulate specific behaviour is widely applied in multidisciplinary studies. For instance, taxes are more effective for smoking and alcohol consumption, while positive rewards have shown promise in preventing behaviours like unsafe sex, which are harder to monitor. Financial incentives, including taxes, correlate with behaviour by leveraging economic principles to encourage healthier choices and deter harmful behaviours (de Walque, 2020). In France, tax incentives modestly impacted the decision to energy-saving renovate, increasing renovations by only 1.09 percentage points. Meanwhile, a study in Spain highlighted that there are indeed tax incentives in place for the ownership of eco-friendly cars, specifically within the framework of the IVTM (Tax on Motor Vehicles). These incentives are designed to reduce the annual tax burden for owners of electric, hybrid, and liquefied petroleum gas vehicles (Alonso, 2020). In European countries, tax incentives significantly affect the decision to purchase electric vehicles (EVs), making them more financially attractive to potential buyers (Jurlin, 2023). Hence, based on the arguments above, this study postulates the following hypothesis:
H5: There is a significant relationship between tax incentives and retirement savings behavior.

Perceived Behavioural Control: The augmentation of retirement savings behaviour for the future necessitates the accessibility of behavioural beliefs that lead to a positive attitude and strong support from family and peer influences alongside normative beliefs. Additionally, a crucial factor that could strengthen the effectiveness of retirement savings behaviour is perceived behavioural control. Within the framework of the interactive theory of planned behaviour, perceived behavioural control operates as a moderating element between attitude and subjective norms regarding intention, while the actual behavioural control is expected to moderate the impact of intention on behaviour (Ajzen, 2020). In the present study's context, perceived behavioural control is projected to moderate the influence of attitudes towards retirement savings and subjective norms with regard to retirement savings behaviour. Various research elucidated perceived behavioural control as individuals' beliefs regarding control that could influence or enable the execution of specific behaviours (Jamal et al., 2016; Nosi et al., 2017; Kumaraguru & Geetha, 2021). Control belief is instrumental in shaping and contributing to PBC in the context of retirement savings behaviour (Ajzen, 2020).

Perceived behavioural control is a vital factor in the interactive theory of planned behavior. It suggests that the more control people feel they have overperformed a behaviour, the more likely they intend to do it. This highlights the importance of confidence in one's abilities and resources. Kumaraguru and Geetha (2021) described PBC as how much a person feels they can perform a certain behaviour, considering both their skills and the potential challenges. It reflects on past experiences and the expected difficulties in doing the behaviour. From another perspective, PBC is about how easy or hard people think it will be to perform a certain action based on their feelings and not on the real difficulty of doing the action.

In the context of this study, it is expected that financial literacy and self-control contribute to PBC in influencing and shaping retirement savings behaviour among civil servants in Malaysia. Several studies examined how these factors influenced retirement savings behavior. Lajuni et al. (2018) defined financial literacy as the knowledge about financial matters and the skills of how to manage finances effectively, which influence a

person's ability to change their financial behavior. Financial literacy suggested that higher financial literacy encourages individuals to save more, indicating that higher financial knowledge significantly enhances the propensity to save among low-income groups (Rabun et al., 2023). Research findings also show that the better the financial literacy applied, the lower the level of consumptive behaviour, implying the role of behavioural control. Research findings further highlighted the influence of financial literacy on students' spending habits, indicating a correlation with behavioural control (Putri et al., 2022).

Understanding financial products through financial literacy augments perceived behavioral control, helping individuals make informed and confident investment decisions. Thus, a positive relationship exists between financial literacy and perceived behavioural control in the context of investment decision-making (Pambudi et al, 2024). Prior studies have indicated that enhancing financial literacy can be a valuable strategy to encourage savings behaviour and the intention to save more, underscoring the significance of perceived behavioural control in the financial decision-making process (Peiris, 2021).

Self-control is the ability of individuals to regulate their desires, practice self-discipline, and delay gratification to save money, making saving an effortless endeavour for those with high levels of self-control. It involves managing wants and expenditures effectively to enhance savings, where individuals with higher self-control are better at financial management and less likely to spend impulsively on shopping (Mohd et al., 2020). Generally, self-control encompasses the ability to change or override dominant response tendencies and regulate individuals' behaviour, thoughts, and emotions, which are crucial for managing financial behaviour and savings. The concept also includes the exertion of self-discipline, characterised by the will and capacity to delay fulfilment, which is essential in financial decision-making and saving behaviour (Hartono & Isbanah, 2022).

Furthermore, self-control positively impacts saving behaviour, indicating that individuals with higher self-control tend to save more efficiently, which is crucial for financial management and planning (Faisal et al., 2023). Self-control is positively correlated with perceived behavioural control, as individuals with high Self-control tend to believe more in their ability to conduct certain behaviours. Another study found that self-control has a significant effect on students' saving behaviour; good self-control was correlated with the ability to control money usage and manage finances better (Setya Ningsih & Sudarma, 2018). Self-control contributes significantly to saving behaviour, signifying that individuals with good self-control are more likely to engage in positive savings habits. In short, there is a direct correlation between self-control and perceived behavioural control in the context of saving behaviour (Angela & Pamungkas, 2022).

Perceived behavioural control enhances the relationship between a positive attitude towards retirement savings and retirement savings behaviour by providing the means and confidence to act on the attitude (Yeo et al., 2023). Individuals who feel more in control of their finances are more likely to translate positive attitudes towards retirement savings into actual saving behaviours. This control enhances the impact of a positive attitude toward retirement savings on the behaviour of saving itself (She et al., 2024). Another study also indicates that PBC moderates the effect of attitudes on behaviour by influencing individuals' perceptions of their ability to perform the behaviour. Thus, when someone has a positive attitude towards road violations, for instance, if they perceive that they have no control over performing such actions (due to external factors or personal limitations), they may be less likely to commit them (Castanier et al., 2013).

Perceived behavioural control may also strengthen the impact of subjective norms on retirement-saving actions by equipping individuals with the knowledge and confidence needed to save for retirement (Yeo et al., 2023). For individuals with low perceived behavioural control, the influence of subjective norms on recycling behaviour might be more pronounced. If these individuals perceive strong social support or pressure to recycle, they might be more likely to recycle despite feeling less capable of doing so. In addition, subjective norms have the highest variance in behavioural tests, and researchers suggested that this may happen because moral norms were employed to operate as subjective norms (Liu et al., 2022). Hence, based on these arguments, this study postulates the following hypotheses:

H6: There is a significant relationship between financial literacy and perceived behavioural control.
H7: There is a significant relationship between self-control and perceived behavioural control.
H8: Perceived behavioral control does significantly moderate the relationship between attitude towards

retirement savings and retirement savings behaviour.
H9: Perceived behavioral control does significantly moderate the relationship between subjective norms and retirement savings behaviour.

Perceived Government Policy: Government policy is described as actions taken by the government to address specific public issues, which may involve the use of funds, laws, and regulatory measures to shape and change individuals' behaviour, for example, saving money. This policy includes a set of systems aiming to significantly change savings behaviour through strict legislation and possibly coercion, ensuring individuals save money for future use (Muhammad Husin & Mohamed, 2021).

There are minimal studies investigating perceived government policy's moderating role in the context of attitude and retirement savings behaviour. However, in a different discipline, it was found that the relationship between attitude towards entrepreneurship and the actual development of entrepreneurial ventures can be significantly influenced by perceived government policy. Perceived government policy could augment individuals' attitudes towards entrepreneurship by creating an environment that is encouraging and safe for starting new ventures. The effect of individuals' attitudes on their likelihood to engage in entrepreneurship can be strengthened or weakened depending on the perceived government policies (Obaji, 2014). Another study highlighted the importance of a supportive environment policy in bridging the gap between farmers' positive attitudes towards environmental protection and their actual participation in these activities. It underscores the need for policies that not only encourage positive attitudes but also facilitate the translation of these attitudes into meaningful actions (Dong et al., 2023).

A study on vaccination behaviour found that PGP positively moderated the relationship between attitude and vaccination behaviour among teachers (Abd Rahman et al., 2024). Several other studies defined perceived government policy as how individuals understand and interpret the actions and regulations set by the government, especially those aimed at influencing specific behaviours, such as retirement savings behaviour, through various policy activators, such as information dissemination, incentives, and current policy. Ghadwan et al. (2023) explored how perceived government policy influences employees' financial planning for retirement. The study shows that policies play a crucial role in shaping retirement planning behaviours among public university employees. The research also revealed that government policy significantly moderated the relationship between retirement goal clarity and financial planning for retirement. The finding indicates that clearer retirement goals aligned with supportive government policies lead to better financial planning outcomes.

There have been minimal studies investigating the role of perceived government policy in moderating the relationship between subjective norms and retirement savings behaviour. A study found that when people perceive strong government support for energy-saving initiatives, the social pressure to save energy is more likely to translate into actual energy-saving actions (Hong et al., 2019). In another study, a supportive policy environment enhanced the positive impact of participation intention on actual participation behaviour, indicating that when farmers perceive government policies as favourable, the influence of subjective norms on participation is likely to be stronger (Dong et al., 2023).

Similarly, studies exploring the moderating role of perceived government policy in the relationship between tax incentives and retirement savings behaviour are scarce, specifically in the context of Malaysian civil servants. A study by Ningrum and Setiyawati (2022) investigated the influence of taxpayer awareness on tax compliance and examined whether trust in the government, which is seen as a proxy for perceived government policy, moderates this relationship. The study concluded that trust in the government did moderate the relationship between taxpayer awareness and tax compliance. Another study on the effectiveness of R&D tax incentives in Turkiye did not directly discuss perceived government policy but found that R&D tax incentives were designed to encourage firms to increase their R&D expenditures to boost innovation and economic growth. Meanwhile, Taş and Erdil (2023) suggested that firms' behaviour in response to R&D tax incentives was influenced by the incentives, which can be seen as a reflection of their perceived government policy. Another study described the moderating role of perceived government policy as an investigation of how perceived government policy moderates the relationship between tax incentives and foreign investment, indicating that the perceived government policy regarding transparency and fairness in the application of tax

incentives impacted investment behaviour (Hyun Hong & Nam, 2021). Venti (1992) noted that incentives to save for retirement have been an important component of government tax policy, and pension funds have grown enormously. For instance, private firm pension assets increased from $13 billion in 1950 to $1,836 billion in 1989.

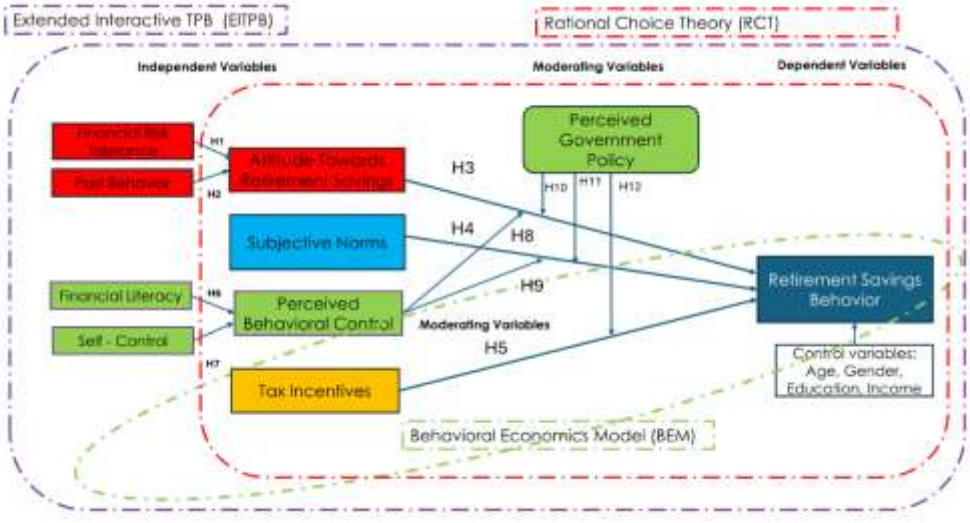
While most of the literature works did not directly explore the moderating role of perceived government policy in the relationship between attitudes towards retirement saving, subjective norms, tax incentives, and retirement savings behaviour, the studies offer several points from their similar concepts related and applicable to the current study. Hence, this study suggests the following hypotheses:
H10: Perceived government policy does significantly moderate the relationship between civil servants' attitudes and retirement savings behaviour.
H11: Perceived government policy does significantly moderate the relationship between civil servants' subjective norms and retirement savings behaviour.
H12: Perceived government policy does significantly moderate the relationship between tax incentives and retirement savings behaviour.

3. Research Methodology

The current study is a causal study, which focuses on the cause-and-effect association between variables. The target population is Malaysian civil servants working in grades 41 to 54. The sample size required was 135 based on the G*Power 3.1 application. The sampling techniques used are nonprobability sampling and purposive sampling. The data were collected through online and offline questionnaire surveys. The questionnaire used was adapted from previous studies, which consisted of 50 items and 10 variables. The SPSS and SEM PLS using Smart PLS Version 4 were applied for the statistical analysis of the data.

Conceptual Framework

Figure 1: Conceptual Framework of Retirement Savings Behaviour Among Civil Servants in Malaysia



4. Conclusion

There are very few theories explicitly related to retirement savings behaviour among civil servants in Malaysia, and they focus on motivations to save for retirement. After a careful and details review of previous research on retirement savings behaviour, this study integrates the interactive theory of planned behaviour, the behavioural economics model, and the rational choice theory to construct a research framework to justify this study. In addition, several variables of new determinants were included to explain further the variance of retirement savings behaviour among civil servants in Malaysia. The current study focuses on the psychological factors of the theory of planned behaviour, namely attitude towards retirement savings and subjective norms,

while perceived behavioural control was employed as a moderating variable to strengthen the relationship between attitude towards retirement savings and subjective norms towards retirement savings behaviour. Tax incentives, which aim to increase income for savings are plotted from the behavioural economics model. The rational choice theory supports perceived government policy in making decisions to encourage those factors to motivate civil servants to increase retirement savings behaviour among civil servants in Malaysia.

A more comprehensive and established theory is needed to better explain factors influencing retirement savings behaviour among civil servants in Malaysia. The conceptual framework proposed in the current study attempts to take a wider view of retirement savings behaviour and examines attitudes toward retirement savings, subjective norms, tax incentives, perceived behavioural control, and perceived government policies in the context of RSB. This new conceptual framework could guide researchers in developing the knowledge base for retirement savings behaviour. As discussed earlier, past studies yielded inconsistent findings and only focused on certain factors, such as psychological factors, which do not guarantee better retirement savings behaviour. Stronger predictors or variables are required to inspire and motivate retirement savings, especially among civil servants in Malaysia. Additionally, there are very minimal studies in the literature that employed perceived government policy and perceived behavioural control as moderating variables. In short, this discourse proposes to develop and validate a conceptual framework to explain the relationships between factors influencing retirement savings behaviour among civil servants in Malaysia, as well as to better understand their retirement savings behaviour.

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Impact of Remuneration and Motivation on Employee Performance Amidst The COVID-19 Pandemic

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Abstract: Globalization and other environmental issues are causing problems for organizations. Improving employee performance is the responsibility of any organization, as it is crucial for the attainment of optimal objectives. An employee's reputation is improved by performing well on the job, which helps them advance in their professions. Without effective remuneration and motivation, it can affect employee performance in the organization. Other than that, the past researchers regarding this study also discussed. The relationship between independent variables and dependent variables was assessed using descriptive analysis, normality analysis, reliability analysis, Pearson's correlation analysis, and multiple regression analysis in this study. The population and sample of employees in the selected organization in Perak. The total population of 250 respondents in the company, and the sampling size was 148 respondents based on the Krejcie & Morgan table. Data collection in this study was conducted through questionnaires, and the data were analyzed using SPSS 20. The findings indicated that employee performance is significantly and positively influenced by remuneration and work motivation, with motivation being the most significant factor in the performance of education employees during the COVID-19 pandemic.

Keywords: *Employee performance, Remuneration, Work Motivation, COVID-19 Pandemic*

1. Introduction and Background

In an organization, employee performance and employee well-being are the most important things that employers need to be concerned to improve the productivity of employees (Abdullah et al., 2021). Productivity can be increased by improving levels of employee performance (Prasetyo et al., 2021). An organization's success is dependent upon the employee's performance, innovation, creativity and commitment (Belete, 2021). Employees are a fundamental aspect of a company, the growth or failure of a firm relies on staff productivity. (Nguyen et al., 2020). Theoretically, excellent performance can lead to more rapid employee career advancement (Firman, 2021). COVID-19 is a global health tragedy and a worldwide economic threat (Al-Sharify et al., 2021). The social and economic effects of COVID-19 widespread will be far-reaching and damaging for all. The COVID pandemic19 also affects global mental health (Sheridan Rains et al., 2021), lots of individuals feel out of control because of this pandemic, worry and concern (Dubey et al., 2020), economic, social and psychological parts (Passos et al., 2020).

This unexpected worldwide health crisis has disrupted the economy in a number of ways, affecting more than just service providers (Akram et al., 2021) but also alter how enterprise services are being provided and the performance of employees (Bartsch et al., 2021). Since the widespread of COVID-19, most companies or industries needed to ask each staff to work from home, and that remained not the actual working life and it lacked the quality of work, family-work engagement, job stress, and sleeping difficulties. Now the whole thing is ongoing by 'new normal' procedures but still alive with the anxiety of the COVID-19 pandemic (Bhattacharjee & Ghosh, 2022). According to Mohamad and Akbari (2022) many industries in Malaysia have suffered greatly as a result of the COVID-19 outbreak, not excluding tertiary education. Gorlick also mentioned employees in technical and vocational education and training (TVET) faced problems caused by COVID-19 such as employees who work from home missing out on social interactions with co-workers, moving less (e.g., stopping walking), fatigue, headaches, and eye-related ailments, and may also suffer from mental health problems including depression and social isolation. In 2020, the global coronavirus pandemic (COVID-19) outbreak caused unanticipated problems that significantly affected the university system (Ngwacho, 2020).

Remuneration is always the most significant aspect affecting employee performance. Sitopu et. al., (2021) mentioned remuneration as salary or incentive given to employees for work done and also further defined the

measurements of remuneration including employee basic salary, wages, bonuses, incentives, allowances and benefits that companies provide and reward for employment. Performance among employees can be raised by paying workers more and implementing human resources improvements more effectively (Elisa et al., 2022).

Work motivation can have a positive impact on enhancing performance (Riyanto et al., 2021). Werdhiastutie et. al., (2020) stated that the Motivation among workers will always enhance the caliber of work produced and the effectiveness of the company. Karim et. al., (2020) stated that the staff pay and benefits fell in 2020 as a result of the COVID-19 pandemic's consequences and the MCO's nationwide implementation. According to Ntanjana (2022), an employee's productivity depends on how frequently they are physically present at their place of employment, how much they are "mentally present," and how well they perform when on the job. Since the COVID-19 epidemic, employees from many businesses, particularly those in education, have been expected to work from home using whatever resources are available in their homes. As a result, motivation has an impact on employee performance since motivated individuals work harder and produce better work (Chien et al., 2020).

Remuneration and motivation are variables that influence the success of employee performance in the organization. From several earlier research, Sitopu et. al., (2021), Iptian et. al., (2020) and Didit and Nikmah (2020) agrees that remuneration and motivation affect concurrently with employee performance. These studies emphasized the skills education sector to identify employee performance and factors affecting them during the pandemic COVID-19 and this research intends to look at the factors of the relationship between remuneration and motivation and the dependent variable which is employee performance.

Problem Statement

The employee is the main indicator for any business to ensure business performance. Organizations must ensure employee performance to achieve business sustainability, including education on business (Amjad et al., 2021). Employee performance is a critical component of an organization that determines whether it succeeds or fails (Ali & Anwar, 2021). Employee performance can be defined as the result or degree of achievement of a person over a specific period in performing tasks in relation to several options, including job requirements, desired outcomes, or shared defined standards (Faozen & Sandy, 2024; Xiang et al., 2021).

The coronavirus pandemic (COVID-19) outbreak in 2020 has brought about unforeseen difficulties worldwide that have severely impacted the service industry. Educational sectors happened to shut down as a pre-emptive determination against the COVID-19 disease. In the meantime, learning sectors have since been transformed into virtual enterprises. For a longer period, the disruptive impacts of the pandemic may have a substantial impact on the motivation and performance of instructors and employees in educational institutions (Kutieshat & Farmanesh, 2022).

Other factors that affect employee performance, especially during an outbreak such as job disagreement, lack of autonomy, higher workloads, and a lack of support from others can cause occupational strain and impair performance. (Saleem et al., 2021; Shoaib et al., 2022). They also experienced disruptions in their emotions and thinking (Sadovyy et al., 2021). To prevent performance from declining, management must comprehend the elements that can increase employee motivation throughout the endemic stage.

Various studies have been reported about the remuneration and motivation that influence employee performance during COVID-19. Employees who are highly motivated and covered by welfare are considered to have better job performance and overall will improve their performance, be more productive and effective (Shtembari et al., 2022). Therefore, the purpose of this study is to look at the variables that affect worker performance generally during COVID-19, and in the educational sector in particular.

2. Literature Review

This section discussed related studies of employee performance during the COVID-19 pandemic by numerous researchers. The association between an actual independent variable and with dependent variable based on the previous study was elaborated further in this section.

Employee Performance: After putting in the required effort at work, a worker's professional accomplishment is represented by their "employee performance," which is correlated with worthwhile employment, a motivated background, and understanding colleagues and bosses (Hendrik et al., 2021). Flexibility in the workplace enables people to combine their personal and professional life, which improves performance and an overall improvement in the organization (Roopavathi & Kishore, 2021). According to Sugiarti et. al., (2021), employees can gain information and skills that will help them fulfill their obligations effectively, resulting in enhanced performance, by focusing on their work.

According to Waal (2021), employee performance is one of the important components for achievement, which they use to outperform the competitors, accomplish their objectives, and generate profits. In addition, he added, corporate culture, training and development, stress, rewards and incentives, and leadership can all shed light on how well employees perform. Akdere and Egan (2020) defined employee performance as a deliberate, integrated method for raising the efficiency of an enterprise through worker performance enhancements as well as team and provider capacity building. It is the growth of capable and dedicated individuals working in a company that encourages and promotes their accomplishments to accomplish common, meaningful objectives (Astuty & Udin, 2020). Every firm will go above and above to correct the form and enhance the caliber of worker performance through efficient administration of human resources (Alipour et al., 2022). Employee performance is what workers accomplish to complete the tasks assigned by the organization (Nurpribadi et al., 2024).

According to Hombalimath and Kinange (2020), the triumph of any organization mostly varies upon the performance of its employees. She also mentioned the factors that significantly affect an employee's performance at work must be identified by an employer, and appropriate changes or corrections must be made as a result. Even in trying times, people's performance can be affected by their ability, effort, and surroundings (Widayanto & Nugroho, 2022). Performance becomes the substance of the company because if there is no performance, the goals cannot be reached. Accurate and unbiased employee performance measurement is the most challenging aspect of the performance appraisal policy (Camilleri & Camilleri, 2021). When assessing an employee's performance, the main responsibilities they have fulfilled and the progress they have achieved over a specified period are contrasted with the initial period objectives (Urdan & Kaplan, 2020).

Employee job quality, knowledge, inventiveness, teamwork, and other factors can all be used to gauge an employee's performance. Since it shows how dedicated and passionate individuals are about their work, the caliber of the work and how it is completed can be viewed as an artistic representation of the sensitive nature of employee performance (Hultman, 2020). Sembiring et. al., (2023), argues that some metrics derived from the work in question can be used to assess an employee's performance. These metrics include work both quantity and quality, proficiency in the field, innovation, collaboration, awareness of oneself, creativity, and individual excellence. Arifin et. al.,(2022) determined that a company can lead the market by using its skilled and dedicated workforce to provide it an advantage over rivals.

COVID-19 Pandemic and its Impacts on Employee Performance: During this pandemic, COVID-19 is not one of the problems for employees become weak, employees with efforts also can influence their performance. According to Narayanamurthy and Tortorella (2021), employee's performance during COVID-19 has been reduced compared to the situation before COVID-19. This is because, during COVID-19, most employees need to force themselves to work from their home and it can decrease and influence their performance and efficiency towards their job. Some employees do not feel comfortable working from home because they need to find a suitable place to do work and it can create conflict issues. The company needs to guarantee the protection of employees' well-being, social distancing, financial security, and job security to decrease pressure and improve the performance of the employees (Pacheco et al., 2020).

Aside from that, individuals must adjust to the COVID-19 pandemic and embrace a "new normal" in their lives since infection will occur if all standard operating procedures (SOP) are not followed. Now the whole thing is ongoing with ‘new normal’ procedures or standard operating procedures (SOP) but still stays with and with the fear of COVID-19 (Muhamad Khair et al., 2021). For the duration of this COVID-19 pandemic, employees were afraid, and worried about this virus, and work-family problems with working from the home-based system (Manroop & Petrovski, 2023). Frustration, work-family problems and conflict, digital inequalities, and

stress, at the same time, not entirely work can be completed from home, and several more problems disturb employee performance (Kundu et al., 2022).

Besides that, organizations have to play important roles during this pandemic to manage employees' performance based on their work stress. Sun et. al. (2022) also mentioned, that to maintain the performance of employees, organizations need to sustain mental health by decreasing anxiety and concern about COVID-19. Employees with good mental and physical health will perform well in the organization. If any company is concerned about sustaining good performance from their employee, the organization needs to make sure the performance of their employees is worthy as well (Kodarlikar & Umale, 2020).

Remuneration: The term "remuneration" means compensation, reward or pay and also can be benefits that each employee gets to boost their performance and job satisfaction. Remuneration is a reward for an employee's performance or contribution to the corporation. According to Ali and Anwar (2021), the payment schemes that are frequently employed to boost staff morale and motivation. Additionally, most firms believe that incentives, prizes, and recognition are essential components of employee motivation programs because they address the performance-related success element. Furthermore, pay and salaries are typically referred to as remuneration that raises workers' job happiness (Rinny et al., 2020). Paying employees helps guarantee that each business has the skilled and motivated workforce that is necessary to achieve both short- and long-term goals.

Martinr and Uribe (2021) mentioned rewarding an employee for services performed or work completed is known as remuneration. She also states that remuneration enhances employees' performance. Remuneration includes basic salary and extra bonuses or additional economic remunerations for employees accepted for the duration of their employment. In other words, the term "remuneration" describes the sum of a person's salary, stock options, bonuses, and other forms of financial support (Lovett et al., 2022). It has been determined that employee compensation, such as bonuses, allowances, and prizes, is a more effective motivational tool that can significantly improve both the job satisfaction and performance of employees as well as the performance of the entire firm (Reddy, 2020).

Didit and Nikmah (2020) suggest which remuneration is one of the payments or rewards that employees receive used because of their services or employment. Other than that, benefits and remuneration are crucial for any firm hoping to reach its targets and goals. Inadequate pay and benefits will result in subpar work, which will lower employee satisfaction and raise absenteeism, which will lower the final result (Pandey, 2020). There are two types of remuneration: non-financial and financial (Mahathir et al., 2020). Financial remuneration refers to salary, wages, bonuses and incentives while non-financial remuneration refers to employee's satisfaction with interesting tasks, job challenges, responsibilities, recognition and so on. Reddy (2020) also defined wages are hourly payments depending on the amount of work laborers complete in a given day, while salaries are a fixed amount provided to employees regularly for their performance and productivity.

Besides that, rewarding employees is the key to making employees more productive. Thus, to reach and sustain a competitive advantage that is to enhance organization performance and must control human capital in the sought-after direction (Alfawaire & Atan, 2021). The key means of accomplishing this is through the incentive power of rewards (Ali & Anwar, 2021) in that particular organization. The willingness of employees to use their skills, talents, and knowledge for the benefit of the company is what drives genuine business success, and it is the responsibility of the organization to foster and support these positive employee contributions by implementing efficient compensation systems (Walelign, 2021).

Motivation: When this COVID-19 pandemic happened, the organization needed to know that remuneration and motivation are very important to the performance of employees in the organization. Motivation plays an important role in increasing employee performance. Paais and Pattiruhu (2020) also pointed out that with motivation, each of the employees not only can achieve organizational goals, but they also can improve their performance and achieve their own goals. Motivation is the internal driving force that propels a person to perform at a high level to satisfy a need or meet an expectation (Maryani et al., 2021).

Motivation is the main thing that we need to be concerned about in the organization, especially related to

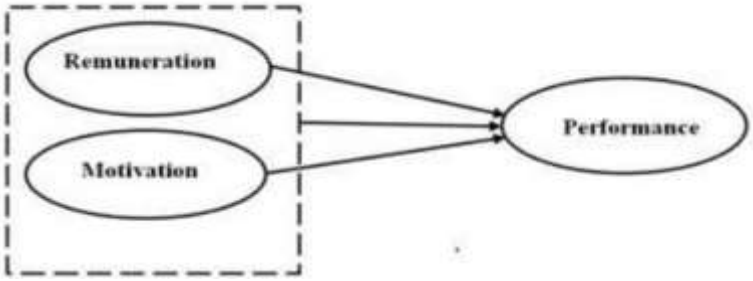
increasing the self-esteem among employees to accomplish their objectives. Motivated employees support the organization to develop more success because motivated employees are regularly looking forward to improving work performance (Hajiali et al., 2022). Motivation affects the performance of workers. Employees who are motivated take greater ownership of their work and are able to directly enhance performance. In contrast, "motivation refers to factors that activate, direct, and sustain behavior that is goal-directed." The "whys" behind our actions, or the needs or desires that propel us, are known as our motives. We assume that a purpose exists based on the conduct we witness, rather than observing one (Gardner et al., 2020).

Workers are motivated by specific variables that support their aspirations to improve their performance and guarantee that they will be more productive within the company. Motivation keeps workers more productive and enhances their subsequent job performance, which both raise job participation by making the work more fascinating and meaningful (Riyanto et al., 2021). Motivation by Nurlina et. al. (2023) is the ability to provide power that makes one's work exciting and motivates them to collaborate, perform well, and integrate with all of their strength and effort to be satisfied. Motivation will cause workers or employees of the company to take their tasks and duties seriously (Salas-Vallina et al., 2022).

Without motivation, we as humans or employees could not achieve better quality, work productively, have good knowledge and so on. While Hattie et. al. (2020) says that motivation is a psychological process that is brought about by or arises from variables as well as other elements. It also reflects the interaction of attitudes, needs, perceptions, and decisions that occur in an individual. Employees who maintain their effort to be motivated in the organization will achieve the goal at the right time. Diefendorff et. al. (2022) suggested that the mechanism that explains a person's level of effort, trajectory, and perseverance in achieving a goal is known as motivation.

Theoretical Framework: Ravitch and Carl (2019) concur that when researchers situate and incorporate formal ideas into their investigation, the theoretical framework acts as a guide. The same study can be approached very differently within different theoretical frameworks. The title of this theory is “Banking Employee Performance During Pandemic COVID-19: Remuneration and Motivation”. Based on the model adopted, the researcher would like to find out the level of performance at the time of the COVID-19 pandemic. The variables were contained with the same variable as the model adopted. It is of the interest of the researcher to determine the association between variables and how variables influence each other.

Figure 1: Theoretical Model of Banking Employee Performance During COVID-19 Pandemic: Remuneration and Motivation



Hypotheses

Hypothesis 1: This study investigated the connection between remuneration and employee performance. This hypothesis was supported by Sitopu et. al. (2021) rewarding an employee for services performed or work completed is known as remuneration. She also states that remuneration enhances employees' performance.
H1: There is a relationship between remuneration and employee performance.

Hypothesis 2: This study investigated the relationship between motivation and employee performance. This hypothesis was supported by Riyanto et. al. (2021) asserts that motivating elements that result from an employee's behavior while executing and managing a job have an impact on that employee's performance.
H2: There is a relationship between motivation and employee performance

3. Research Methodology

Correlational research was used in this investigation. The organization that now operates at a certain college in Perak is the focus of the sample frame, or in other words, the respondent of this study. The population of 250 respondents in this research study was defined as the entire number of employees in the company at the chosen college in Perak. Because it is accessible and readily available, the "convenience sampling technique" was employed as the appropriate sampling in this investigation. A non-probability design called convenience sampling makes use of time to gather some "quick" information to develop a "feel" for the phenomenon or variable of interest (Sekaran & Bougie, 2013). The study chose respondents from among the staff members of the workplaces. In defining the sample size, researchers refer to Krejcie & Morgan (1970) Table that specified when the total population was 250, the sampling size was 148 respondents. Data was gathered using a series of surveys that were disseminated by the researcher both manually and through a Google form. Items on both independent and dependent variables made up the questionnaire. The study questions from prior studies by Murpin et al. (2020) served as the basis for the questionnaire's design. Numerous questions on the questionnaire fell into the categories of independent and dependent factors. The questionnaire was constructed using the items Demographic Profile, Remuneration, Motivation, and Employee Performance, as shown in Table 1.

Table 1: Item Measurement

Variable	Number of Item	Measurement	Sources
Remuneration	5	1. The retribution policy is in line with employee expectations. 2. With the achievement of targets get incentives. 3. The company provides promotions for outstanding employee positions. 4. Bonuses given by the company are appropriate. 5. Provision of benefits according to workload.	Murpin et al. (2020)
Motivation	5	1. The amount of salary received by the employee. 2. The company cares about the work performance achieved by employees. 3. Support from colleagues. 4. Monthly targets are always achieved. 5. Opportunity to reach a career path.	Murpin et al. (2020)
Employee Performance	7	1. Carry out tasks according to applicable SOPs. 2. Correct mistakes in work mistakes. 3. Able to complete tasks assigned by the company on time. 4. Able to fulfill what the company is targeting. 5. Meet the monthly target. 6. Understand what is done. 7. Find ideas and new ideas in completing work.	

4. Results

This section discusses the findings of the study on the independent and dependent variables of remuneration and motivation towards employee motivation at several selected colleges in Perak.

Demographic Profiles

The findings show that out of 148 respondents, 77 (52.0%) were male, meanwhile 71 (48.0%) were female. In this study, most of the respondents were aged 21 – 30 years old which was 92 (62.2%) of them. Meanwhile, 42 (28.4%) were aged from 31 – 40 years old, followed by respondents aged 41 – 50 years old with 10 (6.8%). The least number of respondents are from 51 – 60 years old which was 4 (2.7%). It can be seen that most of the respondents came from the age of 21 – 30 years old involved in this study. Most of the respondents are married which is 74 (50.0%), followed by respondents with status single which is 70 (47.3%). The least amount of

respondents is from widowed status which was 4 (2.7%). Most of respondents have the work experience from 3 – 5 years which was 63 (42.6%), followed by less than 3 years with 49 (33.1%). Meanwhile, 21 (14.2%) were respondents that have work experience of 6 – 10 years and 11 (7.4%) respondents that have work experience of 11 – 15 years. The lowest number of respondents is from respondents that have work experience of more than 15 years which is 4 (2.7%). Most of the respondent's job levels have the same frequency as general employee and supervisory/junior management which were 35 (23.6%), followed by middle management at 34 (23.0%). Meanwhile, respondent's job levels from the category specialist/technical were 29 (19.6%) and the least number of respondents were from upper management which was 15 (10.1%). Summary of demographic profile statistics depicted in Table 2.

Table 2: Demographic Profiles Statistics

Attributes	Label	Frequency	Percentage
Gender	Male	77	52.0
	Female	71	48.0
Age	21 – 30	92	62.2
	31 – 40	42	28.4
	41 – 50	10	6.8
	51 – 60	4	2.7
Marital Status	Single	70	47.3
	Married	74	50.0
	Widowed	4	2.7
Years of Working Experience	Less than 3 years	49	33.1
	3 -5 years	63	42.6
	6 – 10 years	21	14.2
	11 – 15 years	11	7.4
	More than 15 years	4	2.7
Job Level	General employee	35	23.6
	Supervisory/Junior management	35	23.6
	Middle management	34	23.0
	Upper management	15	10.1
	Specialist/Technical	29	19.6

Correlation Coefficient

Table 3 was measured by using Pearson Product-Moment Correlation Coefficient data analysis and it was found there is a relationship between remuneration and motivation towards employee performance. The result of the correlation shows there is a significant, positive, and moderate relationship between remuneration and employee performance. This is because the p-value was less than 0.01 ($r = .499$, $p<0.01$).

Meanwhile, the result of the correlation shows there is a significant, positive, and moderate relationship between motivation and employee performance. This is because the p-value was less than 0.01 ($r = .468$, $p<0.01$). Based on the results of this study, it was obvious that employees adopt a lack of motivation and low remuneration management system especially during the pandemic COVID-19 and employees work remotely from home. This relationship was supported by Hafshah et. al. (2022). Wang et al. (2020) agrees that the lack of social interactions and the result of isolation is what can cause the lack of motivation and commitment due to difficulties in achieving the psychological needs for belongingness and relatedness. According to Pratap et. al. (2021), low-paid workers have been exposed to the full force of the health, performance and jobs crisis.

Table 3: Correlation Coefficient

		Employee Performance	Remuneration	Motivation
Employee Performance	Pearson Correlation	1	.499**	.468**
	Sig. (2-tailed)	148	<.001	<.001
	N	.499**	148	148
Remuneration	Pearson Correlation	<.001	1	.258**
	Sig. (2-tailed)	148	148	.002
	N	.468**	.258**	148
Motivation	Pearson Correlation	<.001	.002	1
	Sig. (2-tailed)	148	148	
	N			

** Correlation is significant at the 0.01 level (2-tailed)

The result indicates there was a significant relationship between remuneration and employee performance (β=.405, p<0.05). Thus, it can be determined that H1 was supported in this study. The finding shows there was a significant relationship between remuneration and employee performance (β=.364, p<0.05). Thus, it can be concluded that H2 was supported in this study.

Findings show the relationship between the independent variable remuneration on the dependent variable which is employee performance during the pandemic COVID-19. Based on linear regression was used to analyze that relationship and overall the findings of the study supported all the hypotheses. According to Reddy (2020), Pay is largely used as a tool to inspire employees to do their tasks successfully and to draw in and keep qualified workers with the necessary experience to help the organization reach its goals. Its presence in an organization cannot be ignored for the straightforward reason that it will have an impact on the accomplishment of objectives.

This study is supported by Rumanda et. al. (2023) entitled "The Effect of Leadership, Work Motivation and Remuneration Based on Worker Performance in the East Java Regional General Tax Office Directorate." The study's conclusions suggest that compensation significantly and favorably affects worker performance.

Based on the results and hypotheses which relationship between remuneration and employee performance is supported. Findings show the relationship between the independent variable which is motivation on the dependent variable which is employee performance during the pandemic COVID-19. Based on linear regression was used to analyze that relationship and overall the findings of the study supported all the hypotheses. Individual, group, and organizational performance would all improve with higher employee motivation (Nguyen et al., 2020).

According to Khan et. al. (2021), When better performance may fairly and equally increase employee rewards, job satisfaction will increase; otherwise, employee happiness is the feedback that shapes self-image and motivates performance improvement. The results of this investigation agree with those of Insan et al. (2021), who found that raising employee motivation will improve the performance of people as a whole as well as in groups and organizations. Based on the results hypotheses which relationship between motivation and employee performance was supported.

Regression Analysis

To investigate the relationship between compensation and employee incentives toward performance during the COVID-19 epidemic, this section addresses hypothesis testing. By examining the sign of a regression coefficient, it may also ascertain if there is a positive or negative relationship between each independent variable and the dependent variable. The regression analysis's result is displayed in Table 4. The coefficient of determination (R^2) of.372 indicates that the independent variables of motivation and compensation accounted for 37.2% of the variance in the dependent variable of employee performance. Motivation and compensation together accounted for 62.8 percent of the variance in employee performance that could not be explained by independent variables.

Table 4: Results of Regression Analysis

Independent Variables	Standard Coefficients	T	Sig.	Collinearity Statistics	
	Beta			Tolerance	VIF
Remuneration	.405	5.949	<.001	.934	1.071
Motivation	.364	5.346	<.001	.934	1.071
R square	**.372**				
Adjusted R square	**.364**				
F	**43.028**				
Sig. of F value	**<.001**				

Dependent Variables: Employee Performance *p-value<0.05

Based on the analysis above, the factors that affect employee performance, which is remuneration, were the most contributing to employee performance during the pandemic COVID-19 in five selected colleges in Perak. The findings show that 40.5% remuneration with (β= .405, p<.005) is the most influenced variable in employee performance during the pandemic COVID-19. Therefore, the results of this study showed that the dedication of remuneration substantially contributes to employee performance. The strong correlation between remuneration and employee performance indicates that institutions should reassess their compensation structures. Competitive remuneration can serve as a motivator that enhances dedication and commitment during tough times, thus directly impacting performance levels. This study highlights the importance of effective remuneration schemes in attracting and retaining top talent. In a competitive job market, institutions offering attractive remuneration are likely to maintain higher retention rates, which is crucial for organizational stability and growth during crises.

According to Narayanamurthy and Tortorella (2021), they showed that the COVID-19 pandemic had a substantial negative impact on workers' well-being and productivity, especially on employee's finances. Employees are paid a high rate of salary will boost their performance but while employees are paid a low rate of salary will affect employees and the organization's performance (Prasetyo et al., 2021). The remuneration system is a successful motivating tool that can significantly improve worker performance and job satisfaction as well as overall organizational performance (Didit & Nikmah, 2020). However, the value of remuneration is not too very reliable to the study. Other studies also showed that sig. variable remuneration is (r^2 = 0.432) or 43.2% and can be concluded that the remuneration is affected by the performance of employees (Didit & Nikmah, 2020; Nguyen et al., 2020; Prasetyo et al., 2021).

The regression coefficients are essential for interpreting the direction of the relationship. A positive coefficient for remuneration implies that higher pay correlates with improved employee performance, while a positive coefficient for motivation suggests that increased motivation leads to enhanced performance. Conversely, if any coefficients are negative, it indicates that higher remuneration or motivation could correlate with lower performance, which could suggest deeper issues within the organizational culture, especially under the constraints of a pandemic.

5. Managerial Implications and Recommendations

The finding shows that only 37.2% of the variance in employee performance is explainable by remuneration and motivation indicating that many other factors are at play. This could include organizational culture, leadership styles, employee engagement, operational processes, and external factors such as market conditions during the pandemic. Organizations need to recognize that merely focusing on financial compensation and motivation strategies may not suffice. The significant unexplained variance suggests that organizations should explore other potential contributors to employee performance (Kurdi et al., 2022). These could range from mental health support to flexible working conditions and professional development opportunities. During the pandemic, employees often faced increased stress and anxiety, making it crucial for organizations to adopt a more holistic approach to employee wellbeing (Mun et al., 2022). Economic instability and changing job markets due to the pandemic could impact employee performance decisions that are beyond the organization's acknowledged in future performance evaluations and strategies (Alsharif et al., 2021).

Organizations should consider how remuneration packages are structured. Offering competitive salaries is essential, but also incorporating non-monetary benefits such as health and wellness programs can enhance overall employee satisfaction and motivation (Dalal et al., 2022). Moreover, organizations also can focus on strategies to foster intrinsic motivation among employees by providing opportunities for growth, promoting a balanced work-life environment, and recognizing employee contributions. Regular feedback and communication can also significantly enhance motivation levels. Given the pressure from the pandemic, organizations should prioritize mental health initiatives and support systems. Employee assistance programs, stress management workshops, and flexible working hours can play a vital role in maintaining performance levels (Davidescu et al., 2020).

Besides, further research to identify additional factors that influence employee performance should be conducted. Surveys and interviews can provide insights into employee needs and preferences, leading to more targeted interventions. Organizations also need to adapt to change while remaining adaptable and responsive to the evolving needs and challenges faced by employees. What worked pre-pandemic may no longer be effective, and continuous evaluation of strategies will ensure that organizations remain relevant and supportive.

The relationship between remuneration, motivation and employee performance during the COVID-19 pandemic highlights the complexity of workplace dynamics in times of crisis. While remuneration and motivation significantly contribute to employee performance, the substantial unexplained variance indicates a broader set of factors at play. By adopting a more integrated and holistic approach, organizations can foster a resilient and high-performing workforce capable of navigating the ongoing challenges presented by the pandemic and beyond. The journey towards effective employee performance is ongoing and insights from this analysis can guide organizations in refining their strategies to foster a productive and motivated workforce.

Organizations need to remember that it is not only a remuneration factor influencing employee performance since remuneration was the most significant variable in this study. Different employees may have varying motivational drivers, such as job security, recognition, job satisfaction, and workplace culture. Thus, a holistic approach to employee motivation should be adopted. In the context of economic hardship caused by the pandemic organizations may face financial constraints that hinder their ability to enhance remuneration. This finding encourages institutions to explore alternative ways to boost employee motivation, such as non-monetary benefits, particularly giving employees flexible working hours, and professional development opportunities that can complement limited financial resources.

The dynamic nature of the pandemic requires organizations to continuously evaluate and adapt their remuneration strategies. Institutions should conduct regular assessments of employee needs and preferences to ensure that compensation packages remain competitive and effective in motivating their workforce. As for recommendations, the organization should review and revamp compensation structures and should conduct a comprehensive analysis of their current remuneration packages to identify areas for improvement. This process may involve benchmarking against other institutions and industry standards to ensure competitiveness. Managers should consider establishing performance-based incentives linked to employee contributions during the pandemic. This can reinforce the connection between remuneration and performance while assuring employees their efforts are recognized.

Organizations also need to provide clear and transparent communication regarding remuneration policies and how they relate to performance can encourage ambition and a sense of trust among employees. Managers should often engage with staff to ensure clarity and gather feedback on compensation-related matters. A supportive workplace culture that emphasizes employee well-being, inclusion, and recognition, going beyond financial incentives should be created. Initiatives might include team-building activities, mental health resources, and professional development workshops. Post-implementation of any remuneration or motivational changes is crucial to continuously monitor to explore its impacts on employee performance and satisfaction. Regular surveys and performance assessments can help gauge effectiveness and inform future strategies.

Conclusion

These days, some companies are content with their staff working remotely since it gives them more time to focus on their performance, which is ultimately what counts. When technology is used to share information and maintain strong contact among employees who work from home, the desire of employees to accomplish their work will grow. Remote, flexible workers tend to be happier and more motivated in life because working from home has been shown to lower stress, allow more time for hobbies and interests, and strengthen personal connections, among other things.

Several recommendations can be described based on the literature review and findings of this study. The independent variables which remuneration were significant but at a lower value for correlation analysis and the recommendation towards it is that some organizations need to develop a modern work environment. An efficient, contemporary workplace encourages more achievement and drives workers to deliver quality work. Employers might supply a set of office supplies for employees to set up at home if they work remotely and employers can listen to each other's opinions even though virtually.

Other than that, employers must encourage cooperative work environments since they will boost output, job happiness, creativity, innovation, and quality of work. and from that it can build trust between team members. Employees will be motivated to work and perform well in the company where they work if their safety and recognition are thought of by the company.

To enhance worker performance, the company needs to design and execute strategies for providing workers with fair compensation and benefits. Since salaries are employees' primary source of income, they place a high value on benefits offered by their employers. Offering benefits to staff members can help them feel valued and rewarded for their efforts. Online and off, managing the company's reputation should be of utmost importance. A business that mistreats its staff is more likely to lose clients and have a disastrous PR campaign. One disgruntled worker is all it takes to lower revenue and decrease consumer loyalty. It is evident that giving employees the proper benefits is more crucial for the business.

Last but not least, the company must be concerned about employee motivation. The performance of the organization will suffer if employees are not more motivated. Organizations must give workers equitable promotion opportunities based on their productivity. Additionally, allowing employees to make decisions about their particular jobs might boost their motivation. Not only do rational, quantitative approaches hold the key to sustained survival and organizational success, but also employee commitment, engagement, and drive at work. As the world continues to overcome the obstacles the pandemic has brought about, educational institutions and other organizations must leverage these insights to motivate their workforce effectively and enhance overall performance. By prioritizing competitive remuneration, fostering a supportive culture, and continuously evaluating strategies, organizations can emerge stronger in the face of adversity.

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Assessing Tourists' Willingness to Pay for Community-Based Ecotourism: Enhancing Sustainability and Local Involvement

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Abstract: Malaysia's captivating attractions are increasingly promoted through community-based ecotourism (CBE) initiatives. These efforts aim to empower local communities, conserve nature, and generate income by involving locals in managing ecotourism resources and activities, ensuring both economic benefits and sustainability of protected environments. CBE highlights diverse customs and cultures, enhancing ecotourism experiences through local resources. Understanding tourists' attitudes and preferences is crucial for developing sustainable cultural tourism packages. Key inquiries involve measuring local community participation, artistic elements, and tourism offerings in CBE management around protected parks. Evaluating tourism preferences and willingness to pay (WTP) for attributes provided by local businesses is essential for effective CBE management strategies in rural areas. This study employs the Choice Experiment model to analyze tourists' preferences for CBE activities and their marginal willingness to pay (MWTP) for management attributes at Min House Camp (MHC) in Kubang Kerian, Kelantan. The attributes examined include local community involvement, activity packages, accommodation facilities, and information provided. The study found 'super' package activity, increased local participation and employment, excellent accommodation, and adequate information to be the most important attributes. The study suggests that business owners and local managers adopt the CBE concept and focus on the key qualities that have been identified. Local communities and stakeholders should implement new tour packages at MHC, combining desirable features to meet market demand. Future studies could use a mixed logit model to account for multiple attributes of community ecotourism tours in protected parks.

Keywords: *Choice Experiment, Community-based Ecotourism, Local Communities, Min House Camp, Kelantan, Willingness to Pay*

1. Introduction and Background

Like many other countries, Malaysia is renowned for its captivating and authentic attractions. Sabah and Sarawak have increasingly expanded their initiatives to promote community-based ecotourism (CBE), with a strong emphasis on empowering local communities, conserving nature, and generating income. These efforts aim to engage local communities in decision-making regarding the management of ecotourism resources and activities. The objective is for ecotourism to not only generate income for local populations but also enhance the sustainability of protected natural environments.

Moreover, CBE highlights diverse customs and cultures, enriching individual ecotourism experiences through local and community resources. The economic value of CBE is derived from traditional cultural practices. Understanding tourists' attitudes and preferences is crucial for developing sustainable cultural tourism packages. A key inquiry concerns how to gauge local community participation, cultural elements, and tourism offerings in CBE management around protected parks. Therefore, assessing tourism preferences within the context of ecotourism activities and the willingness to pay (WTP) for attributes provided by local community businesses is imperative. This evaluation can inform management strategies for CBE in rural areas.

Community Engagement (CE) offers several advantages over the Contingent Valuation Method (CVM), particularly in addressing two key issues. CE delineates an asset in terms of its attributes and levels, enabling the measurement of multiple attributes of a good. In contrast, CVM primarily treats a single good as a whole. The CE model is well-suited for estimating tourists' preferences toward multiple facets of CBE in protected

areas. This study seeks to establish a preference framework for CBE using the CE model. The research aims to discover tourists' preferences for various attributes of ecotourism tours. Observable differences in preferences can be assessed through interactions between demographic characteristics and welfare estimates for potential ecotourism packages in protected areas. In essence, this study focuses on the critical aspect of effectively managing community-based ecotourism.

Background

The focal point of this study revolves around Min House Camp (MHC), situated in Kampung Pulau, Kota Bharu, Kelantan, adjacent to the Pengkalan Datu River (refer to Figure 1). Kota Bharu, characterized as a concentrated urban center, is positioned in the northeastern and most ruralized region of Peninsular Malaysia. Given the Malaysian government's keen interest in advancing the ecotourism industry, this research concentrates on rural ecotourism sites in West Malaysia. Notably, various governmental initiatives currently advocate for eco-tourism destinations in this area, particularly in Kelantan. Consequently, the selection of this rural ecotourism destination in Kelantan is motivated by its categorization as a Community-Based Ecotourism (CBE) site and its strategic location. It involves and benefits local communities, promotes the conservation of natural resources, and offers unique cultural experiences to visitors who enjoy exploring the outdoors.

Crucially, MHC serves as a recognized research center, focusing on the study of stingless bee species by several local and international universities. In 2018, out of fourteen Malaysian organizations, MHC received the ASEAN Tourism Award from the Kelantan state, achieving the Green Hotel Standard. The ASEAN Tourism Award acknowledges exemplary sustainable rural or urban tourism products within ASEAN, proposed and implemented through collaborative efforts between public and private sector stakeholders, contributing to the advancement of their respective areas and destinations.

The research in this study was centered around Min House Camp (MHC) in Kubang Kerian a community-based ecotourism project located on the outskirts of Kota Bharu town. It involves and benefits local communities, promotes the conservation of natural resources, and offers unique cultural experiences to visitors who enjoy exploring the outdoors. The camp's expansive compound includes various facilities such as chalets, multipurpose halls, a bee farm, a firefly garden, an organic farm, and a mini petting zoo. Additionally, the camp caters to water sports enthusiasts, providing activities like kayaking, river bathing, fishing, and clam digging.

In addition to the firefly-watching, Min House Camp facilitates various cultural engagements, encompassing craft-making, culinary sessions, traditional games, and performances like “wayang kulit and dikir barat. Wayang Kulit is a traditional form of puppet-shadow play, where intricately designed leather puppets cast shadows on a backlit screen. A skilled puppeteer narrates stories from ancient epics, accompanied by traditional music and voices. Dikir Barat is a form of traditional Malay vocal music that involves group chanting, typically performed in a rhythmic and melodic style. It often includes elements of poetry, praising religious or cultural themes, and is commonly performed during festive and cultural events.

Min House Camp not only functions as a recreational venue but also serves as a comfortable accommodation option, especially beneficial for individuals who need to be close to Hospital Universiti Sains Malaysia. Its strategic location, within a 2 km radius, makes it an optimal choice for long-term patients in search of a peaceful setting. The camp's association with Kelantan’s Down Syndrome Association, led by the owner serving as its President, emphasizes its sincere dedication to community involvement.

2. Literature Review

Much literature has been published on economic valuation studies using the Choice Experiment (CE) technique (Louviere et al., 2000). Various studies have highlighted the application of different valuation methods to assess the economic value of marine biodiversity, coral islands and national parks, in both developed and developing countries (Hearne & Salinas, 2002; Lindhjem & Navrud, 2008; Suwardi et al, 2020; Rani et al, Silva et al.,2022). However, in developing countries, this technique is still not well-known (Adamowicz et al., 1998). In the case of Malaysia, CE has been widely applied to value national parks, marine parks, and cultural-heritage sites by Jamal et al. (2004), Yacob et al. (2008), Chea (2016), and Bakar et al. (2018).

Jamal et al., (2004) conducted a study to help decision-makers determine the optimum management strategy using the CE technique in the Matang Mangrove Wetland in Perak. Here, CE was used to estimate the non-market value provided under different management options where they stratified a random sample of ethnic groups in three selected districts in Perak with a sample size of 571 respondents. Five attributes were used, namely; the environmental forest protected, the number of local people employed, the number of bird species protected, the price of visitation and trust fund contribution. The results showed that on average, non-consumer households were willing to pay a sum of RM 12.70 a year to achieve a better alternative scenario. The results have proven that this CE approach can be successfully used in a developing country as long as the choice sets are carefully developed, and the effective collection of field data is undertaken.

In a separate study by Yacob et al. (2008), they estimated the value of ecotourism resources at Redang Island Marine Park using the CE approach. There are two parts of the management properties which include the marine park area and the ecotourism facilities and services. The author used the conditional logit (CL) model and mixed logit (ML) model to analyze the data. The findings show that socio-economic variables such as age, gender, education and income contributed to visitors' preferences. For the marine park area, the ML model showed a slight improvement in explanatory powers as compared to the CL model while for the ecotourism facilities and services, the CL model was better than the ML model regarding explanatory power. Hence, this application of CE to value ecotourism in the case of the Marine Park in Malaysia can be used as the benchmark for ecotourism operators and management authorities to improve operations and policy development.

A study by Chea (2016) estimated the economic benefit of 'living heritage' in Melaka city using the CE method. Here, there were four attributes identified namely living heritage, natural environment, crowded recreational activities and the heritage charge value. A sample size consisting of 502 responses was used for this study. The findings showed that the respondents had a positive WTP for all the attributes which would help to provide valuable insights into the value of this unique heritage site for both the community and society.

In another study, Bakar et al. (2018) estimated visitor's preferences towards the improvement in ecotourism and management in Kubah National Park (KNP) by utilizing the CE technique. There were five attributes of ecotourism and management used in their study namely amenities, information provided, availability of an interpretive trail, availability of a park guide and entrance fee charges. The CL model was used to analyze the data using a sample size of 303 respondents. The findings indicated that respondents were WTP to support the changes or improvements in the current management condition which were currently being provided at a reasonably basic or low level.

3. Research Methodology

Study Area

The research in this study was centered around Min House Camp (MHC) which is located at Kampung Pulau, Kota Bharu, Kelantan next to the Pengkalan Datu River (see Figure 1). Kota Bharu can be described as a concentrated city located in the most ruralized part of the northeast of Peninsular Malaysia. As the Malaysian government is concerned with the development and operation of the ecotourism industry, this study has focused on West Malaysian rural ecotourism sites as several government initiatives presently promote eco-tourism destinations in this region, particularly in Kelantan (Habibu, 2018). Furthermore, this is one of the main reasons why this rural ecotourism destination in Kelantan was selected, given its location and being categorized as Community-Based Ecotourism (CBE). More importantly, MHC is also recognized as a research center, for studying the stingless bee species by several local and international universities. In 2018, among fourteen Malaysian organizations, MHC won the ASEAN Tourism Award from the Kelantan state, as it fulfilled the Green Hotel Standard. The ASEAN Tourism Award recognizes ASEAN's best sustainable rural or urban tourism products that are proposed and implemented by public and private sector stakeholders who have collaborated and worked together for the benefit of their respective areas/destinations.

The compound area of the MHC houses a variety of facilities ranging from chalets, a multipurpose hall, a bee farm, a firefly garden, an organic farm, and a mini petting zoo and even hosts water sports activities such as kayaking, river bathing, fishing and clam digging. Free Wi-Fi is also available in the area. The accommodation arrangements comprise 2 units (attached houses) with 3 rooms (for 13 max), 2 units attached with 2 rooms (9

pax), and 2 units attached with 1 room (4 pax max). Floating river rooms are also available (max 2 pax) and 1 traditional small hut (max 3 pax) with a shared bathroom. Besides that, there are two types of dorms which are basic and standard that are offered particularly for backpacker visitors who require budget accommodation. Peak season is during public and school holidays where many student groups visit and camp overnight as the compound also provides a camping area. One of the exciting highlights after dark is to watch fireflies where visitors are taken on a boat ride to witness the beautiful fireflies that naturally light up the local surroundings. The boat ride for firefly-watching operates from 8 pm until 11 pm. Besides that, visitors can also engage in the many cultural activities that are offered including handicraft-making, cooking lessons, traditional games and watching cultural heritage performances such as the wayang kulit (shadow play) and dikir barat (a Kelantanese traditional dance).

Figure 1: Map of Research Sites (MHC)



Material And Methods

The choice experiment (CE) technique was first introduced by Louviere and Woodworth (1983). This technique uses a common theoretical framework with a dichotomous choice contingent valuation in the Random Utility Model (RUM) (McFadden, 1973). In CE these characteristics are known as attributes. For example, visitor n obtains utility from an alternative j over other choices in the choice set C, therefore:

$$U_{nj} = \max (U_{n1}, U_{n2}, U_{n3} \ldots . U_{nJ})(i \neq j, \forall i, j \in C_n) \quad (1)$$

Their choices can be observed but cannot be measured directly. However, the true individual's utility U_{nj} can be stated as:

$$U_{nj} = V_{nj} + \varepsilon_{nj} \quad (2)$$

Where V_{nj} represents the measurable component of utility, which is independent of the observable attributes of alternatives including demographic information of the individual. $\varepsilon_{nj}$is a random component that captures the effect of unobserved and omitted influences on choices. Consequently, Equation 2 then becomes:

$$V_{nj} + \varepsilon_{nj} > V_{ni} + \varepsilon_{ni}(i \neq j)(i \neq j, \forall i, j \in C_n) \quad (3)$$

This shows that the ε_{nj} affects the utility of alternative j but cannot be observed. When this error term is treated as a random variable, and the visitor selects alternative j over another alternative I among a set of possible alternatives C, the probability can be presented as:

$$\begin{aligned} P_{nj} &= p\left(U_{nj} > U_{ni}\right) \quad (4) \\ &= p(V_{nj} + \varepsilon_{nj} > V_{ni} + \varepsilon_{nj}) \\ &= p(V_{nj} - V_{ni} > \varepsilon_{nj} - \varepsilon_{ni}) \\ &= (i \neq j, \forall i, j \in C_n) \end{aligned}$$

In this form, the utility function can be expressed as a linear function of the site attributes and can be presented as:

$$V_{nj} = \beta_1 + \beta_2 X_{nj2} + \beta_3 X_{nj3} \ldots\ldots + \beta_k X_{njk} \quad (5)$$

where X_{njk}measures the site qualities and β is the parameter.

The discrete choice model in the previous section becomes a CL model when the ε_{nj}Is assumed to be independently and identically distributed (IID) with an extreme value of type 1 Gumbel distribution. The probability of choosing *j* using this IID assumption becomes:

$$P_{nj} = \frac{\exp(V_{nj})}{\sum_i \exp(V_{ni})} \quad (6)$$

The maximizing likelihood function is then used to estimate the coefficients as stated in Equation 7, as:

$$logL(\beta) = \sum_{n=1}^{N} \sum_{j=1}^{J} y_{nj} \log\left[exp(\text{Vnj}) \,/\, \sum_{i=1}^{j} \exp\left(V_{nj}\right)\right] \quad (7)$$

Where Y_{nj}Ll take the value of 1 if the visitor chooses j and 0 if otherwise. This is the most applied model for parameter estimation in CE studies (Adamowicz et al., 1998; Hanley et al., 2001; Haider et al., 2004). Indeed, it is mostly used due to the ease of estimation as compared to other models such as multinomial probit (Train, 2009).

To estimate the marginal effects of the changes for certain attributes, for example, attribute k, the computation of implicit price is appropriate. According to Bennett and Adamowicz (2001), implicit price explains the amount of money that visitors are willing to pay to obtain an additional improvement in the k attribute.
The function of this implicit price is:

$$\text{Implicit price or WTP} = \beta k/\varphi \quad (8)$$

Where βk is the parameter of the attribute and φ is the MU of income; the resulting value is shown in ratio terms. If the value is greater than zero, this means a positive monetary return to a visitor, while a negative value results in a monetary loss.

Identifying the Attributes and their Levels

Based on the previous literature review, this study uses CE design to understand the CBE in the MHC area. Choices of attributes and levels should be relevant to the policy-making process and must have meaning to the person who answers the choice set of questionnaires (Bennett and Blamey, 2001). This list was then presented to a focus group who were asked to indicate which attributes played an important role in determining consumer choice, and the group was also allowed to add additional attributes. In addition, several discussions were undertaken with the Department of Tourism Kelantan, local communities and volunteer visitors to

discuss the attributes. Finally, five management attributes were agreed upon and a series of multiple choices to respondents such as involvement of the local community, package activity, accommodation facilities, information provided, and entrance fees. The preference attribute and level for CBE in MHC are shown in Table 1.

Table 1: Attributes and level of management in Min House Camp, Kubang Kerian

Variable	Level				Expected Sign	Explanation
	1	2	3	4		
CBE	No change	Increase 10%	Increase 20%	Decrease 5%	+	Utility increases as the level increases.
PAC	Normal	Premium	Super		+	Utility increases as the level increases.
FAC	Non-satisfactory	Satisfactory	Very Good		+	Utility increases as the level increases.
INFO	Low	Medium	High		+	Utility increases as the level increases.
PRICE	No Charge	RM 4.40	RM 4.80	RM 5.20	-	Utility reduces as the price increases.

Employment and Involvement of Local People

Based on the focus group discussion, the current level of jobs and involvement was set at 10% of the total population (Yacob, 2008) and was used as a base to determine the level of involvement in MHC. The attributes were selected based on the concept that CBE benefits the local community. The employment growth significantly creates an opportunity for the local economy, and therefore job opportunities are created for locals who live within the boundary of the ecotourism sites. Four levels were assigned to this attribute:

No change.
Increase 10%.
Increase 20%.
Decrease 5%.

Package Activity

The other attribute regards the package of activities. Three levels were chosen: normal, premium and super. The normal package offered by MHC was inclusive of accommodation, food and usage of multipurpose halls, while other activities such as firefly watching, kayaking, folk games, team building, traditional archery, organic farm, stingless bee farm and honey tasting were excluded. The premium package activity included a normal package with better accommodation, traditional food, and two additional activities, while the super package activity included comfort accommodation, and organic food with three additional activities. Three levels were assigned to this attribute:

Normal activity packages.
Premium activity packages.
Super activity packages.

Accommodation Facilities

MHC currently offers various types of accommodation such as chalets and campsites. The improved provision of facilities is planned to increase the tourists' use of utilities such as the quality and the number of lockers, cleanliness of public washrooms, showers, café restaurants, and the parking area. Therefore, for this study set, three levels comprising the status quo were used. First, 'unsatisfactory: a low number of facilities provided such as no locker for dorm visitors with less cleanliness of public washrooms, showers, café restaurant and park area'. Second, 'satisfactory: this envisioned relatively better facilities including the provision of locker facilities for visitors who stayed in the dorm, with clean washrooms, showers, café restaurants and the surrounding park area. Third, 'very satisfactory: the best provision of the facilities, including lockers, water supply, washrooms, showers, café restaurant and the surrounding park area kept clean at all times. Three levels were assigned to this attribute:

Unsatisfactory.
Satisfactory.
Very satisfactory.

Information Provided

The type of information presented was another important factor in the decision of where to recreate. Various levels of information are currently offered at the site as some tourists may need to be better informed while performing recreational activities. However, some tourists may be looking for more information about flora, fauna and park attractiveness. The additional information could be achieved through the availability of interpretive programs, proper positioning information boards, signboards and posters in the right place, where relevant brochures and pamphlets could also be made available. However, the effectiveness of this program depends on how well the visitors can obtain useful information inside the park itself.

Accordingly, this shows that the design of materials and their distribution and accessibility at appropriate places will determine how effective the information is and how it is used. Notwithstanding, the environment created could also help to create and encourage nearby residents to support nature protection in the nearby park and to reduce degradation of the nature park resources. Three levels were assigned to this attribute:

Low: Limited information, direction and sign only for management and safety purposes; informative paper, brochures and pamphlets are not well-organized in a specific place.
Medium: Better conditions, where directions and signs for management and user safety are provided in key intersections. Signs are easy to read and identifiable, park guards and educated guides provide information on nature and cultural activities.
High: The best level of providing information services, where directions and signs for management and safety are provided at intersections and near the camping area and restrooms. Park guards and guides act as one-on-one guides to visitors in the park, enlightening them on how to contribute to the sustainability of the park and the environmentally friendly use of the park using video presentations.

Marginal Entrance Fee

Although the entrance to the MHC was set as 'no charge' for local and international visitors, MHC managers were asked to reflect on the acceptability of introducing an entrance fee. The entrance fee would be used towards the management and maintenance of the park and building facilities. The paying of an admission fee would also give visitors the right to enter and utilize the facilities provided in the park. However, in this case, the payment vehicle attribute needed to be defined carefully so that all respondents could make real choices and, therefore, any hypothetical bias in the study could be reduced (Juutinen et al., 2011). Suggestions for the entrance fee included several possible payments of no charge, RM 4.40, RM 4.80, and RM 5.20, as:
No charge.
An increase of RM 4.40.
An increase of RM4.80.
An increase of RM5.20.

Experimental Design

A statistical software package (SPSS) was used to produce the orthogonal design. With this design, the levels of different attributes were consequently reduced and allocated properly into each choice set. The last step was to pair the generated alternatives from the orthogonal design with the status quo or current scenario. Each set consisted of two alternatives and one current scenario in the CE questionnaire. For example, in Figure 2, the visitors were given a choice between two alternatives with costs of RM4.40 and RM5.20. The trade-off concerns whether increase jobs and involvement of local people to 10%, super package (Inclusive comfort accommodation, traditional food and hall usage (only necessary) + 2 additional activities), satisfactory accommodation facilities and high information provided rather than decrease jobs and involvement of local people to 5%, normal package (inclusive accommodation, food and hall usage for student and university only), satisfactory accommodation facilities and medium information provided. Moreover, before each choice card, the following statement was made, "suppose Figure 2 represents the scenarios of management to be available in Min House Camp. Please tick (√) your preference in the box".

Figure 2: Example of a choice card in the CE model questions

Management	Option A	Option B	Option C (Current Situation)
Employment to Local People	Increase 10%	Decrease 5%	No Change
Package Activity	 Super	Normal	Normal
Accommodation Facilities	Satisfactory	Satisfactory	Unsatisfactory
Information Provided	High	Medium	Low
Marginal Entrance Fee	RM4.40	RM5.20	No Charge
Your most preferred Option (Tick one box)	√		

Sample Design and Implementation

The experimental survey was conducted at Min House Camp from July to November 2019 with a sample size of 360 respondents. Convenience sampling was applied where local and foreign visitors who visited the MHC could be selected given their accessibility, convenience and proximity to partake in the questionnaire survey.

4. Results

A summary of the socio-economic profile of respondents is next presented in Table 2. The distribution of the sample respondents' gender was 42% for males and 58% for females. The total number of respondents was 360 with ages ranging between 18 and 72 years of age, with a mean age of 42 years. Regarding the respondents' education level, 17% of the respondents had completed primary school, 16% had completed secondary school, and with a degree certificate, 44% had a pre-university and diploma certificate, and 24% held a Master's and PhD certificate. As for marital status, 44% of respondents were currently single, 55% were married, and 1% of them were others. Most of the respondents were currently employed or seeking employment status; 53% and 36% respectively.

Table 2: Demographic and Geographic Information About Visitors in Min House Camp, Kubang Kerian, Kelantan

Variables	Frequency	Percentage (%)	Mean
Age (Years)			41.806
Income per annum			4240
Gender			
Male	151	42	
Female	209	58	
Education Level			
Primary School	62	17	

Variables	Frequency	Percentage (%)	Mean
Secondary School	58	16	
Pre-University and Diploma	159	44	
Degree	57	16	
Master and PhD	24	7	
Work Status			
Employed	190	53	
Seeking Employment	129	36	
Retired	36	10	
Others	5	1	
Marital Status			
Single	158	44	
Married	199	55	
Others	3	1	

Conditional Logit Result

Table 3 shows the results of simple CL model conservation. Most of the variables in the model such as CBE2, CBE3, PAC2, PAC3, FAC2, FAC3, INFO2, INFO3 and PRICE are significant at a 1% and 5% significant level. Whereas CBE4 is not significant due to the visitors who are not in favor of reducing local people's employment by 5%, which is consistent with the finding of Yacob et al., (2008). As seen from the results, these variables are by a priori expectations. The positive coefficient in all the parameters except for PRICE implies that visitors have a higher preference for these levels as compared to the status quo (CBE1, PAC1, FAC1 and INFO1). Also, the coefficient for PRICE is negative which confirms that imposing a higher marginal entrance fee would lead to negative contributions towards satisfaction (UTILITY).

Table 3 also reports the marginal rate of substitution (MRS) of the management attributes for each level. Here, all the variables have positive values which means that most of the visitors are willing to pay slightly more with the improvement of the attribute levels. Accordingly, CBE2 and CBE3 have a value of RM 1.05 and RM 1.06 respectively. Next, PAC3 has a higher value of RM 1.03 than PAC2 valued at RM 0.49. FAC2 and FAC3 both have a higher value than the other variables of RM 1.41 and RM 2.52 and the values for INFO2 and INFO3 are RM1.52 and RM1.40 respectively.

Table 3: Simple CL Model for Management

Variables	Coefficients (β)	Std.Error	P-value	Marginal Value (RM)
CBE2	0.79858626	0.12406717	0.0000***	1.05
CBE3	0.80477956	0.15324741	0.0000***	1.06
CBE4	0.06227625	0.16322511	0.7028	0.08
PAC2	0.36783748	0.15814010	0.0200**	0.49
PAC3	0.78190266	0.23462752	0.0009***	1.03
FAC2	1.06477114	0.18904913	0.0000***	1.41
FAC3	1.91157652	0.21834423	0.0000***	2.52
INFO2	1.15233703	0.13407648	0.0000***	1.52
INFO3	1.05759440	0.17855798	0.0000***	1.40
PRICE	-0.75745367	0.16298409	0.0000***	

Summary statistics
Number of observations 1440

Log-likelihood function	-1196.845
Log-likelihood function no coefficients	-1289.8753
Chi-Squared	186.0606
Pseudo- R^2	0.07212
Adjusted Pseudo- R^2	0.06889

NOTE: *** Significant at 1% and ** 5% level

In the interaction model, the best-fit model for the CL interaction model for management is shown in Table 4. The likelihood ratio value increased to 365.6886 as compared to the simple model which was 186.0606. This value is also compared to the critical chi-squares value of 40.289 ($X^2_{(0.01, 22)}$). The model chi-squared statistic displays satisfactory results, thus, rejecting a null hypothesis that indicates the coefficients are statistically, significantly different from zero. The increase in pseudo-R2 values also confirms the improvement of this model. This value has slightly increased from 0.07212 to 0.14175 which shows the interaction model is more precise. There are some notable features of the variables in this interaction model for the management attributes. In Table 4, eight main attributes are found to be significant at a 1% level and with the expected sign. In a comparison of this model with the previous simple model in Table 4.20, it shows that CBE4 is still not significant although having a positive coefficient which is consistent with the findings by Yacob et al., (2008). Therefore, this indicates that strong relationships are affecting the interaction variables to the main attributes.

Regarding the interaction variables, most of them are significant at the 1% level. The negative sign of all age coefficients (CB2_AGE) shows that young people were more inclined compared to older people to support the employment of local people at a 10% increase in employment. Next, the negative sign of the age coefficients (PC2_AGE and PC3_AGE) shows that young people were more inclined compared to older people to support either "premium package activity" or "super package activity". Furthermore, the negative sign of FC2_AGE also shows that young people were more inclined to support satisfactory accommodation facilities. The positive sign of PC3_INC and FC2_INC indicates that a higher level of income contributes positively to support "super package activity" and "satisfactory accommodation facilities". Also, the medium information provided and associated with employment has a negative relationship (IN2_WORK) indicating that full-time employment does not support the provision of information at the medium level. Likewise, FC2_EDU indicates that people who have a higher level of education tend to support satisfactory accommodation facilities and the negative sign of gender with the upgrade package activity (PC3_GEN) indicates that females have a higher preference than males in supporting the super package activity.

Table 4: CL Interaction for Management Models Results (Model 6)

Variable	Coeff.	Std. Err	P-Value	Marginal Value (RM)
CBE2	3.454	0.550	0.0000***	3.54
CBE3	0.922	0.164	0.0000***	0.94
CBE4	0.080	0.168	0.6351	0.08
PAC2	2.221	0.609	0.0003***	2.27
PAC3	4.509	0.726	0.0000***	4.62
FAC2	1.387	0.651	0.0331**	1.42
FAC3	1.976	0.226	0.00008***	2.02
INFO2	2.814	0.240	0.0000***	2.88
INFO3	0.781	0.186	0.0000***	0.80
PRICE	-0.976	0.180	0.0000***	-
CB2_AGE	-0.056	0.012	0.0000***	-0.06

Variable	Coeff.	Std. Err	P-Value	Marginal Value (RM)
PC2_AGE	-0.051	0.012	0.0000***	-0.05
PC3_AGE	-0.079	0.015	0.0000***	-0.08
FC2_AGE	-0.031	0.011	0.0058***	-0.03
PC3_INC	.637556D-04	.348417D-04	0.0673*	0.00
FC2_INC	.948532D-04	.395427D-04	0.01658**	0.00
IN2_WORK	-0.918	0.112	0.0000***	-0.94
FC2_EDU	0.060	0.022	0.0073***	0.06
PC3_GEN	-0.402	0.215	0.0609*	-0.41
No. of observation	1440			
Log-likelihood	-1107.031			
Log-likelihood function no coefficients	-1289.8753			
Chi-Squared	365.6886			
Pseudo- R2	0.14175			
Adjusted Pseudo- R2	0.13605			

Significant at ***1%, **5% and *10% level

Welfare measure (Marginal Value)

The marginal values for both CL simple and interaction models are shown in Table 3 and Table 4 respectively. According to Siebert (2008), the marginal rate of substitution shows the WTP of respondents based on their (truly revealed) preferences. To measure the average WTP of the respondents, the β value of this attribute is divided by the β value of price. The marginal value can be called 'implicit price' which explains the amount of money that visitors are willing to pay to obtain an additional improvement in k attribute (Bennett and Adamowicz (2001). For example, The MWTP of 'No Change' (10% of the total population) to 'increase 20%' regarding the issue of involvement and job employment of the local community is RM 3.54. Here, the respondents are willing to contribute as much as RM 3.54 on average to support employment and involvement of the local community by up to 20%. Next, the MWTP of 'increase 20%' to 'increase 30%' is RM 0.94. This indicates that the respondents value the improvement of 'increasing 30%' in employment and the involvement of local people is the least. Last, the low relative value of 'increase 30%' shows that the respondents most preferred an increase to 20% for involvement and employment of the local community in MHC.

For, package activity, the MWTP of the 'normal' package to 'premium' is RM 2.27. Here, the respondents are willing to pay an average of RM 2.27 for the premium package to ensure better accommodation, traditional food, free hall usage, and two additional activities. The MWTP of the 'premium' to the 'super' package is RM 4.62. Here, the respondents are willing to pay more; RM 4.62 for the 'super' package to ensure better accommodation, organic food, free hall usage and three additional activities. Next**,** the MWTP of 'non-satisfactory' to 'satisfactory' accommodation facilities is RM 1.42. Here, the respondents are willing to pay on average RM 1.42 for satisfactory accommodation facilities. In this case, 'satisfactory' includes the better provision of locker facilities for visitors who stay in a dorm, upgraded washrooms, showers, café restaurants and the surrounding park area. Next, the MWTP regarding the 'satisfactory' to 'very satisfactory' packages is RM 2.02. Here, the respondents are willing to pay slightly more; RM 2.02 for 'very satisfactory' accommodation facilities in MHC. 'Very Satisfactory' means the best provision of facilities including lockers, water supply, washrooms, showers, café restaurants and the surrounding park area always kept clean.

Lastly, the MWTP for the information provided from 'basic' to 'medium' is RM 2.88. The respondents here are willing to pay on average RM 2.88 for 'medium information' which includes directions and signs for management and user safety provided at key intersections. Also, the signs are easy to read and are identifiable, plus park guards and educated guides provide information on nature and cultural activities. However, the

respondents are willing to pay a lesser amount for 'high information' which is RM 0.80. This means that the respondents are more supportive of the effort of providing 'medium' rather than 'high' information. The reason for the low relative value of 'high' information is that the improvement of 'medium' information provided is relatively sufficient for the MHC visitors.

Discussion

Based on the CE model, this study analyses tourists' preferences for CBE and related activities as well as their MWTP four management attributes of the ecotourism destination at MHC namely, involvement of the local community, packages activity, accommodation facilities, and information provided. This study uncovered tourists' preferences for potential CBE tour packages in communities adjacent to the protected area. Based on the empirical results model, the most important attributes were found to be 'super' package activity, followed by an increased 20% involvement and employment of local people, very good accommodation facilities and medium information provided. Indeed, the findings of the CE results are consistent with the previous literature by Yacob et al., (2008), Mohamad (2014), Juutinen et al., (2011) and Bush et al., (2008).

5. Managerial Implications and Recommendations

For policy implications, business owners or local managers may consider adopting the concept of CBE in the future and focusing on the key attributes identified in this study. Moreover, local communities and other stakeholders should be encouraged to implement new tour package programs identified in the MHC area. For example, park management could develop better combinations of tour features. The ideal combination would involve visitors enjoying superior activities with the involvement and employment of the local community.

Conclusion

The objectives of this study are to discover tourists' preferences for various attributes of ecotourism tours. These aspects should be highlighted to meet future market demand. Furthermore, it may be beneficial to segment the market based on tourist preferences and needs and to set budgets for ecotourism management in protected areas accordingly. For future studies, the application of a mixed logit model could be considered to account for the multiple possible attributes of community ecotourism tours in protected parks.

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Public Private Partnership and Financial Implication to Government: A Case Study from Malaysia

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Abstract: The implementation of infrastructure projects through the Public Private Partnership (PPP) that involve investments from the private sector has greatly benefited the country. Apart from being an alternative to conventional public infrastructure projects, PPP is also said to be a more efficient method as the risk of project implementation is transferred to the private partner. Even with these advantages, it cannot escape criticism, especially the implementation of PPP projects which involve financial implications to the government. The main purpose of this study is to investigate the Malaysian government's experience in the implementation of PPP projects especially regarding its financial implication issue and how the Malaysian government addresses the issue. A total of 29 officers from several government agencies were interviewed. The interview transcripts were analyzed using ATLAS. Ti application. Apart from contributing a theory regarding PPP, the results of this study have provided new knowledge on PPP, especially Malaysia's experience in dealing with financial commitment issues arising from the implementation of PPP projects. Although the context of development in other countries may differ, this Malaysian experience can be used as an example for PPP practitioners in planning PPP projects elsewhere.

Keywords: *Public-private partnership; development program; government procurement; fiscal management*

1. Introduction and Background

Public Private Partnership (PPP) is a strategy used by the government to provide public services, especially public infrastructure by inviting private partners to invest in public infrastructure projects. It refers to the collaboration between government and private companies in designing, building, financing and operating public infrastructure for the benefit of the general public (Ismail & Abdul Razak, 2023; Musawa et al., 2017). The implementation of the PPP program in Malaysia rooted since the 1980s under the privatization policy (Mohamad et al., 2018). The policy aims, among others, to reduce government participation in the economy and to enhance greater private-sector involvement (Economic Planning Unit, 1991). The privatization program undertaken in Malaysia does not only involve the corporatization of government entities and transferring/selling of government assets but also includes the implementation of new government projects using the private sector's investment under the build-operate-transfer (BOT) and build-operate-own (BOO) scheme (Hensley & White, 1993).

Over the years, new ideas have emerged in development practice worldwide. Private Finance Initiative (PFI) policy was introduced in 1992 by the British Conservative government. This PFI policy was initiated because it offered an opportunity for the British government to invest in infrastructure "off-balance-sheet", that is, implementation of infrastructure through public spending or borrowing was replaced by paying a tariff for infrastructure use to the private sector (Spackman, 2002). The introduction of PFI was controversial and attracted criticism as some argue that the PFI contract is a 'marriage made in heaven' and used by the government to enrich certain businesses with lucrative terms (Hodge & Greve, 2005). Being critical to Conservative Party policy, The Labor Party government in 1997 introduced PPP policy, a friendlier term to denote partnership in the contract, as an alternative to the Conservative Party's controversial PFI policy (Wettenhall, 2008).

Many criticisms of privatization policy related to mismanagement and corruption (Reinsberg et al., 2020). Privatization was expected to promote competition and eliminate corruption. In practice, the opposite has often been true as beneficiaries have engaged in new types of corruption to maximize their gains instead. As the failures and abuses of privatization became apparent, PPPs have been promoted, ostensibly to mobilize private finance for the public purpose (Sundaram, 2023).

Corresponding to the development of PFI and PPP in the United Kingdom, Malaysia shares a similar story where PFI has been announced in the Ninth Malaysia Plan. PFI is an initiative to use private sector funding in public infrastructure. Although the usage of private sector financing has been practiced in toll road projects since the 1980s, the PFI initiative has enhanced the private financing alternative. As opposed to the user pay concept in the toll road project, the private partner in PFI is paid by the government on the usage of the facility constructed. This is in line with PFI practices in the United Kingdom where under PFI, private sectors are remunerated through payment based on service availability (Spackman, 2002).

There were various initiatives by various government departments regarding PFI. The Economic Planning Unit (EPU) considers the PFI program the same as the privatization program because it is similar to the build-lease-transfer (BLT) that has been implemented in Malaysia. For example, the government building in Putrajaya Administrative Center was built by a private partner and it was leased to the government (Suhaiza Ismail & Abdul Razak, 2023). The lease payment made by the government to a private partner in BLT is similar to the availability payment concept under PFI.

On the other hand, by the PFI initiative announced in the Ninth Malaysia Plan, Pembinaan PFI Sdn. Bhd. (PFI Sdn. Bhd.) was established by the Ministry of Finance (MOF) to implement PFI projects. Several projects were identified to be constructed through PFI and PFI Sdn. Bhd is assigned to raise project financing for those projects. It was reported that the financing was provided by Employee Provident Fund (EPF) and Retirement Fund Incorporated (Public Account Committee, 2015). Under this arrangement, all PFI-identified projects will be funded by PFI Sdn. Bhd.. PFI Sdn. Bhd. will then repay the financing. This arrangement makes PFI projects implemented under the Ninth Malaysia Plan significantly different from the term PFI that has been normally understood and practiced in other jurisdictions worldwide (Ismail & Yusof, 2010).

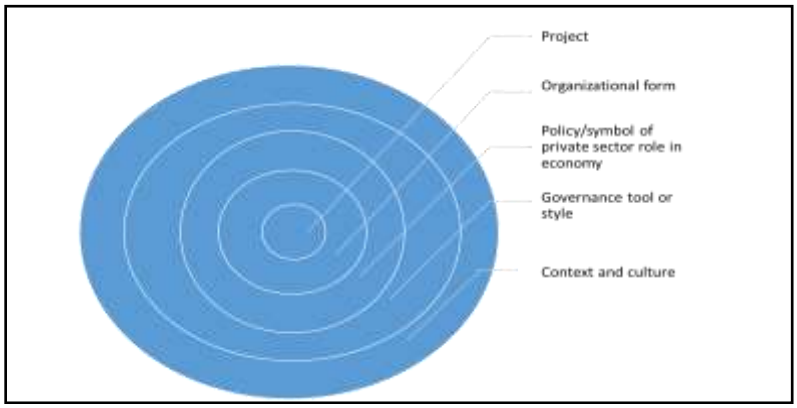
PFI Sdn. Bhd. was established by the MOF as a controlling tool for future payment commitments related to PFI projects. This corresponds to a general argument that claims PFI is used to circumvent the government budget. (Acerete et al., 2019; Benito et al., 2008; Reeves, 2015). There are beliefs that PFI will cause greater financial implications to the government if it is not properly managed because the government is committing to pay the private sector throughout the concession period (Engel et al., 2013).

The establishment of a PPP unit, namely, Unit Kerjasama Awam Swasta (UKAS) in 2009 marked a new direction in the privatization and PFI initiative in Malaysia. PFI projects that have been implemented through PFI Sdn. Bhd. was discontinued. UKAS is entrusted with the administration of the privatization program and PFI program that was originally administered by EPU and MOF separately. The term public-private partnership (PPP) was promoted to be the new term as an umbrella policy that combines both privatization and PFI under one program (Unit Kerjasama Awam Swasta, n.d.).

2. Literature Review

Hodge and Greve (2013) Have discussed a broader conceptual phenomenon of the term PPP which may be referred to as (1) a specific activity or project, (2) an organizational form or management tool, (3) a statement, or policy regarding the role of the government in economic activity, (4) a symbol or governance tool or (5) a historical context and culture sets of assignment (Figure 1).

Figure 1: Dimensions of PPP Phenomenon



Source: Hodge and Greve (2013)

Hodge and Greve (2013) conclude that the most usage of the term is always regarding what they call a long-term infrastructure contract' (LTIC) partnership between public and private partners. Another contributor to PPP research, Grimsey and Lewis (2004) also discussed the term PPP which has been used in various countries. They have defined PPP as a risk-sharing relationship based on a shared aspiration between the public sector and one or more partners from the private and/or voluntary sectors to deliver a publicly agreed outcome and/or public service'. Looking at this definition, it has been construed from three dimensions identified by Hodge and Greve (2013), that is, PPP as a specific project, a management tool, and a policy statement of the government as to their involvement in the economy.

Yescombe (2007) Took the position to discuss PPP from a similar dimension where PPP is regarded as 'project based' and 'contract based' with its definition comprised of 4 key elements, (1) a long-term contract; (2) involves activity of design, construction, financing, and operation of public infrastructure (facility) by private-sector party; (3) with payments over the long-term contract made either by the government or by the public as users of the public facility; and (4) with the facility remaining in public-sector ownership, or reverting to public-sector ownership at the end of the contract. This LTIC-type definition of PPP concurs with the observation made by Hodge and Greve (2013) that most discussion about PPP is related to infrastructure project dimensions.

Martin (2016) Argues that there is much confusion about what PPP is and what is not PPP when he discusses that on many occasions, being in public seminars and/or academic conferences, collaboration between public and private partners and any contracting-out procurement by public organizations has been attributed to PPP. He contended that PPP should be part of a procurement contract that involves construction/reconstruction of infrastructure/ public facility and not any other else. PPP should not cover other arrangements such as collaboration/joint venture and/or long-term services.

In a different perspective to the conclusion made by Martin (2016), Saussier and de Brux (2018) Explained PPP where they categorized the implementation of infrastructure projects into three types, (1) public procurement where the government assigns construction or service needs to a private entity as a contractor in return for a payment in the immediate term; (2) concessions contract which is based on the assignment of a mission comprising financial investment, construction of the project together with its operation and maintenance; and (3) Availability-based PPP that allow a government to assign a contractor with a comprehensive project as part of a long-term contract, against payment or remuneration paid by the government and spread over time. She also explained that apart from public procurement, the other two categories are always regarded as PPP where a concession contract is a "user pay PPP" meanwhile an availability-based contract is a "government-pay PPP". Either "user-pay PPP" or "government-pay PPP", many kinds of literature have also discussed the use of PPP as a way to avoid budget constraints. (Cepparulo et al., 2024)

Theories Underpinning PPP

It has been discussed in literature that not all collaboration between the public sector and private sector can be regarded as PPP in its true technical meaning although any form of collaboration between government and private sector may be called public-private partnership. PPP has been established as a technical term and can only be attributed to certain features as follows:

PPP is part of a public infrastructure procurement program that uses private sector investment;

PPP involves long-term infrastructure contracts between public and private partners, and it ranges from the designing, funding, and building of the facility to the operation and maintenance of the facility; and

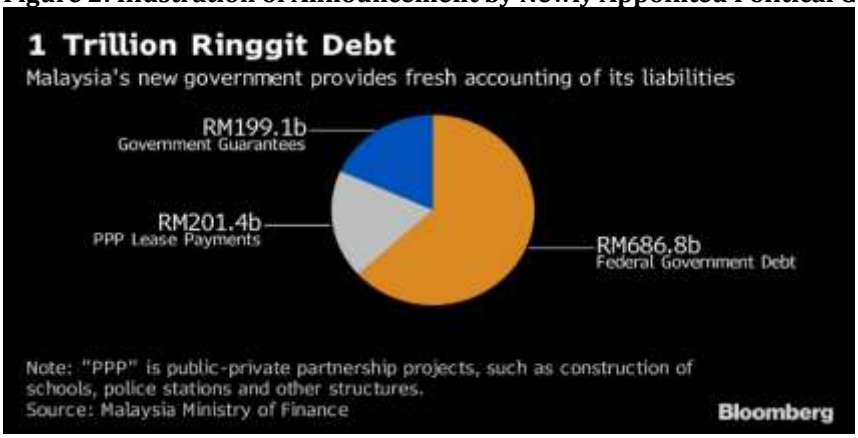
two major types of PPP, that are, user-pay PPP and government-pay PPP.

Issue And Challenges

Government strategy to use PPP in providing public service and public infrastructure seems to be a good strategy. However, although PPP used private sector investment, the implementation of the PPP strategy still has financial implications for the government. It is because in the availability type PPP, although it does not need government funds for the construction of the project, it requires government payment commitment in the form of lease rental payment throughout the contract period. For example, the government has explained in the parliament that they chose to construct six Universiti Teknologi Mara (UiTM) campuses through PPP to overcome a lack of development funds. By doing this, the government must pay RM375 million in rent annually for 23 years, based on concession agreements that have been signed (Zahiid, 2014).

It was in 2018 when the newly elected Malaysian government reported that the national commitment to its debt was bigger than what had been reported by the previous government. The total amount is to be more than RM1 trillion. In explaining the number, the government has included in the calculation of the national debt with government guarantee loan and PPP payment commitment illustrated in Figure 2 (Shukry & Jamrisko, 2018).

Figure 2: Illustration of Announcement by Newly Appointed Political Government



Although it has been clarified that the inclusion of government guarantee loan and PPP lease payments commitment is not an appropriate mechanism to assess the actual government's debt as compared to the regulatory limitation (55% of GDP), it is still an eye-opening discovery that PPP lease payments commitment has become a serious issue that the government needs to address. According to the data reported when Budget 2021 was tabled in Parliament, the amount of PPP payment commitment represents 12% of the GDP as shown in Table 1.

Table 1: Government Debt and Liabilities Exposures

Component	RM Billion		Share of GDP (%)	
	2019	2020	2019	2020
Federal Government Debt	793.0	874.3	52.5	60.7*
Committed Guarantees	194.0	209.3	12.8	14.6
Other liabilities (PPP, PFI, PBLT)	182.2	173.3	12.1	12.0
Total	**1,169.2**	**1,256.9**	**77.4**	**87.3**

** Debt ceiling amount of 55% of GDP has been raised under a new Act enacted in 2020, that is, Temporary Measures for Government Financing (Coronavirus Disease 2019 (COVID-19)) 2020 Act.*
Source: Ministry of Finance, 2020

This disclosure inspires the researcher to undertake this study with the general objective of investigating the government's experience in the implementation of PPP projects especially on the procedure that may have been overlooked regarding the financial commitment of PPP projects.

3. Research Methodology

The main objective of the study is to investigate the experience of public officials on PPP projects and their financial matters. The study utilizes a qualitative research design with face-to-face semi-structured interviews. The population of the study construed government officers in departments which directly involved in PPP mainly UKAS, several divisions in MOF and specific divisions in Ministries which directly involved in the implementation of PPP projects.

A total of 29 individuals were interviewed and became a sample of the study. They represent three clusters for analytical purposes that are UKAS cluster, the MOF/EPU cluster and the cluster from implementing agencies. The details of the individual interviewed in terms of demographics and the date the individual was interviewed are presented in Table 2.

Table 2: Participants Demographic

Coding	Cluster	Designation	Service Experience (Years)
P1	UKAS	Principal Assistant Director	17
P2	UKAS	Deputy Director General	28
P3	UKAS	Principal Assistant Director	19
P4	UKAS	Senior Assistant Director	8
P5	UKAS	Director	20
P6	UKAS	Principal Assistant Director	18
P7	UKAS	Director	22
P8	UKAS	Director	20
P9	UKAS	Principal Assistant Director	17
P10	UKAS	Senior Director	23
P11	UKAS	Senior Assistant Director	12
P12	UKAS	Senior Assistant Director	14
P13	UKAS	Principal Assistant Director	18
P14	Implementing Agency	Assistant Secretary	2
P15	Implementing Agency	Mechanical Engineer	19
P16	Implementing Agency	Senior Assistant Secretary	8
P17	MOF	Principal Assistant Secretary	19
P18	MOF	Principal Assistant Secretary	18
P19	MOF	Principal Assistant Secretary	19
P20	MOF	Senior Assistant Secretary	14
P21	MOF	Senior Assistant Secretary	13

Coding	Cluster	Designation	Service Experience (Years)
P22	MOF	Head of Section	22
P23	MOF	Principal Assistant Secretary	16
P24	MOF	Head of Section	21
P25	MOF	Head of Section	21
P26	Implementing Agency	Principal Assistant Secretary	19
P27	EPU	Principal Assistant Secretary	15
P28	Implementing Agency	Deputy Undersecretary	22
P29	Implementing Agency	Principal Assistant Secretary	18

Although it is visually seen that the distribution of samples by cluster is less balanced, the fact is that there are samples representing the UKAS and MOF clusters that have also served in the implementing agencies. 5 participants (P6, P8, P13, P17 and P23) representing UKAS and MOF have served in other ministries and have been directly involved in the implementation of infrastructure projects. It is also visually shown that only 1 participant represents EPU. However, 5 of the participants (P1, P7, P9, P23 and P25) representing UKAS and MOF have served in EPU. Therefore, the visual distribution should not be considered disproportionate because the samples' experience in other clusters is not uncommon.

4. Findings and Discussion

The findings of the study are based on two research questions. The research questions and the findings are elaborated in the following subsection.

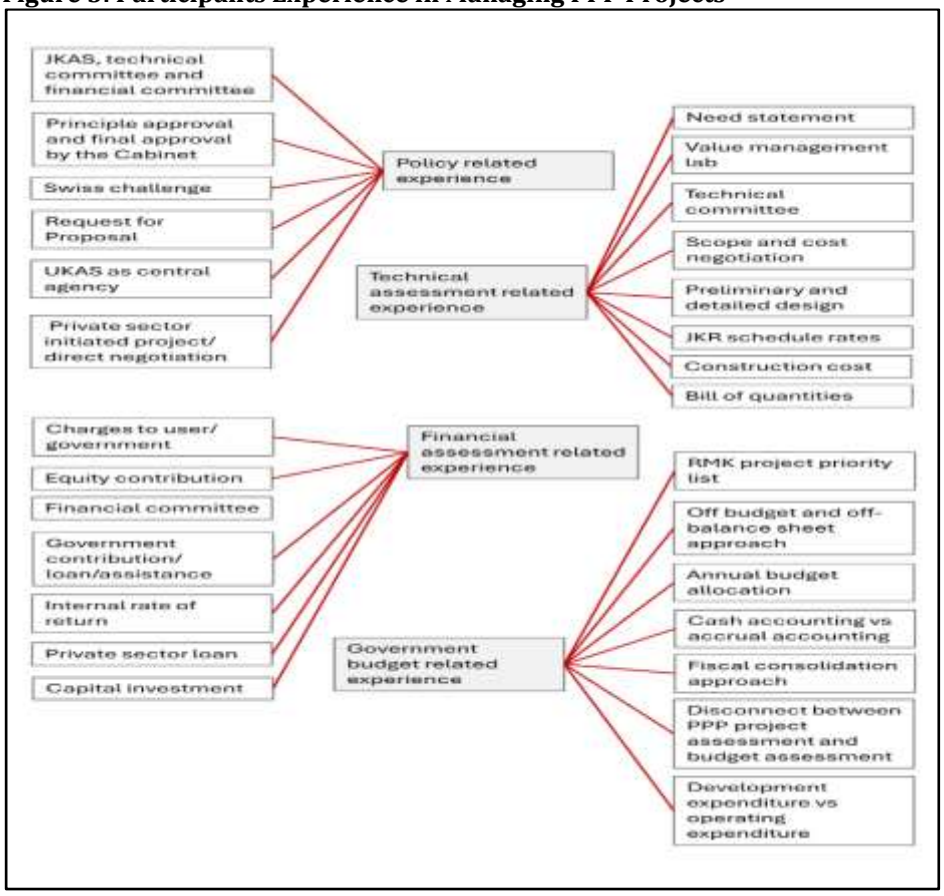
First Research Question

The first research question of the study is "What are the experiences of public sector officials in managing PPP projects, especially future payment commitment about PPP projects?". Although this research question emphasizes the experience in managing future financial commitment regarding PPP, the responses from the participants do not necessarily answer this research question directly. Not all participants are involved with the future financial management of PPP. The financial management of PPP also depends on the perspectives of participants which are diverse from each other. For example, most of the responses from UKAS cluster participants consider that financial management is related to private company's investment and how to ensure that the private company is getting fair and not extravagance returns. Meanwhile, the response from the MOF Cluster assumes that financial management is related to payments to be made by the government to the concessionaires. In addition, the perspective of the technical officers is that the financial management is related to the price offered for each component of the project and its management is hovering on the means and method to obtain more value for money to the government.

Each participant's response and explanation were labeled and encoded to specific codes and code categories. Using the ATLAS. Ti application, codes and code categories are generated to address the participants' experience in managing PPP projects and financial matters related to PPP projects. The codes and code categories are shown in Figure 3.

Based on Figure 3, there are 28 codes related to the existing experience of participants that have been classified into 4 code categories, namely policy-related experience, technical assessment-related experience, financial assessment-related experience and government budget-related experience. The code categories can be regarded as emerging themes in addressing the first research question. The detailed explanations of these themes are elaborated in the subsequent subsection.

Figure 3: Participants Experience in Managing PPP Projects



Theme 1: Policy-Related Experience

The implementation procedure for PPP projects has been set by UKAS, the government department responsible for the implementation of PPP projects. This procedure includes (1) the role of UKAS as the single central agency that processes all PPP project proposals, (2) the evaluation of project proposals carried out by several levels of committees and (3) the need to obtain approval from the Cabinet. This procedure is a procedure set on a policy basis by the Government. In explaining their experience in processing PPP projects, P8 and P4 stated:

"…as a central agency, the role of UKAS is to coordinate and negotiate. We have the secretariat role. We are not even the signatories, right? to all this concession agreement. We are not the signatories… at the end, it is that implementing agency which will be entrusted to carry forward with that project."

"…in terms of my experience, I handle project proposals to be discussed at the JPP, JKAS, and JTAS level and prepare Cabinet paper to get cabinet approval. That is how we implement a project. We have a strong governance. I would like to say strong. Through these committees, we solve issues. Make recommendations."

The establishment of UKAS in 2009 is also linked to the government's intention and policy to boost private investment. P9 is among officers previously posted in EPU manages privatization projects and has been transferred to the newly established UKAS. P9 shared her experience:

"The time when I joined EPU is in two thousand and seven. At that time as I recall, we had not implemented PFI. We are still researching the model, the cash flow, and the viability as we are going to implement a project on a PFI model. So, this PFI model is one of the new models under PPP. So, at that time, the privatization section (in EPU) mostly managed projects that have already been implemented on a privatization basis, right? And PFI was

a subset or new model at the time. We have no project that involves payment by government, long-term commitment... It is only after two thousand nine, we (the government) decided to implement projects through PFI. And UKAS was established…"

PPP project assessment and planning procedures set by UKAS are also influenced by the previous experience in evaluating privatization project proposals. The assessment of proposed privatization projects was previously made through the Privatization Committee, a committee chaired by the central agency responsible for the approval of development projects i.e., EPU. The privatization committee consists of other central agencies such as MOF, the Attorney General's Chambers, the Department of the Director General of Lands and Mines, and the Ministries and technical departments that regulate the relevant industries. The privatization committee acts as a main committee assisted by two sub-committees, namely the technical sub-committee and the financial sub-committee.

After UKAS was established, the privatization committee was renamed the Public-Private Partnership Committee (Jawatankuasa Kerjasama Awam Swasta - JKAS). Given the large number of project proposals at the beginning of its establishment, JKAS was assisted by another committee called the project steering committee (Jawatankjuasa Pemandu Projek – JPP) which coordinates technical inputs and financial inputs before a project proposal is discussed at JKAS. There was a time when all PPP projects were discussed at another level of committee chaired by the Chief Secretary to the Government named the PPP Highest Committee (Jawatankuasa Tertinggi Awam Swasta - JTAS). Although it has been very active before, JTAS only convenes as needed and on a case-by-case basis in current practice. P10 explained the role of JKAS and JTAS as follows:

"So now, now we have JTAS again. Okay. But the terms of reference. It's not like the JTAS that you remembered. Okay. The JTAS that you remember was elevated from the JKAS meeting, and then after that KSN (Ketua Setiausaha Negara – Chief Secretary to the government) chairs and the KSU (Ketua Setuausaha – permanent secretary at the Ministries) were attending, then they make the decision. Then it is elevated to the cabinet for approval. Okay, so now the JTAS, uh, it was re-established …. But I think is more of a problem solving, not, it is not as frequent as JKAS. Uh, so this is as and when necessary,"

Theme 2: Technical Assessment-Related Experience

Details of the technical assessment process were mostly obtained from participants who focused only on technical assessments. Generally, the technical aspect that is given attention in PPP projects is the detailed project requirements, especially the design desired by the Ministry as the project owner. This design will be discussed in a value management workshop, or they like to call it a value management lab, to detail each component of the project. Once the details of the scope and components of the project are determined, it is evaluated in terms of the construction cost of each component of the project. This scope and cost determination process is done many times, and it is finalized in value management lab sessions coordinated by technical experts from various disciplines including civil engineering, mechanical engineering, electrical engineering, architects, and quantity surveyors. All these experts are government employees serving in the Public Works Department. P1 commented:

"When we look at any proposal, the first person that we will turn to is our technical agency. They advise us in terms of technicalities. It is the technical reason that is going to determine the cost. Do you want a four-hundred-bed hospital? How do you want to do it? Do you want an A grade? … Everything is determined by the technical agency. From that we can determine the cost and from the cost, he will further evaluate, but the most important thing is to determine the scope and to determine the cost, we need to get a view from the technical agency."

In explaining the process of technical assessment, P12 explained:

"…when we have a value management lab, we're going to break it down by a few groups and that's where the customers will see, along with technical agencies, technical advisors …, we will sit down together and we will review the requirements that they have... the customer's requirement, the previous statement of need to match with the company's proposal. So, to match the two, the government and the company will come up with the optimal scope and cost to make sure that there is no waste there. …we must sit down and design back-to-back... arrange the value management lab to make sure that we get the optimal cost. Value for money."

"I would like to inform you that it is important to prepare documents before going to the value management lab. The documents, in terms of the adequacy of the documents, play a vital role. Normally, we are going to ask for the design drawing up to thirty percent."

Theme 3: Financial Assessment-Related Experience

Details of the financial assessment process were obtained from the interview participants who carried out the financial assessment. Generally, the financial aspect that is given attention starts with the cost of project implementation in terms of capital expenditure (capex). From this capex, a simulation of the projected cash flow will be made assuming the company's equity contribution of 20% and project financing of 80%, project borrowing cost of 8% and financing tenure of 20 years. Through these cash flow projections, the Government can determine the reasonable payment to the concessionaire so that the concessionaire gets a fair payment which is equivalent to equity internal rate of return (equity IRR) at around 10%. P21, a participant representing the MOF who has experience attending meetings in UKAS explained:

"Okay. If I can still recall back... one of the financial assessment guidelines that we (MOF) issued at the time was in terms of specifically assessing financial viability aspects of the PPP project which include capping the return to the private partner, we also determining another financial requirement, for example, the WACC (weighted average cost of capital) as well as the determination of the debt-equity ratio. Reasonable return to private partner is important to achieve the project viability with correct cash flow projection to ensure that the project is sustainable commercially."

This financial assessment process was influenced by the previous financial assessment process in the privatization project. For example, in a toll-highway privatization project that was implemented through build-operate-transfer under a user-pay concept, the cost to construct the highway and other related costs during the construction is termed capital expenditure (CAPEX). From this capex, a simulation of the projected cash flow will be made assuming a certain number of traffic using the highway, the company's equity contribution, amount of project financing, financing cost, financing tenure, maintenance as well as operating cost throughout certain concession periods. Through these cash flow projections, the government can determine the reasonable toll rate for the highway and reasonable concession period so that the concessionaire gets a fair return.

Theme 4: Government Budget Related Experience

When PPP projects were actively implemented after the establishment of UKAS in 2009, there was a loophole in terms of procedures regarding the evaluation of PPP projects, especially regarding the provision of future financial allocations. As told by the participants, the evaluation of PPP projects covers two main aspects, namely the technical aspect and the financial aspect. The financial aspect involves matters relating to the amount of private investment, equity amount, project loan amount, borrowing cost, concession period and availability payment rate. In both aspects, this technical examination and financial assessment do not consider the need to apply for financial allocation. The financial allocation for the PPP project is as explained by P4:

"…in the Malaysian context, the implementation of Malaysia's development project is all about budgeting and allocation, right? The Ministry has to apply allocation from development expenditure. It is all about budget, budget, and budget. But for the development of PPP projects, it is the same. However, for the PPP model, right? It is easy because we can do the project first and we do not have to get the budget. It is private partner money. But we made a financial commitment throughout the concession period."

The loophole happens because of two factors, namely (1) the evaluation process of the PPP project is influenced by the evaluation process of the privatization project. The evaluation of privatization projects does not involve future government payments as they are mostly user-pay. (2) The allocation application mechanism adopted by the government does not involve an application to provide future allocation. Application for allocation by government agencies to the Ministry of Finance involves allocation for operating expenses and allocation for development expenses. The allocation for operating expenses is based on the needs of the department's operation in the current year while the allocation of development expenses is based on the implementation of development projects that have been approved in the five-year Malaysia Plan. In this regard, there is a gap at the beginning of the implementation of the PPP project about the allocation application. Among the general opinion at that time is that the financial application for PPP payment will only be made after the relevant

ministry has started making availability payment and this payment is of an operating in nature i.e., the application will be made for operating expenses. It was explained by P24:

"We allocate the expenditure for the PPP payment. We used to put under the OE (operating expenditure) for PPP, right? It was just that we were going to pay some sort of rent. However, the thing that we pay for is a package for a building, (such as) UITM. That was supposed to be the thing that we spent under DE (development expenditure) but we were doing it on PPP... Then, we start to look at the bottom of the OE. The amount is enormous."

The issue related to PPP payments began to arise after the government, in particular the MOF realized that the increase in government budget applications by Ministries and agencies was a consequence of the impact of financial commitments for completed PPP projects. At that time, the MOF initiated a fiscal consolidation process to reassess the government's payment commitments either in the form of operating expenses, development expenses or other payments including loan repayments, debt service payments, commitments related to PPP projects and commitments related to projects borrowed by other entities with government guarantees. It was explained by P20:

"…starting from the year two thousand and seventeen, the government has begun to make a more comprehensive report on government liability. Before this, PPP projects, government guarantees as well as government's company debt were not reported in any reporting but only used for internal reference. Starting in two thousand and seventeen, uh, two thousand and eighteen, we have done more comprehensive reporting to include all of these elements…. So, the issue that arises over the PPP is a huge commitment from the PPP project itself… resulting in the inability of the government to finance payments arising from PPP, using operating expenditure…. (payment for) PPP need to be reclassified as development expenditure."

After the fiscal consolidation process was implemented, a resolution was made that all payments related to PPP be made through the development expenditure even though it was previously seen as an operating in nature to be paid through the operating expenditure. Development expenditure comes from Development Funds. According to P18, this resolution is by the Development Funds Act, 1966 where Schedule 1 of the Act has listed the purpose to which the Federal Development Funds may be applied. The list includes the acquisition of capital assets as well as the repair and maintenance of public property. According to this list, maintenance payments for PPP projects may also be made through the allocation of the Development Funds.

The determination of PPP payments using the allocation from the Development Fund is a strategic and critical decision as the government needs to ensure a controlled fiscal position where the government's borrowings to cover the shortfall in government income each year can only be made for development expenses. The government shall not borrow for operating expenses. This was explained by P18:

"If you look at the Federal Constitution, Article Nine states that all government spending for operating expenses, Supply Bill, must be covered by the government revenue. So, if there is (enough) revenue, then you can finance the OE (operating expenditure). If there is no (enough) revenue, there is no OE. We cannot do it. That means the government has to make sure the revenue is always sufficient to fund the Supply Bill's expenses."

P20 further explained:

"… the operating expenditure is funded using revenue…. Federal Constitution and the Financial Procedure Act… does not allow the government to finance the operating expenses through borrowing. It means that OE can only be funded using the revenue. So as the amount of OE grows because it includes PPP… as well as other operating expenses such as emoluments, pensions, subsidies and so on, the government has decided to transfer this PPP commitment to development expenditure..."

Financial commitments related to PPP have also been included in the list of development allocation requirements for each Ministry involved. In this regard, each Ministry should consider the need for PPP payment in applying for development allocation. This affects the Ministry not only in applying for the annual

allocation from the MOF but also in applying for new projects in the Malaysia plan every five years. It was explained by P25:

"…an example, the implementation of the university through PPP, (including) the development of the Pagoh higher education hub... residential college... many residential colleges. It does not fit in with the development planning. The development planning by the Ministry of Higher Education itself. When it happens like this, in a very short time with so many PPP projects, until now the allocation for the development expenditure to the Ministry of Higher Education is just to pay for this PPP. (As a result) We cannot submit or create new development projects... The allocation requires a lot to be spent on PPP projects that were not planned and are not in line with the initial plan in the (five-year) Malaysia Plan."

Second Research Question

The second research question of the study is "What kind of new procedure needs to be established to control government financial commitment to PPP projects?" The second research question is intended for the researcher to conclude on the responses given by the participants and to propose a well-directed budgetary management framework for the implementation of PPP projects.

From the responses received from the interview participants, it can be noted that each participant had a different perspective on the control of financial implications regarding PPP projects. For participants involved in the financial evaluation, the control of financial implications is more focused on the method to ensure that the concessionaire does not profit extra-ordinarily from the implementation of the PPP project. The method they use is to evaluate the PPP projected cash flow and the appropriate charge rate to the user or the appropriate availability payment set out in the concession agreement. The government's ability to pay for the availability payments does not fall within the scope of the evaluation by the financial evaluation committee.

For participants involved in the technical evaluation, the control of financial implications is about how to obtain the construction design at the lowest and optimal cost. Each component of the project is refined through a value management lab and each cost of the components is checked to suit the market price. The scope of this assessment also does not consider the government's ability to meet the payment requirements involved.

The existing procedures inherited from the government's experience in implementing privatization projects before the UKAS era became one of the factors that led to the existing loophole in the need to obtain financial allocations in advance. The previous privatization project evaluation procedure was suitable for previous privatization projects as the privatization projects did not involve payment from the government, but they were mostly user-pay projects. When PFI projects, which involve payment from the government in the form of availability payments, are processed through the privatization project procedure, the ability of the government regarding the payment component is not considered in the evaluation process.

Another reason why there is a loophole is that there is confusion over the allocation to be applied for PFI projects when it was first implemented after 2009. The common opinion at that time is that the allocation will only be applied in the future after three or four years when the project is completed by the concessionaire. The allocation is believed to be under operating expenditure because all rental payments are made under operating expenditure. So, with that belief, the need for development allocation does not arise.

The issue related to the financial implications of PPP began to arise after the MOF realized the high number of operating expenditure applications from Ministries that have PPP projects completed by the concessionaires. Since this PPP payment commitment is a contractual obligation, the MOF has no option but to provide the allocation. This event led to a fiscal consolidation process implemented by the MOF.

The fiscal consolidated approach that was implemented by the MOF has led to a new approach and it affects the implementation procedures of PPP projects. These approaches include:
to ensure that all PPP project payments are made through development expenditure;
all PPP-related payment commitments are listed in the development commitment for each Ministry each year in the annual budget; and
the commitment to PPP projects is monitored every fiscal year through the annual fiscal outlook report.

5. Conclusion

In a nutshell, the response from PPP practitioners, especially government officials, regarding PPP financial commitment is hovering around single window proposal, that is, the need to have a single source of approval for all government development projects either directly funded by the government or development project that is implemented through PPP. This is because most participants are of the view that procedures processed by different central agencies have resulted in the widespread implementation of PPP projects without regard to the government's financial capabilities.

The common opinion at this time is for EPU (now officially known as the Ministry of Economy) to review all development projects in the five-year Malaysia plan and determine all the projects to be implemented either through the development allocation or the projects to be implemented through PPP. Nevertheless, it is noted that this matter is ultimately up to the Ministries to determine their projects and the method of implementation of their projects considering the Ministry's existing commitments. This is because the EPU usually sets the ceiling of development allocation to every ministry, and it is the Ministry that will formulate the project implementation strategy based on the ceiling. After all, the commitments for PPP projects have been listed in the list of the Ministry's development expenditure requirements in the annual budget.

This study suggests a theory that, at least from a Malaysian experience perspective, a PPP project is a development project and should be funded from the development expenditure of the country. This Malaysian experience has demonstrated one of the forms of a well-directed management framework to address the issue of Government payment commitments about PPP projects. It can be replicated by any other government in addressing the issue of future commitments related to PPP. It may not suit every country as the way they implement development projects and PPP projects may vary. However, the Malaysian experience is one of the case studies that other countries may learn if they have the same or similar problems.

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Appraising the Determinants and Outcomes of Islamic Financial Literacy through the Lens of a Systematic Literature Review

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Abstract: This research illuminates the determinants and outcomes of Islamic financial literacy as scrutinized in prior investigations. A systematic literature review unfolded across the Scopus database from 2016 to 2023. This investigation encompasses 22 articles from the 40 scholarly works extracted from the Scopus database. The Journal of Islamic Accounting and Business Research emerges as the most prolific disseminator of insights into the determinants and outcomes of Islamic financial literacy, credited to its robust publication frequency throughout the year. The autonomous and reliant facets of Islamic financial literacy were predominantly studied, with emphasis not only on individual dynamics but also on business perspectives. The determinants instigating Islamic financial literacy congregate within the affective, conative, family influence, self-controlled, and demographic predictors. Conversely, the ramifications stemming from Islamic financial literacy manifest in cognitive, affective, and conative dimensions, leaving an indelible imprint on the business realm. Geographic focus reveals a concentration of prior investigation within Muslim-majority nations, predominantly Indonesia. Furthermore, the investigation discovers that past studies were mainly conducted in the context of Islamic banking. The evidence from the present study provides input to researchers in conducting further research on Islamic financial literacy.

Keywords: *Islamic Finance, Islamic Financial Literacy, Muslims, Scopus, Systematic Literature Review*

1. Introduction

Increasing interest has been shown among researchers on Islamic financial literacy, especially in countries with a high population of Muslims. Islamic financial literacy refers to the awareness, knowledge, skills, attitudes, and behavior of Islamic financial activities (Mujiatun et al., 2023). Islamic financial literacy has also been quoted as *Sharia* financial literacy or literacy in Islamic finance in various research (Hoque et al., 2022; Satria et al., 2023; Srisusilawati et al., 2022). In contrast to financial literacy, Islamic financial literacy integrates an Islamic or *Sharia* perspective into its conceptualization.

In the Malaysian context, financial literacy has gained the attention of the banking system's regulator, Bank Negara Malaysia. The launching of the second Financial Inclusion Framework 2023-2026 shows the continuous commitment of Bank Negara Malaysia to improving financial inclusion and enhancing Malaysia's financial well-being and living standards (Bank Negara Malaysia, 2023). The Financial Education Network (FEN), an inter-agency consortium with eight members and 22 collaborating institutions, is playing a crucial role in supporting this framework. FEN aims to enhance financial literacy among Malaysians (Bank Negara Malaysia, 2016). The Financial Inclusion Framework also receives support from the National Strategy for Financial Literacy 2019-2023 with the mission to enhance financial education, which in turn will improve financial literacy among the Malaysian community (Bank Negara Malaysia, 2019). It is a known fact that justified decisions on financial matters and financial resilience can be achieved by financially literate individuals (Bank Negara Malaysia, 2019).

Motivation of Study

The main objective of conducting this study is to explore the determinants and outcomes of Islamic financial literacy in past studies. Such exploration would shed light on the existing level of exploration on Islamic financial literacy as the systematic literature review will provide the compilation of past studies (Okoli and Schabram, 2010). The systematic literature review would also highlight the loophole in the existing studies

(Xiao & Watson, 2019; Tamrin et al., 2017). This study reviewed articles published in Scopus-indexed journals from the year 2016 until 2023.

Research Questions

This research has been carried out based on the following research questions:

Research Question 1: Who are the respondents in previous research?

Knowing the respondents studied in previous research would allow us to understand the behavior of different types of respondents, as affected by specific determinants and causes of specific outcomes. Human behaviors differ due to the different characteristics and nature of human beings. It would be interesting to see the diverse behavior of the respondents as it sheds light on conducting future research.

Research Question 2: What are the study contexts in previous research?

The study contexts set the basis for understanding the evidence provided by previous research. It specifies the specific areas where past research has been carried out. It also shows the variation in the determinants and outcomes of Islamic financial literacy across different study contexts. This helps us to determine the areas that need to be studied in future research to be conducted.

Research Question 3: Which countries became the venues for conducting previous research?

Population differs from one country to another. The population influences the nature, customs and expectations of the people in the country. Knowing the countries that became the venues for conducting the previous research would facilitate us in understanding the evidence provided by the previous research, besides assisting researchers in planning their future research.

Research Question 4: What are the determinants of Islamic financial literacy in previous research?

Recognizing the factors that determine Islamic financial literacy would enable us to understand the factors that could influence Islamic financial literacy. This would assist future researchers in designing their studies, specifically in determining the factors that they would study in their research.

Research Question 5: What are the outcomes of Islamic financial literacy in previous research?

Identification of the outcomes of Islamic financial literacy would enable us to understand the impact that Islamic financial literacy could have. This would assist future researchers in determining what impact they would like to discover in their research.

2. Research Methodology

Kitchenham et al. (2009) method of conducting a systematic literature review guided this study. Six researchers were involved in performing the systematic literature review of journal articles on Islamic financial literacy. The systematic literature review conducted involves all the phases recommended by Kitchenham et al. (2009) from planning the systematic literature review, executing the systematic literature review, and reporting the systematic literature review conducted. This study also employed Okoli and Schabram's (2020) steps of conducting systematic literature. The steps encompass (1) defining the purpose of conducting literature, (2) delineating the protocol of conducting research, (3) searching the literature, (4) implementing practical screening, (5) assessing quality, (6) extracting data, (7) synthesizing the literature, and (8) writing the completed review.

As stated earlier, exploring the determinants and outcomes of Islamic financial literacy in past studies is the main objective of this study. The protocol of this research outlines the research objective and questions, as well as a systematic literature review as the research method for this study. Database containing Scopus-indexed journals was searched as it contains compelling and reliable research articles. Practical screening, an

indispensable phase, winnowed out extraneous articles, ensuring a focused investigation of Islamic financial literacy. Quality appraisal was safeguarded by exclusively considering journal articles, products of a stringent review process by adept evaluators. Extracting data from these chosen articles involved capturing details on respondents, study context, research venues, determinants, and outcomes of Islamic financial literacy. The denouement of this research endeavor materialized in the comprehensive documentation of the systematic literature review process.

The initial string searches yielded 40 journal articles, and after judicious quality appraisal and practical screening, 22 articles emerged as germane for further scrutiny, as delineated in Table 1.

Table 1: Selected Empirical Studies

No.	Authors	Journal
P1	Mujiatun et al. (2023)	Sustainability
P2	Patrisia et al. (2023)	ISRA International Journal of Islamic Finance
P3	Yusfiarto et al. (2023)	Journal of Islamic Accounting and Business Research
P4	Gunawan (2023)	Quality – Access to Success
P5	Satria et al. (2023)	Quality – Access to Success
P6	Pala et al. (2023)	Journal of Islamic Accounting and Business Research
P7	Oemar et al. (2023)	Corporate Governance and Organizational Behavior Review
P8	Osman et al. (2023)	Journal of Islamic Marketing
P9	Yeni et al. (2023)	Cogent Economics and Finance
P10	Hoque et al. (2022)	Sustainability
P11	Srisusilawati et al. (2022)	F1000Research
P12	Al-Awlaqi & Aamer (2022)	International Journal of Emerging Markets
P13	Majid & Nugraha (2022)	Journal of Islamic Monetary Economics and Finance
P14	Widyastuti et al. (2021)	Journal of Islamic Accounting and Business Research
P15	Kevser & Dogan (2021)	Transition Studies Review
P16	Md. Sapir @ Md. Shafik & Wan Ahmad (2020)	Journal of Islamic Accounting and Business Research
P17	Daradkah et al. (2020)	Transition Studies Review
P18	Lajuni et al. (2020)	Malaysian Journal of Consumer and Family Economics
P19	Utomo et al. (2020)	Journal of Islamic Marketing
P20	Albaity & Rahman (2019)	International Journal of Emerging Markets
P21	Warsame & Ireri (2018)	International Journal of Bank Marketing
P22	Abdul Rahim et al. (2016)	International Journal of Economics and Financial Issues

3. Findings and Arguments

The meticulous review of the 22 carefully selected articles provided the research team with insights to address the five research questions.

Research Question 1: Who are the respondents in previous research?

Previous investigations into the determinants and outcomes of Islamic financial literacy predominantly scrutinized the individual perspective, besides the business perspective. Within the individual paradigm, respondents encompassed Muslim individuals, investors of Islamic instruments, customers of Islamic banks, customers of conventional banks, prospective Muslim investors, prospective Islamic bank customers, past investors in Islamic unit trusts, Muslim university students, and members of the public in general, as shown in Table 2. On the business front, insights were derived from entrepreneurs in the *Halal* tourism sector, small and medium enterprise (SME) entrepreneurs, street vendors in the SME sector, and business owners in general, as shown in Table 3.

Table 2: Respondents in Previous Research (Individual Perspective)

Paper No.	Respondents
P2	Muslim individuals of Gen Z
P3	Investors of Islamic instruments
P4	University members
P6	Islamic bank customers
P9	
P10	
P7	Muslim workers
P8	
P12	Islamic bank and conventional bank customers
P20	Potential Islamic bank customers
P13	Prospective Muslim investors
P14	Past investors of Islamic unit trust
P15	Members of the public
P17	
P21	
P16	Muslim university students
P22	
P18	Bank customers

Table 3: Respondents in Previous Research (Business Perspective)

Paper No.	Respondents
P1	Halal-tourism entrepreneurs
P5	Small and medium enterprise entrepreneurs
P11	Small and medium enterprise street vendors
P19	Business owners

Research Question 2: What are the study contexts in previous research?

The canvas of Islamic financial literacy in prior research primarily unfolded within the precincts of Islamic banking. Additionally, investigations extended to encompass Islamic financial products and services, the Islamic capital market, Islamic unit trust, Islamic financial management, zakat on income, crowdfunding FinTech platforms for Islamic securities, small and medium enterprises (SMEs), and micro, small, and medium enterprises (MSMEs) in the *Halal* tourism sector. Notably, some studies did not explicitly specify any particular context. The study contexts are shown in Table 4.

Table 4: Study Contexts in Previous Research

Paper No.	Study Contexts
P1	Micro, small and medium enterprises in the Halal tourism sector
P5	Small and medium enterprises
P11	
P3	Islamic capital market
P6	Islamic banking
P9	
P10	
P17	
P20	
P21	
P12	Islamic and conventional banking
P8	Islamic financial management
P13	Islamic securities crowdfunding FinTech platform
P14	Islamic unit trust
P18	Islamic financial products

P19	
P7	Zakat on income
P2	
P4	
P15	Not specified
P16	
P22	

Research Question 3: Which countries became the venues for conducting previous research?

The geographical landscape of previous research on Islamic financial literacy predominantly centered around Muslim-majority nations, with Indonesia taking the lead. Other countries contributing to the body of knowledge include Malaysia, the United Arab Emirates, Turkey, Bangladesh, Yemen, and Jordan. This geographical concentration might be attributed to the heightened interest of Muslim researchers in Islamic financial literacy.

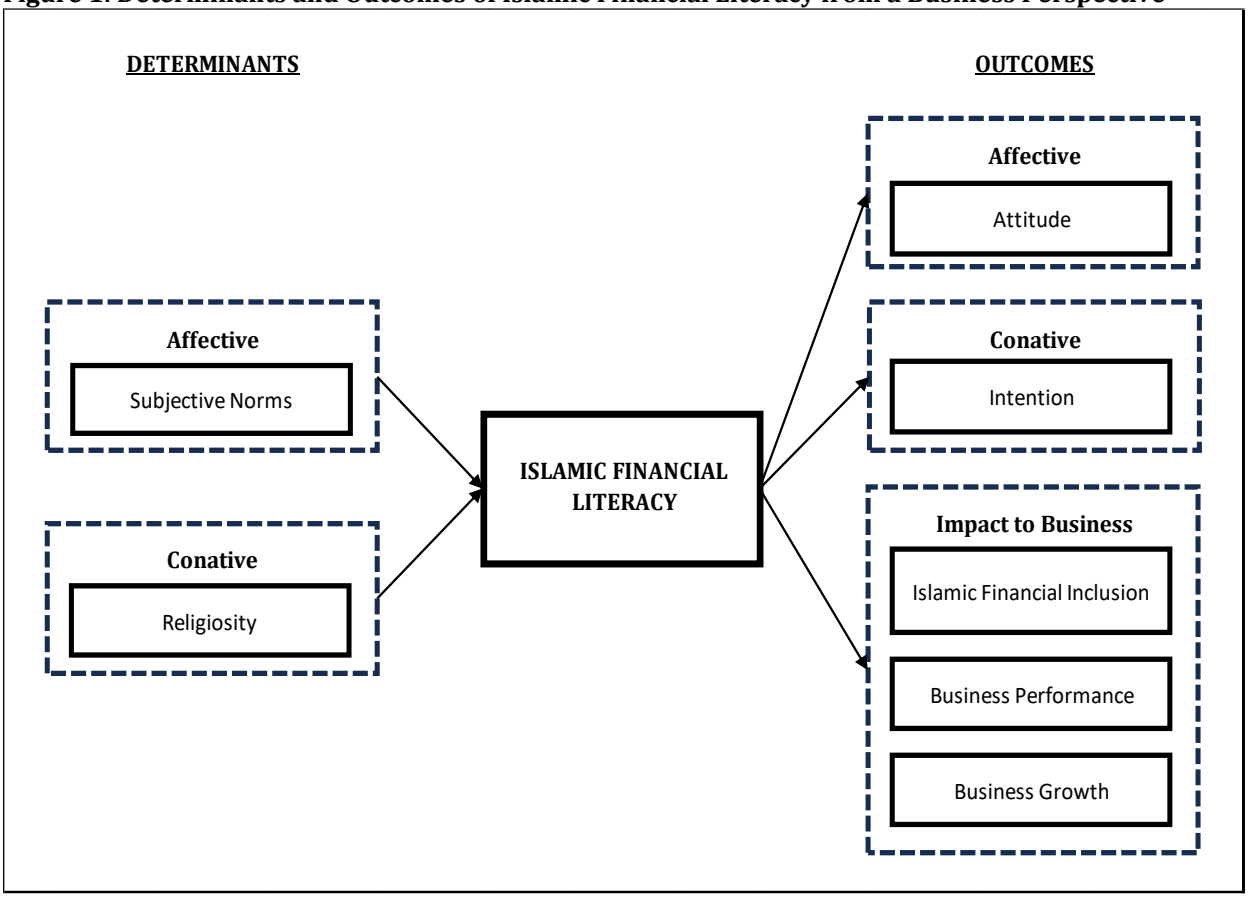
Table 5: Countries where Previous Research was Conducted

Paper No.	Countries
P1	
P2	
P3	
P4	
P5	
P7	Indonesia
P9	
P11	
P13	
P14	
P19	
P6	Turkey
P15	
P8	
P16	Malaysia
P18	
P22	
P10	Bangladesh
P12	Yaman
P17	Jordan
P20	United Arab Emirates
P21	

Research Question 4: What are the determinants of Islamic financial literacy in previous research?

The determinants of Islamic financial literacy are clustered into affective and conative dimensions for studies emanating from the business perspective (as illustrated in Figure 1). In contrast, investigations from the individual perspective revealed determinants grouped into family influence, self-controlled, and demographic predictors (as depicted in Figure 2).

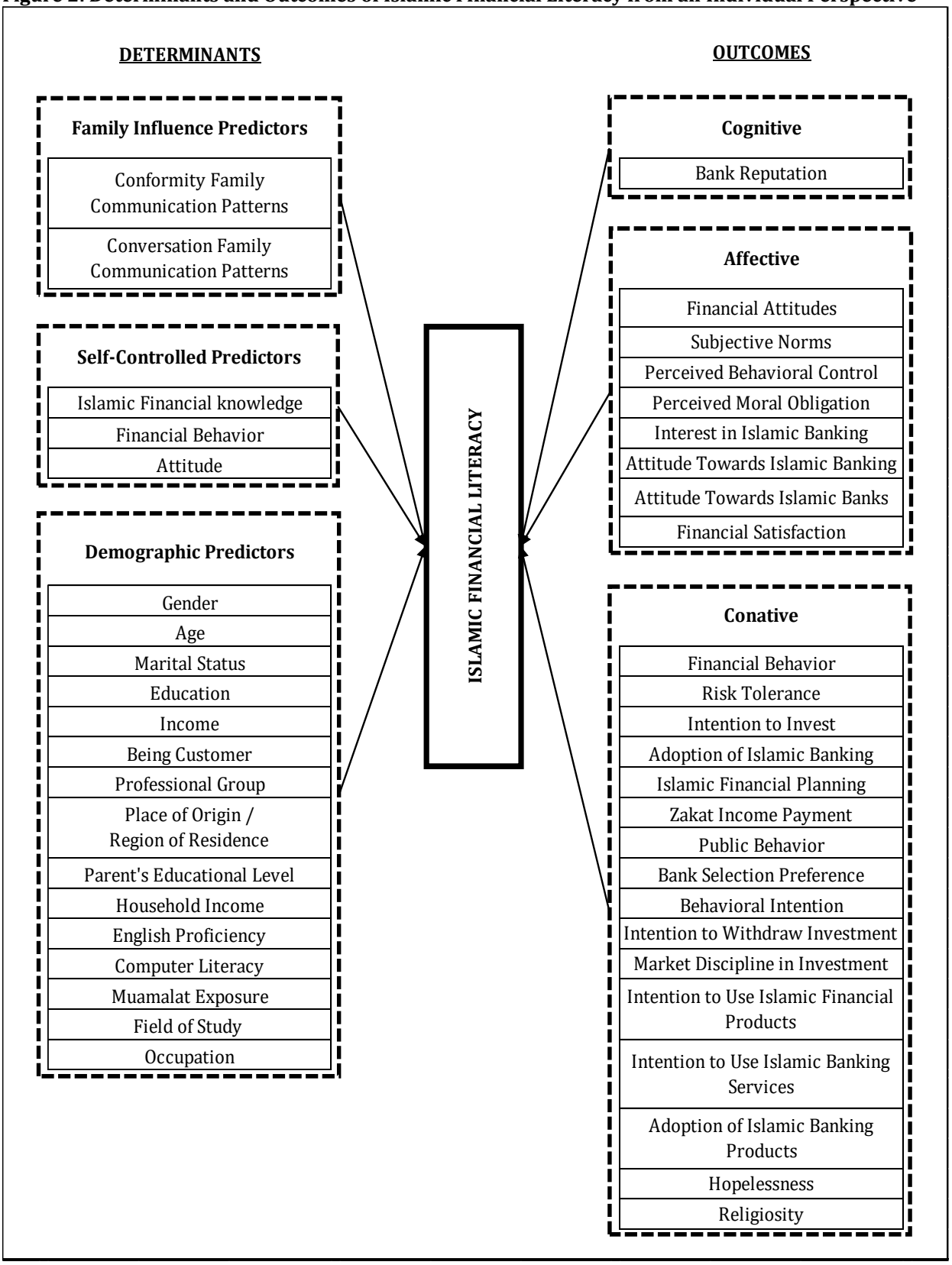
Figure 1: Determinants and Outcomes of Islamic Financial Literacy from a Business Perspective



Research Question 5: What are the outcomes of Islamic financial literacy in previous research?

Outcomes stemming from Islamic financial literacy are clustered into affective, conative, and impact on the business for studies approached from the business perspective (as illustrated in Figure 1). Conversely, outcomes from the individual perspective coalesced into cognitive, affective, and conative dimensions (as depicted in Figure 2). These delineations provide a nuanced understanding of the multifaceted impact of Islamic financial literacy on individuals and businesses alike.

Figure 2: Determinants and Outcomes of Islamic Financial Literacy from an Individual Perspective



4. Conclusion

This investigation illuminates the prevailing patterns in the determinants and outcomes of Islamic financial literacy. The determinants of Islamic financial literacy are classified into affective, conative, family influence predictors, self-controlled predictors, and demographic predictors. On the other hand, the outcomes of Islamic financial literacy are classified into cognitive, affective, conative and impact on business. It is also noted that prior research was concentrated on studying the perspective of the individual rather than from a business perspective. Islamic banking emerged as the main context for studying Islamic financial literacy in previous research. This is because Islamic banking is the most significant component among the few components of Islamic finance. Past studies on Islamic financial literacy were carried out mainly in countries dominated by Muslims. The research evidence outlines the basis for future research design on Islamic financial literacy. The industries can also benefit as this study provides the input for them to strategize their businesses in the increasingly competitive environment. Nevertheless, more studies on the determinants and outcomes of Islamic financial literacy are required to enable us to better appreciate the importance of Islamic financial literacy.

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Understanding and Addressing Non-Payment of Housing Maintenance Fees in Klang Valley: Challenges and Solutions

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Abstract: Housing maintenance fees are essential to maintaining the standard and operation of residential communities. However, non-payment issues present serious problems to the Joint Management Body (JMB) and residents due to various issues related to maintenance are delaying to be solved. Thus, this study objectively assesses the role and relationship of JMB with the respondents toward residents' commitment and support in making payments for housing maintenance. A quantitative approach through a survey questionnaire was distributed among 31 respondents of high-rise buildings in Klang Valley for a pilot study. Four (4) independent variables were involved: the role of JMB, the relationship between residents and JMB, facilities provided, and safety and security towards the dependent variable of resident's commitment and support. The findings show that most respondents agree that any problems related to the housing unit should be consulted with JMB and residents should get permission from JMB before proceeding with any necessary action. This study is expected to benefit JMB and residents in ensuring a sustainable harmonious housing environment in the high-rise buildings and thus contribute to the achievement of SDG 11: Sustainable Cities and Communities.

Keywords: *Financial Management, Maintenance Fee, Joint Management Body (JMB), High-rise Resident, Resident's Commitment*

1. Introduction and Background

Building maintenance is defined as ongoing efforts and tasks to keep a building or facility in good condition (Eisner, 2022). High-rise buildings are required to have regular maintenance. In addition to contributing to the preservation of a property's value, maintenance fees are mandated by law under The Strata Management Act 2013, which requires developers who choose strata titles to establish a Management Corporation to oversee the property's facilities and common areas (since the development company is legally the owner of the common areas). In Malaysia, building maintenance procedures were first implemented in 1971. When the Prime Minister intended to create a new culture for the entire country through maintenance, it became more active in 2007 (Zakiyudin et al., 2015).

The next step is for the Management Corporation to suggest how much and when the fees will be collected for property maintenance. Eventually, a Joint Management Body comprised of the developers and property owners will be established to oversee how the money is used for property management and upkeep. In addition to interest charges by the Joint Management Body for late payments, failure to pay Maintenance Fees and contributions to Sinking Funds may result in significant fines or even jail time from the government. Therefore, it is in everyone's best interest to pay the fees they owe on time and to resolve any issues or disagreements about how the property is managed by following the correct procedures.

Most of the residential type in Malaysia is high rise building. Table 1 shows the data extracted from mudah. In 2023 which items are listed on the website? The majority of high-rise buildings are condominiums with 1714 units followed by apartments with 1494. The square feet range from 318 sqft to 3735 sqft. The selling price is between RM 788,000 and RM 3.1 million. The sample taken was collected from the Klang Valley area.

Table 1: Unit Listings on the Malaysian Housing Website (mudah. my)

Type of High-Rise Building	Frequency
Service Residence	506
Apartment	1494
Flat	247
Studio	13
Condominium	1714
Others	17
Duplex	5
Townhouse Condo	4
TOTAL	4000

The common areas and facilities of a strata of property, such as a condominium block, are owned collectively by all unit owners. Consequently, owners are required to pay a maintenance fee, sometimes known as a service charge, collectively to manage and maintain the property and its amenities. Homeowners in Malaysia are required by law to pay these monthly fees under SMA 2013. These payments are collected and managed by the Joint Management Body, or JMB, before strata titles are granted, and thereafter by the Management Corporation, or MC (LBS Bina, 2022).

There are over 20,000 strata development schemes throughout Peninsular Malaysia and the Federal Territory of Labuan. This includes condominiums, apartments, flats, shop houses, 'town houses', and 'landed strata'. All advancements of this strata are regulated under a piece of legislation which is the Strata Management Act 2013. This Act has the role of providing a uniform reference and guide regarding the maintenance and management of a stratified development. Table 2 shows the Program Perumahan Rakyat (PPR) ownership as of March 2022. In total, 20,715 units have been developed and are under construction. It shows that most of the housing projects consist of strata buildings.

Table 2: Program Perumahan Rakyat (PPR) of Ownership (as of March 2022)

State	Completed Project		Project Under Construction		Total	
	No. of Project	No. of Unit	No. of Project	No. of Unit	No. of Project	No. of Unit
Johor	-	-	1	400	1	400
Kedah	7	2516	1	500	8	2016
Kelantan	5	2968	-	-	5	2968
Melaka	1	336	2	375	3	711
Negeri Sembilan	2	250	2	552	4	802
Pahang	31	4168	2	200	33	4368
Perak	1	99	-	-	1	99
Perlis	-	-	-	-	-	-
Pulau Pinang	1	231	-	-	1	231
Sabah	-	-	-	-	-	-
Sarawak	5	1775	1	461	6	2236
Selangor	2	1880	2	904	4	2784
Terengganu	-	-	1	500	1	500
W.P. Kuala Lumpur	2	2100	-	-	2	2100
W.P Labuan	-	-	1	500	1	500
W.P. Putrajaya	-	-	-	-	-	-
TOTAL	57	16.323	13	4,392	70	20,715

Apart from that, the government also has developed another housing project in Malaysia called PR1MA. Statistics as of March 2022 in Table 3 have shown that 48,401 units are developed and under construction

which makes the addition of strata building in Malaysia.

Table 3: PR1MA Corporation Malaysia Housing Project

State	Completed Project		Project Under Construction		Total	
	No. of Project	No. of Unit	No. of Project	No. of Unit	No. of Project	No. of Unit
Johor	3	1960	3	2519	6	4479
Kedah	4	3340	3	1511	7	4851
Kelantan	1	965	2	825	3	1790
Melaka	3	1852	3	2782	6	4634
Negeri Sembilan	-	-	3	2929	3	2929
Pahang	1	317	2	1023	3	1340
Perak	9	6571	2	1060	11	7631
Perlis	1	231	-	-	1	231
Pulau Pinang	1	1017	1	1218	2	2235
Sabah	3	1861	4	3485	7	5346
Sarawak	3	3238	-	-	3	3238
Selangor	3	3292	2	1043	5	4335
Terengganu	-	-	-	-	0	0
W.P. Kuala Lumpur	2	2617	1	920	3	3537
W.P Labuan	-	-	-	-	0	0
W.P. Putrajaya	1	560	-	-	1	560
TOTAL	35	27,821	26	18,316	61	46137

However, the issue of late and non-payment of maintenance fees is a common issue for strata residents. It might be affected by several factors such as financial constraints of residents, low satisfaction of maintenance from JMB, and other related factors. The problem of faulty and inefficient lifts often shackles multi-story residential owners but unwittingly it stemmed from their attitude in failing to pay the maintenance fees to the housing management.

Mohammad Khalid Ab Karim, deputy chairman of the Housing and Strata Management Tribunal and the Housing and Local Government Ministry (KPKT), stated that the current state of affairs will inevitably make it impossible to do building maintenance, repairs and cleaning, including elevator maintenance.

Based on complaints received in 2019, of the 5,675 cases registered with the Strata Management Tribunal (TPS), a total of 5,291 cases 93 percent involved maintenance fees, which was the highest number of complaints in TPS (Malaysian Institute of Estate Agents, 2020). The maintenance fee arrears normally involved low and medium-cost houses which on average were imposed a payment of between RM30 and RM200 a month.

Due to that issue, the Housing Maintenance Division (BPP) under the Ministry of Housing and Local Government has introduced the Public Housing Maintenance Program and Private Housing Maintenance Fund to ensure that the government is providing a comfortable and quality living environment for residents of low and medium-low-cost strata public and private housing. This section provides allocations to help the management body (JMB/ MC) repair and maintain low and medium-low-cost stratified public and private housing. Table 4 shows the allocation of government for the Public Housing Maintenance Program and Private Housing Maintenance Fund.

Table 4: Public Housing Maintenance Program and Private Housing Maintenance Fund

State	Public Housing Maintenance Program		Private Housing Maintenance Fund	
	No. of Project	Allocation (RM)	No. of Project	Allocation (RM)
Johor	3	3,500,000	22	6,000,000
Kedah	4	4,500,000	5	1,400,000
Kelantan	-	700,000	2	400,000

Melaka	4	3,500,000	6	1,400,000
Negeri Sembilan	5	3,500,000	2	1,700,000
Pahang	-	700,000	5	1,600,000
Perak	6	2,400,000	7	1,600,000
Perlis	8	2,100,000	-	-
Pulau Pinang	16	4,000,000	22	6,300,000
Sabah	4	4,100,000	2	1,400,000
Sarawak	2	2,600,000	-	400,000
Selangor	8	4,300,000	19	8,400,000
Terengganu	5	2,100,000	4	1,400,000
W.P. Kuala Lumpur	-	-	-	-
W.P Labuan	-	700,000	1	700,000
W.P. Putrajaya	3	-	-	500,000
TOTAL	68	38,700,000	97	33,200,000

Although there is an initiative from the government for the maintenance fund, it is not sufficient to maintain the building throughout the year. The commitment and support from the residents to pay the maintenance fee is essential to ensure that the building can be maintained well and thus provide the quality of life for the residents.

Ministry of Housing and Local Government has published a rating tool on the quality of life for the strata building residents. It was based on the star rating which indicates the number of stars represents the quality of life. The assessment was done in 2019 and implemented by COB to the 5739-development scheme. Five (5) main components involved in the star rating are the resident's well-being, risk safety management, finances, establishment and management of the body, and maintenance. The star rating was given based on these scores: Score Star Rating.

Table 5: Score Star Rating

Score	Star Rating
90 - 100	★★★★★
60 – 89	★★★★
50-59	★★★
40-49	★★
39 and below	★

Based on the evaluation, it was found that a total of 65 development areas, which represent 1% achieved a 5-star rating, 548 areas (10%) achieved a 4-star rating, 1006 areas (17%) achieved a 3-star rating, 1434 areas (25%) achieved a 2-star rating stars and as many as 2686 areas (47%) achieved a 1-star rating (Kementerian Perumahan dan Kerajaan Tempatan (KPKT), 2019).

Based on the information received, it was found that the measurement component of star rating under the component of strata residents' awareness and compliance with strata management laws is a component that requires more attention and improvement. Enforcement activity statistics show that the most enforcement action is about the owner's failure to pay maintenance charges. Thus, it can be concluded that the level of awareness of strata owners about the obligation to pay maintenance charges is still at a low level (Kementerian Perumahan dan Kerajaan Tempatan (KPKT), 2019)

2. Literature Review

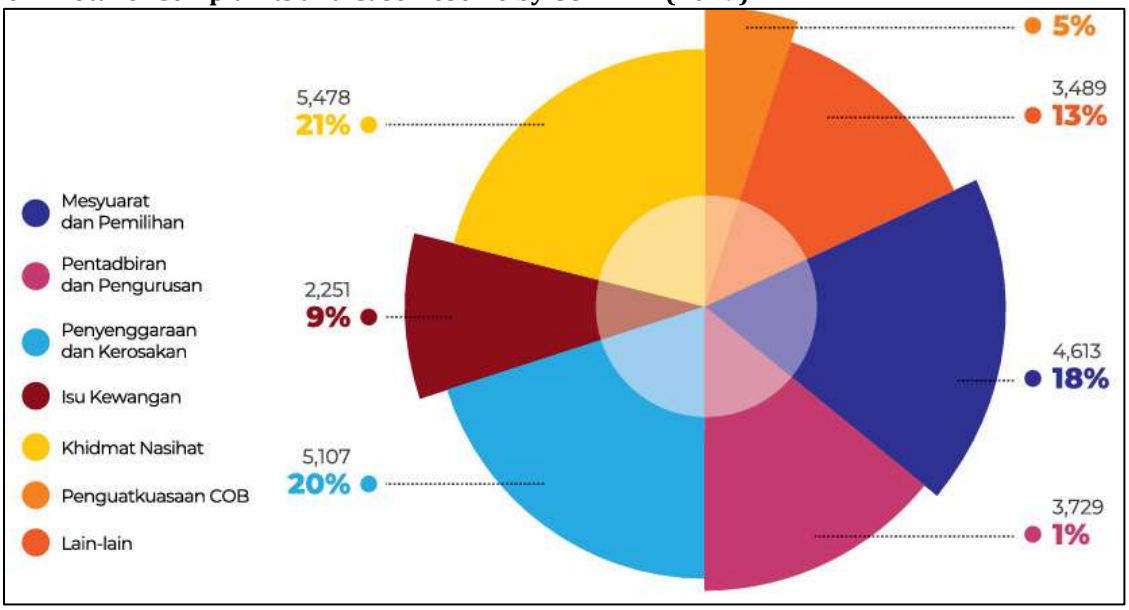
Poor Collection Maintenance Fees

The expenses of housing upkeep are probably greatly influenced by maintenance considerations (Horner & El-Haram, 2002). In general, there are two primary categories of maintenance variables: technical factors and administrative issues. Technically speaking, low-quality spare parts and materials, as well as shoddy craftsmanship, might have an impact on maintenance costs. On the other hand, inadequate budgeting control, delayed maintenance execution, and inadequate maintenance management are among the administrative issues that affect maintenance costs. The maintenance elements that influence the cost of home maintenance are intimately tied to the choice of the maintenance management team and personnel.

The research concluded that five of the most dominant factors were the expectation of tenants, building materials, building services, building age and failure to execute maintenance at the right time. Meanwhile, it was found that two of the most influential impacts were outstanding maintenance charges and over-budget (Ali et al., 2010). Poor collection maintenance fees have become a common problem for high-rise buildings (Sholehah et al., 2020). This resulted in bad tenant satisfaction with the units they stayed in because of poor maintenance by the Joint Management Body (JMB).

A report by KPKT in 2019 shows the complaint received by the COB PBT. The quality-of-service delivery refers to the number of complaints received that were successfully resolved by the COB PBT. In 2019, a total of 25,914 complaints were received. Of the total number of complaints received, 25,545 representing 99% of the number of complaints were successfully resolved. Figure 1, shows that 20% of the issues are related to maintenance and damage which contribute to the second largest percentage. 9% of the issue comes from financial issues. Most of the complaints are about consultancy and advice.

Figure 1: Total of Complaints and Case Resolve by COB PBT (2019)



Facilities Provided by JMB

Due to the growing trend of buyers choosing to own strata properties, it is crucial for both strata owners and tenants to comprehend the distinctions between shared facilities, auxiliary lots, and properties that are not part of strata schemes. Making a distinction between these components is essential to determining which amenities and facilities are the responsibility of the strata management bodies and which are the strata owners.

A stratum scheme consists of three components: the exterior of the stratum, the parcel, and the common property. The common property, which includes things like the roof, water tank, gutter, rainwater downpipe and external wall, is the primary subject of this study. Common use window, retaining wall, playground, fence,

manhole, garbage house, prayer hall, hall, lift, staircase, and corridor; sewer pipe, apron and drainage. (Shuhaimi et al., 2023).

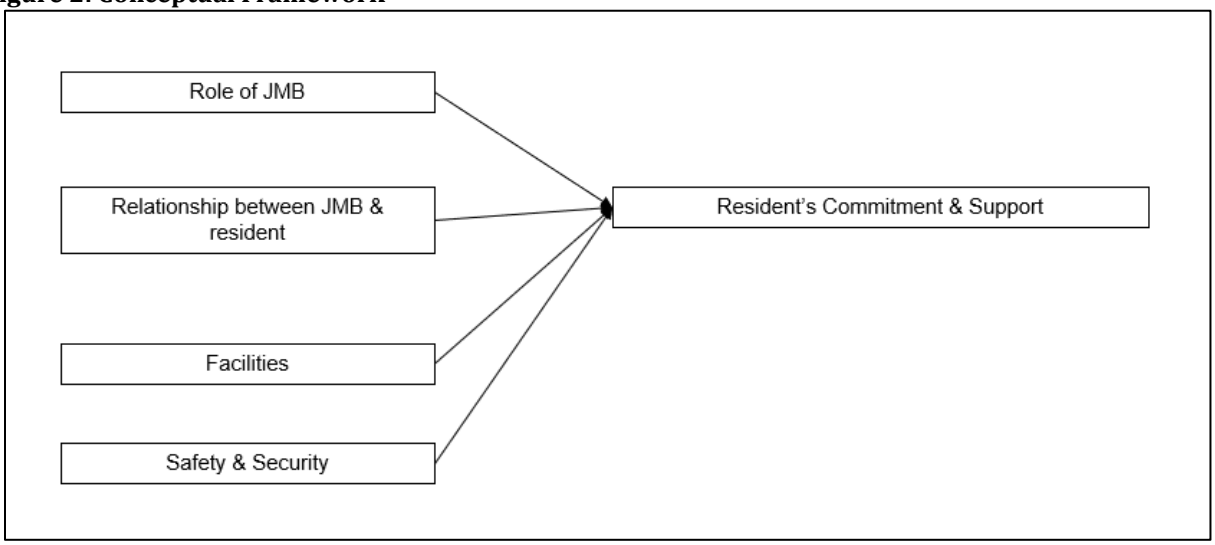
Financial Constraints by Residents

It was stated that following the enactment of the Building and Common Property (Maintenance and Management) Act 2007, the Ministry received roughly 15,000 complaints regarding various issues relating to strata buildings. The Malaysian Bar website also stated that one of the main grievances regarding strata properties is the inability to pay the maintenance fee, also known as and other contributions to the developer, while the parcel owners have no control over the monthly charges and the quality of service rendered. However, with the introduction of the Building and Common Property (Maintenance and Management) Act of 2007, which created a Joint Management Body (JMB), some of these issues were addressed (Mohamad, 2015).

Conceptual Framework

Figure 2 shows the conceptual framework of the study which contributed to the resident's commitment and support. Four (4) main factors are identified in this study which are the role of JMB, the relationship between JMB and residents, facilities provided, and safety and security.

Figure 2: Conceptual Framework



3. Research Methodology

The objective of this survey is to identify the challenges of the maintenance fee collection for the strata building. This survey comprises 31 respondents including owner and tenant on their perception towards JMB and challenges for late and non-payment of maintenance fee. The respondents were asked about their perception of the role of JMB, the relationship between the residents and JMB, the basic facilities provided, and the safety and security of the building. All these variables are measured towards the resident's commitment and support to the JMB, in this case including payment of maintenance fee to the JMB.

This study employed a quantitative method through a survey questionnaire to the residents of the strata building. This initial stage is distributed among 31 residents of the strata building and served as a pilot study, and in the future, more samples will be included. Determining the sample size such that there is adequate power to demonstrate meaningful effects and meet study objectives is a crucial part of research study design. The pilot study estimates are a valuable source of information when determining the sample sizes for the main investigations. Typically, the observed impact size or outcome variability from pilot studies is used to help with the main study's sample size estimate (Tseng & Sim, 2020). Roscoe (1975) suggested that a sample size greater than 30 and less than 500 is suitable for most behavioral studies. Thus, the sample of 31 for the pilot study is sufficient to test the reliability of the questionnaire.

4. Results and Discussion

This section discusses the results and discussion of the study. The analyses comprise reliability analysis, frequency distribution, and descriptive statistics. Reliability means the degrees to which the measures are free from error and therefore yield consistent results. The rule of thumb on the indication of internal consistency was explained by Kuder & Richardson (1937) as in Table 1.

Table 1: The rule of thumb on the indication of internal consistency

Cronbach's Alpha	Internal Consistency
α ≥ 0.90	Excellent
0.90 > α ≥ 0.80	Good
0.80 > α ≥ 0.70	Acceptable
0.70 > α ≥ 0.60	Questionable
0.60 > α ≥ 0.50	Poor
0.50 > α	Unacceptable

Table 2 shows the Cronbach's alpha value for independent and dependent variable. The Independent variable consists of the role of JMB, the relationship between residents and JMB, basic facilities provided, and safety and security. Meanwhile, the dependent variable is the resident's commitment and support. All the variables show more than 0.80 Cronbach's alpha value which indicates that all variables have good and excellent internal consistency.

Table 2: Descriptive Statistics

Variable	Part	Cronbach Alpha Value
Independent Variable	Role of JMB	0.915
	Relationship between Residents and JMB	0.889
	Basic Facilities Provided	0.915
	Safety and Security	0.923
Dependent Variable	Resident's Commitment and Support	0.860

Table 3 shows the respondent profile of the respondents. Most of the respondents hold a position of others (administrative, executive, etc.) with 41.9% followed by director with 29.0%, 16.1% of managerial position and government officer is 12.9%. Regarding the types of residents, the majority of the respondents an owners of the unit with 58.1% and the balance of 41.9% is among the tenants.

Table 3: Respondent Profile

Classification		Frequency	Percentage (%)
Job Position	Managerial Position	5	16.1
	Director	9	29.0
	Government Officer	4	12.9
	Others	13	41.9
Types of Residents	Owner	18	58.1
	Tenant	13	41.9

The opinion of the respondents on the role of JMB is illustrated in Table 4. The ranking was measured based on the mean given by the respondent from the Likert scale of 1 to 5. Most of the respondents agree that they fully understand the role of JMB. It was followed by the agreement that the rules and regulations set by JMB are reasonable. The least agreement is on the system used by JMB which might not a systematic.

Table 4: Descriptive Statistics of Role of JMB

No	Role of JMB	Mean	Ranking
1.	I fully understand the role of the Joint Management Body (JMB).	3.94	1
2.	The rules and regulations set by JMB are reasonable.	3.68	2
3.	The JMB's staff have a good attitude towards residents	3.52	3

4.	The JMB's staff is knowledgeable and skilled in carrying out the task.	3.32	4
5.	JMB provides satisfactory service quality.	3.16	5
6.	The JMB uses a systematic system.	2.97	6

Table 5 shows the relationship between residents and JMB. Most of the residents agree that residents and JMB always respect each other. It was followed by the statement that they would greet each other when met up. The least agreement was residents did not know the staff name and JMB did not ask if the residents had any problems.

Table 5: Descriptive Statistics of Relationship between Residents and JMB

No.	Relationship between Residents and JMB	Mean	Ranking
1.	Residents and JMB's staff always respect each other.	3.57	1
2.	We will greet each other when we meet up.	3.13	2
3.	JMB's staff will always ask if we have any problems.	2.81	3
4.	I know the JMB's staff name	2.74	4

Table 6 shows the ranking of agreement to the statement of basic facilities provided by the JMB. Most of the residents agree that basic facilities were provided to the visitors such as public toilets, a prayer room, and a visitor parking area. It is followed by the facilities provided are in working order. The least mean was if there is any problem with basic facilities, it will be solved immediately. It means that if any problem arises with the basic facilities, JMB will take some time to resolve the issue, which does not make the residents happy.

Table 6: Descriptive Statistics of Basic Facilities Provided

No.	Basic Facilities Provided	Mean	Ranking
1.	Basic facilities are provided for visitors, such as public toilets, a prayer room, and a visitor parking area.	3.71	1
2.	The basic facilities provided are in good working order.	3.58	2
3.	The basic facilities provided are sufficient for residents.	3.55	3
4.	The basic facilities provided are clean and ready to be used.	3.55	3
5.	The strata's surroundings are consistently tidy and well-kept.	3.52	4
6.	Basic facilities are provided for disabled visitors, such as toilets and wheelchair routes.	3.32	5
7.	There is a platform for residents to express information, ideas, and suggestions.	3.16	6
8.	If there is a problem with basic facilities, it will be solved immediately.	3.10	7

Table 7 is about the opinion of the respondents on the safety and security in their building. Two statements mostly agree with the residents which are the security guards have a good attitude and a complete fire extinguisher is provided in the housing unit. It was followed by another two statements which are relevant safety and security systems are provided and resident's safety is monitored regularly by security guards. The least agreement statement is the residents do not show how to use the fire extinguisher in case a fire starts.

Table 7: Descriptive Statistics of Safety and Security

No.	Safety and Security	Mean	Ranking
1.	The security guards have a good attitude.	3.45	1
2.	A complete fire extinguisher is provided in my housing unit.	3.45	1
3.	Relevant safety and security systems are provided in my housing unit.	3.39	2
4.	The residents' safety is monitored regularly by security guards.	3.39	2
6.	The safety and security equipment provided is well-functioning and ready to be used when necessary.	3.32	3
7.	The security guards are skilled and well-experienced.	3.06	4
8.	The central point and route information were being told to residents if a fire occurred.	2.87	5
9.	Residents were shown how to use the fire extinguisher in case a fire	2.45	6

started.

The resident's commitment and support are shown in Table 8 on the opinion of the statement. The residents agree that any dangerous incidents should be reported immediately to the JMB. It was followed by the statement that residents should consult JMB if facing any problems and the residents should get permission before proceeding with any action. Surprisingly, the issue of payment does not happen here and most of the residents do not feel that the rising maintenance fee makes it difficult for the residents to pay their bills.

Table 8: Descriptive Statistics of Resident's Commitment and Support

No.	Resident's Commitment and Support	Mean	Ranking
1.	Residents should report immediately to JMB if there are any dangerous incidents.	4.39	1
2.	Residents should consult JMB if facing any problems related to their housing unit.	4.06	2
3.	Residents should get permission from JMB before proceeding with any action they consider necessary.	4.06	2
4.	Residents should inform JMB if any wrongdoing occurs among residents	3.97	3
5.	Residents can help JMB with cleanliness and safety initiatives.	3.87	4
6.	The rising maintenance fee makes it difficult for residents to pay their bills.	3.45	5

Regression Analysis

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.695[a]	.484	.401	.62585

a. Predictors: (Constant), COMPUTE_SAFETY, COMPUTE_ROLE, COMPUTE_FACILITIES, COMPUTE_RELATIONSHIP

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9.174	4	2.294	5.856	.002[b]
	Residual	9.792	25	.392		
	Total	18.967	29			

a. Dependent Variable: COMPUTE_COMMITMENT
b. Predictors: (Constant), COMPUTE_SAFETY, COMPUTE_ROLE, COMPUTE_FACILITIES, COMPUTE_RELATIONSHIP

Coefficients

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.324	.441		5.275	.000
	COMPUTE_ROLE	-.160	.207	-.200	-.775	.446
	COMPUTE_RELATIONSHIP	.251	.215	.353	1.167	.254
	COMPUTE_FACILITIES	.607	.219	.784	2.779	.010
	COMPUTE_SAFETY	-.207	.279	-.278	-.744	.464

a. Dependent Variable: COMPUTE_COMMITMENT

The above table is the regression analysis of the study. The R square of the regression analysis is 0.484 indicating that 48.4% of the independent variables (role of JMB, Relationship between JMB and residents, Facilities provided by the JMB and Safety and Security) influenced the Resident's Commitment and Support.

Overall, this model is valid and significant since the significance value is 0.002, which is less than 005. For the

variable, only one independent variable is significant which is facilities provided by the JMB with a significant value of 0.010 less than 0.05 significance value. Meanwhile, other variables are not significant since the value is more than 0.05 (role of JMB, (0.446), Relationship between JMB and residents (0.254), and Safety and Security (0.464)).

Regarding the variable's influence on residents' commitment and support, the variable of basic facilities provided by the JMB has the highest influence (0.607) compared with other variables. The role of JMB and Safety and Security recorded a negative relationship between the variables and the residents' commitment and support.

5. Managerial Implications and Recommendations

In summary, most of the respondents agree that the section of residents' commitment and support is important in ensuring the issue of late and non-payment of maintenance fees can be resolved. Overall, three main factors that could contribute to the resident's commitment and support to the JMB are the role of JMB, the relationship between residents and JMB, and safety and security. The main focus which contributes to the residents' commitment and support is the basic facilities provided by the JMB. Thus, the issue of maintenance fees could be resolved through the action taken related to the basic facilities provided in the residency. Management sustainability is important to ensure that the building can be facilitated accordingly and the issue of facilities could be avoided.

Conclusion

A housing maintenance fee is important to ensure that the building is well maintained and thus could contribute to the resident's quality of life. The findings from the pilot study have shown that the financial issues of the respondents are not the main issue towards the commitment and support from the respondents to pay their maintenance fee. Most of the issues come from administrative issues such as a lack of awareness about using fire extinguishers. Apart from that, the residents are unhappy with the time the JMB took to resolve the issue of the basic facilities. It is recommended that the residents and JMB have a clear communication between them including the importance of paying maintenance fees and the facilities provided by the JMB. Besides that, the role of JMB is very important to ensure the resident's commitment and support. Therefore, necessary action should be taken to ensure that the country can achieve SDG11: Sustainable Cities and Communities. The policy that could enhance the collection of maintenance fees is suggested to have a late payment charge to the residents. Besides that, the role of the government in taking into consideration to include the maintenance fee in housing loans could be considered.

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Job Satisfaction and Turnover Intention among Travel Agency Employees in Selangor

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Abstract: Job satisfaction is among the most difficult issues for many business leaders to address. Researchers have widely discussed this problem, yet statistics still show an alarming increase, and various factors cause it to happen often. This study aims to examine the relationship between job satisfaction and turnover intention and investigate the moderating effect of employee gender and years of experience on the relationship. The four workplace satisfaction determinants—career advancement, employee empowerment, pay level, and nature of the work—that affect employee turnover intention are covered in this study. This study involved respondents among the travel agencies' employees within the state of Selangor, regardless of their working position. A set of questionnaires was distributed to 130 employees from 26 travel agency companies that participated in the study. The results show employee empowerment has a significant negative relationship with turnover intention. It has been also found that the relationship between job satisfaction and turnover intention is significantly moderated by gender and years of experience. This study recommends that further research should use a larger sample size and qualitative methods to gain comprehensive knowledge regarding the phenomenon.

Keywords: *Job Satisfaction, Turnover Intention, Travel Agency, Employees, Selangor*

1. Introduction and Background

Malaysia has a stable labor market with an increase in employment from 15.3 million to 15.6 million in quarter one of 2018, with the service sector recording the largest employment at 62.2 percent (DOSM, 2019a). Job vacancy increments in the market are also reported as highly competitive, with Malaysia expected to have 40, 4513 job vacancies by the end of 2022 (DOSM, 2019a). The government's strategic location, competitive environment, and stable business policies have attracted foreign investors to Malaysia, making the job market attractive for employees however, maintaining current good employees is extremely challenging. Many organizations face challenges in retaining employees and addressing turnover intention in today's globalized economy. Human resources play a crucial role in retaining experienced and skilled employees, but training new employees is time-consuming and challenging. In Malaysia, the average number of people changing jobs is 15 months and 73% of employees leave their existing company after switching roles (Page, 2015). To maintain a low turnover rate, organizations need to maintain a balance between inflowing talent and outflowing the best employees as many research shows that high turnover rates can negatively impact productivity and organizational profits. Malaysia has a sizable labor force, with the manufacturing and services industries employing the most people, according to the National Employment Returns report, which is produced yearly by the Institute of Labour Market Information and Analysis (ILMIA). In Malaysia, this industry has an average turnover rate of 20%, with lower-skill groups contributing to greater rates.

One of the reasons for job turnover is primarily caused by a lack of career progression, with 52 percent of employees stating that career advancement is the main reason to leave the company. Another push factor is seeking fresh challenges and salary increments, with 35 percent of employees seeking salary increases (Page, 2015). The Malaysia Employee Intentions Report (2015) found that 54 percent of respondents would be open to new jobs due to future career advancement and progression, while 49 percent would be motivated by salary increments. In many businesses, high turnover rates have long been a problem and a financial burden. Much research has been done on the reasons behind employee turnover, but the majority of them have focused on

the hotel sector, with very few also looking at travel agents (Phang, 2014). In addition to this increase in turnover, the Bureau of Labor Statistics' Job Openings and Labor Turnover Survey (JOLTS, 2020) reports that the tourist and hospitality sector experiences between 70 and 80 percent of annual turnover.

Hossain (2020) reported that those who work in the service industry, think that the workplace can occasionally be extremely hard and competitive. Consequently, it often leads to employee turnover, which is a serious issue for any company within the industry. According to Dwesini (2019), a significant staff turnover will have both positive and negative effects on the company where it has a detrimental effect on employees which may cause sales and profitability to decline. Thus, within the tourism sector, it is critical to understand both the possibility of resignation and job happiness in a study by Willie (2021), it has been demonstrated that greater job happiness is linked to improved employee productivity, which in turn results in better experience quality and more robust customer and organizational engagement.

In a prior study, Lei, Basit and Hassan (2018) investigated how job satisfaction can result in employees faithfully serving in an organization by reducing the turnover rate of intention among them. The study was conducted among 139 respondents out of a total population of 191 people in a travel agency in Malaysia. Prior studies (Nointin, 2018) have shown that among workers in travel companies in Sabah, Malaysia, job satisfaction positively affects the propensity to leave. It also recommends that the study population be expanded to include Malaysian travel agencies in future studies. Therefore, exploring and understanding job satisfaction is imperative for organizations to prevent losses and unnecessary cost increases as the biggest valuable asset in an organization is its experienced employees. Replacing them with experienced employees can be costly and negatively impact morale and business opportunities thus it is essential for organizations to thoroughly explore and understand job satisfaction to prevent losses and unnecessary costs.

There is also a need for employers to address the gender gap between male and female employees in terms of job satisfaction. According to a 2017 Jobstreet.com happiness poll of workers in the service sector, gender influences job satisfaction, with certain work conditions favoring male employees more than female employees. Furthermore, male and female employees have notable salary disparities, with male employees making more money than female employees (Ho, 2018). The labor force in Malaysia is divided into 15.77 million (48.4%) males and 15.25 million (46.8%) employed persons (DOSM, 2019c). The gap between males and females is statistically high, with males in the labor force and employed persons showing statistically higher numbers. The government has been working to attract more females to the labor force, but organizations must understand and justify their job satisfaction. One major issue is wage level and career enhancement. Female employees receive a mean of RM 890 monthly, while male employees receive RM 1,914 monthly (DOSM, 2019a). This gap is about 46 percent, with males receiving extra salaries even in the same sector and position. Some argue that males are more educated than females but this is not accurate (Abou-Shouk, 2021). Understanding the dynamic of job satisfaction and turnover intention impacted by gender is important. Despite the increasing number of female employees holding higher positions, male employees still dominate in certain areas. Organizations should focus on pressuring female employees to take higher positions to improve their wages and reduce turnover intention.

2. Literature Review

Job Satisfaction

Job satisfaction is a crucial aspect of organizational well-being, as satisfied workers perform better and contribute to higher performance levels. Research has been conducted to identify factors that contribute to employee satisfaction, such as individual attitudes toward work, motivation, and organizational policies. Herzberg's two-factor theory suggests that certain job motivation elements, such as recognition, achievement, work nature, advancement, growth, and responsibility, contribute to job satisfaction (Herzberg, 1959). However, other factors, such as company policy, working conditions, relationships with peers and subordinates, supervisors, salary and benefits, and job security, can also contribute to job dissatisfaction which is known as the hygiene factors (Herzberg, 1959). A study by Ghazi, Shahzada and Khan (2013) found that academic staff were satisfied with both hygiene and motivation factors, while the motivation of university teachers depended more on hygiene factors being fulfilled. Herzberg's theory suggests to preserve excellent

instruction and successful student outcomes, employers should concentrate on elements that affect job satisfaction.

Nature of Work

When the work is intriguing, the person could be thrilled and driven by the nature of the work. Maintaining enthusiasm for job content that does not pique an employee's attention is extremely difficult. Chin (2018) separated the measurement of intrinsic and extrinsic work satisfaction into two sections. The nature of work and opportunities for career advancement are measured by intrinsic job satisfaction, whereas salary and supervision are measured by extrinsic job satisfaction. The nature of the work indicates a positive relationship with the employee, however, the association between job satisfaction and supervision in Malaysia's manufacturing industries yields a negative relationship.

Another study by Ibrahim, et al. (2014) comparing the United States and Singaporean samples demonstrates significant differences statistically in t-tests measuring the nature of work. On the other hand, no statistical difference is shown on occur among Singaporean and Malaysia sample depending on observed running condition satisfaction. A study conducted in 2015 by Raziq and Maulabakhsh in Quetta, Pakistan, on employee job satisfaction found a favorable correlation between workplace culture and employee job happiness. This implies that to increase employee satisfaction, firms would need to quickly grasp the importance of a positive work environment.

Pay Level

Employee pay or wages are classified as compensation for their job (Spector, 1997). In a study by Richardson, Mikkelsen and Burkes (1997) there is a difference between men and women in terms of promotion and pay in doing the job. According to Clark (1997), this analysis reveals that women's employment is weaker than men's by certain statistical criteria, but women record higher rates of work satisfaction than men do. A study by Guha and Chakrabarti (2014) considered pay level as a pull factor and the result shows higher pay becomes a significant reason for IT workers to enter a new organization. Furthermore, a study by Ibrahim et al, (2014) revealed pay subscales were statistically important among workers in the United States and Singapore.

Employee Empowerment

According to Rana and Singh's (2016) study, work satisfaction scores and employee empowerment have a significant and favorable relationship. The study found that workplace ownership offers workers the power to execute the strategy and the manager's goal. A key strategy for managing the business to counter external stressors has been leveraging employee satisfaction and their support for the workplace. Employee empowerment is specifically described as giving employees decision-making authority while ensuring the highest level of customer satisfaction. Kim and Fernandez (2016) examined a quantitative model of the relationship between workplace satisfaction and the attrition plan of federal bureaucrats in the United States. The premise that employee empowerment favorably and considerably improves job satisfaction, which in turn has a considerable and negative impact on turnover, is strongly supported by the empirical investigation's findings.

Career Enhancement

Wexler (2001) defines advancement in career and employee growth as a promotion. A research of 26,359 managers in a financial services business found that promoted managers are less inclined to resign than non-promoted managers, and promoted women are less willing to withdraw than promoted men. A study has been done by Zhang (2016) to study the influence of job satisfaction and turnover intention among industrial workers. The findings revealed that a lack of professional progress in career enhancement and development is the most important factor contributing to employee turnover. This suggests that a corporation that provides a decent career path system for its employees while also offering promotions can retain good personnel.

Years of Experience

Terms of service or working experience are frequently taken into consideration when evaluating an individual's level of job satisfaction and risk of attrition. The number of particular studies on the impact of years of work experience on turnover and job satisfaction is still very small at this time. Sukriket (2014), however, discovered that the number of years of service in the current organization had a substantial impact on turnover

expectation, even if around half of the respondents envisaged leaving the firm within three years. The younger respondents, who had worked for the organization for one to two years, had the greatest intention of leaving their current position. Meanwhile, Zhang (2016) investigated the factors that influence employee turnover, focusing mostly on personal factors such as gender, age, years of employment, education, and experience. He found that younger workers with higher levels of education and inexperience seem to be less loyal to the company and to be more dissatisfied with their jobs overall.

Gender

One trait that has drawn a lot of attention is gender, particularly in the context of understanding work satisfaction and turnover. The theory of social roles contends that males and females tend to act differently in intent to exhibit turnover (Eagly, 2012). According to Lambert, et al. (2001), it has been demonstrated that men are less satisfied with their jobs than women. Men continued in their careers since they were frequently portrayed as the main breadwinners. Although the impact of gender on work satisfaction is also assessed, the literature has produced contradictory results. According to studies, women were more likely than their male coworkers to quit their occupations, supporting this argument. The study by Abubakar and Maitama (2015) is suggested to replicate and broaden the findings of earlier research by examining the moderating effect of gender on the connection between work satisfaction and employee turnover intention.

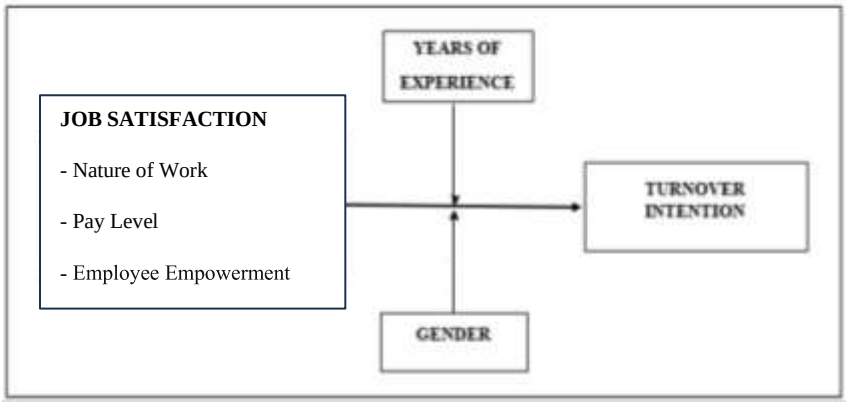
Turnover Intention

The percentage or quantity of workers who leave an organization and are replaced by new hires is referred to as employee turnover. These days, a lot of businesses are conscious of and concerned about the staff turnover rate. Turnover intention has been the subject of in-depth study by numerous academics, and it continues to be a productive area of research in the field of organizational psychology (Abubakar & Maitama Kura, 2015; Guha & Chakrabarti, 2014). A study by Tnay et al., (2013) aimed at ensuring that workers are kept within an organization, concentrated on a variety of variables that may affect employee engagement behavior, including work satisfaction (pay satisfaction, supervisory support, and organizational dedication. The finding revealed pay satisfaction is correlated with the intention of the turnover of employees. This is similar to another research by Phang, Kucukusta and Chan (2014) who studied Hong Kong travel agencies workers' turnover intention. Five factors are found to be substantially correlated with turnover intention that are, total work satisfaction, career jumping, employment stability, educational chances, and promotional incentives.

Research Objectives and Hypothesis

The purpose of the study is to investigate the relationship between job satisfaction and turnover intention among employees in the travel agencies within the Selangor area. The objectives of the study are (1) to examine the relationship between job satisfaction and employee turnover intention, (2) to investigate the moderating effect of employee gender on the relationship between job satisfaction and turnover intention, (3) to investigate the moderating impact of the employee years of experience towards the relationship between job satisfaction and turnover intention. Figure 1. shows the research framework in which job satisfaction is measured through four variables (nature of work, pay level, career enhancement, and employee empowerment) on turnover intention. The moderating factors are gender and years of experience. The study's hypotheses attempted to find whether; the nature of work negatively affects turnover intention (H1a), the pay level negatively affects turnover intention (H1b), the employee empowerment negatively affects turnover intention (H1c) and career enhancement affects turnover intention (H1d). The study also hypothesized; that year of experience moderates the turnover intention (H2) and, that gender moderates the turnover intention (H3).

Figure 1: Research Framework on the Relationship between Job Satisfaction and Turnover Intention: Gender and Years of Experience as Moderator



3. Research Methodology

This cross-sectional quantitative study includes the employees working in travel agencies in Selangor with a total population of 13,252 people. The unit of analysis is trainee, non-executive, junior executive, and senior executive. The sampling frame is retrieved from the MOTAC data system, with respondents from 110 travel agencies in Selangor. The study consists of 130 respondents from 26 travel agencies. The sample size is calculated using G Power analysis, with an effect size of 0.15 and several predictors according to the variable. The sample size indicated for this study is 129. A convenience sampling technique is used to collect data from 130 employees working in a tourism agency in Selangor. The questionnaire was distributed via email to the administrative officer, who circulated it among the staff. The items for nature of work, pay level, employee empowerment, and career enhancement were adopted from Chin (2018), Chan (2019), Rana (2016), and Ibrahim (2018). All the items used 5 Likert scales ranging from 1 to 5 with 1 being the lowest scale in each section. The reliability of indicators is shown in Table 1.

A preliminary test for testing the normality of the data was conducted and data were analyzed using SPSS 25.0 using multiple regression to assess the correlation of the relationship between job satisfaction and turnover intention and the moderating effect of years of experience and gender.

Table 1: Reliability Value

Job Satisfaction	
Previous Study	**Cronbach Alpha**
Factor A- Nature of Work (Chin, 2018)	0.714
Factor B- Pay Level (Chan, 2019)	0.850
Factor C-Employee Empowerment (Rana, 2016)	0.584
Factor D- Career Enhancement (Ibrahim, 2018)	0.840

4. Results

Statistical evaluation of the data was performed in IBM SPSS Statistics version 25.0 using descriptive statistics and regression analysis to assess the predictive value of independent variables. The values of Skewness and Kurtosis for all variables are within the range of ±3. The subsequent analysis proceeded as the first assumption of multivariate analysis was met. Table 2. highlights the demographic details of the respondents who participated in the study.

Table 2: Demographic Details of Respondents (n=130)

Demographic		Frequency	Percentage %
Age	18-30	51	44.6
	21-40	58	39.2
	41-50	21	16.2
Gender	Male	57	43.8
	Female	73	56.2
Education Level	SPM	7	5.4
	STPM	9	6.9
	Diploma	48	36.9
	Bachelor Degree	58	44.6
	Master	8	6.2
Total years of working experience	0-2 years	11	8.5
	3-5 years	33	25.4
	6-8 years	39	30.0
	>9 years	47	36.2
Current Position	Trainee	4	3.1
	Non-Executive	26	20.0
	Junior Executive	47	36.2
	Senior Executive	53	40.8
Total		130	100

The majority of respondents were in the age group of 21 to 40, contributing the most significant percentage, and females formed slightly more than half of the total respondents. An enormous number of participants have a bachelor's degree qualification (44.6%), and most had a cumulative number of working experiences of more than nine years (36.2%). Senior executives and junior executives' positions contribute the most profile of respondents in the organizations (77%).

Table 3: Coefficients of Multiple Regression Analysis

	Beta	Partial Correlation	t-value	sig
Constant	34.809	2.135	16.307	<0.000
Employee Empowerment	-.272	-.215	-2.493	<0.014
The excluded Variable Nature of Work	-.020	-.017	-.189	.850
Pay Level	-.148	-.111	-1.254	.212
Career Enhancement	-.074	-.054	-.613	.541

$R = 0.215$, $R^2 = 0.046$, $F = 6.213$, $P < 0.05$

In the multiple regression analysis of independent variables thought to affect turnover intention (nature of work, pay level, career enhancement, employee empowerment), the resulting model was significant ($R = 0.215$, $R^2 = 0.046$, $F = 6.213$, $P < 0.05$). When the predictive value of job satisfaction was examined, a significant relationship was detected between employee empowerment and turnover intention ($\beta = -0.272$, $p < 0.05$). Nature of work, pay level, and career enhancement were not associated with turnover intention ($p > 0.05$). The coefficient value shows that the intention to leave the company decreases by 0.272 for every unit increase in employee empowerment. The finding further confirmed that hypothesis 1c is accepted while hypotheses 1a,1b, and 1d are rejected.

Table 4: Model Summary (Gender and years of working experience as moderators)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
EE	.226[a]	.051	.036	.58805
EE x Gender	.247[b]	.061	.039	.58731
EE	.350[a]	.123	.101	5.121
EE x YOE	.369[b]	136	.103	5.114

F = 2.725, Sig.=0.047, P < 0.05 (Gender moderator); F = 4.143, Sig. =0.09, P < 0.05 (Years of working experience moderator)

Figure 2: Grouped Scatter of Employee Empowerment on Turnover Intention by Gender

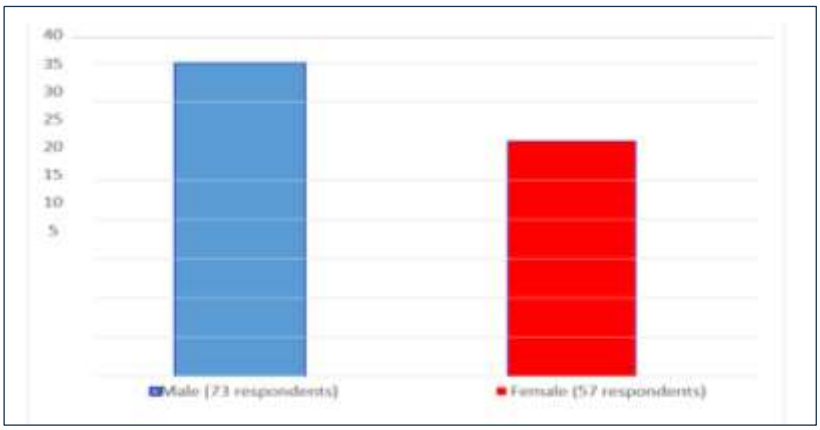
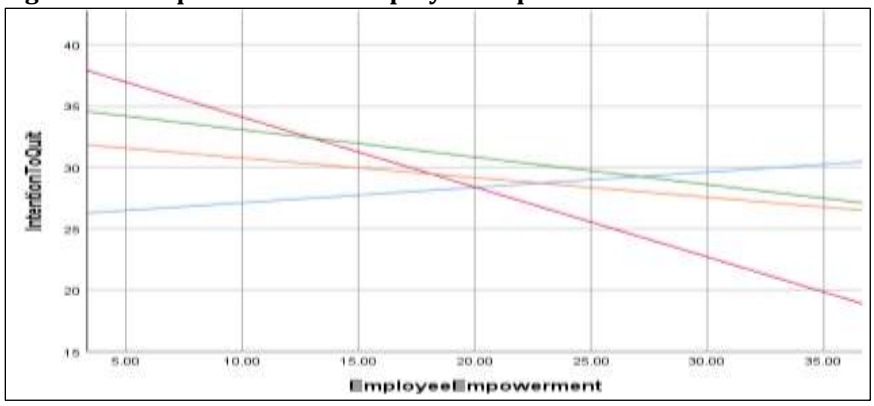


Figure 3: Grouped Scatter of Employee Empowerment on Turnover Intention by Years of Experience



The hierarchical regression analysis on moderators towards employee empowerment and turnover intention has yielded significant results for gender (F = 2.725, p=0.047) and years of working experience (F =4.143, p= 0.009). The model summary result in Table 4. shows the variance of the dependent variable turnover intention for both moderator gender and years of experience are 3.9% and 10.3% respectively (R = 0.247, R^2 = 0.039) and years of working experience (R = 0.369, R^2 = 0.103). The results are significant at p<0.05. Gender and years of working experience are found to have moderating effects on turnover intention through employee empowerment. Males have the highest job satisfaction through employee empowerment as compared to females. People with 3 to 5 years of working experience have the highest turnover intention as compared to those who have 9 years of working experience who have the lowest turnover intention. The findings further

prove that hypotheses 3 and 4 are confirmed and accepted. Hence, all hypotheses within this study are supported except for H1a (nature of work, H1b (pay level), and H1d (career enhancement). The study confirms that employee empowerment is the key factor that leads to turnover intention among employees while gender and years of working experience moderate the relationship.

Discussion

Four factors of job satisfaction were measured within this study that are pay level, nature of work, career enhancement, and employee empowerment. The result from the study indicates job satisfaction through employee empowerment affects turnover intention where employees who experience job empowerment will decrease the intention to leave the company. This study shows employee empowerment has the greatest impact on turnover intention and this further indicates that higher degrees of independence and non-routine job duties are linked to a reduced likelihood of turnover. The finding is supported by a previous study (Kim & Fernandez, 2016) where the outcome shows staff empowerment has a positive and materially meaningful impact on job satisfaction, which in turn has a negative and substantive impact on the purpose of turnover. Additionally, it is also supported by Sergio and Rylova (2018) who highlighted to ensure that individuals are engaged and satisfied with their jobs, employee empowerment may prove to be the most effective strategy, and being employee-empowered is primarily focused on granting them the authority to make decisions independently. Besides that, the factor of pay level in job satisfaction shows there is no relationship with turnover intention and this finding correlates with previous studies that indicate a non-relationship between pay level and turnover intention (Romeo, Yepes-Baldo, & Lins, 2020). Concurrently, the nature of the work exhibits negligible value in the multiple regression analysis, indicating the absence of a relationship between turnover intention and turnover, a finding corroborated by earlier research (Al Sabei, et al., 2020). Finally, there is a negligible correlation between job satisfaction and turnover intention when it comes to the career enhancement components as discovered in this study.

Employee empowerment and turnover intention also revealed a substantial association between job satisfaction and the moderating impacts of an employee's gender. There exists a robust association between the components of employee empowerment and the degree to which gender influences the intention to leave. This outcome aligns with the research findings by Rigther (2017) who also found gender strongly moderates the association between job satisfaction and intention to resign, according to a sample of employees from various organizations operating abroad. It is also evident from the results that men are more satisfied with their jobs' empowerment than women are. Research by Crookston et al. (2021) supports this, demonstrating how men differ noticeably from women in that they feel more in control.

Men who feel powerful at work and who are also highly satisfied with their jobs are less likely to want to change jobs. Previous research (Obi, 2021) that looked at the degree of empowerment of non-managerial bank employees in both Nigeria and the U.S. supports the findings of this study by showing that male respondents in both nations exhibit higher levels of empowerment than female respondents. The study also demonstrates a substantial association between job satisfaction and turnover intention, with years of experience having a moderating influence. Notably, the group with the highest turnover intention is one with three to five years of experience. Sukriket (2014) supports this conclusion with research on employees that reveals most respondents intend to quit the company, with younger respondents having worked there for two to three years making up the majority of respondents. Additionally, this study demonstrates that the group with the lowest intention of turnover has more than nine years of experience. Previous studies have also indicated that employees with more experience with the current organization are likely to have fewer plans to depart (Gupta & Shaheen, 2017; Zhang, 2016).

5. Conclusion and recommendations

The study's main objective is to assist the Selangor tourist organization in comprehending the relationship between job happiness and intention to leave, taking into account the moderating effects of gender and years of experience. This study has already looked at several factors that influence turnover intentions, and it turns out that gender and years of experience supported the noteworthy value association between employee empowerment and turnover intention. For future studies, it is crucial to consider other variables that may impact the intention of staff turnover. Furthermore, certain of the correlations discovered were not in the path

expected by the hypotheses thus extended studies are required to disentangle these interactions and offer more insight into the link between job satisfaction and intention to leave in travel agency companies in a larger geographical context that is the whole state of Selangor. Furthermore, it would be interesting to use the qualitative research method to examine the participants' observations, along with the focused group which can help to develop a more comprehensive knowledge of turnover intention behaviors.

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Unravelling Smart HRM 4.0: A Narrative Review of Progressive 4.0 Technology Integration in Human Resource Management

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Abstract: The integration of progressive 4.0 technology into human resource management (HRM) represents a significant shift in how organizations optimize and enhance workforce capabilities. This review explores the origins, applications, benefits, challenges and future prospects surrounding smart HRM 4.0. By reviewing existing literature, this paper examines the utilization of Artificial Intelligence (AI), Big Data analytics, machine learning (ML) and the Internet of Things (IoT) in HRM, specifically in talent acquisition, training, performance management, and rewards. Additionally, it addresses the implementation challenges including data quality assurance, skill shortages, and cultural resistance. The paper also emphasizes the importance of ethical considerations. In terms of future research, it highlights the necessity for ethically deploying Industry 4.0 and establishing robust AI governance frameworks. By combining technological innovation with ethical values, organizations can navigate the complexities of this integration, leading to a future characterized by workplace efficiency, accountability, and fairness.

Keywords: Industry 4.0, *4.0 technologies, Smart HRM 4.0, Ethical implications, Corporate digital responsibility.*

1. Introduction and Background

In today's dynamic global business landscape, organizations around the world are experiencing significant transformations due to the disruptive impact of Industry 4.0. Within the context of these transformations, attention is directed towards the advent of progressive 4.0 technologies in boosting operational excellence (Calabrese et al., 2022). This era of technological disruption highlights the crucial need for firms to adapt and innovate to maintain their competitiveness (Marcon et al., 2022). As Industry 4.0 advances, the transformation goes beyond operational adjustments involving various business functions, including human resource management (HRM). Consequently, conventional practices are being re-examined, and innovative approaches powered by technological advancements are being explored (James et al., 2022 & Pillai et al., 2021).

Smart Human Resource Management 4.0 (Smart HRM 4.0) represents this shift by embracing advanced technology associated with Industry 4.0 in improving human resource (HR) functions and enhancing organizational performance (Duman & Akdemir, 2021; Verma et al., 2020). In the current climate of business uncertainty, the adoption of Smart HRM 4.0 is crucial for organizations seeking to navigate the complexities of the digital age while maximizing the full potential of their workforce. However, organizations often encounter various managerial challenges in transitioning to Industry 4.0, including hesitancy or resistance to adopt and implement these advanced technologies (Calabrese et al., 2022; Marcon et al., 2022). This underscores the significance of examining the adoption of I4.0 technologies and the barriers they present for the development of Smart HRM 4.0 along with its influence on HR and organizational performance.

As research on Smart HRM 4.0 is still in its initial phase, the comprehension of this concept remains limited, particularly regarding the influence of Industry 4.0 on HRM evolution and the changes it introduces to people management (Abellan-Sevilla & Ortiz-de-Urbina-Criado, 2023). Investigating this transformative wave raises several research questions to be addressed: (1) What are the key applications of Smart HRM 4.0? (2) Do these key trends enhance the strategic value of HRM? (3) What challenges do organizations face in adopting these smart working practices? (4) What future trajectories can be anticipated for these practices? Through a review of extant literature, this paper intends to offer valuable insights into the applications and benefits, challenges, and future paths of this developing practice. Additionally, it aims to shed light on the transformative impact of Smart HRM 4.0 and its implications for organizational success in the digital era.

2. Literature Review

Fourth Industrial Revolution: A shifting landscape from HRIS to Smart HRM 4.0: Introduced in 2011, Industry 4.0 was originally proposed as Germany's initiative to revitalize the industrial sector through the incorporation of disruptive 4.0 technology (Ghobakhloo et al., 2023; Sarbu, 2022; & Hoffmann Souza et al., 2020). As research on Industry 4.0 advances, a multitude of terms, technology, and areas of application linked to the same concept have emerged, each supporting different business functions (Culot et al., 2020; Duman & Akdemir, 2021). Among the various departments within an organization, the HR department holds a central position due to its responsibility for managing the organization's human capital. By integrating cutting-edge technology, HR functions can be streamlined effectively, resulting in reduced time required for its operations and ultimately contributing to industrial development and enhanced performance (Oswal et al., 2021).

Research on the utilization of HRM technologies has undergone significant evolution. The initial phase of IT integration in HRM dates back to the 1970s with the advent of Human Resources Information systems (HRIS), which computerize the process of HRM by electronically managing HR records and transactions (Hmoud, 2021). The studies predominantly centered on the value of HRIS and its potential to reform HRM practices in organizations (Maamari & Osta, 2021). Strohmeier (2020) and Shahreki et al. (2019) clarify that HRIS exerts a dual impact on HR functions; firstly, on relational dimensions encompassing recruitment, training, and performance management and secondly, on operational facets including administrative tasks, payroll management, and employee data maintenance. Given that HRIS gathers and stores timely data on employee-related matters, its adoption is deemed pivotal for the effectiveness of HR functions, contributing significantly to the precision of employee performance evaluations (Shahreki & Lee, 2024; Maamari & Osta, 2021). Additionally, HR data can be leveraged for strategic, tactical and operational decision-making (Shahreki & Lee, 2024).

In the early 1990s, research in HRM expanded beyond HRIS to include Electronic Human Resource Management (e-HRM), a comprehensive system that comprises diverse integrated mechanisms of HRM and information technologies (Hmoud, 2021; Al-Harazneh &Sila, 2021). In comparison to HRIS, e-HRM offers distinct advantages when it comes to integrating organizational data and improving the quality of HRM services (Zhou et al., 2022), By leveraging network technology such as the Internet in processing HR services and tasks, e-HRM permits employees to access HR data, carry out relevant HRM functions online, and engage with both internal and external stakeholders, such as job seekers, manager, and suppliers (Talukdar & Anirban, 2022).

The latest development of technology in HRM is Smart HRM 4.0, a smart working concept that is firmly grounded in the fourth industrial revolution (Pillai & Srivastava, 2024). This revolution is characterized by the incorporation of sophisticated 4.0 digital technology, including artificial intelligence (AI), robotics, Big Data analytics, machine learning (ML), and the Internet of Things (IoT) (Ogbeibu et al., 2021; Sivakumar et al., 2020). The current body of knowledge surrounding this integration in HRM has mainly focused on its transformative potential for HR operations.

Pillai and Srivastava (2024) pointed out that Smart HRM 4.0 enables organizations to upskill their workforce, while at the same time automating routine tasks. These implications not only optimize operational efficiency but also make the HR functions more agile and responsive to changing market demands. Additionally, the advanced analytical feature of Smart HRM 4.0 allows for a comprehensive insight into employee preferences and behavioral patterns, facilitating more personalized and effective HR interventions (Ganatra & Pandaya, 2023). This data-driven approach marks a substantial departure from traditional and generalized HR practices. The automation of routine tasks and the availability of sophisticated analytic tools enable HR professionals to redirect their focus towards more strategic aspects of their roles, such as talent cultivation and employee engagement. Therefore, Smart HRM 4.0 is recognized as a crucial strategy for addressing the challenges posed by the contemporary workforce (Pillai & Srivastava, 2023).

Reshaping HRM Functions through Smart HRM 4.0: Smart HRM 4.0 not only redefines conventional procedures but also introduces innovative solutions to effectively manage and enhance the workforce. At the core of Smart HRM 4.0 are several key HRM functions, including recruitment and talent acquisition (Pillai & Sivathanu, 2020), training and development (Soltani & Morris, 2020; Chen, 2022), compensation management

(Meijerink, 2021) and performance and predictive analytics management (Murugesan et al., 2023). These functions are seamlessly integrated with the progressive technologies of Industry 4.0 (Pillai et al., 2021).

One notable advancement facilitated by Smart HRM 4.0 is the utilization of ML, a subset of AI, which revolutionizes the talent acquisition process. According to Artar et al. (2024), machine learning algorithms have the ability to predict the success of potential candidates, thereby expediting recruitment processes and improving the quality of hiring decisions. For example, advanced programs that use ML algorithms have been developed to assess a person's skill level (Goretzko & Israel, 2022). Additionally, they can analyze future performance and counterproductive habits and convert a person's digital records into personality variables (Sahin et al., 2019). On another note, the combination of AI algorithms and big data analytics enhances recruitment efficiency by optimizing applicant screening and selection through comprehensive data analysis (Agarwal, 2023). Similarly, ML models in performance management empower organizations to analyze employee performance data, enabling informed decision-making and the customization of personalized development programs (Nayem & Udin, 2024). This approach ensures a more data-driven approach to HRM decision-making.

When it comes to the utilization of robots and robotic process automation (RPA), they have been implemented in the field of HRM to automate repetitive and time-consuming tasks such as payroll processing, benefits administration, and compliance reporting (Samarasinghe & Medis, 2020). This automation not only enhances productivity but also minimizes the risk of human error, ultimately strengthening the accuracy and reliability of HRM activities (Bankins 2021). The integration of the IoT on the other hand, holds promise for enhancing the personalization of training programs. Abdussamad et al. (2022) suggest that IoT-enabled data collection facilitates effective planning, organization, and coordination of training initiatives. By leveraging IoT devices, organizations can implement just-in-time training approaches, continuously monitor training outcomes, and provide real-time coaching and feedback to employees. This real-time analysis enables the identification of skill gaps or deficiencies, empowering organizations to address them promptly and effectively (Mohanty & Mishra, 2020).

The incorporation of progressive 4.0 technology into HRM functions presents a significant opportunity to improve operational efficiency, increase employee engagement, and improve strategic decision-making. If an organization is able to successfully use these technological breakthroughs while also tackling the issues that are connected with them, then they will be in a strong position to succeed in the competitive business environment. Nevertheless, successful implementation requires careful consideration of numerous challenges, especially within human resources.

Implementation Challenges of Smart HRM 4.0: The implementation of technological advancements, particularly the adoption of Smart HRM 4.0, demands a substantial investment in developing capabilities and entails the acquisition of new skills (Calabrese et al., 2021; van Dun & Kumar, 2023). As a result, companies are focusing on acquiring skilled talent to effectively utilize these technologies (Kamble et al., 2018). Therefore, it is crucial to understand the changes brought about by Industry 4.0 in terms of the competencies, skills, and attitudes required to identify the job profiles of the future (Flores et al., 2020). Process understanding, data security, programming, and the operation of emerging technologies such as cyber-physical systems, big data, IoT, and the cloud, are key hard skills that are indispensable in the context of Industry 4.0 (Nicolas-Augustin 2022; Matt et al., 2020). Digital literacy, which was once a strategic advantage in the Third Industrial Revolution (Sakurada et al., 2020), has now become essential for employees, particularly those who require reskilling. Beyond having digital literacy, employees must also be agile in adapting to the ongoing organizational changes brought about by automation's demands (Shet & Pereira 2021). The discussion concerning competencies holds substantial importance in the field of HRM due to its influence on organizations and its relevance to Industry 4.0. Consequently, HRM plays a crucial role in determining the competencies required by an organization and how they should be developed (Meddour et al., 2020). Competency development involves identifying the specific competencies that call for improvement, discerning the critical gaps that exist between the current competency level and the desired level, and subsequently bridging those gaps through suitable and targeted qualifications. This enables organizations to align their workforce with the challenges posed by Industry 4.0 (Abdeldayem & Aldulaimi, 2020).

Furthermore, to be able to accept these changes, there is a need for a cultural shift inside the organization. A major concern about the influence of organizational culture on digital transformation is the potential resistance to change due to shared beliefs and attitudes (Bockius & Gatzert, 2023). Some perspectives within the organization may embrace change, while others may cling to traditional norms, which can slow down the adoption of progressive 4.0 technologies (Agrawal et al., 2020). It is important to note that, a cultural shift that fosters a positive attitude towards change is imperative to establish an environment wherein employees feel empowered to explore new possibilities, acquire fresh knowledge, and readily adapt to innovative approaches (Bozkus, 2024). Hence, a transformation in organizational culture demands the implementation of effective change management methods to overcome opposition and cultivate a culture that values innovation and ongoing learning (Al-Khatib et al., 2021; Tang et al., 2020). Understanding these obstacles is essential for businesses that want to make effective use of 4.0 technologies to improve their HRM procedures.

Another significant technological-related issue often cited in the implementation of smart technology is the problem of data quality. For organizations to adopt big data and AI systems, especially those that are based on machine learning algorithms, they need vast amounts of high-quality data (Bohmer & Schinnenburg, 2023). It poses a challenge as numerous relevant data sets for HR big data are not integrated within HR systems but are rather scattered across different areas of the organization (Angrave et al., 2016; Marler & Boudreau, 2017). The performance of an individual is not only captured through appraisals and HR reports, but also in areas such as marketing, production, and customer service data, as workforce analytics inherently involve multiple functions (Hamilton & Sodeman, 2020). Given that data is dispersed throughout the organization, navigating data collection and determining the specific locations of data sets, compatibility of databases, and availability of data for analysis can prove challenging in certain contexts (McIver et al., 2018). Consequently, HR departments should make data management a crucial priority to ensure these systems are accurate.

3. Ethical Implications

The ethical implications of progressive 4.0 technology raise important concerns for organizations and governments alike (Chatterjee et al., 2021; Weiskopf & Hansen, 2022). Ethical considerations primarily revolve around issues of algorithmic bias and transparency (Hunkenschroer & Luetge, 2022; Pessach et al., 2020; Cheng & Hackett, 2019).

Within the HRM context, algorithmic bias refers to disparities between gender, ethnicity, or other characteristics concerning opportunities associated with employment, promotion and termination that result from the utilization of an AI system (Charlwood & Guenole, 2022). In recruitment and selection for example, algorithmic bias manifests when training data fails to accurately capture the skills and other relevant traits required for a given job, often due to under- or over-representation of certain demographic groups (Albaroudi et al., 2024). This raises significant concerns about fairness and discrimination in human resource practices (Hickman et al., 2021).

Compounding this issue is the lack of transparency in AI decision-making processes. The opaque nature of these systems makes it difficult to understand the rationale behind every decision generated by the AI system, undermining confidence and accountability (Rodgers et al., 2023). This lack of transparency can hinder technology acceptance, as HR practitioners need to learn methods for validating AI results and understand the basics of machine learning programming and algorithms (Bohmer & Schinnenburg, 2023). Considering the direct impact of HRM on individuals and the ethical and legal implications of data-driven decisions (Gal et al., 2020), it is crucial to establish a framework that enables HRM practitioners to fully understand and address the ethical considerations involved in using evolutionary algorithms for decision-making (Rodgers et al., 2023). Transparency is also key in presenting input data, data analysis procedures, and the connections between findings and conclusions, allowing for the validation of predictions (Heidemann, 2024). By enhancing transparency, organizations can build trust and ensure accountability, leading to a wider acceptance and ethical implementation of Smart HRM 4.0.

Another pressing concern in this digital era is the matter related to privacy and data security, given the growing dependence of organizations on the gathering and examination of extensive personal data to drive decision-making (Bozkus, 2024). The potential for misuse of such data, coupled with the threat of unauthorized access

by malicious parties, highlights the need to address ethical considerations surrounding data collection and surveillance (Mittelstadt et al., 2016). Consequently, organizations must implement robust privacy and security measures, be transparent about their data practices, and empower employees to maintain control over their personal information.

In response to these concerns, the concept of corporate digital responsibility (CDR) has been introduced. CDR entails the principles that govern a company's ethical, fair, and protective utilization of data and technology within its digital ecosystem (Hartley et al., 2024). Its objective is to ensure that companies operate with a sense of responsibility, prioritizing long-term sustainable business practices and growth in relation to their adoption and utilization of AI and other 4.0 digital technologies, as well as the underlying data (Hartley et al., 2024; Lobschat et al., 2021). It signifies a company's dedication to the responsible use of technology (Wirtz et al., 2023). CDR assists managers in ensuring the responsible use of new technologies for the benefit of organizations, society, and the environment while mitigating any negative consequences (Toth & Blut, 2024).

4. Limitations

The current study aims to provide an overview of Smart HRM 4.0 within the framework of Industry 4.0, to identify the key trends and challenges associated with the advanced technologies driving HR (such as AI, big data, robotics, and IoT). However, it is important to acknowledge the limitations of this review, which can be addressed in future research.

Firstly, the present study has relied solely on one database (Web of Science) for sourcing and examining relevant articles, potentially leading to the exclusion of important publications. To address this issue, future studies should consider incorporating articles from other influential databases, such as Scopus, ScienceDirect, and Springer, along with systematic literature review protocols and methods.

Furthermore, due to the limited empirical studies found (Chowdhury, 2023), the scholarly discussion primarily consists of conceptual papers and academic literature reviews. Thus, future research can build upon these findings by gathering empirical evidence from HR practitioners to further validate the practical applications of AI and other cutting-edge technologies in HRM.

5. Future Directions and Conclusion

The rapid incorporation of 4.0 technology, particularly AI into HRM has opened up new avenues for study, hinting towards a future in which HR practices would not only be more efficient but also more compassionate and personalized. Future studies may investigate the effectiveness of AI-or data-driven personalized learning and development programs as well as the impact of AI-powered personalized career pathing on employee retention and satisfaction. Research questions worth investigating in this direction include (1) What role does AI play in creating more compassionate and employee-centric HR practices, and how does this affect employee performance and retention? and (2) How does the integration of AI-powered personalized learning and development programs impact employee skill development and job performance? This research could lead to more tailored and effective HR practices that enhance employee experience and organizational performance.

As the field evolves, the importance of conducting research on the development of ethical, responsible, and unbiased systems related to the use of progressive technology in HRM should be emphasized. Both scholars and practitioners have been compelled to explore techniques that ensure AI systems in human resources are built with ethical considerations in mind (Hartley et al. 2024; Bujold et al., 2023). These investigations have been driven by concerns about algorithmic bias and the lack of transparency in decision-making. Hence, it is crucial to establish clear governance frameworks that outline the ethical use of AI technologies, and the responsibility to manage these tools as they become increasingly integrated into HR operations. Hence, future studies may focus on developing industry-specific models that govern the emerging innovation and technology in HRM, examining the role of HR professionals in overseeing AI systems and its impact on employee trust. Specifically, future researchers may address the following research questions: (1) how does the presence of algorithmic bias in AI systems impact decision-making processes in HRM, and what strategies can mitigate such biases? (2) How can governance frameworks be designed to ensure the ethical and responsible use of AI in

HRM, and what are the industry-specific challenges in establishing these frameworks? and (3) What role do HR professionals play in overseeing AI-driven HR systems, and how does their involvement influence the ethical management of these
technologies?

Finally, given the global nature of the topic, future research may also focus on the cross-cultural adoption of Smart 4.0 in HRM. This could include comparing AI and other progressive technology adoption rates in HRM practices across different cultural contexts, investigating the need for cultural adaptation of smart working systems in multinational organizations and exploring the impact of cultural values on employee acceptance of this technology in HR processes. Research questions that can be pursued by future researchers are (1) how do adoption rates of AI and other progressive technologies in HRM vary across different cultural contexts, and what factors contribute to these differences? (2) How do multinational organizations balance the need for standardized Smart HRM 4.0 practices with the requirement for cultural adaptation in different regions? And (3) How do employees from different cultural backgrounds perceive the integration of AI and Smart 4.0 technologies in HRM, and what factors influence their acceptance? Investigating these research questions may be essential in ensuring that Smart HRM 4.0 practices are effective and appropriate across diverse cultural contexts.

Conclusion

In a nutshell, this study offers valuable insights for HR specialists on practical applications of progressive 4.0 technologies in enhancing various HR functions. Smart HRM 4.0 has the potential to bring substantial gains, despite the challenges in implementation, cultural resistance, and ethical concerns. Insights from ongoing research will be crucial in harnessing the full potential of these technologies to build more efficient and responsive HR practices. Successfully navigating towards Smart HRM 4.0 requires a comprehensive approach to integrating technological advancement and commitment to ethical principles and human-centric values. The biggest risk lies in not capitalizing on the opportunities presented by these technologies for HR development, which could result in the failure to meet the evolving expectations of organizations and the labor market. Embracing 4.0 technologies in HRM is not just an option, but rather a need for sustaining competitiveness and relevance in the era of Industry 4.0.

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Optimization of Warehouse Operations for Upstream Service Companies in the Oil & Gas Industry: A Case Study

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Abstract: The oil and gas (O&G) sector drives various parts of Malaysia's economy and accounts for 19% of government revenue in 2021. The volatility of oil prices and the COVID-19 pandemic problem in recent years has taught O&G enterprises, especially upstream players, to focus on business needs and employ cost optimization techniques to compete and survive uncertain circumstances. This study seeks to analyze and describe the warehouse operations setup of an onshore supply base service organization that manages and maintains offshore O&G facilities. This study examines space utilization variables from several supply chain perspectives, particularly operations performance. Semi-structured interviews, site observations, and documentation review are used to collect data for the single-case study. The study findings suggest the organization under study has a basic warehouse setup with lean operations staff to complete business functions. In general, the warehouse arrangement for the organization under investigation is comparable to a distribution center, where 70% of warehouse activities comprise, material receiving, handling, and distribution (loading) to several offshore locations. Findings also showed that two factors, namely: *material handling flow and movement*, and *inventory movement* affect warehouse space utilization. The volume of material handled by the warehouse based on business demand, as well as the seasonal trend from offshore activities contribute to the frequency of material loading and impact the material throughput and transit time, which were found to have an impact on space utilization too.

Keywords: *Oil and Gas, Warehouse Optimization, Qualitative, Case Study, Supply Chain, Malaysia*

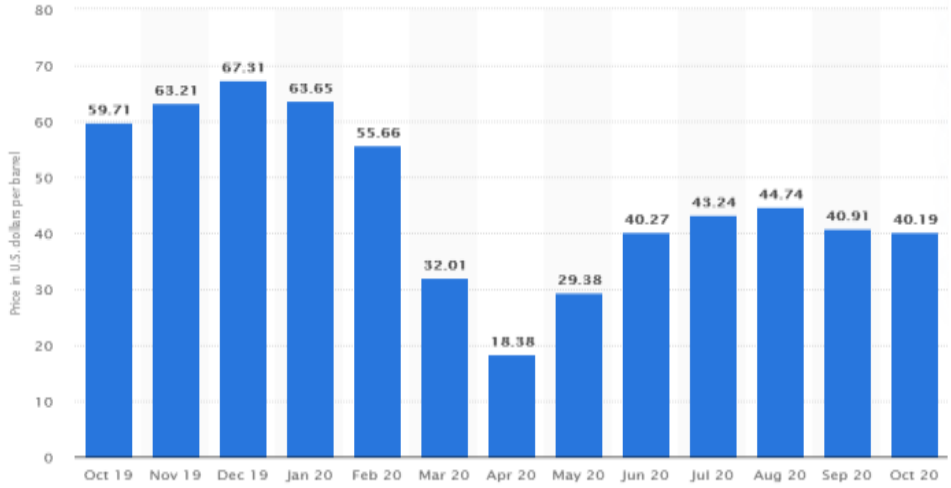
1. Introduction and Background

The oil and gas industry is usually divided into three major sectors: upstream, midstream and downstream. The upstream sector mainly refers to exploration and production activities (E&P) to extract oil and natural gas from the ground, including the search for underwater and underground natural gas fields or crude oil fields and the drilling of wells to recover oil and gas. This sector also treats the crude, removes water or waste and gets it ready for midstream and downstream processes. The midstream sector is involved in safely moving these natural resources from upstream to downstream facilities where they are processed into fuels and finished products used by consumers. This study will focus on the upstream sector where the onshore warehouse functions play significant roles in supporting the activities at offshore locations.

Currently, the industry still facing a gradual recovery in activities, especially for the upstream sector. As the oil price uncertainty and the latest Coronavirus disease (COVID-19) pandemic outbreak, it is a clear reminder to industry players to stay focused on business needs, explore and adopt cost optimization initiatives and become more competitive to sustain the challenges during this unpredictable period. The statistics in Figure 1 show the Brent crude oil price (average monthly) fell beginning in January 2020 from USD67.31 per barrel to the lowest value of USD18.38 per barrel in April 2020 with a total price drop of 72.7%. The price rises gradually in quarter 3 of 2020 and remains stagnant at USD40 per barrel towards year-end.

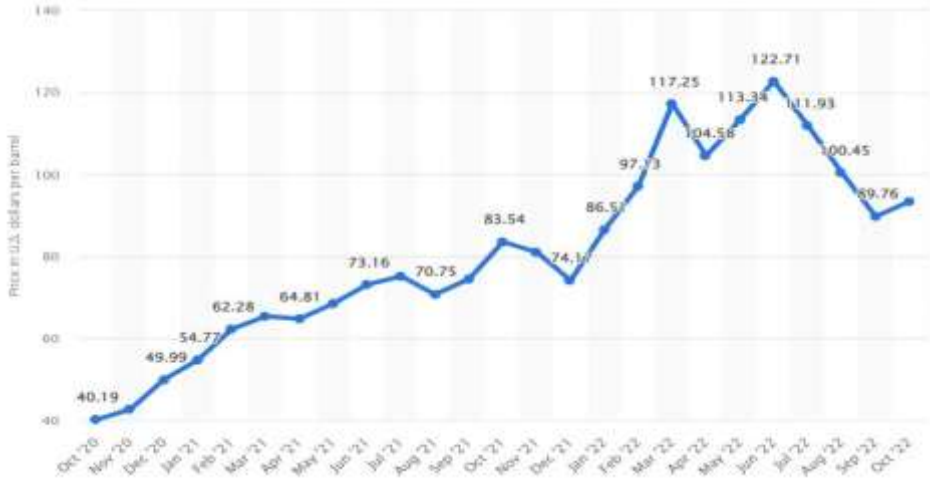
Even though the crude oil price showed improvement in early 2021 and rose between USD80 to USD90 per barrel in 2022 post-pandemic (refer Figure 2), global supply chain uncertainty and prolonged Russia-Ukraine war conflicts may have risk and impact on current business strategy and practice. Considering the historical trend of economic downtime, business resilience is essential to ensure the company can absorb and adapt to a changing environment to achieve its objectives and deliver the products and services as per requirements during any market situation.

Figure 1: Average Monthly Brent Crude Oil Price (October 2019 - October 2020)



(*Source: https://www.statista.com/statistics/262861/uk-brent-crude-oil-monthly-price-development/)*

Figure 2: Average Monthly Brent Crude Oil Price (October 2020 - October 2022)



(*Source: https://www.statista.com/statistics/262861/uk-brent-crude-oil-monthly-price-development/)*

Most of the countries in this region have their own National Oil Company (NOC) which plays a vital role in managing the entire oil and gas resources and is responsible for developing and adding value to these resources. The country's wholly owned company often provides the major percentage of revenue and contributes a significant amount towards the national Gross Domestic Product (GDP).

In Malaysia, the term "upstream business companies" refers to PETRONAS-licensed enterprises that specialize in Oil and Gas Services and Equipment (OGSE). Malaysia Petroleum Resources Corporation (MPRC), an agency under the Ministry of Economic Affairs (MEA), has initiated and published the OGSE100, a list of Malaysia's top 100 OGSE companies rated by revenue from a total of 1,641 OGSE enterprises nationwide. The ranking establishes the industry's benchmark for how well each company is performing in the oil and gas market despite recent obstacles.

Regionally, Malaysian players were more affected by Asian market movements, with slower growth of 6.4% compared to 24.9% for their counterparts. According to an MPRC study and analysis published in November 2019, the total revenue of the top OGSE100 companies decreased by 2.2% to RM55.2 billion in FY2018. The lower crude oil price in 2020 increases the challenges for enterprises to be resilient and react to unanticipated developments, as well as sustain and remain competitive in the sector.

The company in this study (hereafter called the "XYZ" company, due to confidentiality requirements) is a leading services provider for operations and maintenance (O&M) of the offshore facilities in the upstream industry. Since its establishment in 2012, XYZ has been awarded contracts for O&M of offshore facilities, with a total project of more than 10 from 5 different clients (which own the asset or operate the oil and gas field) within Malaysia territory.

As an emerging service provider in the industry, XYZ faces a few business challenges. Some of these challenges include but not limited to:
dynamic environment in fulfilling client requirements and contract obligations.
low-cost operations with business optimization.
flexibility to respond to business risks and opportunities.
limited size of organization (manpower and resources); and
capital investment for system and technology.

To compete in such a demanding environment, the overall supply chain elements connecting onshore activities and offshore operations need to be well-managed including its supply chain planning, contracting strategy, sourcing-to-delivery activities and warehouse operations. Therefore, as per the scope of this study, the supply chain manager and warehouse team must ensure the warehouse operates efficiently to fulfill the contract obligation, providing the responsiveness as required by projects/clients and at the same time controlling the cost to be competitive within the industry.

Similarly, to other OGSE companies, efficient warehouse operations and adequate warehouse space are required to ensure smooth material handling and good inventory management for maintenance, repair and overhaul (MRO) related spares to offer reasonable responsiveness to upstream business demand. It is part of a common preventive measure to avoid unplanned equipment downtime due to stock-out of mission-critical parts and spares. In most cases, these organizations are willing to spend some cost by allocating more resources (including warehouse space) purchasing extra safety stock and keeping the inventory in hand, rather than incurring costs due to the inability to fulfill the client's request and losing future business opportunities.

To accommodate the demand from offshore facilities and support daily operations and materials handling, physical warehouse facilities at onshore supply bases have been established in addition to office-based activities at headquarters, by client requests. These warehouses function as transit centers, storing materials that are received from vendors before they are loaded onto ships bound for offshore destinations. By the project requirements of each client, the materials managed include equipment, spare parts, and consumables that are requested by frontline personnel at offshore sites.

To optimize space utilization and further improve warehouse efficiency, it is imperative to implement the most recent technological innovations. Implementing AI-powered inventory management systems, utilizing IoT-enabled sensors for real-time monitoring, and investing in automated storage and retrieval systems (AS/RS) are all part of this solution. Ultimately, these technologies can contribute to cost savings and enhanced operational efficiency by reducing manual labor, improving accuracy, and optimizing storage space.

Bottom line, the company's warehouse should be able to fulfill its critical role as an onshore logistics hub integrating onshore supplies and offshore demand for ongoing oil and gas facility O&M activities to build a better upstream service sector. Therefore, this study aims to understand the current setup and concerns on warehouse space utilization optimization for service companies in the oil and gas industry, specifically under upstream business.

2. Literature Review

The existing literature shows that there are limited studies on warehouse operations particularly for companies dealing with O&M of the offshore facilities, particularly in Malaysia. Most of the previous studies concentrate on operations and management of warehouses for the manufacturing industry and business operations for logistics and distribution centers.

Despite an increase in warehousing research papers over the previous fifteen years (Koster, Johnson & Roy, 2017), many studies have focused on specific topics such as routing, layout, order picking, and automation. With the recent rise in consumer demand for e-commerce sales and virtual shopping platforms, the warehouse and logistics industry has mostly involved retail business activities. The impetus for this study stems from the fact that the upstream industry's warehouse setup and operations continue to rely on traditional rule-of-thumb and a lack of strategy.

The study conducted by Davarzani & Norrman (2015) suggests relevant warehousing research in the future for both academic development and practitioners' needs. The scope is limited to warehouse operations and internal support activities such as warehouse design, performance evaluation, human resource management, as well as direct interfaces to other departments or companies from a logistics and operations management perspective. However, this research does not include space utilization review and inventory management-related issues.

A complete review of warehouse operation, warehouse design, and performance evaluation has been presented, based on a previous literature study conducted by Gu, Goetschalckx, and McGinnis (2007, 2010). The difficulties are categorized based on the fundamental warehouse functions to establish a meaningful connection between academic researchers and warehouse practitioners. Nevertheless, this literature analysis is focused on publications that were published before the year 2000. There are significant disparities in the technologies used in warehouse operations 30 years ago, particularly in terms of resource management, inventory storage tactics, and material handling techniques.

Regarding this gap, recent studies have been conducted to enhance our understanding of how warehouse operations and design are influenced by the shift towards integrated omni-channels (Kembro, Norrman & Eriksson, 2018) and to survey warehousing strategies in the e-commerce era (Boysen, Koster & F Weidinger, 2019). There is a need for further research on current warehousing strategies, particularly during and after the COVID-19 pandemic. Logistics and supply chain managers want the most recent study on warehouse operations to effectively address the current issues in the developing logistics and warehousing industry.

Davarzani and Norman (2015) also proposed that there exists a substantial disparity between the number of studies employing a modelling method limited by assumptions and those grounded in the intricate reality of warehouses. Further investigation is needed in this field due to the dearth of empirical research, necessitating additional case and action research studies in the future. The study conducted in real-case situations and its resulting findings may directly assist practical applications, aiding the research community in gaining a deeper understanding of the difficulties linked to warehousing. This suggestion pertains to a case study that employs explanatory and descriptive research methods. The study utilizes both quantitative and qualitative data to investigate real-life warehouse scenarios. It involves observing and analyzing events or processes to collect and report data about the specific event or situation.

Davarzani and Norman (2015) argue that further empirical research is necessary to comprehensively comprehend and capture the intricacies of the actual world. The authors suggested that normative studies, which entail prescriptive theory, should be supported by practical applications to benefit both academia and practice. These applications should be founded on postulates, deals, assumptions, or values. Furthermore, the article indicated that by utilizing two approaches, namely a literature review and analysis of practitioners' perspectives, the suggested agenda for future research should address both the observed deficiencies in the existing literature and consider feedback from the industry. For this specific research, the planned method will include conducting interviews with individuals who are directly involved in the research topic, making observations at the research location, and reviewing relevant material. These activities will focus on gathering qualitative data. Subsequently, quantitative data analysis and modelling simulation studies will be conducted to support and strengthen the qualitative findings, providing valuable insights for both academic and practical applications.

Based on another prominent literature by Bartholdi & Hackman (2019, 2008) on warehouse design and operations topic, most current warehouse practices are based on rule-of-thumbs, industry benchmarking and operations-driven setup. This practice can cater to the essential needs of warehouse operations, but it will lead

to operational issues when the requirements and complexity increase in the long run. The literature suggested that mathematical models and simulation from the warehouse records and data will be able to help the practitioners tune their warehouse operations according to the business needs in meeting customer requirements. In line with this finding, the researcher will observe the current warehouse practice and gather the operations data, particularly on space allocation and utilization, material movement and inventory storage status for further analysis. Based on historical data analysis results, this study will present how the simulation model is developed for variable testing and process-based simulation on multiple scenarios. The results and findings from both historical data analysis and simulation models are expected to provide some recommendations for optimizing warehouse operations.

Bartholdi and Hackman (2019) also suggested that there are a few areas of concern for consideration about the good setup of warehouse operations. This includes but is not limited to:

- Warehouse issues, resources and processes
- Warehouse layout and slotting area
- Order-picking path and material handling
- Warehouse system and automation

Regarding warehouse layout, Bartholdi and Hackman (2019) suggested that storage models will play a significant role in determining layout design and allocation. A suitable warehouse layout should increase the throughput, reduce costs, improve the service provided to the customers and provide better working conditions (Richards, 2017). As a fact, the total area of warehouse space and its location will determine the fixed warehouse cost and any increase in space rental tariff will impact overall operations cost, where the comprehensive analysis of the different layouts provides opportunities to improve both ergonomics and economic performance (Calzavara, Glock, Grosse, Persona, & Sgarbossa, 2017). Thus, this study will explore the potential optimization of warehouse space allocation and possible improvement in space utilization will bring value to every cent spent on the warehouse setup.

Based on studies by Perera, Mirando, & Fernando (2022) and Bartholdi and Hackman (2008), allocating space in a forward pick area of a distribution center for small parts where the forward pick area of a distribution center is a cache of conveniently located products from which order pickers can quickly draw, but which must be replenished from bulk or reserve storage. Similarly, a temporary storage area for transit material is allocated near the receiving area and loading area to reduce material transfer handling duration and consolidation time. However, this paper discussed the stocking strategies commonly used by distribution centers where daily material transaction volume is relatively high compared to the material movement for the warehouse operation in this study. The service companies in the upstream business depend on the supply vessel scheduled for shipping out the material to offshore facilities (like a regional warehouse in the distribution center model). Normally the supply vessel departs from the onshore supply base to the offshore location with a frequency between 1 to 2 weeks each.

As cited by Koster, Johnson & Roy (2017) in their paper, optimizing space utilization is one of the main goals of warehouse design and operation. One of the findings suggests block-stack storage as an inexpensive storage system widely used in manufacturing operations for storing pallets, where this form of palletized storage does not require any type of storage equipment, and instead loaded pallets are placed directly on the floor and built-up in stacks to a maximum level permitted by the safety design. As earlier described by Pham, Nguyen, Doan, Thai, & Nguyen, (2019) and Derhami, Smith and Gue (2016), in a relevant paper specific to block stacking warehouses, they propose mathematical models to obtain the optimal lane depth using a simulation model to analyze the layout performance with stochastic input parameters.

Previous studies (Ferreira & Reis, 2023; Toorajipour, Sohrabpour, Nazarpour, Oghazi & Fischl, 2021). suggested warehouse management in the oil and gas industry has been transformed by artificial intelligence (AI) and machine learning, which have both offered substantial advantages and potential disadvantages. AI-powered systems can accurately forecast demand and optimize storage space, resulting in increased efficiency and reduced costs. Machine learning algorithms can guarantee the efficient positioning of items, thereby reducing the likelihood of equipment damage and improving safety. Real-time inventory visibility is facilitated by IoT-enabled sensors, which reduces the risk of equipment loss and enables proactive management.

Furthermore, these sensors can monitor environmental conditions, thereby preventing the deterioration of sensitive materials and guaranteeing adherence to safety regulations. Robotics and automation optimize material handling, thereby decreasing the likelihood of human injury and enhancing productivity (Tikwayo & Mathaba, 2023). On the other hand, cloud-based warehouse management systems (WMS) facilitate data-driven decision-making and provide real-time data, resulting in enhanced efficiency, regulatory compliance, and optimized space utilization (Tubis & Rohman, 2023).

These available literature materials are useful but only provide generic findings and solutions when it comes to explaining the warehouse operations for oil and gas companies serving the upstream industry. This case study to investigate and provide an explanation of warehouse setup, issues in space utilization and influencing factors on performance is expected to suggest possible optimization of warehouse operations. The outcome of this study will also contribute to the research knowledge as well as in practical terms specifically to warehouse operations and overall supply chain management.

3. Research Methodology

The study employs a single-case study approach and uses a multi-method research process including semi-structured interviews, site observations and documentation review as the primary method of data collection. Based on this qualitative research approach, this study will investigate and seek an understanding of how the warehouse operations are being executed by XYZ company as services offered to their clients, involved in the oil and gas industry in Malaysia.

Three data collection methods used in this study are:
Interviews,
Field observation, and
Document review and analysis.

This present study aims to understand the current setup and concerns on warehouse operations for service companies in the oil and gas industry, specifically under the upstream business as explained in the previous section. These data collection methods are chosen after considering the best possible method that can provide rich data. These methods also are the best possible method that can be able to help answer the research questions. Out of these three methods, data were mainly gathered through in-depth interviews. The variety of data collection methods enables the researcher to cross-examine the data to check the consistency of the findings, which is useful to support the study analysis (Long & Johnson, 2000; Denscombe, 2010).

One of the critical key instruments to unearth multiple perspectives amongst the participants, the researcher applies semi-structured interviews, particularly in understanding the warehouse setup and its functions as well as the factors and issues surrounding the warehouse operations. As opposed to a strictly organized interview method, semi-structured interviews provide flexibility to include extra or unstructured questions throughout the interview sessions.

Since the participants of this study vary in terms of their job level (from supervisory to assistant roles) and job responsibility, a different way of questioning styles and content is appropriate to gain each participant's unique experiences, thoughts and stories (Rubin & Rubin, 2012). The interview length varies from 15 minutes to more than 1 hour, with an average length of 30 minutes per interview. A unique code was assigned to each participant to ensure that the individuals and the company remained anonymous in this study, and this was agreed upon before each interview was conducted. Below is the brief profile of the participants involved in this study:

Table 1: List of Interviewees, Roles and Functions at XYZ company

Code	Level	Roles	Function
IP#1	Supervisor	Warehouse & Logistics	Team leader overseeing overall warehouse operations, logistic planning and material movement coordination
IP#2	Executive	Warehouse	Warehouse operations, compliance and inventory management
IP#3	Coordinator	Warehouse	Warehouse receiving and material storage
IP#4	Coordinator	Logistics	Material consolidation, loading coordination and backload handling
IP#5	Assistant	Warehouse & Logistics	Material receiving, storage, consolidation and loading/backload handling
IP#6	Assistant	Administration	Documentation preparation and maintenance records

In addition, field observations were conducted at XYZ company's warehouse locations, in the form of a guided tour to obtain information that could not be covered during the interviews (Yin 2009). Field observations allow the researcher to visualize and learn about physical warehouse setup, process flow and overall warehouse operations. During the field observation also, the researcher can crosscheck and validate the information received from the participants (Tracy, 2020; Sandelowski, 2000), whether it indeed matches the actual activities happening at the warehouse facility. In the event of information uncertainty or any doubt about the process or events at the site, the researcher can seek out further verbal clarification immediately.

During the visit to the company's warehouse facility at the supply base area, the researcher was given access to the warehouse office, goods receiving and storage area. This provides first-hand, real-time information on the overall material flow process of purchased items from material receiving until it was accepted and allocated by relevant projects and facilities. During the observation, field notes were written and supported by photograph images taken within the premises upon agreement by the warehouse supervisor. However, any company logo or information must be removed (hidden) to ensure the company remains anonymous in this study.

Table 2: XYZ Company's Site Observations and Activities

No	Location	Activities and Processes Observed
1	Receiving Area	Material unloading, receiving, inspection & acceptance
2	Transit Storage Area	Material transfer, segregation and tagging
3	Storage Racking Area	Material storage, identification and preservation
4	Consolidation & Loading Area	Offshore container handling and material preparation
5	Warehouse Office	Documentation updating and record keeping

The third data collection method used to further assist the researcher in understanding the supply chain process and its warehouse operations was by reviewing relevant documents produced, referred and implemented by XYZ company. This includes XYZ company procedures, guidelines, warehouse reports and records to support the data collected from interviews and observations (Tracy, 2020; Yin, 2009).

This technique has been employed for the data collection process in this thesis and is based on some justifications. First, the review of relevant documents i.e., warehouse procedures gives a better understanding of the company's warehouse standard operations and procedures, including a fundamental technical understanding of how the warehouse was operated for upstream business, especially for offshore facility's operation and maintenance activities. The document also describes the process flow and various roles and responsibilities of warehouse personnel to ensure the compliance and integrity of supply chain processes for the company. Based on this understanding, the data collection process through interview and observation was facilitated as the researcher was able to confirm and corroborate issues.

Some of these documents are published by the company and some were only released to researchers

specifically for this study with the permission of the participants (Refer to Table 3).

Table 3: List of XYZ company's Documents Obtained for the Study

No	Documents	Information / Scopes Reviewed
1	Warehouse Procedures	Material process flow, warehouse personnel roles, responsibilities and functions.
2	Material Movement Report	Material information, quantity, type (local or bonded) receiving date, loading date and project status.
3	Inventory Report	Material information, quantity, storage location, movement (in/out) and project remarks.
4	Supply Vessel Records	Vessel name, movement data, location to and from.
5	Audit Report	Operational findings and suggestions for improvement.

4. Results

The first part of this section captures findings on physical setup and its process flow as well as operational challenges and influencing factors which will provide some discussion on the warehouse operations for the specific industry. In addition, several factors affecting warehouse space utilization and how to address these factors to increase the utilization will be presented accordingly.

Warehouse Setup

The XYZ company's warehouse under the study was established in the year 2015 in Kemaman Supply Base (KSB), Terengganu (approximately 300km from Malaysia's capital Kuala Lumpur); where the area was gazetting as a bonded supply base for oil and gas business operations for Terengganu offshore project. The establishment was to handle the material purchased by the company on behalf of the client where it involves basic material handling including receiving, temporary storage and transfer to the offshore facility located approximately 200km from the onshore supply base.

After XYZ company was awarded a second project, the operations were relocated to the bigger warehouse to cater to the second contract requirements including storage of project inventory on behalf of the client. Since then, this warehouse has been expanded a few times to cater to requirements for additional projects (third and fourth). The warehouse function is becoming more complex as the requirements also cover consolidation of material for loading, logistics planning and inventory monitoring for operations spare items.

The latest warehouse expansion happened in 2018 where the warehouse has a proper office and layout including an allocated area for material receiving, loading and storage. As this study takes place, the current warehouse setup covers an area of 2,000 square meters (equivalent to 21,500 square feet) including a warehouse office, open space for receiving, temporary storage, loading and forklift movement and dedicated space for ten rows (aisles) of the 4-level racking system (in total 104 racking module). This setup was able to support material movement, handling and inventory storage for a total of five projects (for two contracts servicing two different clients). Table 4 below explains the details of the warehouse layout and its estimated space allocation.

Table 4: XYZ company's Warehouse Layout and Space Allocation

Area Type	Area Function	Est. Space (sqm)	Allocation
Operation Area	Receiving, storage and loading	400	20%
Storage Racking	Inventory 4-tier racking module	400	20%
Open Floor Area	Forklift movement zone/buffer	750	37.5%
Non-activity Area	Office, Counter, Utility, etc.	450	22.5%
Total Area (sqm)		2,000	100%

During a visit to the warehouse location, the researchers found that the warehouse was divided into 2 physical facilities. The first facility (Door 1) with an approximate total space of 800 sqm caters to a warehouse office, receiving counter, receiving area for small material (in boxes), open operations area, and 14 racking modules

(1 row). The second facility (Door 2 and 3) with an approximate total space of 1,200 sqm caters to the main receiving area (material on a pallet), pallet transit area, loading area, forklift movement area and a total of 90 racking modules (9 rows). Figures 3 and 4. show the visual warehouse layout including its functional area location and physical arrangement.

Figure 3: Warehouse Overall Layout and Space Allocation (Door 1)

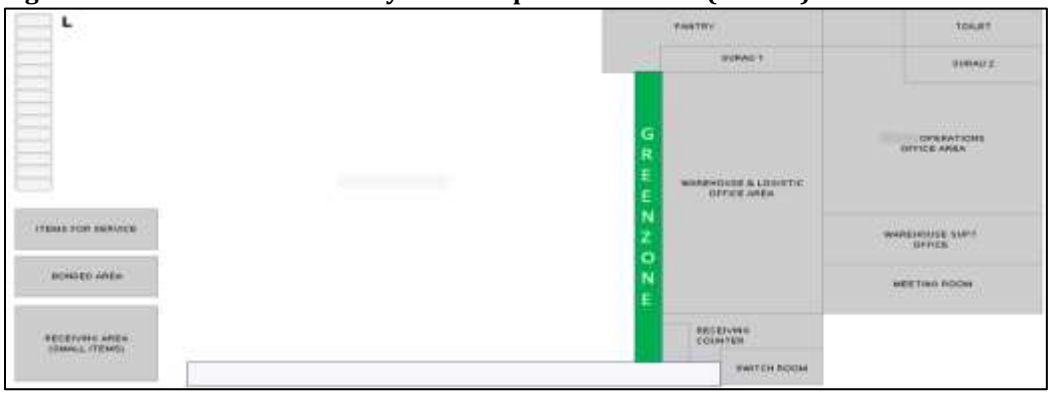
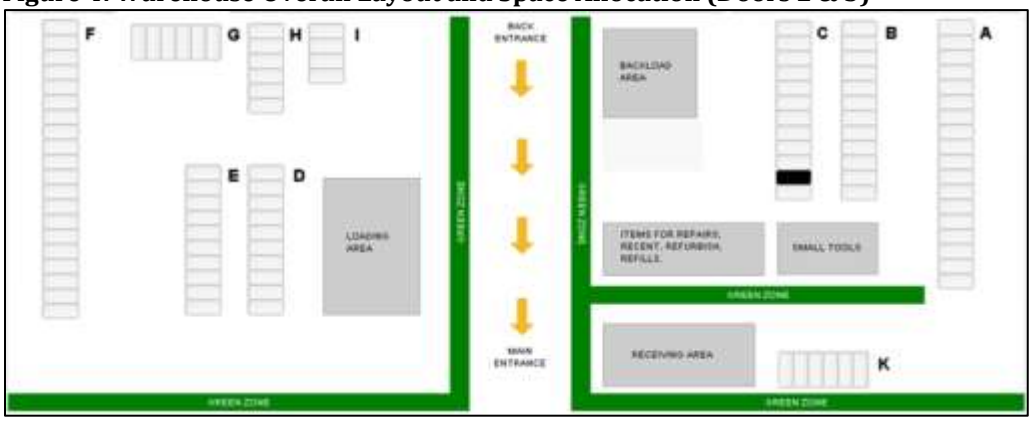
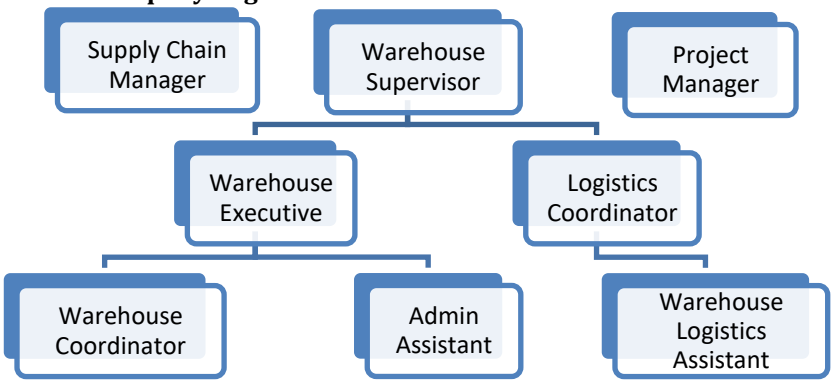


Figure 4: Warehouse Overall Layout and Space Allocation (Doors 2 & 3)



In terms of warehouse resources, the startup of basic warehouse operations employs two warehouse personnel to undertake the receiving and loading functions. As the warehouse function has expanded with more scopes defined under contract requirements, the manpower strength has been increased to cater to the operational tasks, administration and reporting to clients. Currently, the warehouse under study has a total of six personnel including one supervisor (as team leader). As per XYZ company organization chart (refer to Figure 5), the warehouse team reports directly to the supply chain manager and operationally reports to the operations department where all the daily project execution, monitoring and control is happening.

Figure 5: XYZ Company Organization Chart



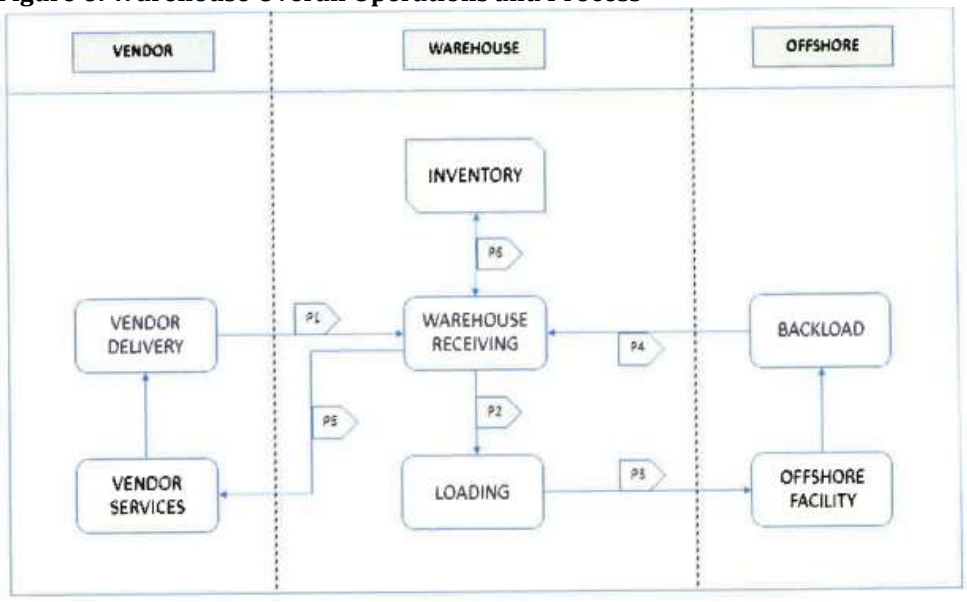
To support basic operations, this warehouse possesses basic material handling tools such as manual pallet jack, trolley, hand tools and packaging consumables. The advanced material handling equipment (MHE) such as forklift, crane and trailer (including equipment's operator) are provided by the supply base operator as chargeable services (pay per use as per timesheet) upon request from the company. As per rules defined by the supply base operator, the request for MHE shall be made one day in advance via the booking system (i.e., request to be made by 4.00 pm for the service to be available the next day at 8.00 am).

From a system perspective, the warehouse uses basic Microsoft Excel sheets as tools for recoding warehouse data including the material movement and its inventory listing. As updated during the interview, the company is currently developing an in-house warehouse management system to improve data recording and upkeep processes for better monitoring and reporting purposes. As part of the plan, this system will be extended to the headquarters office and offshore location for real-time information sharing and better visibility of materials to support the company's O&M activities at the site.

Warehouse Operational Process

During the interview, all participants explained the warehouse operations and their relevant processes by their respective functions. The warehouse operations can be divided into 3 main functions: material handling (receiving, transfer/transit and loading), material storage (inventory management) and logistics coordination (supply boat arrangement). However, the scope of this study only focused on material handling and storage where the processes happened within the company's warehouse space. The overall warehouse operations and process can be referred to as per Figure 6 below:

Figure 6: Warehouse Overall Operations and Process



Based on the above figure, the research scope only covers 3 processes (in oval shape) which include material receiving (Process P1), material loading (Process P2) and inventory material (Process P6). The details for each relevant process refer to the following:

Process P1: material receiving from vendor, inspection and acceptance by warehouse receiving, material handling and assigning to the allocated storage area by project and record updating.
Process P2: retrieval of material from the storage area, consolidation, preparing for material loading including packing and transfer of material into the container, container handling and shipping documentation and record updating.

Process P6: inventory material storage and preservation, material issuing in/out, inventory monitoring/updating and maintaining record/audit.

As the above process is defined in the company's Warehouse Procedures, the researcher has reviewed the documentation and found the activities explained by participants corroborate with the processes and functions defined in the procedures.

All the documentation for the above processes such as Purchase Order (PO), Delivery Order (DO), Commercial Invoice & Packing List (CIPL) and relevant material certificates are recorded and kept by the warehouse as project records for claim purposes and future references. Based on local authority requirements (Royal Malaysia Custom) for bonded supply base area, all documentation including Custom Form required to be kept by the warehouse office as evidence for audit and future purposes with minimum record retention of seven (7) years. The researcher also found that this is aligned with warehouse procedures which defined that the record retention of all documentation is seven years.

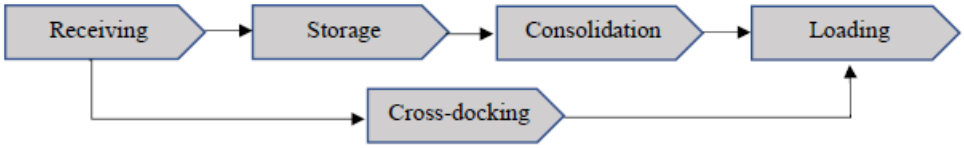
Factors Impacting Warehouse Space Utilization

In managing warehouse space and determining the functional layout, the Warehouse Supervisor and Supply Chain Manager need to identify the possible factors that impact the space utilization. The available warehouse area must be used in the best possible way so that the company will be able to do more with all the space on hand. Generally, the factors relevant to space utilization may include storage systems, as well as racking and pallet patterns. Based on interviews, site observation and documentation review conducted both virtually via desktop and physical process at the site, the current study has captured the applicable factors that affect the current warehouse space utilization.

Material Handling and Movement: Based on the warehouse setup explained in section 4.1, approximately 58% of warehouse space is allocated for material handling operation (20%) and open floor for forklift movement (38%). The space material handling operation includes the receiving area, loading area and temporary storage area for transit material while the forklift movement area includes a dedicated path for the forklift, green zone area and movement safety buffer between storage racking system. The utilization of this area mostly depends on the warehouse activities and its volume including incoming and outgoing materials.

From the interview, the material receiving happens almost every day and the volume (number of pallets) depends on the packing list provided by the supplier prior delivery process. The frequency of material deliveries depends on planned maintenance activities at the site and usually will be high within 2 to 3 days prior next supply boat schedule to the offshore location. In addition, the receiving volume will reach its peak when there are major planned maintenance activities (for example annual facility shutdown works) of certain projects. During site observation, the researcher found that the current receiving rate was minimal (less than five pallets a day) since the major maintenance work (integrated activities for 3 projects) had just been completed in previous months.

Figure 4: Material Handling Flow



The received material will be consolidated according to specific project and location 1 to 2 days prior loading date (Refer Figure 7). During this period, there are also instances where the material received in offshore containers belongs to a supplier for offshore work where this material is handled as per cross-docking operation. The loading schedule is planned by the logistics supervisor a month in advance based on logistic planning input from the client.

However, the final loading date is only made known to the company between 2-3 days in advance since the logistic scope i.e., supply boat to/from offshore location is determined by the client. as an order to transfer the material to a specific location (where consolidation is happened by project). Until the loading date is determined (as an order from the client), all transit material will temporarily occupy the open space allocated from the receiving date. Thus, the total transit time for each material (on a pallet) can be recorded as the loading

date minus the receiving date plus 1 day (1st day receiving). Below Figure 8 explains the timeline of material flow from receiving date to loading date and how to calculate the duration of transit time (TT).

Figure 5: Material Transit Time

Transit Time, TT (in days) = (Loading Date – Receiving Date) + 1



Receiving date	Temporary Storage	Consolidation	Loading data
August 1	August 1	August 12	August 14
Total duration, TT = (14/08 – 01/08) + 1 = 14 days			

Due to material volume received within a week varying by project and the loading date not being determined upfront, the warehouse implemented a pool area on a sharing basis for temporary storage of transit material instead of specific allocation by project. The labeling tag was used to identify each material detail (i.e., PO and DO reference) and its belonging to which project. This method enables better utilization of pool space to cater to various volumes of transit material for consolidation before loading. Based on site observation, approximately 250 square feet of open floor space has been allocated for this purpose and this area can accommodate up to 150 pallets at one time.

Inventory Movement: In terms of inventory management function, this XYZ warehouse stores materials that have been purchased by clients as maintenance spares onshore for operating facilities usage upon requirement in the future. These inventories are categorized as MRO materials which include but are not limited to equipment/spare parts (including pumps and motor), special tools (for turbine/engine maintenance work) and common maintenance consumable supplies (such as gaskets, bolts and nuts). Some spares with high value (such as spare equipment and special tools) are considered as assets for the project.

As captured from the inventory data for Quarter 3 2022, Table 5 shows that the number of SKUs for spare equipment and parts dominates 61% of the inventory list followed by special tools (32%) and consumables supplies (7%). Based on input from the inventory management focal, most of the materials stored on the racking since the year 2018 are considered very slow-moving. The inventory retrieval only happens when there is a material request from the material coordinator at the site.

Table 5: Inventory Categories, Total SKU and Volume

Type of Inventory	No. of SKU	Volume %
Equipment / Spare Parts	221	61%
Special Tools	115	32%
Consumable Supplies	25	7%
Total SKU (Q3 2022)	361	100%

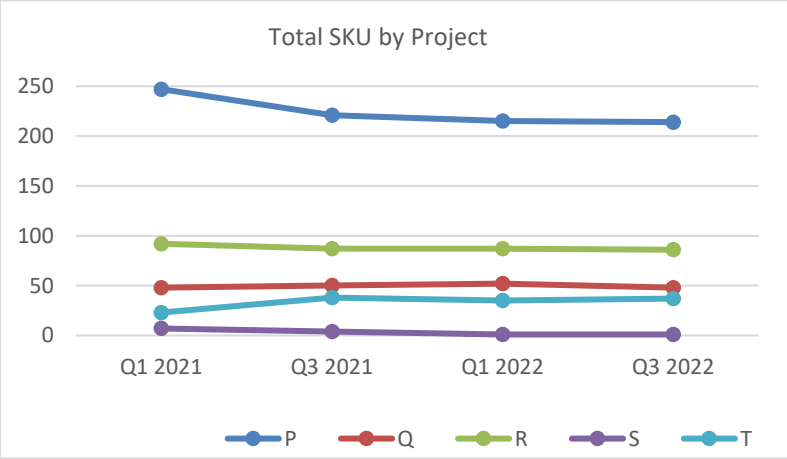
Table 6 shows a total number of SKU changes for a total duration of 18 months from March 2021 (Q1 2021) until August 2022 (Q3 2022), where the change in data presented based on bi-quarterly (e.g., Quarter 1, Quarter 3, 2021 and Quarter 1, Quarter 3, 2022). From the table also, the initial total SKUs of 418 in Q1 2021 is reduced to 361 in Q3 2022 with a total SKU movement rate of 14%. However, if the total SKU is segregated by project (Project P, Q, R, S, and T), each project shows a different trend. For instance, SKU for Project P has decreased by 23% (58 SKUs) and inversely SKU for Project T has increased by 61% (14 SKUs). Further reference made with inventory management focal clarified that there are surplus materials backloaded from offshore for Project T for storage on racking.

Table 6: Total SKU by Project

Project	Q1 2021	Q3 2021	Q1 2022	Q3 2022
P	247	215	190	189
Q	49	50	49	48
R	92	87	87	86
S	7	1	1	1
T	23	38	35	37
Total SKU	418	391	362	361

Figure 8 shows a visualization of inventory movement trends by each project for the captured inventory monitoring duration of 18 months. About 52% of SKUs stored on the racking belong to Project P and they were inherited from the client during the project award (since year 2018). In addition, most of the materials stored on the racking were found with very slow-moving rates of 6% to 7% per year. The space allocated for inventory (which is about 20% of warehouse space) is considered fully utilized since the racking is permanently installed on the warehouse floor. Further utilization analysis by racking volume (space multiplied by height) to determine the actual capacity utilization will be explained in the next section under quantitative findings.

Figure 8: Inventory Movement Trend by XYZ company's Project



Warehouse Space Availability: As the previous section explains on few factors impacting warehouse space utilization, the researcher also captures some findings and concerns with regards to warehouse space availability based on information gathered during interviews and site observation. Based on the warehouse setup background and expansion happening earlier as described in Section 4.2, it was found that there are a few concerns which considered external factors impacting the warehouse space utilization. These factors are detailed below:

Warehouse space availability: There is limited space available to be leased within the supply base area, where priority is given to big oil & gas companies and offshore asset owners (clients).
Warehouse space suitability: Not all available space is suitable to cater to requirements for the company's warehouse operation, especially with a significant amount of inventory required to be stored as per contract obligation.
Business decision: The management prefers to operate the warehouse in a single-point location (including the warehouse office, operation area and storage) for better monitoring, management and cost efficiency.

Since the warehouse was established within the bonded supply base area, the available warehouse space depends on the offer given by the landlord. Based on historical events of warehouse relocation and expansion, the available and suitable spaces are limited and offered on a first come first served basis. For instance, this warehouse operates in two physical buildings (Door 1 is separated from Door 2 and Door 3) as explained in Section 4.2.1. This is happening to meet the company's management direction to have efficient operations of

the warehouse at a single location (in this case the closest space available for lease).

Discussion

Generally, the main goal of warehouse operations is to meet the demands and specifications of customers while making efficient use of the space, tools, and labor available in the warehouse. The corporation will receive and load the necessary goods in time for replenishment on the store at the offshore site for the planned O&M activities, according to this analysis, if warehouse operations are efficient.

The way a warehouse is set up at the beginning usually dictates how it will be used. The warehouse structure for the organization under investigation is based on a basic configuration with a lean operations team to complete the business function, based on results reported in the previous chapter. It is advised that the company set up its first warehouse activities to achieve its contractual obligations to complete the fundamental project needs. This is especially important as a transit point for the consolidation of materials at the onshore supply base before they are transferred to the offshore location.

However, as more contracts have been secured, the warehouse operations require expansion (physical & resources) and the project requirements becoming more complex, i.e., client's spares for storage, inventory management & reporting. Client's requirements are more stringent, especially with regards to new regulations by local authorities and compliance audits by governing bodies, i.e., new Custom regulations on the declaration for local goods before entrance to the supply base area.

In terms of facility and location, this warehouse is located within the preferred location for handling and storage of material for offshore operations. However, there are some limitations and relevant challenges for warehouse facilities located in the gazette supply base area (i.e., space availability against suitability, rules and regulations for bonded against non-bonded area). Contrarily, the company may opt to set up the warehouse outside the supply base without these limitations but may incur other possible operations challenges (i.e., additional cost for building construction/initial setup and logistics cost from the warehouse into the supply base area).

In terms of resources, this warehouse employs a basic operations structure which is commonly implemented to meet lean operations management. The warehouse personnel employed are adequate to perform the basic function of the warehouse from incoming material receiving to outgoing material loading. However, there are some concerns about manpower capacity and capability which limits the intended output of warehouse operations. In addition, the risk of overloading tasks assigned to these personnel may lead to unnecessary work pressure, an unhealthy working environment and unsafe working conditions.

This study also discovered that the warehouse still uses a basic spreadsheet to record transactional data and inventory levels. This arrangement duplicates manual data entry and may compromise warehouse information flow accuracy. Instead, the corporation may design its own WMS, including receiving and loading. The company might also subscribe to or outsource a better warehouse management system from a recognized third party that integrates with its supply chain system to maintain material requisition and PO issuance continuity.

Warehouse procedures, established by management, guide staff inefficient process execution. The warehouse procedures outline basic warehouse operations flow with appropriate roles and responsibilities of warehouse staff. The organization accepts this practice because there are no non-conformance findings from past audits.

Warehouse space utilization assesses how efficiently the warehouse stores goods and inventories. If the proportion is low, the warehouse may be larger than needed due to faulty inventory storage layout or space allocation based on demand predictions. According to the definition, warehouse space utilization is the percentage of warehouse or facility space used. This derives the formula as below:

$$\text{Space Utilization \%} = (\text{Amount of Warehouse Space Used} \div \text{Total Warehouse Space}) \times 100$$

Based on the above formula, the warehouse space is considered in use when the materials occupy the space for a specific time. In this study, it was found that 58% of total warehouse space was allocated for forklift movement and operations (material receiving, transit storage and loading activity) while 19% was installed

with storage racking. Thus, only 77% of floor space is available for warehouse operations purposes and the remaining 23% was a non-activity area which has been excluded from the calculation. From this finding, it was found that approximately 25% of the floor space has been fully utilized for racking and the utilization of balance 75% depends on daily activity volume and material movement trend. Refer to Table 7 for calculation details.

Table 7: Calculation for Warehouse Space Utilization

Area Type	Calculation	Space Utilization %
Storage Racking Space	19% ÷ 77% × 100 = 24.7%	25%
Operation Space	21% ÷ 77% × 100 = 27.3%	75%
Movement Space	37% ÷ 77% ×100 = 48.0%	

5. Managerial Implications and Recommendations

This study provides practical guidance for warehouse management and supply chain practitioners in identifying the aspects and difficulties related to warehouse operations. This study also aids practitioners by examining the correlation between these elements and difficulties and the success of warehouse operations, particularly in terms of warehouse space utilization.

This study demonstrates the significance of establishing a warehouse to the specific needs and service requirements of a firm. Furthermore, the successful and efficient execution of warehouse activities heavily relies on the proficient administration of warehouse resources.

This study provides a baseline understanding of warehouse operations for service companies in the upstream industry. The findings and outcome from this study may provide guidance and opportunities for future research in the following areas:
Although the study has identified two main factors impacting space utilization, the level of importance of each of the factors is not defined as the objective of this study is only to identify and explore the factors.
A larger scale study using a quantitative survey instrument involving more participants from various stakeholders can be carried out to further investigate more factors and the interrelation between these factors. The quantitative survey also may discover new factors or issues that have not been identified in this study.
For future research, further study could be carried out about warehouse layout design for warehouse set up within the same industry, with the expectation to determine the effectiveness, advantages and disadvantages of each layout. In addition, a similar study was to determine the impact of inventory management strategy for similar warehouse operations, where categorization and classification of inventory were made before organizing and storing them on allocated racking.

Conclusion

This study enhances the comprehension of warehouse operations for service companies, namely those involved in providing operations and maintenance (O&M) for offshore facilities in the upstream business. This study enhances our understanding of the specific requirements and approach for setting up warehouse operations to fulfill contractual obligations. This study is one of the first to examine and document how the organization determines the fundamental warehouse activities that can meet the business requirements while ensuring that the setup and functionality remain cost-effective. This study also revealed the diverse aspects and difficulties that impacted the utilization of warehouse space and the performance of operations.

The results of this study make a valuable addition to the existing information about how the arrangement of a warehouse, the process of handling materials, and the methodology of storing inventory impact the utilization of warehouse space. The warehouse in question utilizes a combination of a distribution center (DC) layout and an inventory storage layout. The transit material is managed according to the DC concept, while the inventory is housed on a 4-tier racking system. According to the researcher's expertise, this study is the first of its kind to be undertaken in both environments, offering significant insights to warehouse operations and supply chain management professionals.

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The Impact of Healthcare Service Quality on Patient Satisfaction at University Health Center

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Abstract: Patient satisfaction is a critical aspect of healthcare service quality that needs to be periodically evaluated and improved. Understanding various factors, including empathy, assurance, reliability, tangibility, and responsiveness, is necessary to enhance healthcare quality and improve patient satisfaction. This research aims to investigate the level of patient satisfaction and the relationship between patient satisfaction and service quality, using the five SERVQUAL model as a framework. A positivist approach was used to explore the relationship between variables. Data collection was carried out for two weeks using online questionnaires. For this research, 120 UiTM respondents were chosen using convenience sampling. Data was analyzed using SPSS version 29. The findings revealed a significant positive relationship between tangibility, responsiveness, and empathy with patient satisfaction. This study highlights the importance of regularly assessing patient satisfaction and identifying areas for improvement in healthcare service quality. University health centers can enhance patient satisfaction and provide better student healthcare services by focusing on tangibility, responsiveness, and empathy.

Keywords: *Patient satisfaction; University healthcare center; SERVQUAL; Health service quality*

1. Introduction and Background

Despite limited medical resources, providing the highest-quality healthcare services has long been the primary goal for healthcare systems worldwide. Providing high-quality healthcare services is fundamental to ensuring positive patient outcomes and overall population well-being. The most important aspect of healthcare delivery services is the patient's satisfaction, representing the whole experience and the standard of care received. Patient satisfaction, which reflects the degree to which a patient's expectations and perceptions of healthcare services are met, has emerged as a critical measure of healthcare quality.

As the demand for healthcare quality has increased, healthcare systems are constantly changing and improving, so it is necessary to find a way to assess outputs while evaluating patient satisfaction. Patient satisfaction impacts various aspects, including clinical outcomes, hospital reputation, and patient retention. Healthcare systems are constantly changing and improving, so finding a way to assess outputs while evaluating patient satisfaction is necessary. The need to monitor and assess patient satisfaction has increased along with the demand for healthcare quality, prompting the creation of guidelines for patient satisfaction monitoring (Gavurova et al., 2021; Al-Qudimat et al., 2024). Improving an understanding of and enhancing patient satisfaction can benefit healthcare organizations by increasing patient loyalty, producing better results, and enhancing their reputation (Ferreira et al., 2023).

Healthcare service quality in Malaysia's university healthcare centers is a crucial aspect that significantly affects the behavioral intentions of university students. While access to healthcare is guaranteed in Malaysia, there is a growing emphasis on evaluating the quality of services offered within higher education institutions. A survey on customer satisfaction is considered an effective way to provide healthcare service providers with beneficial information. As customers of the healthcare center, the students' views should be considered, as they can serve as strategic inputs in assessing their satisfaction. The issue of healthcare quality and student satisfaction has been studied by many researchers across the globe over the past few years (Alshurideh, 2014; Lee & Kim, 2017; Rezaian & Selamat, 2015; Abdullah et al., 2022). However, the study on the relationship between service quality and satisfaction, specifically in public universities, is limited and has inconsistent

findings.

In the contemporary healthcare landscape, the quality of services provided within health centers plays a pivotal role in shaping patient experiences and satisfaction. With the evolution of the healthcare system, particularly within university health centers that cater to diverse student populations, understanding the dynamics of service quality becomes increasingly important. Assessing customer satisfaction through surveys effectively gathers beneficial information for healthcare service providers (Marzo et al., 2021). Thus, it is essential to determine the influence of healthcare service quality on students' satisfaction. This study attempted to fill this gap by examining the impact of healthcare service quality on student satisfaction at UiTM Selangor Campus.

2. Literature Review

Patient Satisfaction

Research on patient satisfaction began in the early 1950s, focusing on the interaction between doctors and patients. It gained a significant increase in interest in the 1960s, with extensive studies conducted to explore various dimensions of patient satisfaction. Patient satisfaction has garnered significant interest in the healthcare sector because it is a critical indicator that captures the quality of care delivered and the overall patient experience. Traditionally, patient satisfaction was viewed as a customer service initiative, but recent research has highlighted its importance as a critical dimension of healthcare quality (Hefner et al., 2019).

The concept of patient satisfaction has been defined variably across studies. Generally, it reflects the degree to which patients' expectations regarding healthcare services are met (Al-Abri & Al-Balushi, 2014). Some researchers view it as a measure of attitudes toward care (Goodrich & Lazenby, 2023), while others define it as the congruence between patient expectations and their actual experiences of care (Agency for Healthcare Research and Quality, 2020; Lateef, 2011; El-Haddad et al., 2020), which posits that the gap between expectations and actual experiences influences satisfaction. These definitions illustrate the complexity of patient satisfaction, emphasizing its dependence on individual perceptions, expectations, and the specific attributes of care received. Understanding these nuances is essential for healthcare providers aiming to enhance patient experiences and satisfaction levels.

Patient satisfaction is a critical determinant of healthcare providers' success (Kalaja & Krasniqi, 2022), as it includes the treatment outcome, overall experience, and interactions with healthcare providers (Manzoor et al., 2019). It reflects the state of pleasure or happiness that patients experience while utilizing healthcare services (Manzoor et al., 2019). Moreover, patient satisfaction is a multi-aspect concept closely related to the main attributes of services and providers (Hussain et al., 2019). This emphasizes that patient happiness is an essential quality measure in healthcare settings. By integrating patient satisfaction metrics into healthcare assessments, healthcare providers can pinpoint development opportunities and elevate the general standard of care provision. Understanding and improving patient satisfaction will be essential as healthcare evolves, enhancing the quality of care and patient outcomes**.**

Service Quality Gap Model (SERVQUAL Model)

The service Quality Gap Model, or SERVQUAL model, developed by Parasuraman, Zeithaml, and Berry (1988), is a widely applied service quality framework to determine the level of satisfaction among patients across the globe (Alshrbaji et al., 2022). The SERVQUAL model represents service quality as the discrepancy between a customer's expectations of service offering and the customer's perceptions of the service received (Parasuraman et al., 1985). The SERVQUAL model includes five dimensions: tangible, reliability, responsiveness, empathy and assurance. The dimensions of the SERVQUAL model are explained in the following:

Tangible

Tangible is an essential factor in patient satisfaction and healthcare service quality. The term "tangibility" describes the physical spaces, tools, staff, and informational resources that patients encounter while receiving medical care. These specific factors greatly influence patients' opinions about the quality and satisfaction of the services they receive. To shape patients' views of service quality, for example, research by Parasuraman et al. (1985) highlights the significance of tangible cues, such as the appearance of medical equipment, the

cleanliness of facilities, and the professionalism of staff apparel. Modern facilities and well-maintained equipment are positive, tangible features that can boost patients' confidence in the healthcare provider and increase overall patient satisfaction.

Patient satisfaction in healthcare settings is intricately linked to the quality of services, particularly the tangible aspect of care. Tangible dimensions of healthcare quality, such as the physical environment, equipment, and facilities, are crucial in shaping patient perceptions and experiences (Suhadi et al., 2022). Studies have shown that the quality of amenities, which falls under the tangible dimension, positively influences patient loyalty and satisfaction (AlOmari & Hamid, 2022). Additionally, the tangible dimension is one of the critical components of service quality that significantly impacts patient satisfaction (Fadila et al., 2022). Therefore, the following research hypothesis is proposed:
H1: Tangible positively influences patient satisfaction

Reliability
The service's reliability means that patients receive the treatment they believe is correct for their health problems. Reliability in healthcare service quality is a crucial aspect that directly impacts patient satisfaction. The reliability of healthcare services is defined as their consistency and dependability in meeting patients' needs and expectations (Endeshaw, 2020). It is one of the critical dimensions used for measuring the quality of healthcare services (Endeshaw, 2020; Osarobo & Adekunle, 2022). Studies have identified reliability as a fundamental characteristic of high-quality healthcare services, alongside other dimensions like responsiveness, assurance, and empathy (Jordan et al., 2021). Ensuring reliability in healthcare services is essential for building patients' trust and delivering consistent care that meets their expectations (Endeshaw, 2020).

The relationship between reliability in healthcare service quality and patient satisfaction is intricate. Studies have shown that the reliability of healthcare services is positively associated with patient satisfaction (Endeshaw, 2020). When patients perceive healthcare services as reliable, consistent, and dependable, it enhances their overall satisfaction with their care (Endeshaw, 2020). Reliability builds patient trust, a critical factor in patient satisfaction (Endeshaw, 2020). Therefore, healthcare providers must ensure reliability to improve patient satisfaction (Endeshaw, 2020). According to the discussions, the hypothesis is proposed.
H2: Reliability positively influences patient satisfaction.

Responsiveness
Responsiveness is the ability and willingness of healthcare providers to address patients' needs and concerns successfully. Responsiveness requires effective communication, which is also necessary to promote desirable patient-provider interactions. When healthcare services are responsive, patients feel valued, listened to, and cared for, leading to higher satisfaction levels (Ugwu et al., 2022). Healthcare providers are highly valued by their patients because they actively listen to their concerns, offer clear explanations, and involve them in decision-making. Renedo and Marston's (2015) article highlighted how communication influences patients' views of responsiveness and made the case that polite, honest communication increases patient satisfaction.

Responsiveness in healthcare service quality pertains to the promptness and willingness of healthcare providers to assist patients and deliver care when required. It encompasses timely appointments, quick responses to inquiries, and efficient handling of patient needs (Nguyen & Pham, 2023). Studies have consistently shown that responsiveness is a critical dimension of healthcare service quality that significantly influences patient satisfaction (Ugwu et al., 2022). Patients highly value healthcare facilities that are responsive to their needs and concerns, as they enhance their overall experience and perception of the care received (Kaur et al., 2022). A previous study by Chandra et al. (2019) and Uguwu et al. (2022) reported that patient satisfaction and responsiveness correlate positively. Patient satisfaction was more vital in healthcare facilities with higher responsiveness scores (Li et al., 2023), and this highlights how crucial it is for healthcare providers to put responsiveness at the top of their service delivery structure to improve patient outcomes and satisfaction (Ugwu et al., 2022). Thus, it is hypothesized that:
H3: Responsiveness positively influences patient satisfaction

Assurance

Assurance is reflected in the patient's reliance on the doctor and hospital staff and their confidence in their qualifications and competence (Parasuraman et al., 1996). Assurance encompasses medical professionals' skills, service reliability, and patient-provider trust development. Patients are more likely to feel satisfied with the quality of care they receive when they have faith in the abilities and knowledge of their healthcare providers. Patients place a high value on reliability in healthcare settings because it eliminates ambiguity and cultivates trust in the healthcare system, increasing patient satisfaction with their care.

Assurance in healthcare service quality encompasses factors such as the competence of health workers, the courtesy of their behavior, reliability, and the safety of services provided. Patient satisfaction is a crucial outcome in healthcare services, influenced by various service quality dimensions, including assurance (Laela et al., 2022). The relationship between assurance and patient satisfaction is significant, as the ability of healthcare providers to convey trust and competence directly impacts how satisfied patients are with the care they receive (Laela et al., 2022). Patients who perceive high levels of assurance from healthcare providers are more likely to be satisfied with their care (Laela et al., 2022). This emphasizes the importance of delivering quality healthcare services and ensuring that patients feel confident in their care, which can positively impact their overall satisfaction with the healthcare experience. Therefore, it is hypothesized that:

H4: Assurance positively influences patient satisfaction.

Empathy

Empathy in healthcare service quality refers to the ability of healthcare professionals to understand and share their patients' feelings, show compassion, and provide personalized care (Moudatsou et al., 2020). It is fundamental in establishing a therapeutic relationship between carers and patients, contributing significantly to better health outcomes (Moudatsou et al., 2020). Studies have consistently highlighted the importance of empathy in healthcare, emphasizing its role in optimal communication between medical professionals and patients (Haddad et al., 2023). Empathy is crucial for developing a positive patient-provider relationship, linked to improved patient outcomes, higher levels of patient satisfaction, and an enhanced sense of well-being among patients (Holmes & Starr, 2022).

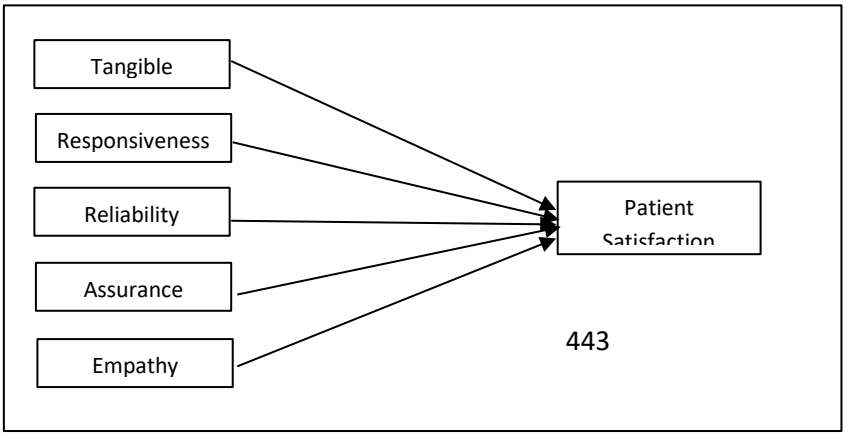
The relationship between empathy and patient satisfaction is further supported by evidence showing that patient-perceived empathy is linked to reduced anxiety and distress and increased satisfaction (Hoffstädt et al., 2020). Additionally, empathy has been identified as a critical factor in determining the quality of service in healthcare, with aspects such as a calm working demeanor, effective communication, appealing appearance, and the ability to address patient concerns contributing to patient satisfaction (Laela et al., 2022). Moreover, empathy facilitates positive communication relationships, personal attention, and understanding of patient needs, all of which are essential for enhancing patient satisfaction (Simanullang et al., 2021). Therefore, this study proposed the following hypothesis:

H5: Empathy positively influences patient satisfaction.

Conceptual Framework

The conceptual framework of this study was guided by SERVQUAL, developed by Parasuraman, Zeithaml, and Berry in 1988. The SERVQUAL model, developed by Parasuraman, Zeithaml, and Berry, is widely used to assess and comprehend service quality from the consumer's viewpoint in various service industries, including healthcare. Figure 1 shows the conceptual framework of this study.

Figure 1: Conceptual Framework



3. Research Methodology

Design, Sample, and Setting

A positivist approach was used to explore the relationship between variables. The study was primarily conducted via a survey among students in UiTM Puncak Alam. The G*Power software was used to calculate the sample size for this study. The effect size was set at 0.15 (medium effect), α at 0.05, and power at 0.80; thus, the sample size is 92. However, the researcher distributed the questionnaire to 150 students to obtain an excellent response rate. The inclusion criteria were established to ensure that the sample accurately reflects the population of interests: 1) participants must have utilized the university health clinic UiTM Puncak Alam at least once during the academic year, and 2) willing to participate in the survey. This study utilized convenience sampling for data collection due to its accessibility, efficiency, and willingness to engage participants, aligning with research objectives and university context, making it a practical choice.

Instrument Development

The research instrument for this study was developed based on an extensive literature review that combined existing validated measurements. The questionnaire, which consisted of seven sections measuring demographic data, namely tangible, reliability, responsiveness, assurance, empathy, and patient satisfaction, was used to collect the data. The respondents were requested to complete the questions about their demographic backgrounds, such as gender, age, semester, type of residency, and faculty. A total of 37 items were adapted from Abdullah et al. (2023) to measure all the variables. The researchers employed a five-point Likert scale ranging from strongly disagree to agree.

Data collection procedures

Data was collected from the respondents using an online survey via Google Forms. The questionnaire was distributed via WhatsApp. The respondents took approximately 5 to 10 minutes to complete the questionnaires. One hundred fifty questionnaires were distributed via Google Forms to the respondents, and only 120 were returned.

4. Results

Data were analyzed using SPSS version 26.0. Most of the respondents were female, in semester five from the Faculty of Business and Management, aged 18-23 years old and staying in the college residency. The results are presented in Table 1.

Table 1: Demographic Profile of the Respondents

Variable	Frequency	Percentage (%)
Gender		
Male	29	24.2
Female	91	75.8
Semester		
1	20	16.7
2	14	11.7
3	10	8.3
4	14	11.7
5	50	41.7
6	8	6.7
7	4	3.3
8	20	16.7
Faculty		
Faculty of Business and Management	*92*	*76.7*
Faculty of Hotel and Tourism Management	*7*	*5.8*

Faculty of Accountancy	*3*	*2.5*
Faculty of Health Science	6	5.0
Faculty of Education	8	6.7
Faculty of Pharmacy	2	1.7
Kolej Pengajian Alam Bina	1	0.8
Kolej Pengajian Seni Kreatif	1	0.8
Age		
18 - 23 years old	89	74.2
24 - 29 years old	30	25.0
30 years old and above	1	0.8
Type of Residency		
College	95	79.2
Non - resident	25	20.8

Table 2 below presents the descriptive statistics results of the study, including mean, standard deviation, skewness, kurtosis and Cronbach's alpha value. The normality test was run to determine the distribution's shape. The assumptions were tested by running the descriptive statistics, and the Skewness and Kurtosis results were presented. The normality test shows that the data was generally distributed since the value of the skewness and kurtosis was ±3 for each variable (Ng & Coakes, 2013). In this study, reliability analysis was performed by computing Cronbach's alpha values for each variable. The findings revealed that the scale has good internal consistency.

Table 2: Descriptive Statistics

Variable	Mean	SD	Skewness	Kurtosis	No of Item	Cronbach Alpha
Tangible	3.885	0.764	-0.661	1.126	6	0.912
Reliability	3.892	0.814	-0.715	0.829	7	0.949
Responsiveness	3.892	0.814	-0.670	0.719	7	0.937
Assurance	4.063	0.790	-0.898	1.084	5	0.953
Empathy	3.968	0.834	-0.770	0.585	6	0.951
Patient Satisfaction	4.019	0.830	-0.812	0.613	6	0.954

The association between the independent and dependent variables (patient satisfaction) was investigated using the Pearson product-moment correlation coefficient. Preliminary analyses were performed to ensure no normality, linearity and homoscedasticity assumptions were violated. The findings revealed a strong positive correlation between all independent and dependent variables. A summary of the correlation result is presented in Table 3.

Table 3: Pearson correlation coefficient

	1	2	3	4	5	6
Tangible	1					
Reliability	.906**	1				
Responsiveness	.906**	1.000**	1			
Assurance	.822**	.898**	.898**	1		
Empathy	.829**	.896**	.896**	.914**	1	
Patient Satisfaction	.865**	.897**	.897**	.885**	.899**	1

Multiple regression analysis was used to measure the relationship between the variables. This multiple regression addressed which variable in a set of independent variables can be considered the best predictor or most significant factor influencing the dependent variable. Table 4 shows the results of the multiple regression

analysis conducted in this study. The result shows no collinearity problem as the value of the VIF was less than ten, and the tolerance value was below 1.0, given from the three independent variables. The R2 value of 0.871 indicates that 87.1 percent of the variation in the dependent variable is explained by the independent variables. Another 12. percent of the variance in patient satisfaction was explained by other factors. The F-test is significant at the p-value <0.05 (0.000); therefore, the linear model is valid overall.

Table 4: Multiple Regression

	Standardized Coefficients (Beta)	T	sig	Lower CI	Upper CI	Tolerance	VIF
Tangible	0.223	2.670	0.009	0.063	0.423	0.162	6.168
Reliability	0.120	1.360	0.177	-0.053	0.288	0.146	6.835
Responsiveness	0.190	2.092	0.039	0.011	0.405	0.137	7.310
Assurance	0.159	1.681	0.095	-0.030	0.365	0.126	7.935
Empathy	0.096	3.041	0.003	0.102	0.483	0.121	8.239
R2	0.871						
Adjusted R2	0.865						
F change	153.555						
Sig F Change	0.000						

As specified in Table 4, the result from multiple regression analysis revealed no significant relationship between reliability and patient satisfaction (β=0.120, p>0.05) and assurance and patient satisfaction (β=0.159, p>0.05). However, this study indicated a significant relationship between tangible (β=0.223, p<0.05), responsiveness (β=0.190, p<0.05) and empathy (β=0.096, p>0.05). Table 5 shows the results of the summarised hypotheses of this study.

Table 5: Summary of Hypotheses

Hypotheses	Results
H1: There is a significant relationship between tangible and patient satisfaction.	Supported
H2: There is a significant relationship between reliability and patient satisfaction.	Rejected
H3: There is a significant relationship between responsiveness and patient satisfaction.	Supported
H4: There is a significant relationship between assurance and patient satisfaction.	Rejected
H5: There is a significant relationship between empathy and patient satisfaction.	Supported

Discussion

Tangible elements such as the physical environment, equipment quality, staff appearance, and overall ambiance are integral to patient satisfaction. Tangible forms the first impression of a healthcare facility and can substantially impact a patient's overall experience. The findings revealed a positive relationship between tangible and patient satisfaction. The finding observed in this study mirrors those of previous studies, which show that tangibles significantly influence patient satisfaction (Purwanti et al., 2019; Koampa et al., 2023; Zuriati & Chiew, 2020; Abdullah et al., 2022; Fadila et al., 2022; AlOmari & Hamid, 2022; Jha et al., 2020). There are several possible explanations for this. First, when patients perceive the physical environment as clean, well-maintained, and modern, their satisfaction levels tend to increase. Second, adequate facilities, such as waiting areas and examination rooms, contribute to a positive patient experience. This strong relationship highlights that patients' perceptions of tangible factors can significantly shape their overall satisfaction with healthcare services, making it a critical area for continuous improvement and investment. Improvements in these areas can lead to higher satisfaction as patients associate their experiences with the quality of care.

Reliability is a service provider's ability to consistently and accurately deliver promised healthcare services. This dimension is critical for fostering patient trust and satisfaction. Key components of reliability encompass timely and accurate diagnoses, consistent treatment outcomes, and effective communication, which significantly shape the overall patient experience. Our study examined the reliability dimension and surprisingly found that reliability is not a significant predictor of patient satisfaction. However, this result has not been previously described (Smith et al., 2020; Abdullah et al., 2022; Jordan et al., 2022; Endeshaw, 2020;

Zuriati & Chiew, 2020). The demographic characteristics of the respondents might influence a possible explanation for this. Their age and healthcare experience may influence their perception of reliability and satisfaction. Additionally, the context of a university health center, often characterized by limited resources and staff, can impact service delivery and, consequently, patient perceptions of reliability and satisfaction. To further enhance reliability in healthcare settings, it is recommended that regular staff training be provided and a comprehensive feedback mechanism be implemented to improve service quality. Implementing strategies that enhance reliability can lead to improved patient satisfaction outcomes. As reliable healthcare services foster greater patient trust, satisfaction, and loyalty, healthcare providers must prioritize enhancing reliability in their service delivery.

Responsiveness, encompassing aspects such as timely care, effective communication, and attentiveness to patient needs, emerges as a critical determinant of patient satisfaction in healthcare settings. The findings show a positive significant relationship between responsiveness and patient satisfaction. This result generally replicates that of past research (Ugwu et al., 2022; Kaur et al., 2022; Li et al., 2023; Abdullah et al., 2022). The analysis highlights the importance of healthcare providers and staff being responsive to patient concerns and needs, as it directly influences overall satisfaction levels and perceived quality of care. This may be explained by the fact that when patients feel their healthcare providers are responsive, they are more likely to trust and adhere to medical advice, further reinforcing the positive relationship. Thus, healthcare institutions aiming to improve patient satisfaction should prioritize improving responsiveness to patient needs. It is recommended that university healthcare centers prioritize and enhance their responsiveness strategies to foster better patient satisfaction outcomes. Research by Smith et al. (2020) highlights several practical approaches, including improving staff communication skills, optimizing appointment scheduling processes to minimize waiting times and implementing systems to promptly resolve patient queries and concerns. These strategies improve patient experience, operational efficiency, and quality of healthcare service. Furthermore, cultivating a patient-centered culture in which responsiveness is ingrained as a core value among healthcare providers and staff can significantly improve patient satisfaction metrics. Continuous monitoring and feedback mechanisms should be implemented to gauge responsiveness levels and identify areas for improvement, ensuring ongoing enhancement of patient satisfaction in university healthcare settings.

Assurance encompasses aspects such as the competence of healthcare providers, their ability to instill confidence and trust, and the clarity of communication about medical procedures and diagnoses. According to the findings, assurance is not a significant predictor of patient satisfaction. However, the current study's findings do not support the previous research. The studies conducted by Laela et al. in 2022, Abdullah et al. in 2022, and Smith et al. in 2021 do not support the current findings. A possible explanation for the finding might be due to the environment of a university health center, as healthcare centers often operate with limited resources and staff, which may affect the ability of healthcare providers to instill confidence in their patients. If students experience long wait times or feel that their concerns must be adequately addressed, this can diminish the perceived importance of assurance in their overall satisfaction. This highlights the importance of healthcare providers ensuring clear communication, competence in medical care, and demonstrating empathy towards patients to improve overall satisfaction levels. Implementing strategies to enhance assurance can lead to improvements and outcomes, reinforcing the critical role of healthcare quality assurance in patient-centered care (Smith et al., 2021). By focusing on factors such as staff competence, communication, and the ability to inspire trust, healthcare providers can enhance the overall satisfaction levels of their student patients. Understanding the importance of assurance in this context can help healthcare professionals tailor their services better to meet university students' needs and expectations.

Empathy involves understanding and sharing another person's feelings, translating to providers listening attentively, showing concern, and addressing patients' emotional and medical needs (Hojat et al., 2011). Consistent with the literature on the association between empathy and patient satisfaction (Johnson et al., 2021; Abdullah et al., 2022; Holmes & Starr, 2022; Rajput et al., 2020; Laela et al., 2020; Haddad et al., 2023), this study confirms that empathic care by healthcare providers influenced patient satisfaction, which is an important outcome measure for healthcare quality. Patients who perceive their providers as empathetic are more likely to report positive experiences and outcomes, including increased trust, better adherence to treatment plans, and overall satisfaction with their healthcare encounters (Johnson et al., 2031; Derksen et al., 2013; Kim et al., 2017). Fostering empathy among healthcare professionals is crucial for enhancing patient

satisfaction and improving the overall quality of healthcare delivery. Therefore, strategies that enhance empathy in university healthcare centers should be implemented to improve patient satisfaction levels further. The recommendations include providing healthcare workers with ongoing empathy training to help them develop their interpersonal skills, implementing patient feedback mechanisms to regularly assess and improve empathetic communication, and cultivating a culture of compassionate care by encouraging policies and procedures. These programs are essential to developing a compassionate healthcare environment that enhances patient happiness and experiences.

5. Managerial Implications and Recommendations

The managerial implications of research on patient satisfaction are profound for enhancing healthcare services and the overall performance of healthcare organizations. By identifying the primary determinants of patient satisfaction, providers at university health centers can optimize resource allocation, thereby improving patient experiences and satisfaction levels. Moreover, the insights derived from such research can serve as strategic guidelines for university healthcare centers, particularly regarding quality improvement initiatives, promoting patient-centered care, and implementing staff engagement training programs.

The findings enrich the existing literature on healthcare service quality and patient satisfaction and provide a nuanced understanding of the interplay between these elements within the specific context of university health centers. This research contributes to establishing best practices in healthcare management and lays a foundation for future inquiries into this critical area. The emphasis on patient satisfaction as a key performance indicator underscores its significance in fostering patient loyalty and enhancing the reputation of healthcare institutions. As healthcare environments become increasingly competitive, measuring and responding to patient satisfaction will be crucial for healthcare organizations' long-term success and sustainability.

To fully understand the dynamics of patient satisfaction among university students, further research is needed to investigate additional factors that may influence their experiences, including trust and patient-centered care. Trust plays a crucial role in shaping students' perceptions of service quality. Establishing a trusting relationship between healthcare providers and students can significantly enhance satisfaction. A patient-centered approach where individual needs and preferences are prioritized can also lead to more positive outcomes. Engaging students in their care and actively respecting their unique circumstances fosters a sense of ownership and satisfaction. Future studies should also consider assessing patient satisfaction across different campuses. This comparative analysis can provide valuable insights into how varying service quality and institutional practices impact student experiences. By examining satisfaction levels in diverse settings, researchers can identify best practices and areas for improvement, ultimately contributing to enhanced service quality and student well-being. Future research can inform strategies to improve healthcare services and enhance student satisfaction outcomes.

Conclusion

The research findings underscore the critical relationship between service quality dimensions and patient satisfaction within university health centers, particularly at UiTM Puncak Alam Campus. The study identifies tangible aspects, responsiveness, and empathy as significant predictors of patient satisfaction. This indicates that the physical environment of the health center, the staff's willingness to assist patients, and the compassionate demeanor of healthcare providers are pivotal in shaping patient experiences. Given the increasing importance of patient satisfaction as a critical performance metric in healthcare, these insights are particularly relevant for university health management. Enhancing service quality improves patient outcomes and influences healthcare institutions' overall reputation and financial viability. The findings suggest that university health centers should enhance their healthcare facilities and staff training programs to foster a more supportive and effective patient care environment. While this study primarily focuses on assessing the service quality of the university health center, it does not explicitly compare these services to those offered by external healthcare providers. However, valuable insights can be drawn by examining service quality across various universities and healthcare settings. In conclusion, this research highlights the necessity for university health centers to adopt a proactive approach in addressing the identified service quality dimensions. These institutions can significantly enhance patient satisfaction by investing in tangible improvements and fostering a culture of responsiveness and empathy among healthcare providers. This, in turn, will lead to better health

outcomes, increased patient loyalty, and a stronger competitive position in the healthcare market.

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Fostering Future Investors: Analysing Determinants of Stock Market Participation Among Malaysian Students using PLS-SEM

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Abstract: Participation in the stock market is crucial for financial engagement and wealth creation. However, specific population segments, such as students from higher learning institutions, may exhibit lower stock market participation levels. Addressing this issue, this study uses the behavioral finance theory to examine how financial literacy, financial well-being, herding behavior, overconfidence bias, risk tolerance, social interaction, and investment intention influence stock market participation. Data was collected through a self-administered questionnaire distributed to 669 university students in Malaysia aged 17-30 years old. The findings reveal that financial literacy, herding behavior, risk tolerance, and social interaction positively influenced investment intention. The study also discovered that investment intention positively influences stock market participation. This study has made significant contributions to both theory and practice. Theoretically, this study contributes to the literature by confirming the positive relationship between financial literacy and investment intention. This study contributes to the development of more effective interventions and policies that not only educate students about an essential aspect of financial literacy but also prepare them for a financially secure future.

Keywords: *Stock market participation, investment intention, higher education institution, behavioral intention*

1. Introduction

The stock market is a public platform where buyers and sellers of stocks (also called shares) come together to trade. Stocks represent ownership claims on businesses; investors can own a piece of a company by buying stocks. Jaiyeoba and Haron (2016) stated that comprehending the investment decision-making behavior of stock market participants extends beyond merely examining their priorities.

The Malaysian government has encouraged investment in the stock market throughout the years, particularly among university students who allocate their investment funds towards various savings schemes that yield minimal returns. The National Strategy for Financial Literacy 2019-2023 illustrates a national initiative to promote and foster a culture of savings and investments among Malaysians. Hence, it is imperative to comprehend the financial aspect of human behavior and decision-making and scrutinize the determinants that impact the inclination of Malaysian undergraduate students toward investing in the stock market. (Yang et al., 2021). Furthermore, it is paramount to ascertain the influence of these factors on the involvement of unemployed individuals in the Malaysian stock market.

According to the CGS-CIMB Retail Investors' Sentiment Survey, only 17% of Malays participate in stock market activities, compared to 76% of Chinese, 4% of India, and 3% of other ethnicities in Malaysia. Furthermore, the survey highlights that 25% of the investors surveyed are under the age of 31. This suggests that most investors are relatively young and may have different investment preferences and risk tolerances than older investors. Surprisingly, the survey also reveals that only 5% of the investors identified themselves as students with either rudimentary knowledge or no knowledge of stock investment. This implies that most investors surveyed possess at least some level of understanding or experience in stock investing.

Evidence of determinant factors, namely financial literacy, financial well-being, herding behavior, overconfidence bias, risk tolerance, and social interaction, that influence stock market investment intention and participation has not been fully addressed, especially from the perspective of Malay Bumiputra and young people in Malaysia. Based on the financial behavior theory (Thaler, 1999), this study tries to answer the following research questions: (a) How do determinate factors, namely financial literacy, financial well-being, herding behavior, overconfidence bias, risk tolerance, and social interaction toward influence stock market investment intention? (b) Does investment intention influence stock market participation?

Thus, this study seeks to fill in the literature gap by examining how financial literacy, financial well-being, herding behavior, overconfidence bias, risk tolerance, and social interaction influence investment intention, as well as how investment intention influences stock market participation. The study provides significant contributions to both theory and practice. From a theoretical perspective, this study enhances understanding of the influence of financial literacy, financial well-being, herding behavior, overconfidence bias, risk tolerance, social interaction on stock market investment intention, and the influence of investment intention on stock market participation. From a managerial perspective, the findings provide guidelines to help financial and educational institutions develop their comprehensive approach, which makes the initiative more aligned with contemporary trends such as digitalization and more appealing to a generation that is increasingly conscious of sustainability.

2. Literature Review

Stock market participation

The stock market serves as a platform for individuals and institutions to buy and sell securities, such as stocks and bonds, intending to generate returns on investment. Understanding the stock market and its impact on investment intention is crucial for individuals seeking to participate in financial markets (Jain et al., 2022). The stock market is a crucial instrument in equity investments. It attracts significant funding from financial institutions and retail investors (Sabiran et al., 2023), particularly in developing countries, as it represents the country's economic performance (Murthy et al., 2016).

Gaining insights into the determinant factors that influence stock investment intention holds paramount importance for various stakeholders, as the participation of stock investors plays a pivotal role in determining the stock market's success (Yoopetch & Chaithanapat, 2021). A higher number of investors, from individual to institutional to international investors, could assist in the stock market growth and improve market efficiency. It asserts that people are more motivated to take the necessary measures to enter the stock market and make investments when they genuinely want to invest and intend to do so. This goal may motivate people to do a thorough analysis, get the essential information, seek advice, and get beyond entry-level obstacles, increasing stock market participation. The extent to which a person participates in the stock market has a significant impact on how much money she/he can accumulate and spend (Mehra & Prescott, 1985).

Investment Intention

Investment intention refers to an individual's inclination or desire to invest in financial instruments, such as stocks, bonds, or mutual funds, intending to generate long-term capital growth or income. (Ghosh, 2022). Recent research has focused on various factors influencing investment intention in the stock market. One important factor is financial literacy, which refers to an individual's knowledge and understanding of financial concepts, products, and investment strategies. (Dorina et al., 2022). Research has consistently revealed a positive association between higher levels of financial literacy and investment intention in the stock market. (Jain et al., 2022; Lin & Bates, 2022). Individuals with excellent financial knowledge and understanding are likelier to have a positive attitude toward stock market investing and express an intention to invest.

In the context of Malaysia, as a developing nation, Ahmaed and Noreen (2021) Expressed that investors need help making investment decisions due to the high volatility and vast heterogeneity of investor behavior. Given the influential role of financial literacy, financial well-being, herding behavior, overconfidence bias, risk tolerance, and social interaction in shaping investment decisions, the study puts forth the following hypotheses with the research model as shown in Figure 2:

Financial Literacy

Financial literacy refers to acquiring a comprehensive range of competencies and information, enabling individuals to make judicious and efficient choices regarding their financial assets. Enhancing financial literacy levels enables individuals to make more informed decisions regarding their financial investments (Bayar et al., 2020). Ahmad and Shah's (2022) Research uncovered a noteworthy positive correlation between financial literacy, investment choices, and investment outcomes.

In addition, Bayar et al. (2020) Econometric analysis findings suggest a positive relationship between financial risk tolerance, financial literacy level, and educational level. This relationship is attributed to the fact that these factors facilitate making complex financial decisions. Furthermore, Mishra (2018) Disclosed that individuals must augment their financial literacy and awareness by participating in financial education programs or seminars offered by diverse organizations. The inadequate level of financial literacy among individuals poses a significant challenge to their preparedness to engage in stock market investment, which necessitates a comprehensive grasp of fundamental concepts about the economy, industry, and companies.

Financial Well-being

Financial well-being refers to an individual's overall satisfaction and sense of security regarding their financial situation. It encompasses various dimensions, including financial stability, financial security, and financial freedom. (Diener & Biswas-Diener, 2008). Understanding and promoting financial well-being is important as it is closely linked to an individual's overall life satisfaction, psychological well-being, and overall quality of life (Brailovskaia et al., 2022).

Financial literacy is a crucial aspect of financial well-being, which refers to an individual's knowledge and understanding of financial concepts, products, and decision-making skills (Kumar et al., 2023). Numerous studies have emphasized the positive association between financial literacy and financial well-being. Higher levels of financial literacy are linked to better financial management practices, reduced financial stress, and improved financial decision-making (Cossa et al., 2022; Van Nguyen et al., 2022).

Additionally, financial behaviors play a vital role in determining financial well-being. Research has shown that responsible financial behaviors, such as budgeting, saving, and prudent debt management, positively impact financial well-being. (Bhatia & Singh, 2023; Mousavi & Rasaeimanesh, 2023). Conversely, impulsive spending, excessive debt, and inadequate savings contribute to financial distress and hinder financial well-being.

Herding Behavior

Herding behaviors are the propensity for people to rely on their investment choices on the actions and behaviors of others, especially in ambiguous or uncertain circumstances. Jaiyeoba et al. (2020) Detailed that it is a scenario in which rational investors disregard their information and instead adopt the judgments of others when making investment decisions. This phenomenon occurs when the impact of external information or decisions outweighs investors' private information. To be clear, people are more likely to form an intention to invest when they obtain support or encouragement to engage in herding behavior through social cues or recommendations from reliable sources. Bakar and Yi (2016) defined herding behavior as the tendency for an individual to conform to the decisions of the majority, which are assumed to be correct. The perception of a consensus or majority partaking in a specific investing activity can foster trust and confidence, improving one's intention to invest.

The influence of herding behavior on investors' stock market participation decisions has been affirmed in multiple studies (Ahmaed & Noreen, 2021; Pahlevi & Oktaviani, 2018; Yang et al., 2021). Thus, the phenomenon of availability bias occurs when an individual's decision-making process is influenced by easily accessible and recent information. The findings of Ahmaed and Noreen (2021) shed light on the behavior of individual investors in the Pakistan Stock Exchange, indicating a strong alignment with various factors. Specifically, investors demonstrate agreement with the impact of other investors' decisions regarding stock selection and stock volume on their investment decisions. This suggests a manifestation of the herding effect in their behavior, as they also exhibit agreement with other aspects associated with herding. Yang et al. (2021) concurred that a lack of knowledge and limited access to information leads many investors to mimic the actions of others. The strong alignment of investors with the factors mentioned above holds significance due to the presence of the herding effect. This phenomenon highlights investors' tendency to follow others' decisions and behaviors, further emphasizing the impact and relevance of the identified factors.

Conversely, Bakar and Yi (2016) discovered that herding does not significantly influence investors' decision-making. On the other hand, availability bias occurs when individuals base their actions on readily accessible and recent information. The findings suggest disparities exist between retail and institutional investors concerning their tendencies towards herding behavior and religious bias. Retail investors are advised to

acquire knowledge or seek guidance from institutional investors to mitigate the occurrence of excessive herding in the market.

Overconfidence bias

The overconfidence bias describes a person's propensity to exaggerate their skills, expertise, and the precision of their judgments. The concept discussed is associated with the self-attribution bias, whereby individuals tend to overestimate their abilities by attributing their successes to their skills and capabilities while attributing their failures to external factors such as 'poor luck' (Bakar & Yi, 2016). Investors who exhibit overconfidence tend to misconstrue the precision of the information presented and overrate their analytical abilities when scrutinizing such information. Jaiyeoba et al. (2020) Indicated that mounting evidence from many parts of the world suggests investors have excessive confidence. In addition, this phenomenon leads individuals to overestimate their level of expertise, underestimate potential hazards, and amplify their perceived capacity to manage circumstances.

Studies by Bakar and Yi (2016), Jaiyeoba et al. (2020), and Pahlevi and Oktaviani (2018) found overconfidence to have a significant positive impact on investors' decision-making to participate in the stock market. In previous investigations conducted by Jaiyeoba et al. (2020), it was discovered that overconfident bias, anchoring bias, and representative heuristics have similar impacts on both retail and institutional investors. Therefore, it becomes crucial for retail investors to actively work on reducing the influence of these biases when making investment decisions rather than solely relying on guidance from institutional investors.

In contrast, the studies conducted by Ahmad et al. (2022), Fagerström (2008), and Kafayat (2014) revealed a detrimental effect of overconfidence on decision-making. It asserts that individuals become more careful and methodical in their investing decisions by acknowledging and lowering overconfidence, which increases their propensity to engage in investment activities. Ahmad et al. (2022) proved that the quality of investment decisions is substantially impacted by overconfidence, which negatively correlates with investment decision-making.

Risk Tolerance

Risk tolerance is the capacity of a person to accept and withstand possible setbacks in the pursuit of greater financial returns. People are more likely to decide to invest when they receive assistance in understanding and controlling their risk tolerance through risk assessment tools, instructional materials, or individualized guidance. It implies that improving people's risk comprehension and comfort level with taking calculated risks makes them more likely to indicate an intention to engage in investment activities.

Studies by Ahmad & Shah (2022) and Yang et al. (2021) demonstrated the noteworthy positive impacts of risk tolerance on investment intention in the stock market. Risk perceptions related to investment choices and performance significantly influence the decision-making process. One decides to refrain from investing if they believe a high risk is involved with their investment selection and performance. Mishra (2018) also found that households with a higher risk tolerance are more likely to participate in stock markets. Ahmad and Shah (2022) identified a robust correlation between risk tolerance, investment decisions, and investment performance. In essence, individuals who perceive a higher level of risk associated with their investment decisions and performance tend to make more informed decisions and experience improved investment success.

Social Interaction

Support for social interaction entails allowing people to interact meaningfully, exchange personal stories, and seek counsel from others on financial concerns. When assisted in fostering social contacts and participating in an investor community, people are more likely to establish a favorable desire to invest. Besides, people can learn important lessons, boost their self-esteem, and increase their understanding of investment techniques through social interaction. As a result, people are more likely to want to engage in investing activities.

Previous studies revealed that social interaction notably impacts individuals' inclination towards investing and participating in the stock market (Shanmugham & Ramya, 2012; Yang et al., 2021). This specific discovery corroborates the results from Wu et al. (2018), which posited that social interaction significantly influences individuals' investment intentions in the stock market. Novice investors may derive elevated levels of both

utilitarian and hedonic values from social values, and hedonic values primarily drive the inclination towards investing in the stock market. Experienced investors tend to prioritize utilitarian values to a greater extent. Furthermore, Shanmugham and Ramya (2012) demonstrated that engaging in social interaction, such as utilizing social media and receiving information from close acquaintances, fosters an inclination towards investing in the stock market and consequently enhances participation in the stock market.

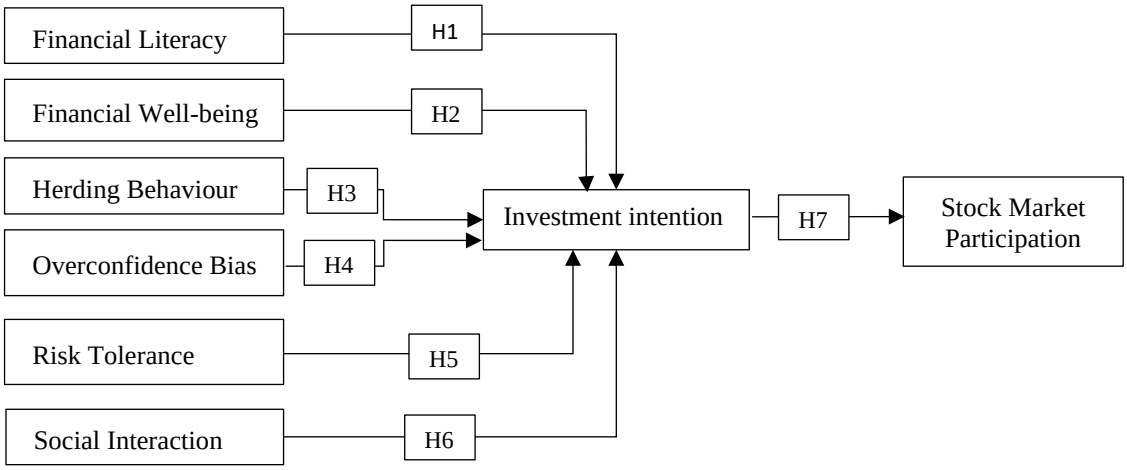
Theoretical framework and hypotheses development

Conventional financial theories are built upon the assumption that participants in financial markets behave rationally, operate within efficient market environments, and consistently make rational judgments. Investors exhibit irrational market behavior: they trade excessively, acquire stocks without considering their fundamental value, purchase the same stocks as their friends, base their decisions on past performance, and retain losing stocks while selling winning ones. The concept of investment decision remains elusive, as discussions on its various facets have not yet yielded definitive principles or theories that can be universally applied (Ahmad et al., 2022). Furthermore, most researchers also stated that the feelings, human behavior, and perspectives an investor brings to the investment process should not be overlooked by research (Ahmaed & Noreen, 2021; Amin & Pirzada, 2014; Yang et al., 2021).

The effect of behavioral factors such as financial literacy, financial well-being, herding behavior, overconfidence bias, risk tolerance, and social interaction on investment intention to participate in the stock market was explored by various investigators (Ahmaed & Noreen, 2021; Bakar & Yi, 2016; Yang et al., 2021). Understanding investors' behavior is more important than understanding stocks; therefore, understanding such behaviors is vital. Even experienced investors usually fail because they permit their cognitive biases to determine their decisions (Jaiyeoba & Haron, 2016).

Therefore, comprehending the investment decision-making behavior of Malaysians may facilitate the implementation of measures that encourage investors to engage actively, aligning with their long-term investment objectives while considering their short-term requirements (Mishra, 2018). Applying the financial behavior theory in the context of this study, it is proposed that financial literacy, financial well-being, herding behavior, overconfidence bias, risk tolerance, and social interaction influence stock market investment intention and participation. Concerning the financial behavior theory, the following theoretical framework and hypotheses were proposed for this study, as shown in Figure 1.

Figure 1: Research model



Therefore, based on the financial behavior theory and past literature, the following hypotheses were developed:

H1 - Financial literacy has a positive influence on investment intention
H2 - Financial well-being has a positive influence on investment intention.
H3 - Herding behavior has a positive influence on investment intention.
H4 - Overconfidence bias has a positive influence on investment intention.

H5 - Risk tolerance has a positive influence on investment intention.
H6 - Social interaction has a positive influence on investment intention.
H7 - Investment intention has a positive influence on stock market participation.

3. Methodology

Sampling

This study utilized a quantitative research approach with a recommended sampling method by Hulland et al. (2018). The study used G*Power application tools to determine the minimum sample size needed, which was 98 respondents for one independent variable and two dependent variables, using a medium effect size (f2) of 0.15. However, 690 questionnaires were collected through an online questionnaire for two months.

Measurement Items

Data were collected using a well-structured and self-administered questionnaire with questions in a prearranged order. The questionnaire items were developed by the researchers for this study. The questionnaire was divided into nine main areas. Section A dealt with the demographic profile, which included students' general information such as gender, race, age, education level, and others. Section B represented the dependent variable, which was stock market participation. Section C touched on the variable, which was investment intention. Meanwhile, Section D focused on the students' financial literacy.

On the other hand, Section E highlighted the third determinant factor, which was students' financial well-being. Next, Section F emphasizes herding behavior. Then, Section G focused on overconfidence bias. Section H consists of risk tolerance and Section I highlights the factor that emphasises social interaction. All items in Section B until F were measured on a five-point Likert. Scale ranging from 1-strongly disagree, 2-disagree, 3-Moderate, 4-Agree, and 5-Strongly Disagree. The average time taken by each respondent was almost 10 to 15 minutes. A total of 700 questionnaires were distributed, and 690 (9%) were returned. However, 21 sets were discarded due to incompetent data, resulting in merely 669 usable responses.

Data Analysis

Data analysis is vital in uncovering valuable insights and reaching conclusive findings. In this section, we describe the data analysis methods employed in our study, emphasizing using two essential tools: Statistical Package for the Social Sciences (SPSS) for descriptive analysis and SmartPLS software for model analysis. This comprehensive approach enabled us to thoroughly examine the research variables, evaluate their interrelationships, and assess the validity of our proposed theoretical model. By leveraging these analytical techniques, we were able to gain a deeper understanding of the data and extract meaningful findings.

This study employed SmartPLS software, a powerful statistical tool that utilizes a partial least squares (PLS) approach to evaluate the proposed theoretical model and explore the relationships between variables. This approach is particularly well-suited for exploratory research and complex latent variable models. The model analysis consisted of two main components: the measurement model analysis and the structural model analysis.

4. Results

Demographic Profile

Descriptive analysis is an essential step in any empirical study as it provides an initial understanding of the data and facilitates the exploration of patterns and trends within the variables of interest. We used SPSS, a widely recognized statistical software, to conduct descriptive analysis in our research. This involved calculating measures of central tendency (e.g., mean, median) and dispersion (e.g., standard deviation, range) for the research variables.

To test the proposed hypotheses, a survey questionnaire was administered to university students in Malaysia, focusing on individuals aged 17-30 years. A total of 669 students actively participated in the study, with an intriguing distribution of respondents: 31.5% were males (211), while 68.5% were females (458). The ethnic distribution indicated that 99.4% of the participants identified as Malay (665), while the remaining 0.6% were

of Chinese ethnicity (4%). Regarding residential areas, approximately 54.6% of the respondents resided in rural regions, whereas 45.4% lived in urban areas. Furthermore, educational levels varied among the participants, with 47.4% at the diploma level, 48.6% pursuing a degree, and 3.9% enrolled in pre-diploma or certificate programs.

Measurement Model

The measurement model analysis assessed the research constructs' reliability, validity, and associated indicators. Following the guidelines proposed by Hair et al. (2017), the study examined convergent validity using measures such as factor loading, average variance extracted (AVE), and composite reliability (CR). The analysis findings affirmed that all the criteria successfully met the necessary standards. Notably, the factor loadings surpassed the recommended threshold of 0.7, the AVE values were higher than 0.5, and the CR values exceeded 0.7. These findings indicate that the scale measurements demonstrated satisfactory convergent validity, as depicted in Table 1.

Table 1: Convergent validity for scale measurement

Variable	Item	Loading	CR	AVE	VIF
Financial Literacy (FL)	FL1	0.646	0.846	0.58	2.402
	FL2	0.808			
	FL3	0.816			
	FL4	0.764			
Financial Well-being (FW)	FW1	0.694	0.836	0.507	1.586
	FW2	0.678			
	FW3	0.675			
	FW4	0.811			
	FW5	0.692			
Herding Behaviour (HB)	HB1	0.719	0.891	0.62	2.716
	HB2	0.769			
	HB3	0.831			
	HB4	0.817			
	HB5	0.797			
Investment Intention (INT)	INT1	0.845	0.925	0.756	2.735
	INT2	0.882			
	INT3	0.891			
	INT4	0.858			
Overconfidence Bias (OB)	OB1	0.783	0.911	0.673	2.921
	OB2	0.806			
	OB3	0.853			
	OB4	0.857			
	OB5	0.799			
Risk Tolerance (RT)	RT1	0.649	0.856	0.546	1.94
	RT2	0.756			
	RT3	0.805			
	RT4	0.825			
	RT5	0.638			
Social Interaction (SI)	SI1	0.847	0.937	0.75	2.735
	SI2	0.894			
	SI3	0.898			
	SI4	0.837			
	SI5	0.853			
Stock Market Participation (SMP)	SMP1	0.752	0.898	0.638	2.587
	SMP2	0.816			
	SMP3	0.784			
	SMP4	0.785			
	SMP5	0.853			

The study employed the heterotrait-monotrait (HTMT) ratio of correlations based on the multitrait-multimethod matrix to ensure discriminant validity, as Henseler et al. (2015) recommended. Discriminant validity is considered questionable if the HTMT value exceeds the threshold of HTMT.85 (0.85) suggested by Goodboy & Kline (2017) Or HTMT.90 (0.90), as proposed by Gold et al. (2001). As illustrated in Table 2, the results reveal that all the HTMT values are below the HTMT.85 threshold, indicating the presence of discriminant validity.

Table 2: HTMT ratio of correlations

	Variable	a	b	c	d	e	f	g	h
a	Financial Literacy								
b	Financial Well-being	0.645							
c	Herding Behaviour	0.792	0.605						
d	Investment Intention	0.767	0.573	0.678					
e	Overconfidence Bias	0.842	0.612	0.799	0.675				
f	Risk Tolerance	0.706	0.634	0.581	0.735	0.666			
g	Social Interaction	0.740	0.526	0.754	0.75	0.769	0.607		
h	Stock Market Participation	0.769	0.508	0.740	0.757	0.792	0.604	0.766	

Structural Model

The structural model analysis aimed to examine the relationships between the latent variables and test the proposed hypotheses. SmartPLS facilitated the estimation of path coefficients and provided measures such as the significance levels (p-values) and effect sizes. Furthermore, the significance and reliability of the structural model's relationships were evaluated using bootstrapping techniques. To evaluate the R2, standard beta, and t-values of the structural model, a bootstrapping procedure with 10,000 resamples was conducted. Additionally, as recommended by Hair et al. (2017), the predictive relevance (Q2) and effect sizes (f2) were examined. Detailed results can be found in Table 3.

Table 3. Structural model

Hs	Relationship	Std. beta	SE	t-value	Decision	f2	R2	VIF	Q2
H1	FL → INT	0.176	0.045	3.879**	Supported	0.034		2.402	
H2	FW → INT	0.038	0.034	1.135	Unsupported	0.002		1.586	
H3	HB → INT	0.132	0.049	2.673**	Supported	0.017		2.716	
H4	OB → INT	-0.015	0.05	0.301	Unsupported	0.000		2.921	
H5	RT → INT	0.287	0.037	7.819**	Supported	0.121		1.94	
H6	SI → INT	0.326	0.051	6.358**	Supported	0.114		2.735	
H7	INT → SMP	0.679	0.029	3.642**	Supported	0.856	0.607	2.735	0.593

Note: ** p<0.01

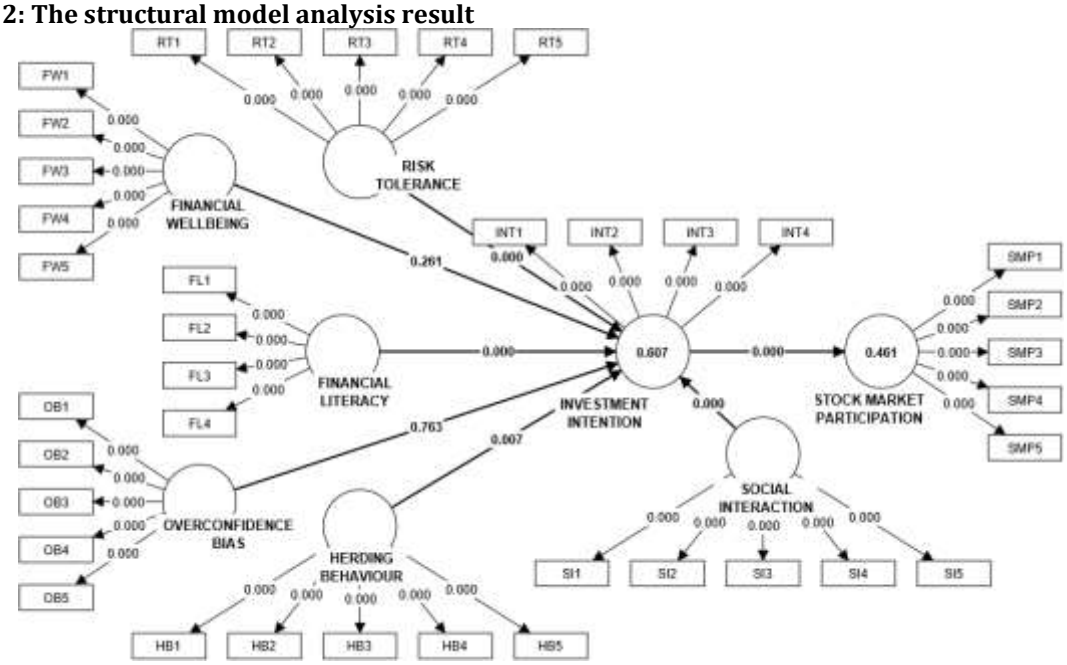
Based on the structural model analysis findings, as shown in Figure 2, several factors were significant predictors of investment intention, which in turn was found to predict stock market participation strongly. Financial literacy (β=0.176, p<0.001) was found to have a significant positive effect on investment intention, suggesting that individuals more financially literate are more likely to express an intention to invest. Herding behavior (β=0.132, p=0.004) was also a significant predictor of investment intention, indicating that individuals who perceive others in their social networks to be investing are more likely to express an intention to invest themselves. Additionally, risk tolerance (β=0.287, p<0.001) and social interaction (β=0.326, p<0.001) were also significant positive predictors of investment intention.

Furthermore, the analysis showed that investment intention had a strong positive effect on stock market participation. This suggests that individuals who intend to invest are more likely to participate in the stock market. Therefore, H1, H3, H4, H6, and H7 ware supported the study hypotheses. On the other hand, financial well-being (β=0.038, p=0.128) was an unsupported predictor of investment intention. Similarly, overconfidence bias (β=-0.015, p=0.382) was also found to be an unsupported predictor of investment intention, indicating that these factors did not significantly affect investment intention. Thus, H2 and H5 have not supported the study hypotheses.

The study employed the blindfolding procedure to evaluate the model's predictive relevance. A commonly used technique, Stone-Geisser's Q2, was applied as a criterion for assessing predictive relevance and examining the R2 values. This approach, as emphasized by Henseler et al. (2009), serves as a valuable measure for evaluating the model's predictability. By employing the blindfolding procedure, Q2 assesses the model's predictive validity using PLS analysis.

Typically, the Q2 is computed with a leave-one-out cross-validation approach, with a recommended omission distance of 5–10 in PLS analysis (Akter et al., 2013). If the resulting Q2 value exceeds 0, the model holds predictive relevance for a specific endogenous construct (Hair et al., 2017). Notably, the analysis findings demonstrate a Q2 value of 0.593 for stock market participation, surpassing zero and indicating a substantial level of predictive relevance within the model. According to the guidelines provided by Hair et al. (2017), a Q2 value of 0.02, 0.15, or 0.35 represents small, medium, or large predictive relevance, respectively, between an exogenous construct and a specific endogenous construct. Hence, this model has large predictive relevance.

Figure 2: The structural model analysis result



Discussion

The findings derived from the structural model analysis and the results presented in the table offer several implications and predictions in real-world contexts. One of the most significant implications is that financial literacy positively influences investment intention. Implementing financial literacy programs and interventions can enhance individuals' inclination to invest. This finding aligns with previous research, consistently demonstrating a positive association between financial literacy and investment behavior.

In addition, the analysis reveals that financial well-being does not significantly influence investment intention, indicating that improving individuals' financial well-being may not necessarily translate into an increased inclination to invest. This finding is unexpected, as financial well-being is often considered a significant predictor of financial behavior. However, it is possible that other factors, such as financial literacy or risk tolerance, exert a more substantial influence on individuals' investment intentions.

Furthermore, the positive relationship observed between herding behavior and investment intention suggests that the investment decisions made by others can influence individuals. This finding aligns with previous research, which has consistently demonstrated the significant impact of social factors on shaping individuals' financial behavior.

Moreover, the study highlights that investment intentions positively influence stock market participation, indicating that increasing individuals' investment intentions can effectively promote greater engagement in the stock market. This finding holds significant implications for policymakers and financial institutions aiming to stimulate stock market participation.

Additionally, the non-significant relationship observed between overconfidence bias and investment intention suggests that overconfidence may not necessarily increase individuals' investment intentions. This finding is unexpected, considering that overconfidence bias is a commonly observed cognitive bias in financial decision-making. However, it is plausible that other factors, such as financial literacy or risk tolerance, exert a more substantial influence on shaping individuals' investment intentions.

Finally, the compelling positive associations observed between risk tolerance, social interaction, and investment intention imply that individuals with a higher propensity for risk-taking and with extensive social networks are more inclined to express an intention to invest. These findings align with prior research emphasizing the influential roles of risk tolerance and social influence in shaping financial behavior. Overall, the findings presented in the structural model have important implications for individuals, financial professionals, and policymakers interested in promoting greater investment intention and stock market participation.

A deeper understanding of the factors influencing investment intention opens up opportunities to devise more impactful interventions and policies to encourage individuals to invest in their financial future. With this knowledge, policymakers and financial institutions can develop targeted strategies to address barriers, enhance financial literacy, promote risk awareness, and cultivate social networks that support investment decision-making. By aligning interventions with the key drivers of investment intention, such as risk tolerance, social interaction, and financial literacy, stakeholders can effectively empower individuals to make informed investment choices and participate in the stock market. This can contribute to the overall financial well-being of individuals and the broader economy.

5. Conclusion and Implications

The results suggest that financial literacy, herding behavior, risk tolerance, and social interaction positively influence investment intention. In contrast, financial well-being and overconfidence bias have no significant impact. Additionally, investment intention has a strong positive influence on stock market participation. These findings can help financial institutions and policymakers develop targeted interventions to encourage investment behavior among individuals. For example, financial literacy programs can be developed to increase financial knowledge among individuals, and social interaction programs can be created to encourage investment among peer groups.

Future research could explore the impact of financial education interventions on financial literacy, financial well-being, and investment behavior. Furthermore, exploring the connection between overconfidence bias and investment behavior in greater detail would be valuable, as the present study did not reveal a significant relationship. Finally, the influence of social interaction on investment behavior could be studied in more detail, focusing on the role of social media and online communities in shaping investment decisions.

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Analyzing the Impact of Financial Liberalisation on Malaysian Bank's Performance: Quantile Regression Analysis

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Abstract: This study employs quantile regression analysis to examine the impact of financial liberalization on the performance of Malaysian banks, focusing on how these effects vary across different performance levels. A liberalized banking sector prompted commercial banks to intensify risk-taking activities, which ultimately could affect the bank's performance. Using quantile regression analysis, it shows that only the middle quantile indicates all the significant variables for both OLS and quantile analysis. This study found that lower-performing banks may face adverse effects, including increased risk and deteriorating performance, due to heightened financial liberalization. The findings highlight the differential impact of financial liberalization across the performance spectrum and suggest that while liberalization can drive economic growth targeted regulatory measures are necessary to support less and mitigate potential risks to overall financial stability in Malaysia.

Keywords: *Financial Liberalisation, bank performance, quantile.*

1. Introduction and Background

A strong financial system is essential for bank performance and financial stability, which influence investor confidence, economic growth, and overall economic stability. Banks can run effectively and profitably when the financial system is stable. Banks serve as financial intermediaries that facilitate the implementation of monetary policy within the financial system to ensure financial stability. However, the shift from financial repression to financial liberalization, which encourages the movement of capital across borders and the expansion of the financial sector, has led to substantial transformations in the global financial system. Hence, the transition from financial repression to financial liberalization, characterized by the deregulation and reform of the domestic financial sector, will inevitably impact the stability of the financial system. Hence, preserving financial stability requires a thorough understanding of bank performance.

The seminal works of Shaw (1973) and McKinnon (1973) gave rise to the financial liberalization theory. These academics contend that financial repression will hinder financial sector development. Consequently, they recommend financial liberalization policies will boost investment and savings as well as economic growth. According to Hamdi and Jlassi (2014), financial liberalization is the process of putting in place several policies aimed at getting rid of the different controls and limitations that a nation has placed on its financial sector to promote economic growth. Reforming the financial system and financial liberalization are related. Unite and Sullivan (2003) state that the reforms take the form of lowering barriers that allow foreign banks to enter the domestic market and relaxing or eliminating restrictions on foreign investment. Deregulation, which permits foreign-controlled banks to operate in the country, and regulation, which provides incentives for foreign ownership of a portion of domestic banks, are two possible forms of this reform. To facilitate the process of financial liberalization for an integrated global financial market, the government drives and supports it through policy reform.

The Central Bank of Malaysia formerly known as Bank Negara Malaysia (BNM), declared the commencement of its financial liberalization in the year 2009. The announcement of liberalization measures intends to improve Malaysia's economic ties with other nations and highlight the financial sector's crucial role as a catalyst and facilitator of economic progress. The goals outlined in the Financial Sector Master Plan (FSMP)in the year 2001, to create a strong, diverse, and effective financial sector are aligned with these liberalization initiatives. The primary goal of further liberalization is to create a more robust, diverse, and effective financial industry. Furthermore, the goal of financial liberalization is to make domestic and international financial institutions more competitive to maintain overall financial stability and soundness. The most recent stage of financial

liberalization has been centered on improving the resilience and efficiency of the system. The Financial Sector Blueprint 2022-2026 of Bank Negara Malaysia (BNM) remains committed to enhancing financial inclusion and strengthening digital and innovative financial services to meet the dynamic demands of the market. Overall, Malaysia has changed its approach to financial liberalization from initial market liberalization and deregulation to a more balanced approach that takes sustainability, innovation, and stability into account. The country continues to adapt its financial policies to adhere to global standards and address emerging challenges.

Shehzad and Haan (2008) and Daniel and Jones (2007) contend that financial liberalization and financial stability are related and that one will cause the other. Gruben, Koo and Moore (2003) provide more evidence in favor of this theory, concluding that the likelihood of bank collapse increases under liberalized regimes. Hence, financial liberalization would support financial development and boost economic progress even if it is associated with financial instability (Ranciere, Tornell, and Westermann, 2006). Therefore, the research gap is unified by an understanding of how financial liberalization affects banks at various performance levels is made possible by quantile analysis. This approach looks at the effects at different places in the distribution of bank performance indicators, such as return on assets (ROA), rather than just concentrating on average effects (Koenker & Hallock, 2001).

Quantile regression studies by Nguyen, Skully, & Perera (2021) have demonstrated that there may be substantial variation in the impact of financial liberalization on return on assets (ROA) between quantiles. The impacts of financial liberalization on bank performance have been the subject of a recent study (Shen, Chen, & Chen, 2020). These findings imply that while financial liberalization can raise efficiency and profitability, it can also increase risk-taking. Quantile analysis has emerged as a valuable tool in this context, allowing researchers to examine how liberalization affects banks across different levels of performance and risk. Using quantile regression analysis, Claessens and van Horen (2014) explore how financial liberalization impacts bank performance and find that this effect varies significantly across different quantiles of the bank performance distribution.

Therefore, this research intends to add to the growing body of knowledge on financial growth and economic policy by offering empirical data on the connection between financial liberalization and bank performance in Malaysia. It aims to provide insights into the diverse consequences of liberalization policies by concentrating on the quantile effects. These insights can then be used to generate more focused regulatory and policy actions that promote the banking sector's sustainable growth. Therefore, the rest of the work is divided into subsequent sections: the second section examines the existing literature; the third section provides a comprehensive explanation of the data and methodology, and the fourth section discusses the conclusions and analysis. The study's implications are discussed in the fifth and concluding section.

2. Literature Review

Research has demonstrated that financial liberalization may have both beneficial and bad consequences on bank performance. According to Levine et al. (2000), there is a possibility that it will improve bank efficiency and competitiveness through the removal of regulatory barriers to innovation. Yet, if robust regulatory frameworks aren't in place, it can encourage risk-taking and financial instability (Demirgüç-Kunt & Detragiache, 1998). For instance, if regulatory supervision is insufficient, liberalization may cause crises in emerging economies even if it can also increase efficiency (Rajan & Zingales, 2003). According to Hellmann et al. (2000), the regulatory environment's resilience has a critical impact on the overall impact of financial liberalization on bank performance.

Recent research has also explored the impact of financial liberalization on bank performance, offering insights from both Malaysian and global perspectives. Rathnayake et al. (2022) conducted a study on interest rate liberalization and commercial bank performance in Chinese A-Share banks, utilizing a Generalized Method of Moments (GMM) framework. The results indicated that interest rate liberalization and the removal of specific entry barriers enhanced competition and efficiency in the banking sector, leading to reduced bank interest margins. In a study focusing on Malaysian commercial banks, Ma & Soh (2021) examined the impact of liberalization on the determinants of bank efficiency. The research highlighted financial liberalization as a beneficial factor that stimulates the development of the financial sector by eliminating repressive policies,

thereby fostering efficiency and market liquidity. This study underscores the positive effects of liberalization on enhancing the operational efficiency and competitiveness of banks in Malaysia. Financial liberalization can improve asset quality and liquidity by promoting better risk management practices and access to diversified funding sources. This aligns with findings from (Farhat, 2023), who emphasizes that financial liberalization is a crucial determinant of banking sector development in emerging economies. 's study indicates a significant correlation between banking sector growth and financial liberalization, suggesting that liberalization facilitates better access to capital and promotes competitive practices among banks, ultimately leading to improved financial performance. Moreover, the entry of foreign banks, as noted, introduces advanced management practices and technology, further stimulating the development of the Malaysian banking sector.

Financial liberalization has significantly impacted the performance and stability of banks in Malaysia. Abdullah et al. (2004), for example, look at how financial liberalization affected the Malaysian banking industry and discover that although it increased competitiveness and efficiency, it also brought new risks and vulnerabilities, which were especially noticeable during the 1997–1998 Asian financial crisis. To reduce those risks, the study highlights the necessity of efficient regulatory structures. The study conducted by Elryah (2014) offers empirical data about the effects of liberalization and reforms on the performance of Islamic banks in Malaysia. The study employed a panel regression model to examine the relationship between Islamic banks' performance and financial liberalization and reforms. The Z-score was utilized to quantify the association between the banks' equity and return on assets. The results show that profitability, return on assets, financial liberalization and openness, and inflation all statistically positively affect the performance of Islamic banks.

Andries and Capraru (2011) examine how financial liberalization affected the performance of 236 banks from 17 countries in Central and Eastern Europe between 2004 and 2008. Their findings demonstrate that nations with higher degrees of liberalization and openness may boost their economies and provide their customers with more affordable services. Additionally, the degree of bank reform, the soundness score, bank safety, and the interest rate liberalization indicator all positively affect banks' productivity development. Andri et al. (2012), Examined the effects of the banking reform on the financial performance of five Central and Eastern European nations between 2001 and 2008. The evidence shows that the bank performance index, which is based on the cost of intermediation, operational performance, and return on assets, is positively impacted by the financial and banking reform indices. Recent empirical evidence, Nguyen, Skully, and Perera (2021), Kim, Lin, and Suardi (2022), and Shen, Chen, and Chen (2020), among others, supports the results by demonstrating the intricate interactions between financial liberalization, bank performance, and risk-taking behaviors. Their findings suggest that while liberalization can drive efficiency, it also necessitates stringent regulatory oversight to mitigate associated risks (Arestis & Phelps, 2019). This is echoed by Moyo & Roux (2020), who conducted a study revealing that although financial liberalization can lead to improved efficiency, it simultaneously increases the potential for financial instability without adequate regulatory frameworks.

A meta-analysis of the effects of financial liberalization on bank risk-taking is presented by Shen et al. (2020), who contend that although liberalization can increase efficiency, it also calls for strict regulatory monitoring to control the risks involved. Using a quantile regression technique, Nguyen et al. (2021) show that middle quantile banks in Asia—including Malaysia—benefit most from liberalization in terms of return on assets (ROA). Further elaborating on these findings, Kim et al. (2022) demonstrate that the sequencing and timing of liberalization measures have a significant impact on their results. Kim et al. (2022) further elaborate on these findings, showing that the timing and sequence of liberalization measures critically affect their outcomes, with phased liberalization proving more beneficial for bank performance. Their research indicates that a phased approach to liberalization tends to yield more favorable outcomes for bank performance, suggesting that the order and timing of reforms are critical in determining their effectiveness (Wang & Luo, 2023). This aligns with the broader literature on financial liberalization, which posits that the regulatory environment significantly influences the outcomes of such reforms (Moyo & Roux, 2020). Additionally, Moyo & Roux (2020) argue that the interaction between financial liberalization and regulatory quality is crucial, noting that stronger regulatory frameworks can mitigate the risks associated with liberalization, thereby reducing the likelihood of financial crises. Similarly, Wang & Luo (2023) highlight that while financial liberalization can stimulate growth, it also poses risks that need to be managed effectively to ensure banking stability.

The relationship between asset quality and bank performance is well-documented in the literature, highlighting the critical role that asset quality plays in determining profitability and stability. Roman and Danuletiu (2013) demonstrate that banking liquidity, asset quality, and management quality are the primary determinants of banks' profitability and stability, while economic growth rate and banking concentration are the external factors that have the greatest impact on banks' profitability. High asset quality typically leads to lower provisioning for bad debts, higher profitability, and enhanced bank stability. Poor asset quality, on the other hand, increases the risk of defaults, requiring higher provisions and reducing profitability. Studies from both Malaysian and global perspectives have shed light on the impact of asset quality on bank performance (Aldizar & Agustina, 2022). Aldizar & Agustina, 2022) found that asset quality has a significant negative effect on profitability, emphasizing the importance of maintaining high asset quality levels for improved financial performance. Similarly, Samail et al. (2018) highlighted a significant relationship between asset quality and liquidity management in influencing the performance of Islamic banking in Malaysia, underscoring the critical role of asset quality in shaping bank performance that can be measured using a bank's profitability.

Further literature reinforces these findings by exploring the broader implications of asset quality on banking performance. Muriithi & Waweru (2017) examined liquidity risk and its impact on financial performance, revealing that effective liquidity management is closely tied to asset quality, which ultimately influences profitability. Additionally, Gharaibeh et al. (2022) discussed how various risks, including asset quality, affect the stability of banks, suggesting that maintaining high asset quality is vital for enhancing bank stability and profitability. Moreover, the CAMEL framework, which includes asset quality as a key component, has been widely used to assess bank performance and stability, indicating that banks with higher asset quality tend to exhibit better financial health and resilience against economic shocks (Kočenda and Iwasaki, 2021). These studies collectively underscore the importance of asset quality in shaping the financial performance and stability of banks, reinforcing the need for effective asset management strategies to mitigate risks and enhance profitability.

To explore the impact of liquidity on bank performance, various studies have provided valuable insights from both Malaysian and global perspectives. A study by Arif & Anees (2012) found that liquidity risk significantly affects bank profitability, with factors such as liquidity gap and non-performing loans exacerbating this risk. Similarly, Yahaya et al. (2022) revealed a significant negative association between liquidity risk and bank performance, highlighting the importance of effective liquidity management for improved financial performance. These findings emphasize the critical role of liquidity management in influencing bank performance. Sufficient liquidity ensures that a bank can cover withdrawals from customers and reduce the risk of a bank run. However, holding too much liquidity can reduce profitability since liquid assets often yield lower returns. Conversely, insufficient liquidity can lead to solvency issues and higher funding costs. Recent studies further elaborate on these themes, highlighting the nuanced relationship between liquidity and profitability. Ahmad (2023) discusses how banks with lower liquidity thresholds rely on profitability to enhance their stability and attract deposits, thereby improving liquidity and reducing exposure to liquidity risk. In a broader context, Mohammad (2024) examines the relationship between liquid asset holdings and profitability in South Asia, indicating that banks with higher liquid assets may engage in riskier behaviors, which can impact their overall performance. Additionally, Ben-Ahmed (2023) explores the interplay between credit and liquidity risks, revealing that increased liquidity risk negatively affects bank profitability, particularly in the context of Tunisian banks. These findings collectively underscore the critical importance of liquidity management in shaping bank performance, as banks must navigate the delicate balance between maintaining sufficient liquidity and optimizing profitability.

Studies also have extensively explored the relationship between capital adequacy and bank performance from both Malaysian and global perspectives. For instance, Odekina (2019) highlighted that capital adequacy significantly stimulates and enhances the financial performance of commercial banks, underscoring the importance of sufficient capital and effective management in driving improved performance. Strong capital adequacy improves a bank's ability to absorb losses reduces the likelihood of insolvency and enhances overall stability. However, maintaining high capital ratios can also limit the return on equity (ROE) by reducing leverage. This assertion is supported by findings from Amissah & Opoku (2023), who reported an inverse relationship between the capital-to-asset ratio (CAR) and return on equity (ROE) among selected banks in Ghana, indicating that higher capital levels may limit profitability due to reduced leverage. Similarly, Balami &

Chalise (2023) found that while capital adequacy is essential for financial stability, its impact on profitability can be complex, suggesting that excessive capital may hinder banks' ability to optimize returns on equity. These studies collectively highlight the dual role of capital adequacy in promoting stability while potentially constraining profitability.

Further research has expanded on these themes, illustrating the nuanced dynamics between capital adequacy and bank performance across different contexts. For instance, Setiawan & Muchtar (2021) demonstrated a positive relationship between return on equity and capital adequacy in Indonesian banks, suggesting that profitable banks tend to maintain higher capital levels. In contrast, Sah & Saud (2022) found a significant negative association between capital adequacy and ROE in Nepalese commercial banks, indicating that while capital is crucial for stability, it may also impose constraints on profitability. Additionally, Harkati et al. (2020) explored the differential impacts of capital adequacy on risk-taking behavior in conventional and Islamic banks in Malaysia, revealing that adequate capital can mitigate risk-taking tendencies, thereby enhancing overall financial performance. This body of literature underscores the importance of capital adequacy as a determinant of bank performance, highlighting the need for banks to strike a balance between maintaining sufficient capital for stability and optimizing returns for shareholders

The relationship between non-performing loans (NPLs) and bank profitability remains a critical area of inquiry in the banking literature. Athanasoglou, Brissimis, and Delis (2008) and Dietrich and Wanzenried (2011) have established that higher NPL ratios negatively impact profitability by increasing provisions for loan losses and reducing income from interest-bearing assets. Recent studies, such as those by (Wang & Luo, 2019), have further explored this relationship, indicating that financial liberalization can exacerbate NPL issues if not accompanied by robust regulatory frameworks. Their findings suggest that while liberalization can enhance competition and efficiency, it may also lead to increased risk-taking behaviors among banks, resulting in higher NPL ratios and subsequent profitability challenges. This underscores the importance of effective risk management practices in navigating the complexities introduced by financial liberalization.

The link between asset quality, liquidity, capital adequacy, non-performing loan and financial liberalization is dynamic and significantly influencing bank performance. Maintaining a balance among these elements is crucial for ensuring the stability, profitability, and resilience of banks. Effective regulatory frameworks and prudent risk management practices are essential to maximize the benefits of financial liberalization while mitigating potential downsides. By offering empirical insights into the distinct effects of financial liberalization on Malaysian banks, this study adds to the body of knowledge on financial development and economic policy. To ensure sustainable growth and stability in the banking industry, more effective policy interventions can be informed by the more detailed knowledge of these impacts provided by the quantile analysis technique.

3. Research Methodology

This study considered Malaysian samples, where data was collected from 2012–2022. For this study, the Malaysian market offers an interesting setting for several reasons. The sampling criterion for this study is to include all commercial banks in Malaysia. The variable that will be considered in this study is the bank's performance measured using return on assets (ROA). The ROA is the dependent variable and the independent variable is financial liberalization quantified using the financial freedom index. An index with a value between 0 and 100 reflects the degree to which banks are subject to regulatory constraints on their financial freedom. More freedom and less restrictions are indicated by a higher value (Berger et al., 2009; Sufian and Hassan, 2012). Meanwhile, several control variables that could influence financial stability are asset quality, liquidity, capital adequacy, and non-performing loans. The definitions and measurements of each variable used in this study are shown in Table 1.

Table 1: Definition and sources of variables

Variables	Description	Data source
DV: Bank's Performance (ROA)	Return on Assets (ROA) based on commercial bank	Bank Report
Financial Liberalisation (FL index)	Index of financial liberalisation (FLIB)	Heritage.org
Asset quality (ASQUAL)	Bank Specific data (Impaired loans / Gross loans)	Bank Report
Liquidity (LRATIO)	Bank Specific data (Loan/ Total Deposit and Borrowing)	Bank report
Capital adequacy ratio (CAR)	Bank Specific data (Total Equity / Total Assets)	Bank report
Non-performing loan (NPL)	Bank Specific data (non-performing loan/ Gross loans)	Bank report

This study employs an empirical methodology that utilizes panel data analysis and quantile regression. Quantile regression, initially introduced by Koenker and Bassett in 1978, is a method that expands upon the traditional least squares estimation of the average value to encompass a range of models for various conditional quantile functions. Traditional least squares regression provides an approximation of the conditional mean and conditional median, which are placed at the center of the distribution. However, this only offers an imperfect description of the conditional distribution (Mosteller and Tukey, 1977). Quantile regression is employed to obtain specific details about points in the conditional distribution, apart from the conditional mean. This approach, as demonstrated by Buchinsky (1994, 1995) and Eide and Showalter (1997), effectively reflects the entire distribution. Quantile regression is used to estimate different quantiles within a population.

Furthermore, the quantile regression possesses various advantageous characteristics. The quantile regression estimator minimizes the weighted sum of absolute residuals instead of the sum of squared residuals. As a result, the predicted coefficient vector is not affected by outliers. Furthermore, a quantile regression model utilizes a linear programming form, which facilitates analysis. Furthermore, this technique is especially valuable in cases where the conditional distribution deviates from a typical form, such as being asymmetric, having fat tails, or being truncated. The utilization of quantile regression enables a more comprehensive understanding of the impact of explanatory variables on the dependent variable. The quantile regression method enables us to determine the impact of the covariates at various points in the conditional distribution of the dependent variable.

Specification of the estimation model is used to analyze the relationship between financial liberalization on bank performance, especially for selected commercial banks in Malaysia. The estimation models of this study are as follows:

$$\text{ROA} = \beta_0 + \beta_1 flindex_{it} + \beta_2 asqual_{it} + \beta_3 lratio_{it} + \beta_4 car_{it} + \varepsilon_{it} \quad (1)$$

This study employs quantile regression. Quantile regression (QR) analysis to measure the impact of financial liberalization in conjunction with other factors affecting the bank performance using ROA. Quantile regression (QR) is an extension of the ordinary least squares (OLS) estimation of the conditional mean to a collection of models for various conditional quantile functions and purposes by Koenker and Bassett (1978). Moreover, when the error term is non-normal, the quantile regression estimator can provide a more reliable and effective substitute for OLS (Buchinsky, 1995). Based on equations (1), this study extended the model of Koenker and Bassett (1978) to estimate the model separately for sukuk yield using the QR estimator as follows:

$$\gamma = V_t'\beta_0 + \mu_{\theta t}; Quant_\theta \left(\frac{\gamma_t}{V_t'}\right) = V_t'\beta_\theta \quad (2)$$

Where V' is the regressor set of the financial liberalization and other control variables, $B\theta$ is the slope coefficient quantifying the level of the financial liberalization on the bank performance in quantile θ, is the conditional quantile of bank performance, μ is the error term. The estimator for the QR involves minimizing the sample size β and minimizes the weighted absolute values of the residuals using all available data (Buchinsky, 1995; Koenker & Bassett, 1978), as shown in equations (5) and (6), where the θ-th quantile regression yields $0 < \theta < 1$.

$$Min \sum \Theta \gamma t - V_t' \beta_\theta \sum (1 - \Theta) \gamma t - V_t' \beta_\theta$$

$$\beta \gamma_t \geq V_t' \beta \qquad \gamma_t < V_t' \beta$$

Where γ ≥ V'β and γ < V'β are indicator functions, which describe a positive and a negative value of residuals contingent on the value of θ. As a quantile θ increases from 0 to 1, one can find the total conditional distribution of profitability based on bank performance, which depends on the regressor group of the financial liberalization. Instead of squaring all errors, this method gives a weight of (1-θ) to positive residuals and a weight of (1–θ) to negative residuals. In this study, the regression estimation was performed for five different quantiles based on the 10th, 25th, 50th (median), 75th, and 90th percentiles of the profitability spillover distribution of bank performance. The use of a proxy for return on an asset in the set of regressors implies that even within a given conditional quantile, the response of bank performance spillovers varies depending on the level of financial liberalization.

4. Results and Discussion

The empirical investigation is conducted using estimates. Equations (1) and (2) for the 10th, 25th, 50th (median), 75th and 90th quantiles. This allows us to examine the effects of the explanatory variables at different points in the relationship based on the impact of financial liberalization on bank performance. The empirical results discussion between the independent variables and dependent variables are shown in Table 4. The OLS estimates are shown in the last columns of Table 4 for comparison purposes.

Table 2 provides the descriptive statistics for the variables used in the analysis. Overall, the Descriptive analysis describes and summarizes the characteristics of the data set used. The mean value for all proxies of financial liberalization is 53 for ASQUAL is 2.0882 meanwhile for LRATIO is a positive value of 67.07 and CAR is 15.36. All the variables have a positively skewed distribution with a long right tail. Therefore, the assumption of a normal distribution of the error terms in ordinary least squares (OLS) is not assured and may lead to misleading outcomes. Quantile regression can address these issues and offer a more adaptable and comprehensive analysis for examining the influence of financial liberalization on bank performance. Meanwhile, the value of kurtosis measures the peak or flatness of the distribution of the series. The value equal to 3 shows the normal distribution of the series while the negative value shows the platykurtic series. Based on the Correlation matrix Table 3 is a statistical tool that measures the strength and direction of relationships between dependent and independent variables. The result shows all the indicators have a negative relationship with dependent variables.

Table 2: Descriptive analysis

Variables	Obs.	Mean	Std. dev	Min	Max	Skewness	Kurtosis
ROA	200	.9548	.515599	-.75	2.7	0.3735	0.6163
FL index	200	53	4.5940	50	60	0.1976	0.7271
LRATIO	200	67.072	37.339	2.31	252.38	0.2118	0.6541
ASQUAL	200	2.0882	3.0288	0	32.5	0.0046	0.0051
CAR	200	15.364	13.488	5.75	78.24	0.5195	0.5195
NPL	200	2.0882	3.0288	0	32	0.0393	0.0393

Table 3: Correlation Matrix

Variables	ROAA	FLINDEX	LRATIO	ASQUAL	CAR	NPL
ROA	1.0000					
FLindex	-0.0933	1.0000				
LRATIO	-.0519	-.0654	1.0000			
ASQUAL	-.1561	-.0734	.0654	1.0000		
CAR	-.4177	-.0654	-.2991	-.0940	1.0000	

NPL	-.1561	-.0734	-.1193	1.0000	-.0940	1.0000

Table 4: Regression Result

DV= ROA	$\beta_0 + \beta_1 flindex_{it} + \beta_ asqual_{it} + \beta_3 lratio_{it} + \beta_4 car_{it} + \varepsilon_{it}$					
	10th quantiles	25th quantiles	50th quantiles (Median)	75th quantiles	90th quantiles	OLS
FLlindex	-.01790	-.0058	-.0106**	-.0145***	-.04216	-.0168**
	(-1.21)	(-.94)	(-2.13)	(-3.22)	(-1.52)	(-2.40)
ASQUAL	-.07827*	-.0354	-.04916*	-.01253	-.03323**	-.0252**
	(-1.74)	(-1.31)	(-1.87)	(-0.37)	(-2.01)	(-2.37)
LRATIO	-.0003	-.0076	-.00317***	-.00312***	-.00602***	-.00308***
	(-0.33)	(-.87)	(-4.23)	(-5.66)	(-3.24)	(-3.40)
CAR	-.0226***	-.0182***	-.0157***	-.01314***	-.01446	-.01836***
	(-4.95)	(-4.44)	(-6.91)	(-2.82)	(-0.85)	(-7.35)
CONS	1.903**	1.3974***	2.0575**	2.405***	4.4885**	2.391***
	(2.18)	(3.43)	(7.37)	(9.10)	(2.39)	(6.07)

t statistics in parentheses, p<0.10* p<0.05**, p<0.01***

The empirical investigation is conducted by estimating equations at five quantiles, namely the 10th, 25th, 50th, 75th and 90th. Table 4 reports the results. For comparison purposes, we also provide the OLS estimates which are reported in the last columns of tables. In addition, this study also reports the statistical comparison of regression coefficients indicating the difference in the coefficients for each variable. Not all of the variables show significance for all the quantile phases. Moreover, the inter-quantile coefficient test further confirmed the differences among all of the coefficients in terms of the signs positive and negative. Although most of the coefficient is not significant for all quant, the coefficient of financial liberalization (FLindex) indicates the difference results for quant 10, 25 and 90 which is an insignificant negative sign.

Furthermore, the estimated coefficients on ASQUAL and LRATIO show a decreasing value and are insignificant at the 25th quantiles but for LRATIO it is not significant at the 10th and 25th. Meanwhile, the estimated coefficient on ASQUAL and LRATIO show different results on OLS and quantiles regression thus a significant negative impact on ROA. This implies that the impact of financial liberalization on ROA significantly at the middle of the quantile as supported by Nguyen et al. (2021) demonstrates that, in terms of return on assets (ROA), medium quantile banks in Asia—including Malaysia—benefit the most from deregulation. Bumann, Hermes, and Lensink (2013) in their studies, mentioned that Following liberalization, banks in developing nations show that those in the middle quantile see a significant improvement in ROA. Accordingly, the regression results for CAR have a statistically significant negative impact on ROA for the fourth phase of quantile. This study is also consistent with. Levine (2005) where banks in liberalized environments may experience greater instability and lower profitability due to heightened competition and risk-taking behaviors. This shows that the variable of CAR is influenced by the impact on ROA. The result is the same referred to the approach on OLS and quantile regression. This shows that the role of indicator CAR is vital and aligns with previous studies mentioned (Balami and Chalise, 2023).

Based on the result estimated above it shows that only the middle quantile indicates all the significant variables for both OLS and quantile analysis. According to this, banks operate best in environments with moderate degrees of financial liberalization, where advantages like greater efficiency and competition are realized without posing undue risk or instability (Ghosh, 2014). Banks can benefit from better market conditions and operational efficiency in this medium quantile, which will increase their performance and profitability (Fung & Fung, 2016). However, excessive liberalization could put banks at higher risk of instability, which emphasizes the necessity for a balanced approach. According to Chen et al (2017), quantile regression sheds light on the limitations of ordinary least squares (OLS) in capturing the subtle effects of liberalization. It suggests that policies should be aimed at achieving a balanced level of liberalization to maximize bank performance while preserving stability. Therefore in the Malaysia market to safeguard financial stability Considerable government interference is needed. This study employs a quantile technique to examine the relationship between financial liberalization and return on assets (ROA). It not only gives useful insights into how financial liberalization

affects ROA and their co-movement but also sheds light on the behavior of these variables and the extent to which their reactions endure over time.

5. Conclusion

The empirical findings can be succinctly described as follows: The research identifies a consistent relationship between financial liberalization and return on assets (ROA) using both ordinary least squares (OLS) and quantile regression methods. The results indicate that the impact of financial liberalization on bank performance, as measured by ROA, is particularly significant at the middle quantile. Banks may have increased competition, pressure on profit margins, and difficulties with risk management and regulatory supervision at this moderate degree of liberalization (Liu, 2016). This study emphasizes several significant implications for financial institutions and governments. It implies that the impacts of mild financial liberalization are not consistent at different performance levels, even while it can greatly improve bank performance, especially at the middle quantile. This emphasizes the necessity of customized financial strategies to deal with particular regulatory and risk management issues that banks encounter in different stages of liberalization. To maintain public trust and economic stability, policymakers should balance regulatory control with liberalization. Furthermore, the study supports the use of more complex analytical techniques in financial research and policy development by demonstrating the superiority of quantile regression over conventional OLS methods in capturing the complex effects of financial liberalization. To summarize, while financial liberalization can enhance the performance of Malaysian banks, its impact is not entirely uniform. Both policymakers and banks should carefully assess the many impacts to optimize the advantages of liberalization and protect financial stability.

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Developing a Framework for Technopreneurial Behavior: The Mediating Role of Technopreneurial Intention and Moderating Role of Attitudes

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Abstract: Technopreneurship is a combination of technology and entrepreneurship. Entrepreneurs who are involved in technology-based ventures called technopreneurs employ technology throughout their venture operations and produce technology-based services or products. In the era of globalization, especially post-COVID-19 pandemic, technopreneurship has become more significant as it can drive economic growth. Hence, it is very crucial to further investigate technopreneurship behaviour among university students, as they are the future generation that will lead the development of the country and magnify globalization. Few technopreneurs studies have been conducted previously, however, technopreneurs in the Malaysian context are scarce. Thus, this study proposes to investigate the relationship between subjective norms, perceived behavioural control, and technopreneurs' education towards technopreneurs' behaviour, to ascertain the mediating effect of technopreneurs' intention between subjective norms, perceived behavioural control, and technopreneurs' education towards technopreneurs behaviour, and lastly to determine the moderating effect between attitudes, technopreneurs intention, and technopreneurs behaviour, that is based on the Theory of Planned Behaviour. This study proposed a research method through a survey via questionnaire. In determining the sample size, the software of Raosoft is proposed, and for data analysis, the study has proposed SPSS for data screening and PLS-SEM for the main analysis.

Keywords: *Technopreneurs' behaviour, technopreneurs' intention, theory planned behavior*

1. Introduction

The post-COVID-19 pandemic has had an impact on the technological landscape as the world has experienced the transition after post pandemic era ended. The world is evolving rapidly in fostering the adoption of digital technology and reshaping the global economy Brynjolfsson et al. (2020). The Ministry of Higher Education (MOHE) in Malaysia has made entrepreneurship education one of its top agendas in its effort to promote the nation's economic growth and human capital formation. This is agreed by Farinha et al. (2020) who emphasize that entrepreneurship able to promote economic growth and development, particularly by generating innovation and creating jobs, which are crucial for retaining competitiveness in the global market. MOHE is also keen on technology entrepreneurship (technopreneurship) among university students, and specific KPIs (Key Performance Indicators) have become their annual target to be achieved to portray their seriousness in ensuring technopreneur-ship among future generations. Two out of seven of their annual KPIs highlight technopreneurship which are the number of students participating in the technopreneurship programs and also the number of technology-based start-ups among students (MOHE, 2021). The universities play a pivotal role in cultivating future technopreneurs among students by comprehending the factors that influence students' technopreneurs' behaviour for developing successful educational programs and policies. The role of the Ministry of Education as a policymaker and the universities is where the place students can thrive in their technopreneurship. Universities play a crucial role in fostering technopreneurship by designing interdisciplinary curriculums that combine technology skills and training (Hisrich, Peters, and Shepherd, 2017), as incubators and accelerators that provide mentorship and platform among student start-ups (Mian, Lamine and Fayolle, 2016) and to become R&D centre that focused on fostering technopreneurship ecosystem and support students in transforming their idea into viable business (Audretsch, 2020).

According to the Theory of Planned Behaviour (TPB), behavioural intentions drive individual behaviour and are influenced by subjective norms, perceived behavioural control, and attitudes (Ajzen, 1991). In the context of technopreneurship, these constructs have significantly influenced students' intentions and behaviour in setting up technology-based businesses. However, the existing research lacks a comprehensive framework that conducted the factors that influence technopreneurial behaviour, as agreed by Fayolle and Gailly (2015), most of the studies concentrate on specific variables such as educational interventions or personality without

examining the broader impact on entrepreneurial behaviour. The existing empirical studies on technopreneurship are scarce and tend to rely on self-reported intention rather than the ultimate actual behaviours. Bagheri and Pihie (2014) stated that limited research has delved into how individuals take action from intention to behaviour and what specific behaviours and approaches they engage in the process.

Technopreneurial studies are crucial as it driven by social missions and technology adoption can promote technological entrepreneurship, address social challenges, offer job opportunities, stimulate technology transfer and innovation, and contribute to national economic progress (Pratiwi et.al, 2022). Technopreneurial study has been conducted by researchers which mostly focuses on technopreneurial intention rather than perceived actual behaviour or perceived behaviour. Previous researchers determined technopreneurial intention by technopreneurial self-efficacy, entrepreneurial learning (Hoque et al., 2017), environment, attitudes (Utami and Brawija, 2019), education, university support, university research excellent (Yordanova et al., 2020), personal social training, negotiated enterprise and contextual learning (Nurhayati and Machmud, 2019). Unfortunately, to date, the study on technopreneurials is very limited. Previous studies on technopreneurship have underpinned their study by the Theory of Planned Behaviour (TPB). However, very limited research has been conducted on technopreneurial behaviour. Therefore, this study aims to conduct a study with the outcome of TPB which is Technopreneurial Behaviour.

This study aims to propose a comprehensive framework for technopreneurial behaviour among students. The objective of the study is to investigate the relationship between subjective norms, perceived behavioural control and technopreneurial education towards technopreneurial behaviour, the mediating effect of technopreneurial intention between subjective norms, perceived behavioural control and technopreneurial education and technopreneurial behaviour and also the moderating effect of attitudes between technopreneurial intention and technopreneurial behavior.

Proposed Research Objective

This conceptual study intended to propose a framework for technopreneurial behaviour study. The illustration of the framework for this study can be referred to in the next section. The proposed research objectives are as follows:

To determine the relationship between subjective norms and technopreneurs' intention
To determine the relationship between perceived behavioural control and technopreneurs' intention
To determine the relationship between technopreneurs' education and technopreneurs' intention
To determine the relationship between technopreneurs' intentions and technopreneurs' behavior
To investigate whether attitudes moderate the relationship between technopreneurial intention and technopreneurial behavior.
To investigate whether technopreneurial intention mediates the relationship between subjective norms, perceived behavioural control and technopreneurial education with technopreneurial behavior.

2. Hypotheses Development

The objective of the research is to identify the relationship between subjective norms, perceived behavioural control and technopreneurial education towards technopreneurial behaviour, mediates by technopreneurial intention and moderates by attitudes.

Subjective Norms

The first proposed variable for the study is the subjective norm that refers to a close person to someone that significantly important to his or her life including family, friends, or any individual that may influence someone's decision whether to become an entrepreneur or not (Al-Jubari, 2019). Typically, people seek advice or opinions from people surrounding them to make important life decisions since humans need a reference that encourages their desire to succeed. Ayeh, Simpson and Baah (2022) added the degree of peer pressure or support varies frequently from one individual to another and they can also act as a reference while making life decisions.

Haryanto et al. (2023) have demonstrated the significant influence of subjective norms on entrepreneurial intentions, underlining the crucial role in fostering entrepreneurial behaviour. However, a study conducted

among SMEs demonstrated that subjective norms particularly family and friends have a poor impact towards behaviour (Selamat, 2023). Moreover, (Dewantara et al., 2024) have emphasized the importance of offering supportive surroundings to accelerate confidence and entrepreneurial intention which has a role in mediating the impact of subjective technology entrepreneurship behaviour. Therefore, understanding and leveraging subjective norms that refer to the influence of family and close acquaintances can significantly influence technopreneurial intention and technopreneurial behaviour subsequently.
H1: Subjective Norms have a positive effect on Technopreneurial Intention

Perceived Behavioral Control
The second variable is perceived behavioural control which refers to a person's impression of their ability to regulate their behaviour acts as an indicator of their self-efficacy, and self-confidence plays a critical part in influencing technopreneurial behaviour Astuti and Fatimah (2022). Perceived behavioural control includes students' perceived ease of forming a business, students' preparation, capacity to regulate the creative process, adequate knowledge, knowledge of how to construct technopreneurs' endeavours, and belief in high odds of success Al-Jubari (2019).

Perceived behavioural control has played a significant role towards technopreneurial behaviour, mediated by technopreneurial intention. This is agreed by Dewantara et al., (2024), Simamora and Sulistyo (2023), and Tsaknis and Sahinidis (2024) stated that perceived behavioural control favourably influences entrepreneurial intention, which affects the entrepreneurial subsequently. Although the influence between perceived behavioural control and behaviour has been demonstrated by many studies, nevertheless, a study conducted by Ogiemwonyi et.al (2022) found that there is no relationship between perceived behavioural control and green behaviour. As the result was found inconsistently, hence further investigation is needed to discover more evidence.
H2: Perceived Behavioural Control has a positive effect on Technopreneurial Intention

Technopreneurial Education
Technopreneurial education plays an important role in fostering technopreneurship behaviour. Yan, Huang and Xiao, (2022); and Sampene et al., (2022) stated entrepreneurship education may encourage graduates to develop their ventures and boost their entrepreneurial talents, knowledge and attitudes. After understanding the importance of this discipline for economic growth, educational institutions throughout the world have begun to provide students with training in technopreneurship (Hoque and Awang, 2017). Belmonte et al. (2022) have stated that technopreneurship education enables the identification of business-related opportunities, technopreneurship education improves students' skills, knowledge, and interest in entrepreneurship, and triggers interest in technopreneurship.

Wang et.al (2023); Hoang et. al (2020) emphasize the critical role of entrepreneurship education in boosting students' entrepreneurial intents and recommend that universities and policymakers should focus on building creative, technology-based curricula to promote students' engagement in entrepreneurship education.
H3: Technopreneurial Education has a positive effect on Technopreneurial Intention

Technopreneurial Behaviour
Technopreneurial behaviour is the main objective of this study. It refers to overt behaviour that reflects a person's reaction to something that he or she considers favourable. Mok (2022) addresses technopreneurial behaviour, including inventive thinking, risk-taking, and the ability to navigate the use of technology in business goals such as internet advertising, data analytics, and automated machines, which drive corporate performance. As a result, technopreneurs' activity has a tremendous influence on the national economic landscape, not only improving the quality of life but also magnifying economic growth.

The entrepreneurial behaviour in technology-based businesses evolves. In early phases, entrepreneurs display strong self-confidence and rapid decision-making, whereas later stages observe increasing determination, group activity focus, and task timeliness (Michelin et al., 2023).
H4: Technopreneurial Intention has a positive effect on Technopreneurial Behavior
Attitudes
Attitudes are what individuals may have perceived about what is or is not good in practice, as well as thoughts

about the consequences of performing specific actions Setiaji (2018). Ayeh, Simpson and Baah (2022) mentioned that attitude plays an important role since it can influence the decisions made whilst starting a business and attitude training is necessary. Attitudes refer to specific habits or actions, such as entrepreneurship, that represent individuals' views (Al-Jubari, 2019). Such habits can be positive or negative, and as a result, they influence how people participate in a particular event, whether they act or not.

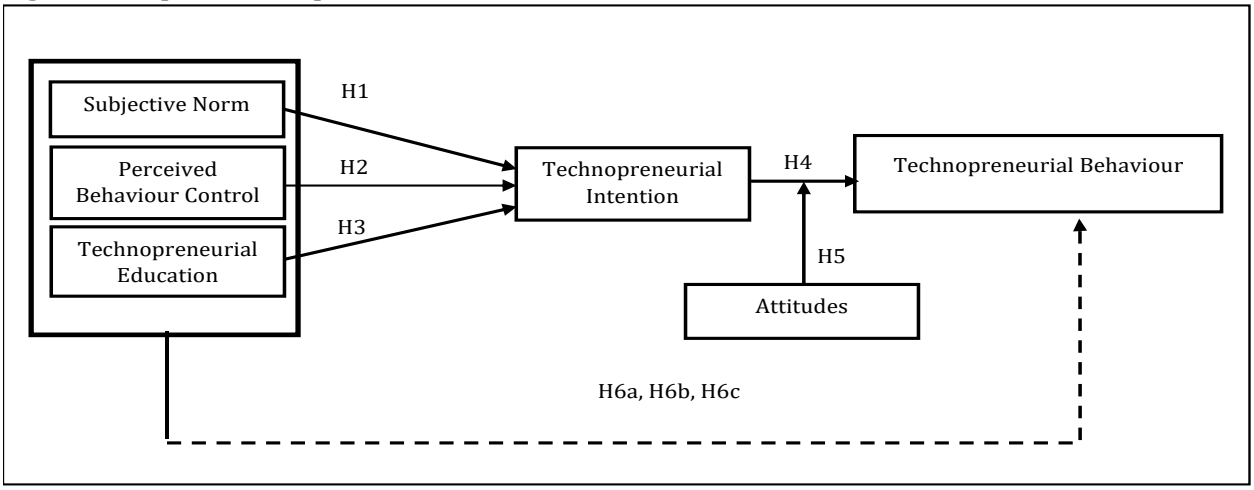
The role of attitudes is suggested in this study as an attitude can influence an individual's decision towards certain circumstances. Ajzen (1991) who introduced the Theory of Planned Behaviour highlighted that people with more favourable attitudes reflect their behaviour, and the more their intention to accomplish it should be. Thus, having favourable attitudes indicates that the individuals have favourable intentions to accomplish their behaviour to perform (Koe et al., 2018).
H5: Attitudes moderate the relationship between technopreneurs' intentions and technopreneurs behavior

Technopreneurial Intention
Technopreneurial intention is a personality attribute in individuals who embrace the way of their thinking in stressing the potential to produce a new value and develop their profession, especially for Malaysian graduates (Mohd and Shamsudin,2017). Technopreneurial intention is the students' learning session to become entrepreneurs, the efforts they put to become entrepreneurs, opportunism to seize every opportunity, entrepreneurship is their priority after graduation, and the best investment in life Hassan, Sade and Migin (2020).

Technopreneurship has to become prominent to improve societies and economies throughout the world in the age of technology globalisation (Hoque, Awang & Siddiqui, 2017) Hence it is very important to investigate students' technopreneurial intention as it could affect the economy subsequently. Entrepreneurial motivation, cognitive traits and opportunities for entrepreneurship have a substantial impact on the entrepreneurial mindset, which then drives technopreneurial intention (Rumangkit and Hadi, 2023). Rozan (2001) mentioned that cultural variations may influence entrepreneurial behaviour and intention, with perceived desirability demonstrating significant values in connection to race among IT technopreneurs in Malaysia. The findings of the technopreneurial behaviour study may contribute to the understanding of the technopreneurial process to magnify technology entrepreneurship programs in universities.
H6: Technopreneurial intention mediates the relationship between subjective norms, perceived behavioral control and technopreneurs education with technopreneurs' behavior

Conceptual Framework
Figure 1 demonstrates the conceptual framework developed for this research. The framework is designed and based on a thorough review of literature to examine the inclination for technopreneurial behaviour.

Figure 1: Proposed Conceptual Framework



3. Proposed Direction for Future Research

The conceptual framework of this study was designed through a comprehensive literature review from various sources and authors. The quantitative method is deemed to be the research method for empirical study in the future. The framework can be applied among undergraduate universities, especially those who enrol in a technology entrepreneurship course or subject. The best research strategy for future studies is the research conducted through a survey or questionnaire to be distributed among university students. In determining the sample size, the software of Raosoft is suggested, as this software is suitable for a known number of populations as compared to GPower, which is more suitable if the total population is unknown. The use of this software will allow the researcher to expedite the process of calculating the sampling size. For the sampling technique, simple random sampling is suggested as all cases in the sample will get equal chances to get selected as a respondent. Lastly, for data analysis, Statistical Package for Social Sciences (SPSS) software (latest version) is suggested for data screening, and the main analysis is to employ Partial Least Squares Structural Equation Modelling (PLS-SEM) via SmartPLS software that comprises a measurement model and a structural model as well as hypotheses testing.

4. Study Implications

The findings of this study may be useful for future research in the area of technopreneurship or technology entrepreneurship. The government has spent a lot and introduced various technology entrepreneurship programs to instil technopreneurship intention among students and to encourage a greater number of technology-based start-ups produced among students. The result may help the Ministry of Education as a policymaker and the universities that are responsible for ensuring the ministry's annual target is achieved. This can be fulfilled by understanding students' behaviour and how their family and friends, perceived behaviour control, and technopreneurship education provided by their college influence their intention to become technopreneurs.

On the other hand, this study will benefit academicians by providing analysis information on previous studies on technopreneurship. The data may supplement the current research findings and assist researchers in improving their current research.

Conclusion

In a nutshell, this research on technopreneurial behaviour offers strong recommendations for students who want to pursue a career in technopreneurship or become entrepreneurs who venture into technology-based business. Stronger technopreneurial behaviour would boost national productivity and contribute to economic growth. It also assists prospective graduates in determining their career paths after graduating from current schooling. In this study, the proposed objective is to investigate the relationship between subjective norms, perceived behavioural control and technopreneurial education towards technopreneurial behaviour, to ascertain the mediating effect of technopreneurial intention between subjective norms, perceived behavioural control and technopreneurial education towards technopreneurial behaviour, and lastly to determine the moderating effect between attitudes technopreneurial intention and technopreneurial behaviour.

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Influence of Industrial Relations with *Ukhuwwah* (brotherhood), *'Adl* (justice) and *Ihsan* (benevolence) among Islamic Universities

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Abstract: The existence of industrial relations with the industrialization drivers has been argued with the persistent competition among different entities, including workers, capitalists, bureaucrats, and authorities, to reduce operating costs while maximizing financial profits. While industrial relations have been relevant through the human resource management of organizations, from the perspectives of Islam, three core values, *ukhuwwah* (brotherhood), *'adl* (justice), and *Ihsan* (benevolence) are essential in establishing a harmonious and ethical relationship between employers and employees, which serves as a solid foundation for creating a positive work environment. This study used the grounded theory method through focused group discussion to explore the integration of Islamic values into the industrial relations of Islamic universities. It focuses on insights from participants who emphasized the significance of promoting positive human relationships, incorporating Islamic teachings, and maintaining a balance between procedural work and community-building activities. The study's findings suggest that incorporating these principles can establish a cohesive and morally upright work environment that is advantageous for both employees and organizations. Suggestions for the industrial relations unit, top management, board of governors, and the government involve cultivating strong unity through team-building, maintaining fairness with clear and open policies, and promoting excellence by supporting professional growth and empathetic work conditions.

Keywords: *Ukhuwwah, 'Adl, Ihsan, Industrial Relations*

1. Introduction and Background

The basis for industrial development from conventional human resource management perspectives is rooted in ongoing conflict between various entities such as employees, employers, capitalists, bureaucrats, and authorities. The main objective of this endeavor is to minimize operational expenses while maximizing financial gains. According to Arudsothy (1990), industrial relations arise from the struggles of workers influenced by political and bureaucratic controls.

Conversely, in Islamic teachings, industrial relations are based on the values of *ukhuwwah* (brotherhood), *'adl* (justice), and *Ihsan* (benevolence), prioritizing a harmonious and ethical connection between employers and employees. These ideas, rooted in Islamic beliefs, offer a strong basis for cultivating a favorable work atmosphere. According to Akhtar (1992), Islamic teachings emphasize the employer-employee relationship with the three values of *ukhuwwah* (brotherhood), *'adl* (justice), and *Ihsan* (benevolence), prioritizing a harmonious and ethical connection between employers and employees. The study also highlights how these principles can foster a harmonious working environment.

Zakiyy (2021) employs a qualitative method of document analysis to identify relevant principles used by the Industrial Court in Malaysia and from the Al-Qur'an, assessing whether Quranic values can be integrated into current practices for resolving disputes in collective agreements. Zakiyy (2021) finds that the values of equity, fairness, benevolence, and mutual understanding mentioned in the verses of the Al-Qur'an align with the objectives of the Industrial Relations Act 1967 in Malaysia and the principles applied by the Industrial Court in adjudicating trade disputes. Similarly, Abd Razak and Nik Mahmod (2021) emphasize the importance of Islamic principles of social justice in the Malaysian trade union movement, while Ahmad (2024) discusses enhancing trade union leadership through lessons from past experiences. Al-Twal, Alawamleh, and Jarrar (2024) investigate the role of *Wasta* social capital in enhancing employee loyalty and innovation in organizations, showing how cultural factors influence industrial relations.

Problem statement

Organizations in the Association of South East Asian (ASEAN) region frequently experience an ongoing conflict in its industrial relations involving employees, employers, capitalists, bureaucrats, and authorities. The main driving force behind this conflict is the aim to reduce operating costs while maximizing financial profits (Arudsothy, 1988; Sharma, 1989; Bhopal, 1997; Hess, 2008; Shahiri, Osman, & Park, 2016; Kuruvilla & Arudsothy, 2005; Warner, 2014; Kumar et al., 2013; Shahiri et al., 2016).

In contrast, Islamic teachings suggest a different system for industrial relations that is founded on the principles of ukhuwwah (brotherhood), 'adl (justice), and Ihsan (benevolence). These principles emphasize the need to create harmonious and ethical relationships between employers and employees, which in turn promotes a positive work environment (Akhtar, 1992). The incorporation of Islamic values into industrial relations can enhance equity, fairness, benevolence, and mutual understanding, which are in line with the goals of the Industrial Relations Act 1967 and the principles upheld by the Industrial Court in Malaysia (Zakiyy, 2021; Abd Razak & Nik Mahmod, 2021; Ahmad, 2024; Al-Twal, Alawamleh, & Jarrar, 2024).

The conflict issue stems from the contradictory paradigms of traditional workplace relations, characterized by adversarial dynamics and commercial motivations, as opposed to the ethical and peaceful values promoted by Islamic teachings. This discrepancy emphasizes the necessity for a thorough analysis of how Islamic principles can be methodically incorporated into the policy and implementation of industrial relations to address conflicts, advance social equity, and improve organizational commitment and creativity. This need is especially pertinent in the context of Islamic universities in two ASEAN countries, specifically Malaysia and Indonesia.

Research Questions

There are two research questions identified in the study. First, how do employees' understandings of the principles of ukhuwwah (brotherhood), 'adl (justice), and Ihsan (benevolence) influence employee-employer satisfaction and contribute to workplace harmony in Islamic universities? Second, how do Islamic universities effectively implement strategies to incorporate the principles of ukhuwah (brotherhood), adl (justice), and Ihsan (benevolence) into their industrial relations procedures to enhance employee productivity and organizational commitment?

Research Objectives

Two research objectives were developed. Firstly, the study aims to explore the understanding of the concept of principles of ukhuwwah (brotherhood), 'adl (justice), and Ihsan (benevolence) among employees to increase employee-employer satisfaction and create workplace harmony in Islamic universities. Secondly, the research seeks to recommend effective strategies for Islamic universities to integrate the principles of ukhuwwah, 'adl, and Ihsan into their industrial relations practices to enhance employee productivity and organizational commitment.

Significance of the Study

This study has two significant reasons. Its primary objective is to further develop perspectives related to ethics in industrial relations. Its main goal is to promote more ethical industrial relations by linking Islamic concepts, namely *ukhuwah* (brotherhood), *adl* (justice), and *Ihsan* (benevolence), into industrial relations policies and practices. By implementing this strategy, the study aims to achieve its objective of distinguishing profit-oriented practices that often lead to disputes and employee dissatisfaction. Conversely, this study advocates for an ethical and harmonious framework that prioritizes equity, justice, and mutual understanding. The results could offer significant perspectives for policymakers and practitioners in the ASEAN region, specifically in Malaysia and Indonesia, to establish more sustainable and equitable industrial relations systems.

Secondly, this study aims to promote organizational loyalty and innovation. The incorporation of Islamic principles into industrial interactions can greatly improve organizational loyalty and innovation. Organizations can enhance employee morale and commitment by cultivating a work atmosphere that promotes mutual respect, justice, and charity. This is particularly important in the context of Islamic universities. Thus, this study aims to investigate the systematic integration of these values into the industrial relations frameworks of Islamic universities in Malaysia and Indonesia. The acquired knowledge could assist educational institutions and other organizations in the area to establish work environments that are more encouraging and inventive, thereby enhancing organizational performance and employee contentment.

2. Literature Review

This section delineates the epistemological discussion of Industrial Relations with Islamic perspectives and values.

Nature of Industrial Relations

Industrial relations is a field of study that falls under the broader discipline of human resource management. It is also available at law schools as a component of labor law. There is a variation in the method of studying industrial relations among these faculties (Lim et al., 2012; Aminuddin, 2024). Law faculties prioritize the study of the legal components of industrial relations within the framework of labor law. This includes analyzing regulations, ensuring adherence to them, and resolving disputes. On the other hand, management faculties prioritize the practical aspects of industrial relations in the context of human resource management. They concentrate on implementing methods and techniques to effectively handle relationships between employers and employees in organizations. Industrial relations refers to the complex web of relationships and interactions between employers, employees, trade unions, and the government within the workplace. It encompasses the study and practice of managing these relationships to ensure a harmonious, productive, and legally compliant working environment.

Components of Industrial Relations

Industrial relations involve various aspects, including how employers and employees interact, negotiate, and resolve conflicts (employee-employer relations); the legal framework governing employment, including labor rights, working conditions, and dispute resolution mechanisms (labor laws and regulations); the process by which employers and trade unions negotiate wages, working hours, and other employment terms (collective bargaining); methods and processes used to address and resolve conflicts or grievances between employers and employees (workplace dispute resolution); organizations that represent employees' interests, advocate for their rights, and engage in collective bargaining with employers (trade unions); and the role of government agencies and institutions in regulating, monitoring, and influencing industrial relations practices to ensure fairness and compliance with laws (government and institutional role).

According to Aminuddin (2024), the study of Industrial Relations incorporates management and industrial relations with industrial relations and employment law. Likewise, Lim et al. (2012) emphasize the importance of a partnership approach in labor relations, highlighting that collaborative strategies can lead to a strategic competitive advantage. Industrial relations aim to balance the interests of various stakeholders, promote fair treatment of workers, and maintain industrial peace and productivity.

Traditional Viewpoints of Industrial Relations

The traditional viewpoints on industrial relations are based on the notion of an ongoing conflict between various entities, such as workers, capitalists, bureaucrats, and authorities. The main objective of this endeavor is to minimize operational expenses while maximizing financial gains. According to Arudsothy (1990), industrial relations arise from conflicts and discussions that are impacted by political and bureaucratic restrictions. The dynamic nature of industrial interactions in the ASEAN region has been examined by several researchers, such as Arudsothy (1988), Sharma (1989), Bhopal (1997), Hess (2008), and Shahiri, Osman, & Park (2016). These studies highlight the fact that the establishment of industrial relations in various countries is greatly influenced by their distinct historical and economic circumstances. For example, Bhopal (1997) and Kuruvilla & Arudsothy (2005) analyze the impact of these circumstances on labor relations and the dynamics between workers, employers, and governments. Warner (2014) and Kumar et al. (2013) emphasize the varied methods and results of industrial relations practices in different countries within the area. Shahiri et al. (2016) enhance the existing research by examining current problems and patterns in industrial relations, offering a thorough comprehension of how past and economic influences persistently influence the sector.

Islamic Institutional Relations Perspectives

Industrial Relations, based on the values of *ukhuwwah* (brotherhood), *'adl* (justice), and *Ihsan* (benevolence), prioritize a harmonious and ethical connection between employers and employees. These ideas, which are based on Islamic beliefs, offer a strong basis for cultivating a favorable work atmosphere.

Ukhuwwah, which refers to the concept of brotherhood, promotes a feeling of camaraderie and reciprocal assistance among colleagues in the workplace. This principle promotes a perspective where employees and employers perceive each other as members of a broader family, emphasizing the utmost importance of mutual respect, support, and cooperation. Ukhuwwah fosters a sense of belonging and unity, hence establishing a workplace atmosphere that promotes value and respect for all individuals. Consequently, this fosters collaboration elevates team spirit and cultivates a collective commitment to attaining mutual objectives.

'Adl, which refers to the concept of justice, guarantees impartiality and fairness in all interactions inside the workplace. This principle requires companies to ensure fair treatment for all employees, assessing them based on their abilities and contributions rather than showing favoritism or prejudice. Equitable remuneration, equitable working conditions, and unbiased conflict resolution are fundamental elements of 'adl. By maintaining fairness and impartiality, companies can cultivate trust and devotion among employees, ultimately resulting in increased job satisfaction and productivity. When employees are aware that they are being treated equitably, they are more inclined to feel inspired and dedicated to their jobs.

Ihsan, which refers to benevolence, motivates individuals to surpass their fundamental obligations and exhibit compassion and kindness. This concept highlights the significance of prioritizing the welfare of others and fulfilling one's obligations with a strong sense of moral accountability. In the realm of industrial relations, Ihsan refers to the demonstration of empathy, comprehension, and assistance between employers and employees. This may entail offering aid to coworkers in need, establishing a nurturing work atmosphere, and cultivating a culture characterized by benevolence and magnanimity. By placing a high importance on the welfare of others, Ihsan contributes to the establishment of a workplace that is more compassionate and considerate. This can have a substantial positive impact on employee contentment and the unity of the organization.

Collectively, these principles establish a harmonious and ethically sound structure for industrial relations that is by Islamic beliefs. This framework not only fosters a constructive and respectful work environment but also guarantees that the organization functions in an ethical and socially responsible manner. By incorporating the principles of *ukhuwwah* (brotherhood), *'adl* (justice), and *Ihsan* (benevolence) into their operations, organizations can foster a work culture that is not only efficient but also ethically upright, resulting in enduring prosperity and viability.

Islamic Institutional Framework

Akhtar (1992) provides an Islamic framework for employer-employee relationships, highlighting how these principles can foster a harmonious working environment. Akhtar (1992) explains that in Islamic teachings, the employer-employee relationships are based on three fundamental principles: *ukhuwwah* (brotherhood), *'adl* (justice), and *Ihsan* (benevolence). These principles are essential for creating a fair, balanced, and compassionate employment environment.

Ukhuwwah (brotherhood) refers to the strong bond and sense of unity that exists between individuals. It represents a deep connection and mutual support among people. *Ukhuwwah* fosters camaraderie and underscores the significance of unity and reciprocal assistance among all individuals in the community, including within the professional setting. It promotes the practice of treating colleagues with respect, empathy, and cooperation, acknowledging that all individuals are members of a wider community united by common beliefs and principles. In a professional context, this means creating a nurturing and cooperative work atmosphere where both employees and employers prioritize each other's welfare.

'Adl, which translates to justice, is a concept that refers to the quality of being fair, impartial, and equitable. Adl is a term that encompasses the principles of justice and fairness. Ensuring equitable treatment and upholding the rights of all individuals is of utmost importance. Within the framework of employer-employee relationships, 'adl imposes a structure of individual and societal obligations, guaranteeing that both parties fairly complete their duties and responsibilities. This entails providing equitable compensation, implementing clear and open guidelines, ensuring impartial treatment, and fostering a harmonious and equitable workplace where the rights of all individuals are upheld.

Ihsan, also known as benevolence, refers to the act of doing good or showing kindness and compassion towards

others. It encompasses the concept of going above and beyond what is expected, and *Ihsan* is the fundamental concept of exhibiting kindness and performing virtuous actions. In the workplace, Ihsan promotes the idea of employers and employees willingly relinquishing their rigid entitlements for the benefit of others, demonstrating acts of righteousness and ethical superiority. For example, a company may offer supplementary assistance to an employee in need, or an individual may voluntarily assist a colleague without anticipating any reciprocation. Ihsan cultivates a culture characterized by empathy and altruism, which improves the overall synergy and efficiency of the workplace.

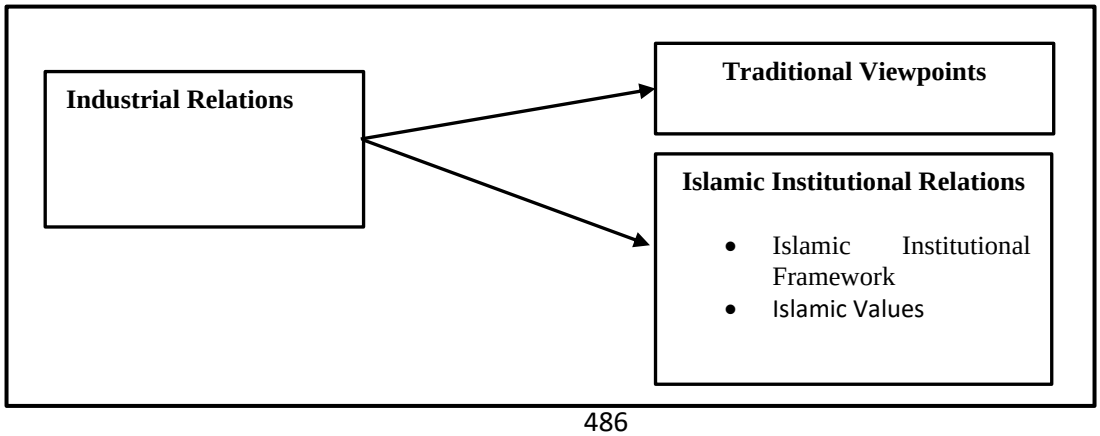
Islamic Values into Industrial Relations

According to Islamic teachings as well, employees are required to maintain elevated moral principles, including truthfulness, honesty, and responsibility. The Qur'an and hadith stress the significance of these attributes as *al-quwwah* (strength) and encourage individuals to exert themselves diligently to provide for themselves and their families, considering such endeavors as striving for the cause of Allah. The Prophet Muhammad emphasized the importance of obtaining a legitimate income, considering it to be equivalent in significance to the act of jihad from the perspective of Allah. Employees should possess qualities of trustworthiness and productivity. The most exemplary workers are those who demonstrate *al-quwwah* (strength) and *al-qudrah* (capability). *Al-quwwah*, also known as strength, encompasses an employee's physical and mental fortitude, capacity to withstand difficulties and general energy in carrying out responsibilities. It includes not just physical endurance but also moral and ethical fortitude, such as integrity, dependability, and the capacity to maintain high moral principles, including candor and honesty.

Al-qudrah, also known as capability, refers to an employee's aptitude, expertise, and mastery in their specific areas of work. It entails possessing the requisite knowledge, competence, and proficiency to carry out responsibilities with effectiveness and meet job requirements. An *al-qudrah* employee is characterized by their adeptness in handling responsibilities, comprehensive understanding of task subtleties, and fruitful contributions to the organization.

In addition, an employee must possess a clear understanding (واضح فهم) of their obligations and carry out their tasks with proficiency (بكفاءة) as seen in the Qur'anic verse, "Appoint me over the storehouses of the land. Indeed, I will be a knowing guardian" (Surah Yusuf, verse 55). Zakiyy (2021) employs a qualitative method of document analysis to identify the relevant principles used by the Industrial Court and from the Al-Qur'an, assessing whether Quranic values can be integrated into current practices for resolving disputes in collective agreements. This study finds that the values of equity, fairness, benevolence, and mutual understanding mentioned in the verses of the Al-Qur'an align with the objectives of the Industrial Relations Act 1967 and the principles applied by the Industrial Court in adjudicating trade disputes. Similarly, Abd Razak and Nik Mahmod (2021) emphasize the importance of Islamic principles of social justice in the Malaysian trade union movement, while Ahmad (2024) discusses enhancing trade union leadership through lessons from past experiences. Al-Twal, Alawamleh, and Jarrar (2024) investigate the role of Wasta social capital in enhancing employee loyalty and innovation in organizations, showing how cultural factors influence industrial relations. Based on the epistemological discussion, the study posited that the industrial relations with *ukhuwwah* (brotherhood), *'adl* (justice), and *Ihsan* (benevolence) the Islamic oriented Industrial Relations. Figure 1 shows the epistemological framework of Islamic-oriented Industrial Relations.

Figure 1: Islamic-Oriented Industrial Relations



3. Research Methodology

This study employed a qualitative research methodology using the grounded theory technique. Grounded theory is a method that involves collecting and analyzing data at the same time to develop theory. It uses a combination of induction and deduction, known as abductive reasoning (Corley, 2015; Glaser & Strauss, 2017). The main objective of these simultaneous endeavors is to construct a theory that is profoundly influenced by the evidence, resulting in a theoretical output that is firmly based. This grounded theory method used a focus group discussion with selected staff of Islamic Universities.

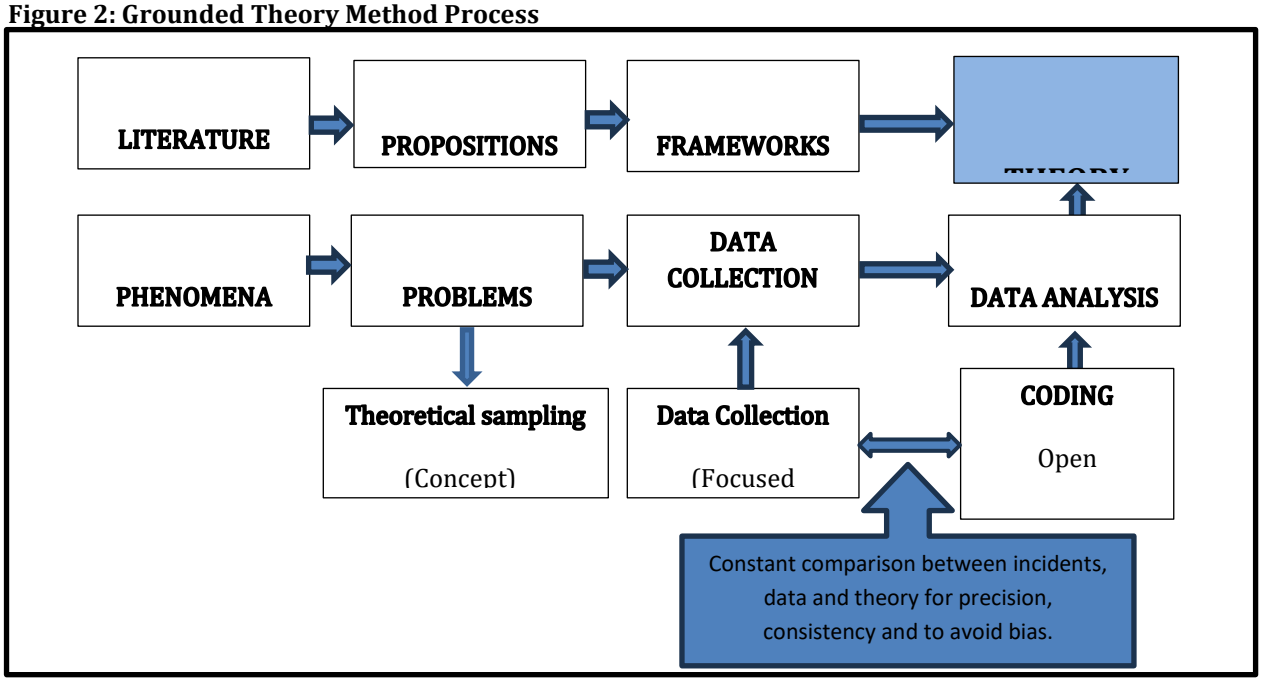
The first phase in the grounded theory method started with a preliminary literature review to understand the context and identify gaps in existing knowledge related to the research topic within Islamic universities. Then the study developed a research design that outlined the objectives, research questions, and the grounded theory approach. The research instruments have been validated by independent researchers. The study secured informed consent from the participants. The data collection method focused on group discussions.

In the data collection phase, the study conducted a focus group discussion with a small and diverse group of staff members. The lead researcher became the facilitator and guided the discussion, ensuring that all participants had the opportunity to share their views. These discussions are recorded and transcribed. Participants were encouraged to elaborate on their experiences and perceptions.

As for the data analysis phase, there were several processes, namely initial coding or open coding, where the collected data was divided into discrete parts and coded for significant concepts and themes. Constant comparison was used to continuously compare new data with existing codes to identify similarities and differences. Then, the axial coding, identified relationships among the initial codes and grouped these codes into broader categories and subcategories. The context and conditions under which the phenomena occur were considered for interactions and consequences.

Finally, selective coding involved the identification of a core category that represented the central phenomenon of the study and integrated other categories around this core category, refining the theory to ensure it was coherent and comprehensive. At the theoretical development phase, data collection and analysis continued until no new significant themes or insights emerged, indicating theoretical saturation. A grounded theory that is well-supported by the data is constructed, explaining the central phenomenon and its related categories. The validation and refinement phase, involved checking and verification, where findings were shared with participants. Feedback was gathered to ensure the accuracy and relevance of the theory, and the theory was refined based on participant feedback and further analysis. Figure 2 depicts the grounded theory method process.

Figure 2: Grounded Theory Method Process



4. Results and Discussion

The focus group discussion began with participants introducing themselves and describing their roles at their respective Islamic universities. The participants included NH from the IT department, MA from security advisory, YR from knowledge repository services, ZF from financial services, LH from corporate services, ZW from health services, and IH from corporate services. With extensive experience ranging from 10 to 20 years, the participants provided a rich foundation for discussing industrial relations in the context of Islamic principles.

Contractual Relationships

When asked to provide insights on industrial relations within Islamic universities, participants collectively defined it as a relationship based on employment contracts, social contracts, and Islamic faith contracts. NH emphasized the harmony between employer-employee relationships aimed at attaining the Pleasure of Allah. NH stated, "T*he harmony between employer-employee relationships should be aimed at attaining the Pleasure of Allah. This spiritual goal should be central to our interactions and management practices*." Supporting NH's view, MA emphasized, "*Both employers and employees must work in harmony to ensure smooth industrial processes. Without this cooperation, achieving our operational goals becomes much harder*."

YR added, "*Fostering good human relationships within organizational structures is vital. When we build strong, positive relationships, it benefits everyone and helps the university function more effectively*." ZF concurred with YR, NH, and MA, saying, "W*e need to integrate Islamic teachings in managing people. These principles guide us to be fair, compassionate, and just in all our dealings, which is essential for a healthy work environment*."

LH highlighted, "*Our work should be procedural and target-oriented, involving employers, employees, and the government. Clear procedures and objectives help ensure that everyone is on the same page and working towards common goals*." ZW noted, "*The regulated nature of these relationships is important. Regulations provide a framework that ensures fairness and consistency in how we manage our staff and operations*." IH concluded the arguments by other colleagues by saying, "*Islamic universities have a unique vision and mission to achieve goodness. This mission should guide all our actions and decisions, aligning them with our core values and objectives*."

In essence, MA highlighted the need for both employers and employees to work in harmony to ensure smooth industrial processes. YR noted the importance of fostering good human relationships within organizational structures. ZF pointed out the integration of Islamic teachings in managing people. LH discussed the procedural and target-oriented nature of work involving employers, employees, and the government. ZW remarked on the regulated nature of these relationships, while IH underscored the unique vision and mission of Islamic universities to achieve goodness.

Ukhuwwah-Adl-Ihsan Approach

The discussion then turned to incorporate the principles of *ukhuwwah* (brotherhood), *'adl* (justice), and *Ihsan* (benevolence) into the industrial relations at Islamic universities. Participants argued that *ukhuwwah* can be integrated into the operations of Islamic universities by fostering a strong sense of community and mutual support among staff. This principle encourages teamwork, collaboration, and the sharing of knowledge and resources. NH from the IT department emphasized the importance of creating an environment where staff feel valued and supported, which can lead to higher job satisfaction and productivity. MA, YR, ZF, LH, ZW, and IH shared similar insights, noting that regular team-building activities and opportunities for staff to engage in social and professional networks can enhance this sense of brotherhood.

According to NH, "*When we talk about integrating the principle of ukhuwwah, or brotherhood, into our industrial relations, it is crucial to focus on creating an environment where staff feel valued and supported. At my department, I have seen how much of a difference it makes when team members know they can rely on each other. This not only boosts morale but also leads to higher job satisfaction and productivity*."

MA responded: "*I completely agree with NH. At my department, the sense of brotherhood is essential. When staff members feel that they are part of a community, they are more likely to go above and beyond their duties. We need*

to have regular team-building activities and opportunities for social interaction to strengthen these bonds."

YR agreed with NH and MA by saying, "Y*es, fostering good human relationships within our organizational structures is vital. At my office, we have started implementing more collaborative projects, which has helped in building trust and cooperation among the team. Encouraging teamwork and the sharing of knowledge and resources is key to embodying the principle of ukhuwwah*." ZF responded: "*From a financial services perspective, integrating Islamic teachings in managing people is fundamental. The principles of fairness and compassion are at the heart of our work. By fostering a strong sense of community and mutual support, we can ensure that our staff feel respected and valued. This not only aligns with the principle of ukhuwwah but also enhances our overall work environment*."

While concurred with other colleagues, LH emphasized by saying: "*Our work should be procedural and target-oriented, but that doesn't mean we can't also focus on building a sense of brotherhood. In corporate services, we have found that clear procedures and objectives help, but it's the mutual support and teamwork that truly drive success. We should encourage regular team-building activities and create opportunities for staff to engage in both social and professional networks*." As for ZW, ZW said: "*I've seen how important it is for staff to feel supported by their colleagues. The regulated nature of our relationships helps ensure consistency and fairness, but we also need to foster a sense of community. Regular team-building activities and a supportive work environment can go a long way in enhancing this sense of brotherhood*."

IH said: "*Islamic universities have a unique vision and mission to achieve goodness, and this should guide all our actions and decisions. By integrating the principles of ukhuwwah, 'adl, and Ihsan into our industrial relations, we can create a more harmonious and ethically sound work culture. It's about aligning our core values with our everyday practices to foster an environment where everyone feels valued and supported*."

While agreeing with IH, MA pointed out that: "*I also think we need to consider how we can implement the principle of 'adl, or justice, in our industrial relations. This means establishing clear and transparent policies that govern employment practices, conflict resolution, and performance evaluation. Fair treatment and equitable distribution of resources and opportunities are essential to fostering a culture of fairness and trust*."

YR mentioned: "*Incorporating the principle of Ihsan, or benevolence, is also important. This involves going beyond the minimum requirements and striving for excellence in all our actions. Providing continuous professional development opportunities and support for personal growth can make a significant difference in staff morale and motivation*." ZF supported YR's opinion by saying: "*Yes, fostering a compassionate work environment where staff feel cared for and motivated to perform their best is essential. This not only benefits the individual staff members but also contributes to the overall success of the university*."

LH said: "*By focusing on these principles, we can create a more supportive and productive work environment. It's about aligning our operations with our core values to foster a sense of community, fairness, and excellence.*" ZW mentioned that: "*Regular team-building activities, clear and transparent policies, and a commitment to professional development are all crucial to integrating these principles into our industrial relations*." Indeed, IH pointed out that: "*Ultimately, it's about creating a work culture that reflects our Islamic values and promotes a harmonious and ethically sound environment for everyone*."

Integrated Approach

NH emphasized the importance of integrating the principle of ukhuwwah, or brotherhood, into industrial relations by creating an environment where staff feel valued and supported. In the IT department, NH has observed the positive impact when team members know they can rely on each other, which not only boosts morale but also leads to higher job satisfaction and productivity. MA agreed, stating that in a security advisory, the sense of brotherhood is essential. When staff members feel part of a community, they are more likely to go above and beyond their duties. MA highlighted the need for regular team-building activities and opportunities for social interaction to strengthen these bonds.

YR echoed these sentiments, noting that fostering good human relationships within organizational structures is vital. In knowledge repository services, collaborative projects have helped build trust and cooperation among

the team. Encouraging teamwork and the sharing of knowledge and resources is key to embodying the principle of ukhuwwah. From a financial services perspective, ZF emphasized that integrating Islamic teachings in managing people is fundamental. The principles of fairness and compassion are at the heart of their work. By fostering a strong sense of community and mutual support, staff feels respected and valued, aligning with the principle of ukhuwwah and enhancing the overall work environment.

LH discussed the importance of balancing procedural and target-oriented work with building a sense of brotherhood. In corporate services, clear procedures and objectives are essential, but mutual support and teamwork drive success. LH suggested encouraging regular team-building activities and creating opportunities for staff to engage in both social and professional networks. ZW, reflecting on health services as a dental therapist, highlighted the importance of staff feeling supported by their colleagues. While regulations ensure consistency and fairness, fostering a sense of community is also necessary. Regular team-building activities and a supportive work environment enhance this sense of brotherhood.

IH pointed out that Islamic universities have a unique vision and mission to achieve goodness, which should guide all actions and decisions. By integrating the principles of ukhuwwah, ‘adl, and Ihsan into industrial relations, a more harmonious and ethically sound work culture can be created. Aligning core values with everyday practices fosters an environment where everyone feels valued and supported. MA added that implementing the principle of ‘adl, or justice, requires establishing clear and transparent policies governing employment practices, conflict resolution, and performance evaluation. Fair treatment and equitable distribution of resources and opportunities are essential to fostering a culture of fairness and trust.

NH supported this, emphasizing that ensuring all staff members have access to the same opportunities for advancement and are evaluated based on their merit and contributions is critical. This creates an environment of trust and fairness. YR added that incorporating the principle of Ihsan, or benevolence, involves going beyond minimum requirements and striving for excellence in all actions. Providing continuous professional development opportunities and support for personal growth can significantly boost staff morale and motivation.

ZF agreed, noting that fostering a compassionate work environment where staff feel cared for and motivated to perform their best is essential. This benefits individual staff members and contributes to the overall success of the university. LH concluded that focusing on these principles can create a more supportive and productive work environment. Aligning operations with core values fosters a sense of community, fairness, and excellence. ZW reiterated the importance of regular team-building activities, clear and transparent policies, and a commitment to professional development in integrating these principles into industrial relations. IH ultimately emphasized that the goal is to create a work culture reflecting Islamic values and promoting a harmonious and ethically sound environment for everyone.

In terms of *‘adl* (justice), participants argued that *‘adl* is crucial in ensuring fairness in all dealings within the university. This principle can be implemented by establishing clear, transparent policies and procedures that govern employment practices, conflict resolution, and performance evaluation. MA emphasized the need for fair treatment and equitable distribution of resources and opportunities. NH, YR, ZF, LH, ZW, and IH echoed these concerns, stating that all staff members should have access to the same opportunities for advancement and be evaluated based on their merit and contributions, fostering a culture of fairness and trust.

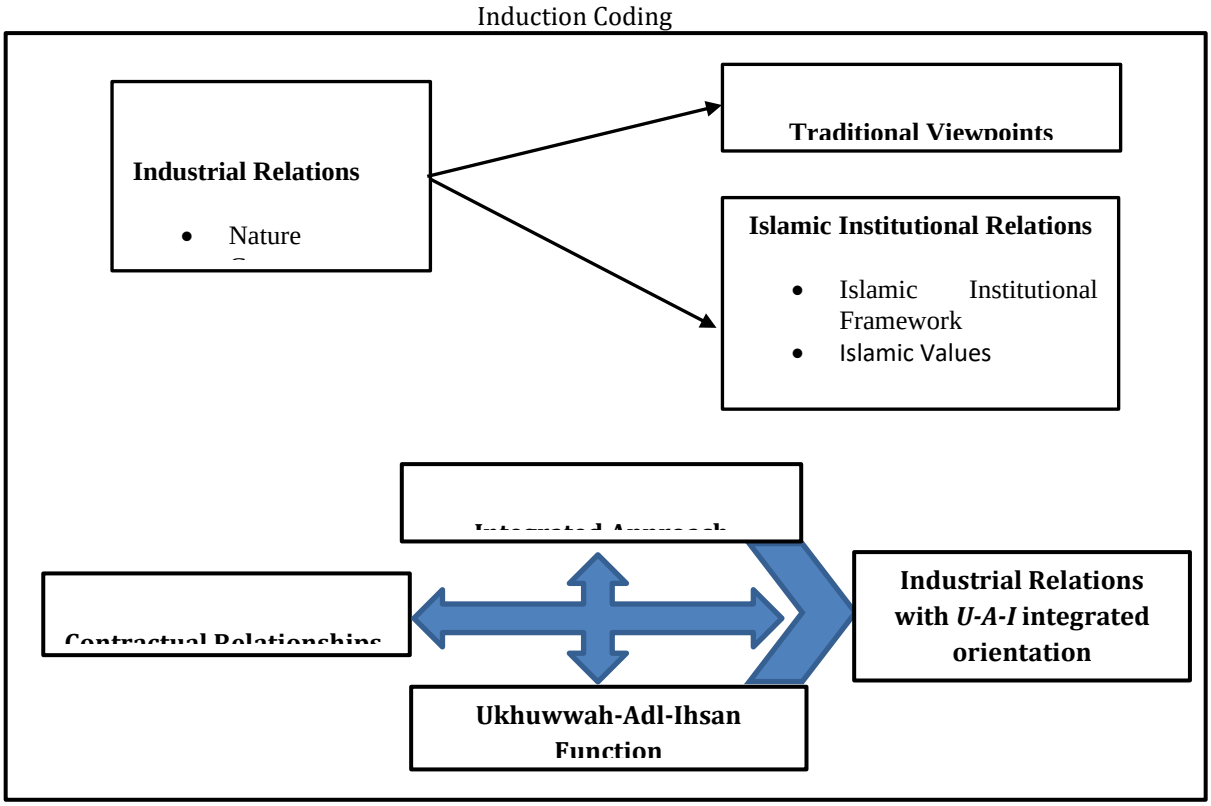
As for *Ihsan* (benevolence), participants argued that *Ihsan* involves going beyond the minimum requirements and striving for excellence in all actions. This can be reflected in the university's commitment to the welfare and development of its staff. YR pointed out the importance of providing continuous professional development opportunities and support for personal growth. NH, MA, ZF, LH, ZW, and IH agreed, emphasizing that fostering a compassionate work environment where staff feel cared for and motivated to perform their best is essential. By integrating the principles of *ukhuwwah*, *‘adl*, and *Ihsan* into their operations, Islamic universities can create a harmonious and ethically sound work culture that benefits both the staff and the institution. **Table 1,** depicts a summary of analysis based on the emergent themes that incorporated inductive and deductive codes derived from the interviews. The table shows that most data codes were found suggesting a convergence of the study findings.

Table 1: Mapping Cross Analysis

Open Coding	Code	Theme
• Contractual Relationship (Employment, social and faith) • Harmonious and cooperative relationships for operational efficiency. • Strong and positive Relationships • An integration of Islamic Guidance • Clear procedure and Result Oriented • Fairness and consistent regulation framework • A guided mission	The understanding of the Islamic Concept of Industrial Relations	• Contractual Relationship • Integrated Approach • Ukhuwah (Brotherhood) • Adl (Justice) • Ihsan (Benevolence)
• Valuing staff and supportive environment • Sense of community and mutual support • Collaboration and teamwork • Incorporate Fundamental Islamic teaching • Conflict Resolution • Fairness in Policy • Equitable opportunities • Excellence and beyond minimum • Compassionate Environment • Professional Development	The practise (Implementation) of the Islamic Concept of Industrial Relations - Ukhuwah- Adl- Ihsan	

Through the combination of the induction framework with the deduction framework, the study developed Industrial Relations with U-A-I integrated orientation. Figure 3 depicts the grounded theory industrial relations theory with an emphasis on *ukhuwwah*, *'adl* and *ihsan*.

Figure 3: Grounded Industrial Relations.



5. Managerial Implications and Recommendations

The Industrial Relations Unit of Islamic universities is recommended to cultivate *ukhuwwah* (brotherhood) with consistent team-building exercises and social engagement opportunities that effectively enhance the connections among staff members. Efforts that actively promote cooperation, collaboration, and the exchange of knowledge and resources will contribute to the development of a supportive community. In addition, the implementation of mentorship programs guarantees that employees feel appreciated and assisted, resulting in a substantial increase in job satisfaction and productivity. To uphold the principle of *'adl* (justice), it is necessary to establish explicit and transparent regulations that govern employment practices, conflict resolution, and performance evaluation. It is imperative to ensure that all staff members are treated fairly and that resources and opportunities are distributed equitably among them. Regularly reviewing and updating policies is necessary to sustain a culture characterized by fairness and trust. To foster *Ihsan* or benevolence, it is essential to offer ongoing professional development opportunities and assistance for personal advancement. An empathetic work atmosphere that cultivates a sense of real concern for staff well-being and fosters motivation for optimal performance should be nurtured. It is crucial to motivate employees to pursue excellence in all their actions, surpassing the minimum expectations.

To the top management of Islamic universities, it is essential to include Islamic principles in leadership. Top management should demonstrate exemplary behavior, reflecting the concepts of *ukhuwwah*, *'adl*, and *Ihsan* in all interactions and decision-making processes. It is important to actively promote a culture of leadership that places a high emphasis on ethical conduct, compassion, and justice. In addition, the top management also needs to improve communication and promote transparency. Thus, the top management must maintain open channels of communication with personnel to keep them informed about policy changes, chances for career progression, and organizational objectives. In addition, it is crucial to foster a transparent atmosphere in which employees feel at ease expressing their problems and suggestions.

Moreover, the top management also should facilitate the advancement of one's professional skills. There is a need for the allocation of resources for staff training and development programs that are by Islamic principles. Acknowledging and incentivizing the contributions and accomplishments of employees will strengthen a culture characterized by exceptional performance and *Ihsan* (benevolence).

Conclusion

The conventional viewpoint on industrial connections, marked by discord and motivated by economic goals, dramatically differs from the Islamic approach, which prioritizes harmonious and ethical relationships. The principles of *ukhuwwah* (brotherhood), *'adl* (justice), and *Ihsan* (benevolence) offer a comprehensive foundation for establishing a healthy and productive work environment in Islamic universities. The study participants emphasized the importance of these concepts in promoting a favorable work culture.

To uphold the principle of *ukhuwwah*, the Industrial Relations Unit should provide frequent team-building activities and social contact opportunities, fostering teamwork, cooperation, and the exchange of resources. It is important to establish mentorship programs to enhance staff's sense of worth, which will result in higher levels of job satisfaction and productivity. It is crucial for *'ADL* to establish explicit and open policies that regulate employment procedures, conflict resolution, and performance evaluation. It is important to guarantee just treatment and equal allocation of resources and opportunities, with policies constantly assessed to sustain a culture of justice and trust.

Advancing *Ihsan* entails offering ongoing chances for professional development and fostering personal improvement. Thus, there is a of creating a nurturing work atmosphere that prioritizes the well-being and motivation of personnel is crucial. Likewise, motivating employees to consistently pursue excellence in all endeavors will yield advantages for both individuals and the university as a collective entity. Top management needs to include Islamic values in their leadership style, exemplifying ethical conduct, compassion, and fairness in all their dealings. In addition, it is important also for the top management to keep communication lines open and promote transparency to ensure that staff members are well-informed and feel comfortable expressing their concerns.

Apart from the top management, the Board of Governors also should ensure that the strategic objectives and policies align with Islamic beliefs, while consistently evaluating their influence on staff morale and achievement. The process of policy formulation should include a wide range of stakeholders, to provide thorough and inclusive governance. In doing so, there is a need to ensure sufficient resources to be assigned to projects that promote community, equity, and professional growth. The government should establish and uphold labor regulations that align with Islamic ideals in educational institutions. Thus, universities that promote ethical work cultures should receive additional financial support and incentives. In addition, there should be nationwide training programs for workers and management on Islamic values.

Islamic universities can establish a harmonious and morally sound work culture by incorporating the principles of *ukhuwwah, 'adl,* and *ihsan*. This will improve staff well-being, encourage fairness and justice, and create a friendly and productive atmosphere that aligns with Islamic ideals.

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How Individual Factors Shape Innovative Work Behavior in Malaysian HEIs: The Role of Innovation Capability, Knowledge Sharing and Psychological Empowerment

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Abstract: This study investigates the factors driving academics' innovative work behavior (IWB) in Malaysian Higher Education Institutions (HEIs), focusing on individual innovation capability, psychological empowerment, and knowledge sharing. The respondents comprised 382 academics from 24 Malaysian universities listed in the QS World Ranking 2023, selected through convenience sampling. Data were collected via a Google Form questionnaire distributed by email. The descriptive analysis assessed individual innovation capabilities, psychological empowerment, and knowledge-sharing levels, and their impact on IWB. The findings indicate high engagement in innovative activities, with academics demonstrating strong innovative capabilities, a sense of empowerment, and active knowledge-sharing practices. These individual factors significantly contribute to fostering IWB, highlighting the importance of continuous professional development, supportive institutional environments, and collaborative cultures in promoting innovation within HEIs. This study provides valuable insights for policymakers and university administrators to enhance the innovative potential of academics, ultimately contributing to the advancement of knowledge and improvement of educational practices in Malaysian HEIs. Future research should explore longitudinal effects and potential moderating factors to further understand innovative work behavior dynamics in academic settings.

Keywords: *Innovative Work Behavior, Individual Innovation Capability, Psychological Empowerment, Knowledge Sharing, Higher Education Institutions, Malaysia*

1. Introduction and Background

In the last two decades, academics have devoted more emphasis to studying innovative work behavior (IWB) due to the demonstrated influential effects of IWB on individual and organizational results (Afsar et al., 2020; Rajandran & Subramaniam, 2023; Sari et al., 2021; Usmanova et al., 2020). The organization's growth and survival are contingent upon IWB, as behavior plays a crucial role in organizational transformation (Zainal & Matore, 2019). In addition, IWB has the potential to transform the work environment by encouraging teamwork, which in turn boosts productivity (Supriyanto, 2019). With the growing recognition of the significance of IWB, non-profit and for-profit organizations are actively searching for effective techniques to encourage their staff members to demonstrate IWB (Choi et al., 2021; Srirahayu et al., 2023). Although much research has been conducted on IWB, there is still a paucity of studies focusing on understanding the process that leads to it (Riaz et al., 2018). Prior research on factors influencing IWB has primarily concentrated on Western nations (Zhou & Velamuri, 2018), and less effort was given to service industries (Javed et al., 2017). Mohammed Afandi & Mohd Effendi Ewan, (2020) Pointed out in their research that there is still a dearth of and a restricted amount of discussion on IWB in the context of education and academia.

The urgency of research on IWB among academics in Malaysian higher education institutions (HEIs) cannot be overstated. As the country strives to become a regional education hub and adapt to the challenges of the Fourth Industrial Revolution (IR 4.0), fostering innovation among academic staff becomes imperative (Rahman Ahmad et al., 2020; Rajandran & Subramaniam, 2023). Besides, to satisfy the current requirements of the market, universities must establish a competitive edge and develop the ability to recover quickly from challenges, which highlights the importance of effectively managing their human resources (Wahab et al., 2024). Due to this, HEIs are increasingly pressured to adapt and innovate to remain competitive and relevant. Because of the fast-paced changes in the labor market and digital transformation, academics are facing immense pressure to improve their teaching methods and instructional materials to keep up with students, particularly at universities (Atatsi

et al., 2021). According to Wahab et al., (2024), academics must demonstrate IWB to better adapt to new situations and be an asset in making their institutions more competitive. Employees who exhibit IWB are those who are constantly thinking of new ways to solve problems or meet the needs of others, and who are also able to recognize when a trend has changed and adapt their thinking accordingly (de Jong & Hartog, 2007).

Thus, to ensure the education system is always competitive, academics should have innovative attitudes or behaviors (Rajandran & Subramaniam, 2023; Wahab et al., 2024). However, existing literature indicates a scarcity of local research on IWB, notably in the context of academic environments (Hashim et al., 2019; Ibus et al., 2020; Johari et al., 2021). This suggests a lack of comprehensive exploration of IWB in Malaysian education. Researchers still have ample space and opportunity to delve deeper into the IWB of academics, as their understanding of how to enhance innovative academic methods remains incomplete (Mohammed Afandi & Mohd Effendi Ewan, 2020). In line with this phenomenon, this paper aims to address the knowledge and empirical gaps surrounding academics IWB in educational institutions, which are responsible for designing and delivering valuable and useful knowledge to students.

Bos-Nehles & Veenendaal, (2019) Observe a lack of knowledge regarding the cultivation of innovation at the individual level. According to a bibliometrics review by Farrukh et al., (2022) The antecedents of IWB at the individual level are the least explored research areas. Luu, (2019) Also emphasizes that employees' use of IWB has not received as much attention as a team or organizational innovation. Previous studies have highlighted the need for focused research on IWB at the individual/personal level (De Jong & Den Hartog, 2010; Farrukh et al., 2022) and therefore the present study will focus on the individual level.

A thorough examination of the literature indicates that knowledge sharing (KS) significantly influences IWB (Aldabbas et al., 2021; Alshahrani et al., 2023; Chen & Pongtornkulpanich, 2024; Islam et al., 2022). Organizations that actively nurture a culture of knowledge sharing are also able to enhance the utilization of IWB (Mustika et al., 2020). According to Nugroho, (2023), asserts that knowledge sharing greatly aids in improving academics' IWB. This includes its ability to encourage teamwork, facilitate the sharing of information and experience, spark new ideas, and aid in the development of novel approaches. As a result, there is limited research on KS in education settings, particularly among academics (Abdullah & Omar, 2020), providing an opportunity to further study in HEIs.

Conversely, psychological empowerment (PE) has been extensively researched and has demonstrated its importance to IWB. However, the results remain uncertain. Some studies show a significant relationship (Helmy et al., 2019; Park & Kim, 2022; Pham et al., 2024; Yadav et al., 2023) while other studies show a negative relationship (Sinaga et al., 2021; Zhang et al., 2021). This has led to a research vacuum on the testing of sophisticated models that can help us better grasp the link between psychological empowerment and IWB among academics at universities.

Another factor that has been overlooked in IWB studies is individual innovation capabilities (IIC). A greater ability for innovation can enable individuals to effectively address work-related challenges, thereby improving both the quality and quantity of their output (Fauziyah & Rahayunus, 2021). According to Nugroho et al., (2021), academic IIC has become a driver of business sustainability. Therefore, organizations regard IIC as a useful asset to establish and maintain a competitive edge and enhance firm performance. The emerging topic of study focused on innovation capability has garnered significant attention from numerous scholars (Chotivanich & Phorncharoen, 2023; Fauziyah & Rahayunus, 2021; Ferreira et al., 2020; Nham et al., 2020). Notwithstanding these significant advancements, there remains a dearth of agreement among scholars. Therefore, this paper seeks to bridge this gap by examining the interplay between psychological empowerment, knowledge sharing, and individual innovation capabilities in fostering academic IWB within Malaysian HEIs.

2. Literature Review

Innovative Work Behavior: Organizational success in today's distribution environment is dependent on having an innovative workforce in an age of digitization, globalization, and fast changes (Udin, 2022). As a result, scholars and organizational practitioners in the fields of management and distribution science have been interested in employees' IWB. Janssen, (2000) defines IWB as employees deliberately generating, proposing,

and implementing new ideas at work, either individually or within a team or organization, to enhance performance. Similarly, Jong & Hartog, (2007) describe IWB as individuals deliberately acting to introduce or implement new ideas, services, methods, or procedures within their job roles, departments, or organizations.

While there is significant scholarly interest in studies on IWB, research specifically focused on IWB in higher education institutions (HEIs) remains limited (Ayoub et al., 2023; Messmann et al., 2018). HEIs undoubtedly contribute significantly to the performance of innovation (Ibus, Wahab, & Ismail, 2020). According to Roffeei et al. (2018), education is crucial since it serves as a reservoir of knowledge and helps shape people's attitudes and talents to become knowledge workers. Given that education is crucial for promoting creative and innovative thinking among students, academics' IWB is critical in the changing environment. This will aid academics in developing a creative attitude, reframing the role of the university in society, and assisting universities in transitioning from traditional to entrepreneurial universities (Farrukh et al., 2022). According to a study by Ebrahim et al., (2023) Knowledge sharing and psychological empowerment are among the most prominent factors in IWB studies. While study by Nham et al., (2020) Highlighted the lack of research specifically examining innovation capability at both personal and organizational levels, even though individual innovation capability is crucial for driving organizational innovation.

Psychological Empowerment: Psychological empowerment (PE) is a process that involves an individual's subjective, cognitive, and attitudinal experiences, enabling them to feel capable, competent, and authorized to complete activities (Llorente-Alonso et al., 2024). Conger & Kanungo, (1988) are widely recognized as the first authors to introduce the notion of PE. Further Thomas & Velthouse, (1990) consider empowerment as a motivating element associated with intrinsic task motivation which consists of four components namely impact, competence, meaning, and self-determination. Spreitzer, (1995) further developed the idea of empowerment by specifically examining its use in the workplace in which the research built upon earlier studies conducted by Thomas & Velthouse, (1990). Spreitzer, (1995) Explains that meaning is how well an employee thinks their values, beliefs, attitudes, and actions match up with their job duties. While Thomas & Velthouse, (1990) refer to competence as an individual's ability to effectively perform job-related tasks when applying effort. Meanwhile, self-determination refers to an employee's perspective on how to carry out their responsibilities, encompassing aspects such as initiative, action, task behavior, and methodology and lastly impact refers to the degree to which an employee can influence the results or outcomes within the company (Spreitzer, 1995). In the past two decades, extensive research on psychological empowerment has provided compelling evidence of its significant impact as a motivational element in influencing IWB (Gultom et al., 2022; Yadav et al., 2023). Afsar & Masood, (2018) Reported empowered employees are likely to demonstrate higher levels of IWB. When an employee has a sense of empowerment, they perceive their job as having a more significant purpose, exhibit increased levels of skill in their work, possess a larger ability to affect outcomes, and have a wider range of options for completing tasks (Nasir et al., 2019).

Knowledge Sharing: Knowledge sharing (KS) is a collaborative process in which employees within an organization exchange knowledge, resulting in the creation of new knowledge (Van Den Hooff & Ridder, 2004). The KS process consists of two distinct phases: knowledge donating and knowledge collecting. Knowledge collection involves engaging and inspiring individuals to share their knowledge or intellectual resources, whereas knowledge donation refers to the transfer of one's intellectual assets to others (Van Den Hooff & Ridder, 2004). To be more specific, knowledge collection and knowledge donation are practices carried out by employees to acquire and share new information, enhancing the overall comprehensiveness of everyone's knowledge (Nham et al., 2020). Almulhim, (2020) states that knowledge sharing may be incredibly beneficial to partners or employees when it comes to solving problems, implementing policies, or developing new ideas. Higher education institutions are classified as knowledge-intensive enterprises due to their significant involvement in knowledge generation, development, and dissemination through teaching, learning, and research (Chen & Pongtornkulpanich, 2024). Hence, academics should possess the skills to effectively administer and harness knowledge, as well as disseminate it, to optimize its utilization and generate groundbreaking results. Knowledge sharing has been evaluated as a foundation for innovation and has demonstrated its ability to enhance the effectiveness of research and development in organizations (Nugroho, 2023). Empirical findings indicate that the act of sharing knowledge, which includes both donating and collecting knowledge, plays a significant role in enhancing employees' IWB (Akram et al., 2018; Chen & Pongtornkulpanich, 2024; Khan et al., 2023; Natsir & Yunus, 2023).

Individual Innovation Capabilities: Lathong, (2021) defines IIC as the ability of employees to conceptualize and implement novel ideas. According to Basadur et al., (1982), for employees to participate in innovative activities, they need to have creative thinking skills that include both divergent and convergent thinking abilities. Divergent thinking refers to the capacity to generate multiple alternative solutions or perspectives, while convergent thinking employs analytical and judgemental skills to assess the value of an idea or pinpoint the root causes of problems (Basadur & Finkbeiner, 1985; Scott et al., 2004). Both sets of capabilities are essential for generating innovative and potentially feasible ideas. Therefore, for an employee to innovate, they must possess both types of talents. Academic staff must be adaptable and innovative to survive in an unpredictable environment under IR 4.0 (Hussein et al., 2016). It is mainly because the ability of staff to innovate is a major factor in an organization's innovation (Zhao et al., 2020). Enhanced capacity for innovation can assist individuals in resolving work-related challenges, thereby improving the quality and quantity of their output (Fauziyah & Rahayunus, 2021). Academic innovation capability becomes a driver of business sustainability (Nugroho et al., 2021). Thus, individual innovation capability is considered a valuable asset for firms to provide and sustain competitive advantage in the implementation of the entire strategy. Researchers have looked at how IIC affects many things, such as knowledge sharing, hard and soft skills, organizational learning, employee performance, transformational leadership, organizational culture, and individual and organizational drives (Ben Moussa & El Arbi, 2020; Fauziyah & Rahayunus, 2021; Iddris et al., 2022; Imron et al., 2021; Lathong, 2021; Lei et al., 2020; Nham et al., 2020; Nugroho et al., 2021; Wibowo et al., 2020). However, not much research has been done on the relationship between IIC and IWB. Studies on the use of IIC to strengthen IWB are even more limited in the education field.

3. Research Methodology

This study employs a quantitative research design to examine the factors driving academics' IWB in Malaysian Higher Education Institutions (HEIs). In particular, the study focuses on three independent variables: individual innovation capability, psychological empowerment, and knowledge sharing, as well as the dependent variable, IWB. The intended target population consists of academics from 24 Malaysian universities listed in the QS World Ranking 2023. The study's sample size consists of 382 respondents who were selected using convenience sampling, a non-probability selection technique that allows for convenient access to participants. Data were collected using a structured questionnaire that was developed through Google Forms. Academics from various disciplines and faculties received the questionnaire via email. The survey items were adapted and adopted from validated scales in existing literature to ensure reliability and validity. The data were analyzed using SPSS 29.0.

Measurements

Innovative Work Behaviour: The 10-item scale from De Jong and Den Hartog (2010) was used to evaluate the employees' IWB. Participants were required to indicate how frequently, using a 5-point Likert-type scale ranging from 1 (never) to 5 (always), they manifest the behaviors mentioned in the survey. A sample item is "I generate original solutions for problems".

Psychological Empowerment: Psychological empowerment is assessed using the scale developed by Spreitzer, (1995). This instrument comprises 12 items, with three items measuring each of the four dimensions of psychological empowerment: meaning, competence, self-determination, and impact. Respondents will rate their agreement with each statement on a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Examples of items include "The work I do is meaningful to me" (meaning), "I am confident about my ability to do my job" (competence), "I have significant autonomy in determining how I do my job" (self-determination), and "My impact on what happens in my department is large" (impact).

Knowledge Sharing: The measurement scale used to assess knowledge sharing was adopted from Van Den Hooff & Ridder, (2004). The questions were extensively employed by numerous prior investigations. (De Vries et al., 2006; Nham et al., 2020). The questions were examined according to knowledge donating and knowledge collecting. The measurement consists of eight items. These items are rated on a Likert scale ranging from 1 (indicating strongly disagree) to 5 (indicating strongly agree). Examples of items include "When I've learned something new, I tell my colleagues about it" and "When I need certain knowledge, I ask my colleagues about it".

Individual Innovation Capabilities: Individual innovation capabilities are measured using a modified version of the scale originally developed by Hurt et al., (1977) and subsequently adapted by An et al., (2015) and Ganesan & Weitz, (1996). This unidimensional measure consists of 6 items and uses a Likert scale from 1 (totally disagree) to 5 (totally agree). The items are designed to gauge the degree to which respondents believe they are involved in creative and innovative activities. Sample items include "I enjoy trying out new ideas" and "I frequently improvise methods for solving a problem when an answer is not apparent". This scale has been validated and shown to be reliable in previous research (Nham et al., 2020).

4. Findings

The background of 382 respondents is described through a table based on the demographic characteristics of gender, age (years), service duration, academic qualification, and position. It is analyzed according to the frequency and percentage as stated in Table 1. Firstly, the majority of the respondents are female academics with 259 (67.8%) while 123 academics (32.2%) are male academics. In terms of age, it states that most of the respondents in this study are between the age of 40-49 years with 169 respondents (44.2%) and between age 30-39 years with 117 respondents (30.6%). The remaining are between ages 50-59 years with 48 respondents (23.3%) followed by between age 20-29 years with 4 respondents (1.0%) and above 60 years with the least number of 3 respondents (0.8%). Next, majority of the respondents have more than 20 years of service duration with 93 respondents (24.3%) followed by 16-20 years of service duration with 77 respondents (20.2%), 11-15 years of service duration with 76 respondents (19.9%), 1-5 years of service duration with 71 (19.1%) and 6-10 years of service duration with 63 respondents (16.5%). In terms of academic qualification, 296 respondents (77.5%) are PhD holders meanwhile 86 respondents (22.5%) are Master holders. Lastly, for positions, most of the respondents are senior lecturers with 181 respondents (47.4%) followed by Associate Professor Madya Dr. with 80 respondents (20.9%), a lecturer with 68 respondents (17.8%), PhD Dr. with 38 respondents (9.9%) and the lowest is Professor with 15 respondents (3.9%).

Table 1: Descriptive Analysis on Respondents Demographic

Item		Frequencies (n)	Percent (%)
Gender	Male	123	32.2
	Female	259	67.8
Age	20-29 years	4	1.0
	30-39 years	117	30.6
	40-49 years	169	44.2
	50-59 years	48	23.3
	More than 60 years	3	0.8
Service Duration	1-5 years	73	19.1
	6-10 years	63	16.5
	11-15 years	76	19.9
	16-20 years	77	20.2
	More than 20 years	93	24.3
Academic	Master	86	22.5
Qualification	PhD	296	77.5
Position	Lecturer	68	17.8
	Senior Lecturer	181	47.4
	PhD Dr.	38	9.9
	Associate Professor Dr.	80	20.9
	Professor	15	3.9

Reliability Analysis

Considering the overall reliability of the observable variables, every observable variable has a high level of reliability between .741 and .968. The results show that Cronbach's Alpha for all variables is acceptable, good, and excellent since the value of Cronbach's Alpha is more than 0.7. Hence, the actual study is reliable.

Table 2: Reliability Analysis (N=382)

Variables	Number of items	Cronbach's Alpha
Innovative Work Behavior	10	.904
Individual Innovation Capabilities	7	.927
Psychological Empowerment	12	.903
Knowledge Sharing	8	.891

Descriptive Analysis

For this study, the mean score is used to evaluate the level of IWB, psychological empowerment (PE), knowledge sharing (KS) and individual innovation capabilities (IIC) practice of academics of HEIs in Malaysia. The data were analyzed descriptively using mean through SPSS version 29.0. The Mean Score Interpretation Table constructed by Moidunny (2009) was used in this study to measure the mean score. The Mean Score Interpretation Table is shown in Table 3 while Table 4 shows the descriptive analysis. According to Table 4, academics in Malaysia HEIs have high levels of IWB (M = 3.82), high levels of PE (M = 4.14), high levels of KS (M = 3.95), and high levels of IIC (M = 4.12). It can be concluded that the mean score for IWB and all the independent variables is high.

Table 3: Mean Score Interpretation Table

Mean Scale	Level
1.00 – 1.80	Very Low
1.81 – 2.60	Low
2.61 – 3.20	Medium
3.21 – 4.20	High
4.21 – 5.00	Very High

Source: Moidunny (2009). The Effectiveness of the National Professional Qualification for Educational Leaders (NPQEL).

Table 4: The Total Mean Score of Variables

Descriptive Statistics

	N	Mean	Std. Deviation	Interpretation Level
Mean_IWB	382	3.8296	.61122	High
Mean_PE	382	4.1440	.53087	High
Mean_KS	382	3.9496	.64269	High
Mean_IIC	382	4.1248	.66139	High
Valid N (listwise)	382			

Descriptive Analysis of Innovative Work Behavior

Table 5 explains the descriptive statistics for the question set on Innovative Work Behaviour designated for this study. The descriptive statistics for Innovative Work Behavior (IWB) among academics reveal interesting insights into how lecturers in Malaysian universities engage with innovation within their institutions. For example, among the IWB practices in organizations, question set (Q2) shows the highest mean (M=4.24) with 136 respondents strongly agreeing that they always want to know how things can be improved in their workplace. It shows a high engagement of academics in continuous improvement. This high level of engagement can be attributed to the intrinsic motivation of academics to continuously enhance their work environment. In academia, there is a strong emphasis on quality improvement and staying updated with the latest developments. With education changing constantly, sticking to one method is not feasible. (Mohammed Afandi & Mohd Effendi Ewan, 2020). Academics often seek to refine their teaching methods, research practices, and administrative processes, leading to a high mean in this category.

While examining Q3-Q5 the result shows high engagement in searching for new methods with (M=4.14, M=3.88, M=4.01) respectively. The majority of the respondents agree with the statements for example for Q3 around 200 respondents often search for new working methods, techniques, or instruments in their institutions. The advancement of education technology, expanding branches of knowledge, and increasing challenges in education require our education system to be innovative to remain competitive (Mohammed Afandi & Mohd

Effendi Ewan, 2020). Next, for Q4, 193 respondents agreed they often generate original solutions for problems. For Q5 almost 210 respondents agreed that they often find new approaches to executing tasks. The high engagement in these areas can be linked to the dynamic nature of academic work, which requires constant innovation to stay relevant and effective. Academics are encouraged to explore new pedagogical strategies, research methodologies, and technological tools. Thus, educational institutions can facilitate and encourage innovation by providing academics with the necessary resources and equipment to experiment with new teaching methodologies (Carvalho et al., 2023).

Meanwhile, Q6 and Q7 also show high engagement in influencing others. Almost 149 respondents agreed they often make important organizational members enthusiastic about innovative ideas while Q7 shows 162 respondents stated they often attempt to convince people to support an innovative idea. The high engagement in influencing others reflects the proactive role that academics play in advocating for innovation within their institutions. This can be attributed to their commitment to improving their work environment and the desire to see innovative ideas come to fruition. Influencing colleagues and administrative staff requires strong interpersonal skills and a supportive organizational culture. Academics often utilize their credibility and expertise to persuade others, fostering a collaborative environment that is conducive to innovation.

Following the rest of the questions, high means for Q8 (M=3.68), Q9 (M=3.80), and Q10 (M=3.93), with many respondents systematically introducing, contributing to, and developing new ideas with 167 respondents,182 and 194 respondents respectively. The practical application of innovative ideas is crucial in academia, where research findings and new teaching practices need to be integrated into everyday work. This high level of engagement demonstrates that academics not only generate ideas but also take steps to implement them, ensuring that their innovative efforts have tangible outcomes. According to Kleysen & Street, (2001), idea implementation is a difficult phase because so many proposed ideas will never see the light of day.

However, Q1 shows lower engagement in non-daily work issues. The lowest mean (M=3.58) with 143 respondents stated only sometimes they pay attention to issues not part of their daily work. This lower engagement might be due to the heavy workload and time constraints faced by academics, making it difficult to focus on issues beyond their immediate responsibilities. Additionally, the academic environment often prioritizes specific tasks related to teaching, research, and service, leaving little room for attention to peripheral issues. Academics are often required to perform challenging tasks in a high-pressure setting, which encompass conducting demanding research, publishing scholarly work, fulfilling teaching and supervisory duties, securing research funding, and managing administrative tasks. (Janib et al., 2021). The total mean score for IWB is (M=3.83), which indicates a significant level of innovative activity but also offers an opportunity for further improvement. The relatively high mean indicates that academics have a proactive approach towards innovation, which is essential for the ongoing enhancement of teaching and research processes within higher education institutions (HEIs).

Table 5: Mean Score, Standard Deviation and Interpretation of Innovative Work Behavior

Descriptive Statistics								
Statement	**N**	**Std. Deviation**	**Mean**	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
I pay attention to issues that are not part of my daily work.	382	.996	3.17	18 (4.7%)	76 (19.9%)	143 (37.4%)	113 (29.6%)	32 (8.4%)
I wonder how things can be improved	382	.672	4.24		7 (1.8%)	30 (7.9%)	209 (54.7%)	136 (35.6%)
I search for new working methods, techniques, or instruments.	382	.725	4.14	1 (0.3%)	6 (1.6%)	53 (13.9%)	200 (52.4%)	122 (31.9%)

I generate original solutions for problems.	382	.748	3.88		10 (2.6%)	103 (27.0%)	193 (50.5%)	76 (19.9%)
I find new approaches to executing tasks.	382	.720	4.04	1 (0.3%)	6 (1.6%)	68 (17.8%)	210 (55.0%)	97 (25.4%)
I make important organizational members enthusiastic about innovative ideas.	382	.906	3.67	5 (1.3%)	27 (7.1%)	129 (33.8%)	149 (39.0%)	72 (18.8%)
I attempt to convince people to support an innovative idea	382	.946	3.74	7 (1.8%)	30 (7.9%)	100 (26.2%)	162 (42.4%)	83 (21.7%)
I systematically introduce innovative ideas into work practices.	382	.915	3.68	5 (1.3%)	34 (8.9%)	107 (28.0%)	167 (43.7%)	69 (18.1%)
I contribute to the implementation of new ideas.	382	.873	3.80	6 (1.6%)	19 (5.0%)	97 (25.4%)	182 (47.6%)	78 (20.4%)
I put effort into the development of new things.	382	.850	3.93	4 (1.0%)	19 (5.0%)	71 (18.6%)	194 (50.8%)	94 (24.6%)
Total Mean_IWB	382	.61122	3.8296					

Descriptive Analysis of Individual Innovation Capabilities

Table 6 presents the descriptive analysis of individual innovation capabilities (IIC) among academics. The findings indicate a generally high level of engagement in innovation activities, reflecting a strong propensity for creativity and continuous improvement within the academic community. In Q1, the analysis reveals that a significant portion of respondents, 179 (46.6%), agreed that they enjoy trying out new ideas (M=4.22). This high level of agreement suggests a positive attitude towards experimentation and innovation among academics. The ability to innovate helps academics be more prepared for the 4.0 educational environment. (Wibowo et al., 2020). This is crucial as the enjoyment of exploring new ideas is a fundamental driver of innovation and creativity in academic settings. Similar trends were observed for Q2 and Q3, where 171 respondents (44.8%) with (M=4.22) agreed that they have a strong eagerness for discovery that leads to new ideas and actively seek out new ways to do things with (M=4.16). This eagerness reflects an intrinsic motivation to innovate, which is essential for academic progress. Academics who are constantly looking for new methods and solutions are more likely to contribute to the advancement of knowledge and the improvement of educational practices. Fauziyah & Rahayunus, (2021) Has been found that individuals with a higher capacity for innovation are better equipped to address workplace challenges, leading to improved quality and quantity of work. Q4 shows that a majority of respondents, 187 (49.0%) with (M=4.19), frequently improvise methods for solving problems when an answer is not apparent. This ability to improvise and adapt is a critical component of innovative capability. It indicates that academics are not only generating new ideas but also effectively applying them to solve unforeseen challenges, which is a key aspect of innovative work behavior.

Innovation capability among faculty members can help HEIs successfully execute the transformation process, leading to improved performance (Ibus et al., 2020). The analysis for Q5 and Q6 reveals that the highest number of respondents agreed that they consider themselves creative and original in their thinking and behavior (161 respondents, 42.1%, M=3.95) and feel they are becoming more creative due to continuous learning in their institutions (173 respondents, 45.3%, M=4.01). This finding underscores the role of continuous professional development and a supportive learning environment in fostering creativity among academics. Continuous learning and professional development opportunities provided by institutions play a significant role in enhancing the creative capabilities of their staff. The respondents demonstrate a very high level of Individual

Innovation Capability, as seen by their total mean score of (M=4.12). Academics believe themselves to be skilled innovators, possessing the requisite creativity, adaptability, and problem-solving abilities to promote innovation.

Table 6: Mean Score, Frequency and Interpretation of Individual Innovation Capabilities

	Descriptive Statistics							
Statement	**N**	**Std. Deviation**	**Mean**	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
I enjoy trying out new ideas.	382	.733	4.22	1 (.03%)	4 (1.0%)	52 (13.6%)	179 (46.6%)	146 (38.2%)
I have a strong eagerness for discovery that leads to new ideas.	382	.733	4.22		4 (1.0%)	58 (15.2%)	171 (44.8%)	149 (39.0%)
I seek out new ways to do things.	382	.759	4.16		6 (1.6%)	66 (17.3%)	171 (44.8%)	139 (36.4%)
I frequently improvise methods for solving a problem when an answer is not apparent.	382	.728	4.19		7 (1.8%)	50 (13.1%)	187 (49.0%)	138 (36.1%)
I consider myself to be creative and original in my thinking and behavior.	382	.862	3.95		21 (5.5%)	88 (23.0)	161 (42.1%)	112 (29.3%)
I feel myself becoming more creative because of continuous learning in the institutions.	382	.828	4.01	2 (0.5%)	12 (3.1%)	81 (21.2%)	173 (45.3%)	114 (29.8%)
Total Mean_IIC	382	4.1248	.66139					

Descriptive Analysis of Psychological Empowerment

Table 7 presents the descriptive analysis of psychological empowerment among academics, assessed through 12 items divided into four dimensions: meaning, competence, impact, and self-determination. Q1 to Q3 fall under dimension meaning, Q4 to Q6 under competence, Q7 to Q9 under impact, and Q10 to Q12 under self-determination. The findings indicate varying levels of psychological empowerment across these dimensions, reflecting how academics perceive their roles, capabilities, and influence within their institutions. For meaning, a substantial majority of respondents strongly agreed that their work is very important to them (Q1: 264 respondents, 69.1%, M=4.66), that their job activities are personally meaningful (Q2: 250 respondents, 65.4%, M=4.62), and that the work they do is meaningful (Q3: 260 respondents, 68.1%, M=4.66). These very high levels of agreement suggest that academics find significant personal value and purpose in their work. The sense of meaning is a critical component of psychological empowerment, as it drives motivation and job satisfaction.

For questions on competence, most respondents strongly agreed that they are confident in their ability to do their job (Q4: 229 respondents, 59.9%, M=4.56) and feel self-assured about their capabilities (Q5: 218 respondents, 57.1%, M=4.52). For Q6, 182 respondents (47.6%, M=4.26) agreed they had mastered the skills necessary for their job. These results indicate a very high level of perceived competence among academics. While the question on impact demonstrates a majority of respondents agreed that their impact on their department is large (Q7: 163 respondents, 42.7%, M=3.99), they have a great deal of control over what happens in their organization (Q8: 120 respondents, 31.4%, M=3.33). They significantly influence organizational outcomes (Q9: 118 respondents, 30.9%, M=3.26). These high levels of agreement reflect a notable sense of impact among academics. Perceiving oneself as influencing departmental or organizational decisions is a key aspect of psychological empowerment, contributing to a sense of agency and responsibility. Lastly, for self-determination, the majority of respondents agreed that they have significant autonomy in determining how they do their job (Q10: 176 respondents, 46.1%, M=3.81), can decide on their own how to go about their work

(Q11: 180 respondents, 47.1%, M=4.09), and have considerable opportunities for independence and freedom in their job (Q12: 181 respondents, 47.4%, M=3.96). These findings suggest that academics experience a high level of self-determination, which is crucial for psychological empowerment. Autonomy in job roles allows for creativity, innovation, and personalized approaches to work, enhancing job satisfaction and performance. The Psychological Empowerment dimension had the highest mean score of (M=4.14), suggesting that academics have a strong sense of confidence in their talents, find their work worthwhile, and believe they have a substantial influence on their organizations.

The high level of agreement for Q1 indicates that academics find their work to be highly significant. Academics often view their roles in teaching, research, and contributing to knowledge as highly meaningful, which enhances their engagement and commitment. The high mean score for Q2 suggests that job activities themselves are seen as personally meaningful. This could be due to the alignment between the tasks performed and the personal values and goals of the academics. When individuals perceive their job activities as meaningful, they are more likely to be motivated and satisfied with their work. Similar to Q1 and Q2, the high agreement for Q3 underscores the overall meaningfulness of the work performed by academics. When employees think their jobs are important, they will put in more effort to understand problems from different points of view and look for different ways to solve them using data gathered from many different sources (Shalley & Gilson, 2004). Employees who had a sense of meaning and were determined were innately inspired to come up with new ideas (Javed et al., 2019).

The high level of agreement for Q4 indicates that academics feel confident in their ability to perform their job tasks effectively. This sense of competence is crucial for psychological empowerment as it enhances self-efficacy and the belief in one's ability to achieve desired outcomes (Bandura, 1997). Q5's high mean score suggests that academics have a strong belief in their capabilities. This self-assurance is likely influenced by their extensive education, training, and experience in their respective fields. When individuals believe in their capabilities, they are more likely to take on challenging tasks and innovate in their work (Bandura, 1997). The agreement level for Q6 reflects the perception of skill mastery among academics. Mastery of necessary skills is fundamental for feeling competent and effective in one's role (Bandura, 1978). A strong sense of competence makes people more prosperous in many ways. (Francis & Alagas, 2019). Employees who possess a high level of competence are more inclined to propose novel approaches to tasks or processes (Singh & Sarkar, 2012).

The high agreement for Q7 indicates that academics perceive themselves as having a significant impact within their departments. This perception of impact is crucial for psychological empowerment as it enhances the sense of control and influence over one's work environment (Spreitzer, 1995). Although the agreement for Q8 is slightly lower, the mean score still indicates a sense of control among academics. Control over work-related decisions is a key component of psychological empowerment, as it allows individuals to shape their work environment and processes (Thomas & Velthouse, 1990). Similar to Q8, the agreement level for Q9 highlights the perceived influence academics have within their organizations. This influence is essential for feeling empowered and motivated, as it allows individuals to contribute to organizational goals and initiatives.

The high agreement for Q10 indicates that academics experience significant autonomy in their roles. Autonomy is a critical aspect of self-determination, allowing individuals to make decisions about their work processes and activities (Deci & Ryan, 1985). Q11's high mean score reflects the freedom academics have in determining their work methods. This self-determination is vital for fostering a sense of ownership and responsibility for one's work, which can lead to greater engagement and innovation. Employees with a strong sense of self-determination are more adaptable, creative, initiative, persistent, and self-controllable (Thomas & Velthouse, 1990). The strong agreement with Q12 underscores the significant opportunities for independence and freedom in academic roles. This independence is essential for psychological empowerment, as it allows individuals to align their work with personal and professional goals, enhancing overall job satisfaction and performance (Deci & Ryan, 2000).

Table 7: Mean Score, Frequency and Interpretation of Psychological Empowerment

	Descriptive Statistics							
Statement	**N**	**Std. Deviation**	**Mean**	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
The work I do is very important to me.	382	.536	4.66		1 (0.3%)	9 (2.4%)	108 (24.3%)	264 (69.1%)
My job activities are personally meaningful to me.	382	.556	4.62		1 (0.3%)	11 (2.9%)	120 (31.4%)	250 (65.4%)
The work I do is meaningful to me	382	.505	4.66			6 (1.6%)	116 (30.4%)	260 (68.1%)
I am confident about my ability to do my job.	382	.580	4.56		1 (0.3%)	14 (3.7%)	138 (36.1%)	229 (59.9%)
I am self-assured about my capabilities to perform my work activities.	382	.600	4.52		2 (0.5%)	15 (3.9%)	147 (38.5%)	218 (57.1%)
I have mastered the skills necessary for my job.	382	.694	4.26		3 (0.8%)	46 (12.0%)	182 (47.6%)	151 (39.5%)
My impact on what happens in my department is large.	382	.872	3.99	4 (1.0%)	13 (3.4%)	83 (21.7%)	163 (42.7%)	119 (31.2%)
I have a great deal of control over what happens in my organization.	382	1.116	3.33	26 (6.8%)	59 (15.4%)	119 (31.2%)	120 (31.4%)	58 (15.2%)
I have significant influence over what happens in my organization.	382	1.090	3.26	26 (6.8%)	64 (16.8%)	126 (33.0%)	118 (30.9%)	48 (12.6%)
I have significant autonomy in determining how I do my job.	382	.898	3.81	5 (1.3%)	25 (6.5%)	92 (24.1%)	176 (46.1%)	84 (22.0%)
I can decide on my own how to go about doing my work.	382	.832	4.09	1 (0.3%)	19 (5.0%)	53 (13.9%)	180 (47.1%)	129 (33.8%)
I have considerable opportunities for independence and freedom in how I do my job.	382	.890	3.96	4 (1.0%)	23 (6.0%)	65 (17.0%)	181 (47.4%)	109 (28.5%)
Total Mean_PE	382	4.1440	.53087					

Descriptive Analysis of Knowledge Sharing

Table 8 presents the descriptive analysis of knowledge sharing among academics, divided into two dimensions: knowledge donating and knowledge collecting. The findings demonstrate a high level of engagement in both knowledge-donating and knowledge-collecting activities, indicating a collaborative culture among academics. For knowledge donating majority of respondents agreed with the statements "When I've learned something new, I tell my colleagues about it" (Q1: 197 respondents, 51.6%, M=3.94), "I share the information I have with my colleagues" (Q2: 200 respondents, 52.4%, M=4.12), "I think it is important that my colleagues know what I am doing" (Q3: 158 respondents, 41.4%, M=3.65), and "I regularly tell my colleagues what I am doing" (Q4: 144 respondents, 37.7%, M=3.46). These high levels of agreement suggest that academics are actively involved in

sharing their knowledge with colleagues. This behavior is crucial for the dissemination of new information and practices within academic institutions, fostering an environment of continuous learning and improvement. The agreement with Q3 highlights the importance of keeping colleagues informed about one's work. This practice fosters a sense of community and collaboration, as it allows colleagues to provide feedback, offer support, and potentially collaborate on related projects. It also ensures that efforts are aligned toward common institutional goals.

While for knowledge collecting, similarly, a majority of respondents agreed with the statements "When I need certain knowledge, I ask my colleagues about it" (Q5: 192 respondents, 50.3%, M=4.32), "I like to be informed of what my colleagues know" (Q6: 167 respondents, 43.7%, M=3.80), "I ask my colleagues about their abilities when I need to learn something" (Q7: 187 respondents, 49.0%, M=4.07), and "When a colleague is good at something, I ask them to teach me how to do it" (Q8: 189 respondents, 49.5%, M=4.24). These results indicate a high level of engagement in knowledge-collecting activities among academics. Actively seeking knowledge from colleagues enhances individual capabilities and promotes a culture of shared expertise and mutual support. The overall mean score for knowledge sharing is (M=3.95), which suggests a significant level of involvement in activities related to sharing knowledge. This implies that academics are not only eager to offer their expertise but also actively seek knowledge from their colleagues, fostering a collaborative climate that promotes ongoing learning and innovation.

The high level of agreement for Q1 suggests that academics are keen to share new knowledge with their peers. This behavior may be attributed to the intrinsic motivation to contribute to the academic community and the recognition of the value of collective learning. Academics often work in collaborative environments where the exchange of new ideas is essential for advancing research and teaching practices. (Cagatan & Quirap, 2024). According to Bin Saripin & Kassim, (2019) Those who are willing to share knowledge are found to be more innovative, The high mean score for Q2 indicates that information sharing is a common practice among academics. This could be driven by the need for transparency and the benefits of shared knowledge in improving work efficiency and academic output. Besides, sharing knowledge can enhance individuals' ability to think creatively, effectively, efficiently, and innovatively (Fauziyah & Rahayunus, 2021). This demonstrates that the act of sharing knowledge will lead to broader opportunities for increased creativity and innovation (Bin Saripin & Kassim, 2019).

The agreement with Q3 highlights the importance of keeping colleagues informed about one's work. This practice fosters a sense of community and collaboration, as it allows colleagues to provide feedback, offer support, and potentially collaborate on related projects. Academics are more prone to being innovative and imaginative when there is a higher level of information exchange among them which facilitates their ability to address and overcome barriers and challenges related to their profession (Ibus et al., 2020). Although the mean score for Q4 is slightly lower, it still reflects a significant level of regular communication among academics. Regular updates about one's work can help in building trust and fostering a collaborative environment. It can also prevent misunderstandings and ensure that all team members are aware of each other's contributions and progress.

The high mean score for Q5 indicates that academics frequently seek knowledge from their colleagues. This behavior is likely driven by the recognition that peers can be valuable sources of expertise and information. Asking colleagues for knowledge can provide quick and practical solutions to problems and enhance one's understanding of complex topics. (Cross, Rob; Parker, Andrew; Prusak, 2000). The agreement with Q6 suggests that academics value being aware of their colleagues' knowledge. This awareness can facilitate better collaboration and resource allocation, as individuals can identify whom to approach for specific information or skills. According to Kmieciak, (2020) Individuals who receive knowledge are less likely to verify the correctness and validity of that knowledge when it originates from a trustworthy source. The high agreement level for Q7 highlights the proactive approach of academics in seeking to learn from their peers. This behavior is essential for personal and professional development, as it allows individuals to acquire new skills and knowledge from those with expertise in particular areas. It also promotes a culture of continuous learning and improvement (Bandura, 1986). The strong agreement with Q8 underscores the importance of peer learning in academic settings. Academics often recognize the value of hands-on learning from colleagues who excel in certain areas. This practice not only enhances individual capabilities but also strengthens the collaborative culture within the

institution, as it encourages knowledge-sharing and mutual support. The recipient can quickly utilize the gained knowledge without the need for time-consuming verification, hence enhancing organizational learning, alertness, and responsiveness (Kmieciak et al., 2012). In addition, increased knowledge-sharing activities among employees enhance their capacity for critical thinking and innovation (Nham et al., 2020).

Table 8: Mean Score, Frequency and Interpretation of Knowledge Sharing

Descriptive Statistics								
Statement	**N**	**Std. Deviation**	**Mean**	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
When I've learned something new, I tell my colleagues about it.	382	.827	3.94	4 (1.0%)	15 (3.9%)	74 (19.4%)	197 (51.6%)	92 (24.1%)
I share the information I have with my colleagues.	382	.730	4.12		9 (2.4%)	54 (14.1%)	200 (52.4%)	119 (31.2%)
I think it is important that my colleagues know what I am doing.	382	.965	3.65	8 (2.1%)	38 (9.9%)	106 (27.7%)	158 (41.4%)	72 (18.8%)
I regularly tell my colleagues what I am doing.	382	1.023	3.46	17 (4.5%)	46 (12.0%)	120 (31.4%)	144 (37.7%)	55 (14.4%)
When I need certain knowledge, I ask my colleagues about it.	382	.667	4.32	1 (0.3%)	4 (1.0%)	25 (6.5%)	192 (50.3%)	160 (41.9%)
I like to be informed of what my colleagues know.	382	.986	3.80	12 (3.1%)	25 (6.5%)	85 (22.3%)	167 (43.7%)	93 (24.3%)
I ask my colleagues about their abilities when I need to learn something.	382	.867	4.07	3 (0.8%)	23 (6.0%)	44 (11.5%)	187 (49.0%)	125 (32.7%)
When a colleague is good at something, I ask them to teach me how to do it.	382	.729	4.24	1 (0.3%)	8 (2.1%)	36 (9.4%)	189 (49.5%)	148 (38.7%)
Total Mean_KS	382	3.9496	.6427					

5. Managerial Implications and Recommendations

The outcomes of the study describing the specific factors that affect academics' IWB in Malaysian Higher Education institutions (HEIs) show how important it is to create a supportive and empowering environment that encourages individual innovation capability, psychological empowerment, and knowledge sharing. Universities strategically position themselves to contribute to SDG 4 (Quality Education) by cultivating atmospheres encouraging ongoing enhancement and innovation in teaching and research, as indicated by their significant involvement in innovative efforts. HEIs can promote educational excellence and equity by improving individual innovative capability, psychological empowerment, and knowledge sharing. This aligns with Malaysia's Education Blueprint 2013–2025, which prioritizes education quality, access, and equity. Furthermore, fostering a culture of innovation aligns with Malaysia's National Policy on Science, Technology, and Innovation (2021–2030), which seeks to convert the country into a knowledge-driven economy.

Therefore, university administrators should establish and maintain a culture that promotes innovation since many respondents are highly engaged in innovative activities. This includes making sure that academics have the freedom, funding, and chances to try new things and come up with creative solutions, as well as acknowledging and rewarding innovative accomplishments. Furthermore, fostering psychological

empowerment through work purpose, providing opportunities for skill development, and promoting flexibility and influence in the classroom can greatly enhance academics' innovative capabilities. Institutions should foster a collaborative environment that freely exchanges knowledge to improve educational methods and research outputs. This will further strengthen their academic staff's collective innovative capabilities.

Conclusion

In conclusion, the high average scores in all variables indicate a solid basis for innovation across Malaysian Higher Education Institutions (HEIs). Academics who possess high levels of individual innovation capability, psychological empowerment, and knowledge sharing are more likely to exhibit innovative work behavior. Nevertheless, to fully exploit these advantages, Higher Education Institutions (HEIs) must persist in providing assistance and improving these elements through specific strategies, resources, and endeavors that are in line with national and institutional objectives for educational and research excellence. Besides, the results of the descriptive statistics on IWB among academics indicate a significant preference for continual improvement, innovative approaches and solutions, influencing others, and the practical application of new ideas. However, academics tend to focus less on non-daily work matters, possibly due to organizational and workload constraints. Gaining insight into these patterns can assist universities in establishing nurturing cultures that promote innovation more effectively by eliminating obstacles and harnessing the inherent and external motivations of academics to increase their inventive work behavior. Besides, Malaysian universities' academics exhibit strong innovation capabilities, fostering an environment of continuous improvement and adaptation.

They engage in innovative activities, demonstrating a proactive approach to discovery. Their creative problem-solving skills, coupled with cognitive flexibility and resourcefulness, are crucial for tackling complex challenges. The correlation between continuous learning and increased creativity underscores the importance of professional development programs in higher education, enhancing knowledge and skills while fostering innovation. While, psychological empowerment among academics is influenced by meaningfulness, competence, impact, and self-determination. These factors contribute to increased commitment, motivation, and job satisfaction. Academics with high perceived competence are more likely to undertake demanding work, offer innovative ideas, and achieve exceptional performance. They also feel a sense of agency and control over their work environment. Thus, institutions can enhance this by engaging academics in decision-making processes and fostering a positive organizational culture. Finally, knowledge sharing among academics reveals a strong preference for both donating and collecting knowledge. It highlights the importance of a cooperative academic environment for professional growth and sharing of expertise. This not only enhances institutional competence but also improves individual comprehension and proficiency. Knowledge donation is crucial in higher education, promoting exemplary practices, innovative teaching techniques, and research discoveries. Meanwhile, engaging in knowledge-collecting activities fosters a cooperative atmosphere, promoting ongoing learning and growth. This culture enhances the quality of education and research.

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Enhancing Social Sustainability in Malaysian Supply Chains: Integrating Occupational Safety and Health for Resilient and Ethical Business Practices

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Abstract: This conceptual paper examines the insufficient integration of Occupational Safety and Health into Malaysian supply chains' social sustainability frameworks, despite its recognized impact on worker well-being and economic performance. While Malaysia has advanced in sustainability overall, incorporating OSH into broader social responsibility strategies remains underdeveloped. This paper argues that protecting worker well-being is essential for sustainable supply chains, directly contributing to social sustainability and economic performance. The study examines the ethical, legal, and business justifications for prioritizing OSH in supply chain management. It draws upon international human rights declarations, treaties, and conventions, including the Universal Declaration of Human Rights, the International Covenant on Economic, Social and Cultural Rights, and the ILO's Occupational Safety and Health Convention, to underscore the fundamental right to a safe and healthy work environment. This model developed through analysis of existing literature and policy frameworks, aims to guide a more comprehensive approach to OSH management within Malaysian supply chains. By analyzing these frameworks, the paper highlights the need for a comprehensive approach that aligns OSH with international standards and sustainable development goals. Ultimately, it advocates for a more resilient and equitable supply chain framework in Malaysia, where worker well-being is central to sustainable business practices.

Keywords: *Occupational safety, health, OSH, social sustainability, supply chain management, worker well-being*

1. Introduction

The concept of sustainability has transcended its initial environmental focus to encompass a broader spectrum of social, economic, and ethical considerations, as highlighted by the United Nations' Sustainable Development Goals (SDGs) (United Nations, 2015). Within this evolving landscape, supply chain management has emerged as a critical area for integrating sustainability principles and recognizing the interconnectedness of business operations and their impact on stakeholders (Carter & Rogers, 2008).

According to Figure 1, "in the contemporary world of business environment, the idea of sustainable enterprise is well embraced with more companies seeking to integrate the triple bottom line; the economic, social and environmental" (Lai et al., 2021). Of the three pillars of sustainability - environmental, economic, and social - the latter has received growing attention in recent literature (Chen et al., 2017; Mani et al., 2016; Mohd Faiz et al., 2016). Social sustainability has become one of the most significant factors in supply chain management as organizations seek to reduce their environmental impact and establish the well-being of employees and residents in the surrounding communities (Thong & Wong, 2018).

Figure 1: Triple Bottom Line Concept



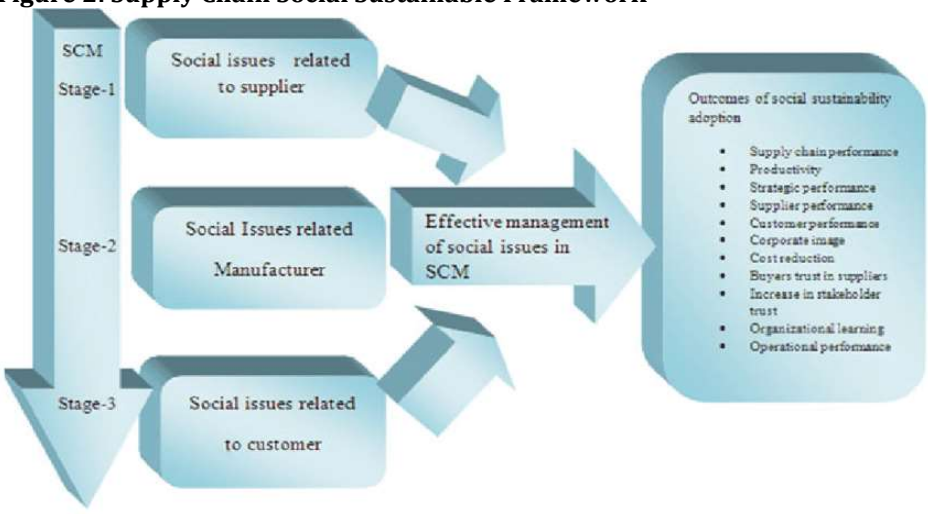
In the context of Malaysia, research suggests that while sustainability initiatives are gaining traction, there remains a need to further incorporate occupational safety and health (OSH) considerations into the broader social sustainability strategy, as per in Figure 2 (Suhaiza et al., 2012; Mohammad et al., 2020). Indeed, ensuring the health and safety of workers across the supply chain is a fundamental aspect of social sustainability, as it directly contributes to the well-being and protection of those who facilitate the flow of goods and services (Schulte et al., 2013).

Protection of workers within the supply chain is not only an ethical problem but also becomes of vital importance to the long-term prosperity of the organization itself and that of society in general. That is to say, lack of safe working conditions, direct exposure to hazardous elements, and poor and insufficient measures for protection result in workplace illnesses, injuries, and deaths, which yield far-reaching effects on the worker, their families, and the community at large (Weisbrod & Loftus, 2012). Within this context, the topic of including OSH in the concept of social sustainability within the supply chains can be viewed as an important direction of development in developing economies, such as Malaysia.

The Malaysian manufacturing industry which has made tremendous input in the economic growth of the country has recently attracted attention with regards to its sustainability (Suhaiza et al., 2012). Previous studies also emphasize that social issues are critical to the manufacturing supply chain and social requirements including labor rights, diversity, and product safety (Mani et al., 2016).

Hence, this paper provides a conceptual framework that recommends the inclusion of OSH into the social sustainability dimension of supply chain management in Malaysia while also supporting the integration due to ethical and economic benefits. If more focus is paid to the protection of the workers from the negative impacts of their jobs, Malaysian companies could improve supply chain robustness, increase the international comparability of Malaysia's economy, and promote fairness and sustainability in the nation.

Figure 2: Supply Chain Social Sustainable Framework



Social Sustainability in Supply Chain Management: An Examination in the Malaysian Context

In supply chain studies, social sustainability has become a key issue. It involves the full use of responsible and ethical practices throughout all parts of the supply chain ecosystems. This broad idea includes fair treatment of employees, respect for basic human rights, active participation in communities, and holistic enhancement of stakeholder well-being (Mani et al., 2016; Sivan et al., 2024a; Suhaiza et al., 2012; Narayanan et al 2024a).

Focusing on the context of Malaysia, a country heavily reliant on the manufacturing sectors, the significance of social sustainability within supply chains is underscored by historical challenges that have surfaced concerning labor rights, workplace safety, and the equitable treatment of workforce participants (Mani et al., 2016). These

industries have always been affected by issues that concern the community, and therefore there should be a collaboration in ensuring supply chains are not only beneficial to the workers but also to society as a whole.

Recent studies have highlighted the imperative of integrating social sustainability into the strategic framework of supply chain management to effectively tackle the aforementioned challenges and contribute to the enhancement of social conditions within these sectors (Lai et al., 2021; Fathullah et al., 2021). This integration ensures that supply chains support fair labor practices, maintain human rights, and have good community relations so that they contribute to long-term economic growth and social progress.

In earlier studies about sustainable supply chain practices, it was seen that they had a positive effect on most performance outcomes, either environmental, economic, or social. For example, research on 400 manufacturing firms in a Malaysian context proved that environmental purchasing and sustainable packaging have a positive effect on these three categories of outcomes (Suhaiza et al., 2012). Practices in sustainable supply chains have constantly been shown in the literature to positively influence several performance outcomes that are grouped as being environmental, economic, or social. As reported by Thong and Wong (2018), "although institutional pressures do mount exogenous forces on firms, the latter still engage unequivocally in environmental and responsible social practices in the pursuit of the superordinate goal of sustainable supply chain management for desirable organizational identity".

The role of social capital in sustainable supply chain management has also been explored in the Malaysian context. From a survey of 106 manufacturing firms, Suheil et al. (2022) demonstrated that there is a relationship between social capital and sustainable performance. According to Suheil et al. (2022), social capital describes the networks, trust, and collaboration among partners in a supply chain; hence, it should be considered an antecedent to the effective implementation of sustainable supply chain practices.

Increasingly, global attention to corporate social responsibility and ethical sourcing has heightened awareness of the issues surrounding social sustainability within Malaysia's supply chain (Sivan et al., 2024b; Narayanan et al., 2024b). This paradigm allows organizations to reduce risks arising from social non-compliance and increase brand reputation and market competitiveness (Fathullah et al., 2021). This can further have a ripple effect on other companies also dealing with the supply chain and result in social sustainability. As a result, although Malaysian firms are increasingly practicing sustainable supply chain management, much of the available literature has focused on environmental and economic as well as social sustainability.

According to the literature, integrating environmental and social issues into supply chain management is observed to have a positive impact on firm performance, as Suhaiza et al. demonstrated in 2012. Social capital can be important in facilitating this process, as Suheil et al. discussed in 2022. While these studies are very informative, much more research is needed to grasp the intricacies of social sustainability in the context of Malaysian supply chain management (Muhammad, Naidu, Sundram, Hussain, Chew, Pillai, & Ibrahim, 2023)

Despite growing interest in both OSH and social sustainability within supply chains, there's a noticeable lack of research examining their integration specifically within the Malaysian context. This research gap makes it difficult to fully understand the specific challenges and opportunities faced by Malaysian businesses in promoting safe and ethical working conditions throughout their supply chains. Further investigation is needed to guide effective policy-making and responsible business practices in Malaysia, ensuring both worker well-being and sustainable supply chain performance.

2. Integrating Occupational Safety and Health to Social Sustainability

OSH has been properly associated as an inseparable part of social sustainability in supply chains. In addition to the ethical imperatives to secure the well-being of workers, OSH acts as the bedrock that underpins the broader social performance and resilience of these complex networks. In that direction, OSH could be named among the most prominent factors of sustainability reflecting its social dimension. Protection of workers within the supply chain is not only an ethical problem but also becomes of vital importance to the long-term prosperity of the organization itself and that of society in general.

As it has been stated in the literature, there is evidence that more and more Malaysian firms adopt Socially sustainable supply chain management, pointing to environmental, economic, and social aspects of sustainability but the integration of OSH about this concept is still an unexplored area. Different authors discuss several aspects connecting OSH and social sustainability in supply chain environments. International Labor Organization, (2022) extends this call by suggesting that the OSH plans should fit within wider CSR policies, especially in global supply chains where labor abuse and hazardous working conditions remain endemic. This is supported by (the International Social Security Association et al., 2023) where the authors have provided a systematic literature review on best practices to enhance safety, health, and well-being at work for global supply chain employees while also recommending using a risk management approach to workplace OSH.

Drawing on the work of Kavouras et al. (2022), the research also exactly highlights that social sustainability is inadvisable without a healthy and safe working environment since these aspects are promising to enhance the health safety and productivity of the working population. In the same vein, Johanson et al (Johanson et al., 2022) have encouraged the integration of social sustainability principles such as OSH into organizational management to elaborate on the ethical and economic value. This is backed by Tan et al. (2023) asserting that improving sustainability performance is prompted by a commitment to OSH, which strengthens employee's affective commitment. These results reinforce the notion of the relationship between OSH, employees' health, and overall organizational resilience.

Good OSH practices promote social sustainability in supply chains in several ways. Jain et al. (2024) describe the evolving nature of work and emphasize the crucial role of OSH in ensuring decent work conditions and protecting worker health in the future (p. 106463). Similarly, Koskela (2014) analyzes the impact of corporate social responsibility reporting on transparency and accountability related to OSH practices, highlighting the strong link between OSH and social responsibility.

Many factors affect the management of a sustainable supply chain, especially the aspects of OSH, for instance, the stakeholder's power and organizational culture. Incorporating stakeholders into the supply chain is a major concern highlighted in Song (2023) when detailing the conduct of OSH in industries where power relations are more sophisticated as in the case of the electric power industry. This study posits that organizations with higher levels of corporate integrity and social consciousness are more likely to develop and apply effective OSH programs in their supply chain for the mutual advantage of employees and society.

Malaysian small and medium-sized enterprises have been identified as one of the areas where enhanced OSH practices' standards will yield the greatest value (Nor Azma et al., 2016). Thus, the embedding of OSH into the conceptual model of social sustainability in the Malaysian supply chain can open up revolutionary changes. By prioritizing worker well-being, organizations can not only enhance their social and environmental performance but also potentially reap economic rewards through reduced operational costs and improved productivity (Nor Azma et al., 2016).

To effectively integrate OSH into the social sustainability agenda within the Malaysian supply chain, a multifaceted approach is required. This may involve strengthening regulatory frameworks, implementing robust OSH management systems, and fostering a culture of safety and health awareness among supply chain actors (Suhaiza et al., 2012, Thong & Wong, 2018). Additionally, collaborative efforts between businesses, industry associations, and government agencies can help drive progress and ensure that sustainability initiatives are consistently applied across the supply chain (Mohammad et al., 2020).

Therefore, OSH has to be integrated into the sustainable supply chain management of organizations hence the importance of involving all the stakeholders and creating an organizational culture that supports OSH. Furthermore, Song (2023) stresses the need for the cooperation of stakeholders, especially within high-risk industries regarding power relations, to address OSH issues and enhance workers' welfare. Thus, it has been noted that the practice of how EHS performance is integrated into corporate social responsibility reports has been increasing over the years: therefore, there is an inclination toward the disclosure of OSH issues in this regard (Dotson & Henshaw, 2009).

In a bibliometric analysis of the existing literature, it is found that the combination of occupational health and social responsibility is the focus of a large number of circulated articles, as reviewed in (Bautista-Bernal et al., 2021). Therefore, further research should explore ways in which theoretical knowledge of OSH can be translated into efficient frameworks that organizations can apply to their social sustainability models. The article by Lannetta (2022) is an excellent way to disclose major difficulties and useful strategies regarding the promotion of OSH and social sustainability in global supply chains. It is noted that the responsibility for the improvement of OSH conditions and associated hazards belongs to multiple actors, including suppliers, buyers, governments, and NGOs. It also stresses the imperativeness of fostering ongoing change and the implementation of the most effective practices in the supply chain to develop and maintain an environment free from work-related diseases, discomforts and injuries to all workers.

Mapping OSH into Social Sustainability Through SDG17: Partnerships for the Goals

OSH can be expanded to the concept of social sustainability with the help of collaboration with SDG 17 – Partnerships for the Goals that promote the attainment of the targets set by the 2030 Sustainable Development Agenda. SDG 17 deals with international cooperation, and partnerships and teaches and reminds governments, the business sector and non-governmental organizations that every global challenge can be resolved through collective and effective cooperation. Through these partnerships, the corporates will be able to have a better approach to integrating OSH into their value chain hence improving the working conditions.

While the connection between OSH and good health outcomes is evident in SDG 3 (directly addresses the health outcomes related to work, aiming to reduce work-related injuries, illnesses, and deaths), a deeper exploration reveals its far-reaching impact across the Sustainable Development Goals, as outlined in the 2030 Agenda (United Nations, 2015).

OSH is not only relevant to the tenth SDG - the prevention of work injuries and illnesses (SDG 3.9) but is also tied to the eighth SDG concerning decent work with better and safer working conditions, (SDG 8). Basic decent working conditions which include safety and health are not only benefits from the physical aspect but are important to the welfare, productivity and satisfaction of the workers. This in effect has further a vast flow chain that affects poverty eradication – SDG 1 and promoting economic growth –SDG 8 (safeguarding labor rights and ensuring safe working conditions). A healthy and secure worker would be economically productive than a sick and insecure worker making the society more resilient.

Moreover, a comprehensive OSH should address the following: susceptibility differences of different demographic segments—women (SDG 5: Achieve gender equality and empower all women and girls); and marginalized communities (SDG 10: Reduce inequalities within and among countries). Addressing inequalities, therefore, ensures that all people have equal access to safe and healthy working conditions, hence leading to a fairer and more just world. Ultimately, the integration of OSH into social sustainability pertains not only to compliance but also to creating a future wherein workers are valued, protected, and empowered to thrive.

In other words, the integration of OSH into social sustainability provides the key pathway toward the realization of the interrelated goals enshrined in the 2030 Agenda for Sustainable Development as outlined in Transforming Our World: The 2030 Agenda for Sustainable Development, 2018. In ensuring the safety and health of employees, SDG 3 and SDG 8 and provide an appreciable ripple effect that pushes social justice, reduces poverty and ensures sustainable economic development. OSH is not a compliance issue but forms one of the main building blocks for a future where businesses have put people on an equal footing with profit, realizing that a healthy and empowered workforce is the bedrock on which to construct a truly sustainable society.

3. Conceptual Framework: Integrating Occupational Safety and Health into Socially Sustainable Supply Chains

When discussing OSH, as well as socially sustainable OSH of supply chains, it is crucial to introduce OSH as a multifaceted endeavor based on ethical, legal, and business principles. The principles of protection for the safety and health of the worker lie in fundamental human rights declarations and treaties. The Universal Declaration of Human Rights, for example, emphasizes the inherent right to life, liberty, and security of person,

which inherently necessitates a safe and healthy work environment (United Nations, 1948, art. 3). Similarly, the International Covenant on Economic, Social and Cultural Rights reinforces this by stating everyone's right to just and favorable working conditions, including a safe and healthy workplace (United Nations, 1966, art. 7).

Beyond ethical considerations, legal frameworks play a critical role in shaping OSH practices. National and international labor laws, alongside specific OSH regulations, establish clear requirements for businesses to uphold. For instance, the International Labour Organization's Convention No. 155 - Occupational Safety and Health Convention, 1981, provides comprehensive guidelines for establishing and maintaining a safe and healthy working environment (International Labour Organization [ILO], 1981). Additionally, diligence standards, such as the UN Guiding Principles for Business and Human Rights (2011), offer a framework for companies to identify, prevent, mitigate, and account for how they address their human rights impacts, including those related to OSH, within their operations and supply chains.

Furthermore, integrating OSH into supply chains is not just an ethical or legal imperative but also a sound business strategy. As Dotson and Henshaw (2009) argue, mainstreaming OSH within supply systems often leads to tangible economic benefits. Companies with robust OSH practices tend to experience higher productivity due to reduced absenteeism and improved worker morale. Simultaneously, they benefit from lower costs associated with workplace accidents, injuries, and legal liabilities. Moreover, a strong commitment to OSH enhances a company's brand image and reputation, attracting customers and investors who value ethical and sustainable practices. Ultimately, prioritizing OSH contributes to a more resilient and sustainable supply chain, benefiting all stakeholders involved.

This integration is composed of the factors that according to Marshall et al., (2014) are referred to as environmental, social and governance (ESG) factors. As for the environment, it entails the reduction of consequences arising from the business undertakings and supply chains and the management of risks associated with the environment. On the ethical side, it embraces the interest of its workers, aims at paying well, and equally, supporting local communities, and the fight for justice for ethical suppliers in the chain. They also seek to find other ways of having proper management of corporations and their operations, policies working regulations and business relations while respecting being audible, accountable, and participative all in an effort towards promoting good practices towards business management.

This integrated framework for OSH in supply chains comprises several key components. First and foremost is leadership and commitment (Song, 2023; Johanson et al., 2022). This necessitates top-down engagement from both buyers and suppliers, ensuring that OSH is integrated into core business models and sustainability strategies. This includes incorporating OSH into environmental management systems, prioritizing OSH funding as a chief business imperative, and effectively communicating OSH expectations and procedures throughout the supply network (Johanson et al., 2022).

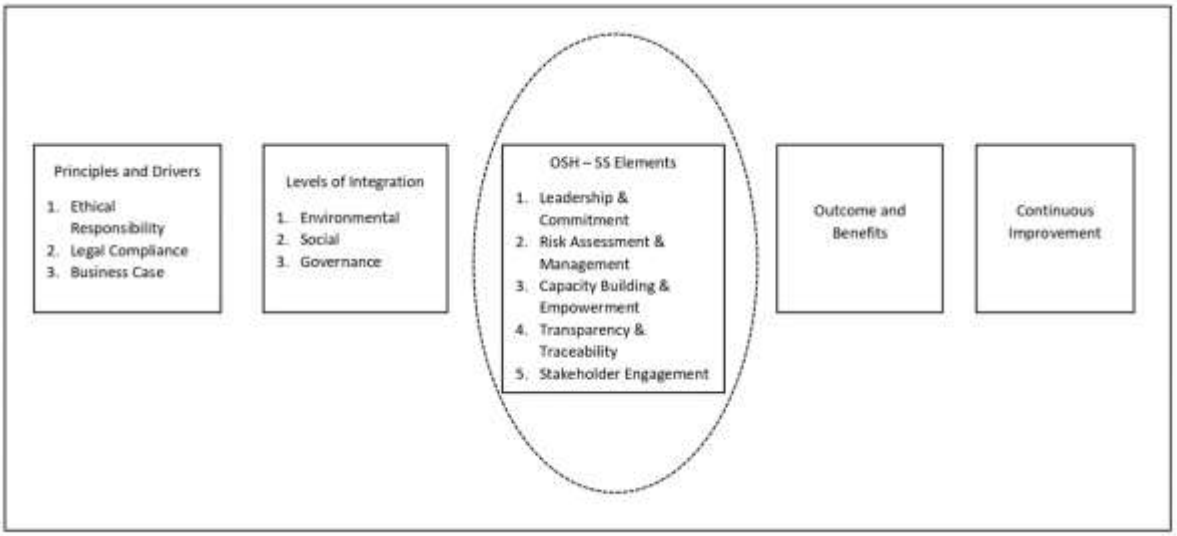
The second crucial component is robust risk assessment and management (Sivan et al., 2024). This involves a shared responsibility between buyers and suppliers to collaboratively assess and monitor the nature and extent of OSH risks. These risks should be evaluated based on specific industries or sectors, geographical locations, and the workers involved. Furthermore, this collaborative approach should extend to the joint development and implementation of feasible and effective risk mitigation strategies, with clearly defined roles and responsibilities for all parties.

Third, capacity building and empowerment are essential for fostering a culture of continuous improvement in the supply chain OSH. This involves providing suppliers with the necessary training, resources, and technical assistance to enhance their OSH management systems. Equally important is empowering workers through information dissemination, skills development programs, and accessible grievance mechanisms.

Fourth, transparency and traceability are crucial for achieving supply chain sustainability goals, including those related to OSH. Enhanced visibility into supply chain operations allows for better identification and mitigation of OSH risks. Furthermore, it promotes accountability and responsibility among all supply chain parties by openly communicating OSH performance and fostering a culture of data sharing through dedicated platforms.

Finally, stakeholder engagement (International Social Security Association et al., 2023) is concerned with the intended communication with the workers, unions, NGOs, and local communities throughout the process. This means that – as was said – their differences must be accepted, and one must strive to appreciate them; their inputs have to be included in the decision-making regarding continuous improvement efforts.

Figure 3: Conceptual framework for integrating OSH into social sustainability.



OSH integration in socially sustainable supply chains has manifold positive outcomes, among them improvement of the OSH performance and workers' well-being, enhancing social sustainability performance, business resilience, and brand reputation, and promoting a more equitable, just, and sustainable global economy. Continuous improvement assures long-term relevance and impact. This implies frequent monitoring, independent auditing, transparent reporting about OSH and social sustainability performance, and related feedback mechanisms for learning and flexibility to adapt the strategies according to emerging challenges and opportunities.

4. Challenges and Opportunities

Malaysia's development of its economy has revealed a growing need to incorporate OSH within the broader aspirations of social sustainability in supply chains. This comprises adequate work practices and community involvement but also involves the vital issue of OSH itself. Integrating OSH into social sustainability in Malaysian supply chains presents both challenges and opportunities, reflecting a broader trend that aligns with Sustainable Development Goal (SDG) 17: Partnerships for the Goals.

While Malaysia has demonstrated progress in embracing sustainable business practices to benefit companies, the environment, and stakeholders, the country still faces significant challenges in ensuring the well-being of workers throughout its supply chains (Danish et al., 2017; Thong & Wong, 2018). Variation in regulatory compliance is among the main hurdles faced when merging Malaysian supply chains with OSH care. Enforcement can be inconsistent across remote or rural parts although Malaysia boasts strong regulations for occupational safety as well as health (International Labour Organization, 2022). The lack of resources and knowledge among small suppliers can result in their partial adherence to occupational health and safety standards, thus creating a gap in safety practices (International Labour Organization, 2022). Large multinationals face significant obstacles when it comes to ensuring that occupational health and safety standards are adhered to throughout their supply chains (Danish et al., 2017).
A major impediment to the integration of OSH into Malaysian supply chains is the absence of awareness as well as education at various levels. There is a lack of knowledge on basic workers' rights, especially for those who are low-skilled or unorganized that touch on workplace environment as far as safety is concerned or even any specific measures that should be put in place for their protection (Eyiah et al., 2019). Workers' ignorance can

lead them to unknowingly cause dangers. At the same time, employers may not fully appreciate the significance of OSH, regarding it as an added expense instead of investing in the welfare and long-term productivity of their employees (Allen & Dibie, 2019).

Addressing this knowledge gap within the supply chain is crucial. Efforts to promote OSH awareness and provide accessible education to both workers and employers, particularly within the supply chain context, are essential to fostering a culture of safety and ensuring that OSH is seen as a shared responsibility (European Agency for Safety and Health at Work, 2012).

Malaysian supply chains can be highly complex, involving multiple tiers of suppliers, subcontractors, and informal labor, making it challenging to monitor and enforce consistent OSH standards (Alsamawi et al., 2017). This intricate web of interconnected businesses requires significant coordination and oversight to ensure that each link, from primary suppliers to smaller subcontractors, adheres to the same high standards of OSH (Cunha et al., 2019). The presence of informal labor within these chains further complicates matters, as these workers may fall outside the scope of traditional monitoring and enforcement mechanisms.

Another opportunity lies in the growing awareness and demand from consumers and stakeholders for socially responsible and sustainable supply chain practices (Muhammad, Naidu, Sundram, Hussain, Chew, Amirrudin, 2023). As Malaysian consumers become more conscious of the ethical and environmental implications of their purchasing decisions, companies may find themselves under increased pressure to demonstrate their commitment to worker well-being, including through robust OSH policies and practices. This consumer-driven shift can serve as a powerful catalyst for change, motivating companies to prioritize OSH integration as a key component of their social sustainability efforts.

However, there are also significant opportunities to integrate OSH into social sustainability within Malaysian supply chains. For example, recent studies have shown that companies with robust OSH management systems tend to have better safety records and overall performance compared to those without such systems (Ayob et al., 2021). By investing in OSH measures, companies can not only protect their workers but also enhance their overall productivity and competitiveness. This can further contribute to the broader goals of social sustainability, as healthy and safe workers are more likely to be engaged, productive, and contribute positively to their communities.

Another opportunity lies in the growing emphasis on corporate social responsibility and stakeholder engagement within the Malaysian business landscape. By integrating OSH into their sustainability initiatives, companies can demonstrate their commitment to worker well-being, build trust with local communities, and enhance their reputation as socially responsible corporate citizens (Nor Azma et al., 2016). This can lead to improved relationships with suppliers, customers, and other stakeholders, ultimately strengthening the resilience and competitiveness of the supply chain as a whole.

One promising opportunity in integrating OSH into social sustainability in Malaysian supply chains is the potential for collaboration and collective action. By fostering partnerships between larger corporations, small and medium-sized enterprises, government agencies, and worker representatives, a more comprehensive and effective approach to OSH can be developed. Establishing industry-wide initiatives, such as joint training programs, shared monitoring and auditing systems, and knowledge-sharing platforms, can help to disseminate best practices and ensure that OSH is integrated throughout the entire supply chain (Napsiah & Faridah, 2012; Nor Azma et al., 2016; Ayob et al., 2021).

Another opportunity lies in the growing awareness and demand from consumers and stakeholders for socially responsible and sustainable supply chain practices. As Malaysian consumers become more conscious of the ethical and environmental implications of their purchasing decisions (Norazah, 2023), companies may find themselves under increased pressure to demonstrate their commitment to worker well-being, including through robust OSH policies and practices (Suhaiza et al., 2012). This consumer-driven shift can serve as a powerful catalyst for change, motivating companies to prioritize OSH integration as a key component of their social sustainability efforts (Ima et al., 2021). For example, the increasing consumer preference for eco-friendly

products and ethical sourcing practices in Malaysia (Tengku et al., 2016) demonstrates this shift towards holding companies accountable for their entire supply chain.

5. Implications of Study

This study underscores the critical importance of integrating OSH into the broader framework of social sustainability within Malaysian supply chains. It highlights the need for strengthened regulatory frameworks and more consistent enforcement to ensure that OSH practices are aligned with the goals of social sustainability. For businesses, the study reveals that prioritizing OSH can lead to improved productivity, enhanced brand reputation, and greater resilience against operational disruptions. Additionally, it points to the potential for increased international competitiveness for Malaysian firms that adopt global best practices in OSH and sustainability.

The study also has significant implications for academia and stakeholder engagement. It contributes to the literature by providing a conceptual framework for integrating OSH into social sustainability, opening new avenues for research on the impact of such integration on supply chain resilience and organizational performance. Moreover, the study emphasizes the importance of collaboration among businesses, government agencies, and NGOs to ensure the consistent application of OSH practices across all tiers of the supply chain, fostering a culture of safety and well-being that benefits both workers and society at large.

Conclusion

Although interest in both OSH and social sustainability within supply chains is growing, little research has been conducted on their integration, particularly within the Malaysian context. This creates a knowledge gap, which constrains the full appreciation of specific challenges and opportunities to the creation of safe and ethical working conditions throughout the supply chains that Malaysian businesses are presented with. Further research in Malaysia is called for to effectively guide policy-making and responsible business practices that assure workers' well-being and sustainable performance of supply chains. With rigorous implementation and continuous improvement, it is foreseen that these efforts will eventually engender a fair and just supply chain setting that benefits workers, local communities, and society at large.

The embedding of these elements of social sustainability into supply chain management frameworks has real benefits. Improvements in brand reputation are associated with increased customer loyalty and higher sales. Moreover, the refining of relations with stakeholders could also further strong collaboration and strengthen supply chain resilience. Second, compliance with international labor standards is a sure pathway to averting legal implications and associated monetary fines. An active social sustainability strategy will also ensure a more committed workforce, hence lower staff turnover, and higher workforce productivity.

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Factors of Innovation Capability That Influence Employee Performance in Public Sector

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Abstract: The purpose of this study is to investigate the factors of innovation capability that influence employee performance in the public sector. Most employees lacked knowledge regarding factors of innovation capability that can guide them to innovate when doing tasks. Weak supportive leadership, unwillingness to share knowledge, difficulties to express creativity, and technological barriers prevent them from innovating and performing well in their workplace. A convenience sampling technique was used and a total of 122 public-federal employees participated in this study. This study was conducted on lower to middle management personnel who currently serve as public employees in any federal agencies in the vicinity of Kota Samarahan, Sarawak, Malaysia. The SPSS was applied in assessing the model. The results indicated that significant influence of supportive leadership, knowledge sharing, creativity and technology capability on employee performance in the public sector. This study will serve as a guideline for management to design new strategies in ensuring its employees perform well, the organization would have a good employee performance rate which literally influences the organization's performance too, and the ideation of policy makers regarding innovative performance among employees can be supported. It was hoped that this study would use other different factors of innovation capability that would influence employee performance with different organizational types or different levels of management for future study.

Keywords: *Supportive Leadership, Knowledge Sharing, Creativity, Technology Capability, Employee Performance.*

1. Introduction and Background

Rapid technological advancement, charges of information, shifting market conditions, shifting economic conditions, and increased business competition on a national and international scale are pushing organizations to continuously innovate to boost employee performance at the workplace as it can lead to organizational effectiveness (Khan, Raya, & Viswanathan., 2021). Innovation is commonly defined as "the generation, acceptance, and implementation of new ideas, processes, products, or services (Pascual-Fernández et al., 2021; Ferreira et al., 2020). In the management perspective, innovation is a result of a process that involves developing and implementing novel management strategies, methods, or techniques (Mendoza-Silva, 2020) by employees to achieve the organization's goals (Firmansyah et al., 2024; Suriati Osman et al., 2016). The aim of innovation is not just to develop new products or services, but also to focus on the renewal and improvement of "soft and tangible" challenges (Khan, Raya, & Viswanathan., 2021). Employees of an organization play a critical role in the creation and implementation of novel ideas and give feedback on innovation activities (Li & Wang, 2022). The willingness and capability of employees to innovate will be evidence of how they improved something for their organization. Since organizations have started to invest in innovative skills, abilities, and behavior, employees become more confident, competitive, and competent with all the essential skills, abilities, and information received (Khan, Raya, & Viswanathan., 2021) for them to perform better.

Innovation capability refers to the ability to utilize information, technologies, and skills possessed by employees and combine them to create new knowledge resulting from the process and product of innovation (Mendoza-Silva, 2021). Nowadays, innovation capability has become prominent in measuring performance such as organizational performance or individual performance as innovation and its management are frequently involved according to current needs and growth (Pascual-Fernández et al., 2021; Mendoza-Silva, 2020). For employee performance, the performance is indirectly through their capability to innovate when doing tasks and later contributes to improve organization performance (Suriati Osman et al., 2016).

The government of Malaysia has already started to impose the transformation of the public sector into more innovative approaches due to the present expectations and demands from stakeholders (Ab Rahman et al., 2018). The efforts of the government to make it happen can be seen through a few of the Malaysian policy

guidelines. For example, *Kumpulan Inovatif dan Kreatif (KIK) Horizon Baru*. Further, the Malaysian government also emphasizes the implementation of the *Ekosistem Kondusif Sektor Awam (EKSA)*. Jabatan Perkhidmatan Awam (JPA) has implemented various quality improvement programs as a continuous improvement effort to strengthen the level of productivity, quality, and innovation to improve the delivery of services by employees to customers (Jabatan Perkhidmatan Awam Malaysia, 2019).

In this context of the study, the use of innovation capability is more towards process compared to other specific types of innovation capabilities. Under the innovation capability process, many determinants can be applied to measure employee performance. Determinants that are considered to suit employees' daily work activities are supportive leadership, knowledge sharing, creativity, and technology capability. These determinants are potentially influencing (Amelia & Kusmaningtyas, 2023; Abdullahi et al., 2023; Ibujés-Villacís & Franco-Crespo, 2022) employee performance Employees especially in the public sector are getting more involved with innovating their capability and self-skills while carrying out office tasks (Suriati Osman et al., 2016).

The study of innovation capability has gained significant attention from practitioners and academics in recent years (Firmansyah et al., 2024; Singh et al., 2023; Mendoza-Silva, 2020). Many countries studied innovation capability and its determinants. However, the studies were more to organizational performance, especially in Western and European countries (Iddris, 2016). For this study, innovation capability and its determinants are more toward employee performance. For the study on innovation capability and employee performance, there was one Asian country involved which is China with innovation capability as a mediator (Zhang, 2022). This indicates that limited studies were conducted in Malaysia. Therefore, this study aims to investigate the factors of innovation capability (supportive leadership, knowledge sharing, creativity, and technology capability) and its influence on employee performance specifically in the public sector.

2. Literature Review

Malaysian Policy Guideline (Kumpulan Inovatif & Kreatif Horizon Baru): There are three objectives of *Kumpulan Inovatif dan Kreatif (KIK) Horizon Baru* which attract the researcher's attention. The objectives are "It is a mechanism involving employees in the process of problem-solving or improvement of work processes and the existing standards of introduce something new; applying the concept knowledge-based and creativity-driven to enable the organization to produce innovations that will add value to the product or service; Focusing on ideas, learning, knowledge sharing and creation of value through the identification and problem-solving strategies, analysis techniques and the production of new ideas that are creative and innovative" (Ministry of Home Affairs, 2009). These objectives are focused on employees serving in the public sector. The objectives emphasize that public sector employees should be active performed to generating new ideas that are creative and accurate to solve any problem appropriately according to the situation at the workplace or organization itself. At the same time, the production of the idea needs to have value-added and valid knowledge before any decision-making and implementation of the innovation is made. This encourages the management of the directed and motivated employees to consistently come up with unique ideas. Moreover, employees would see themselves as engaged, innovative, and performing well on the job, and they would think of themselves as contributing to the organization (Khan, Raya, & Viswanathan., 2021).

Malaysian Policy Guideline (Ekosistem Kondusif Sektor Awam): According to *Ekosistem Kondusif Sektor Awam (EKSA)* implementation by Jabatan Perkhidmatan Awam (JPA), there are several benefits of the appropriate implementation of EKSA associated with this study such as "improving the effectiveness and efficiency of organizational management, generating creative and innovative ideas among public sector employees, optimizing the use of workspace, resources, and energy with quality environmental management, enhancing the spirit of teamwork, and building discipline and good work ethic". Public employees are emphasized on implementing innovations and best practices that can improve their productivity and work quality in workplaces. This *Ekosistem Kondusif Sektor Awam (EKSA)* seems to be closely related to encouraging employees of the public sector to engage in shaping workplace green behavior and green innovation. The employees' ability to innovate is influenced or encouraged by the workplace environment and organization that continuously innovates and increases their knowledge and capabilities which leads to improving their performance (Chan et al., 2017). When green practices and policies are adopted, employees will become aware of them and may be inspired to incorporate them into daily activities, which will ultimately help the environment (Sharma et al., 2021).

Employee Performance: Performance is vital for an individual to accomplish a specific task and perform at a high level that can bring the source of satisfaction with feelings of mastery and pride (Sonnentag & Frese, 2005). The term "performance" refers to individuals or employees within an organization. Employee performance is defined as how well people meet organizational objectives and how they relate their interpersonal behaviors to organizational norms (Imran et al., 2012; Suriati Osman et al., 2016) and completing the mutually agreed-upon work as specified by the employer in a timely, effective, and efficient manner (Tinofirei, 2011). In other word, the performance of an employee depends on his or her willingness and availability to accomplish the work.

Employees in an organization are the source of increased performance of themselves (Qalati et al., 2022). Employee performance is vital to any organization as it is a form of measurement of the success of an organization it also can involve the measurement of the non-financial indicators of an organization such as cooperation, enthusiasm, productivity index, service excellence, and capability. Employee performance can be enhanced through innovation (Suriati Osman et al., 2016). Innovation helps employees to deploy their capabilities in the process of producing products or services in the organization and at the same time raises the competitiveness of the organization in terms of the administrative process, efficiency, and effectiveness of work management (Sadikoglu & Zehir, 2010; Suriati Osman et al., 2016).

Innovation Capability: Innovation is the core of all reforms of a matter to be implemented. Innovation is novel and effective, and the innovative process must produce outcomes (Vivona et al., 2021). Innovation is generally defined as the "generation, acceptance, and implementation of new ideas, processes, products, and services" (Mendoza-Silva, 2020). The source of innovation comes from the actor or organization. That generates novel ideas. In addition, innovation can occur in and/or through the public sector and innovation in the public sector refers to alterations made by the public sector to sustain or enhance its capacity to produce public benefit, hence preserving its legitimacy (Vivona et al., 2021).

Under the dimension of innovation, there is a term known as innovation capability. Innovation capability is a burgeoning and important topic of academic study. However, it is not recognized how the innovation capability may be produced and implemented nor what elements contribute to the innovation capability (Ruhaidi & Nur Riza, 2019) due to its multidimensional nature of terms (Mendoza-Silva, 2020). According to Lawson & Samson (2001), innovation capability is originally described as a higher-order integration competence consisting of the ability to shape and manage numerous capabilities. The term innovation capability is frequently possessed by organizations to integrate critical competencies and resources inside the organization itself to foster successful innovation. In an organizational context, innovation capability is defined as the "ability to continuously transform knowledge and ideas into new products, processes, and systems for the benefit of the organization and its stakeholders.

However, in this literature review, the term innovation capability is more to an individual context which is the employees in an organization and the organization is more to the governmental organization (public sector). In an individual context, innovation capability is defined as the "ability to utilize information, technologies, and skills possessed by employees and combine it to create new knowledge resulting from the process of innovation (Çakar & Ertürk, 2010). Innovation capability is significant in regulating success and performance (Ruhaidi & Nur Riza, 2019) of the employees. It is due to innovation capability relies on intellectual assets such as the ability of employees (Iqbal et al., 2021). As employees are capable of becoming innovative, they are tactically able to develop innovative approaches to solve their daily tasks (Zhang, 2022). Since innovation capability can establish the degree of innovation of an employee in an organization, the government has always encouraged organizational members to innovate and become innovative to cope with increasingly complex challenges. (Ruhaidi & Nur Riza, 2019).

Supportive Leadership: Supportive leadership suffices to encourage the performance of employees as support is the key factor to motivate them as it supports, influences, creates psychological safety and learning orientation, and becomes a voice for employees in the workplace (Oeij et al., 2022). Through leadership within the team learning, a supportive leader can approach his or her employees by asking questions, seeking feedback, and having attentive discussions among themselves (Oeij et al., 2022). Besides, they also involve their employees through scheduled meetings in which they solicit feedback, resulting in increasing their

commitment to work performance (Qalati et al., 2022) and encourages innovation (Lin & Ling, 2021). Further, leaders who assist either directly or indirectly will certainly have an impact on employees who feel valued (Amelia & Kusmaningtyas, 2023).

The voices of a leader and employees are purposedly communicating essential thoughts, details, and judgments about potential advancements (Oeij et al., 2022) for innovative outcomes. Apart from that, when a leader engages in supportive behavior and has casual conversations with employees, it can help bridge the gap between them (Lin & Ling, 2021) which in turn will allow employees to put more creative efforts on behalf of the company. Based on these analyses, it is hypothesized that:
H1: Supportive leadership has a significant relationship with employee performance.

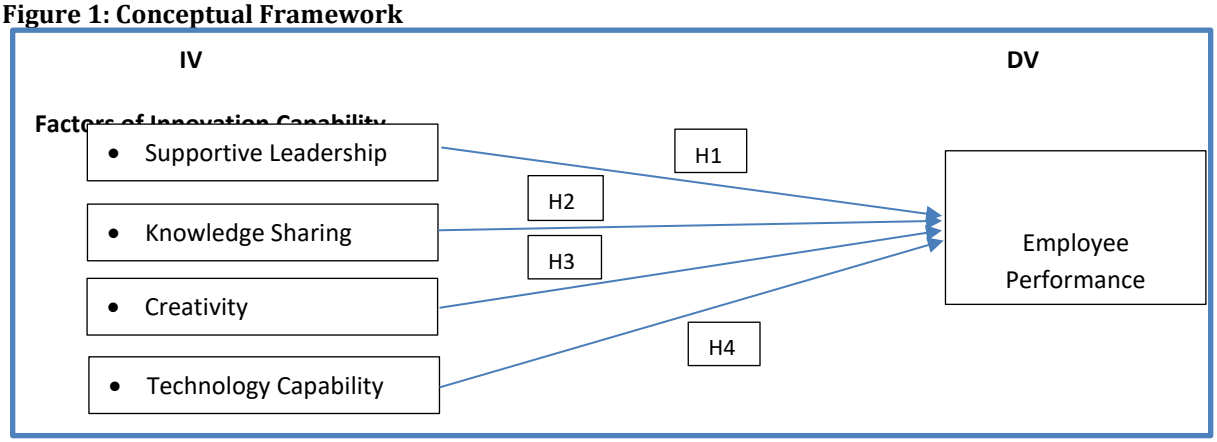
Knowledge Sharing: Effective methods for acquiring, converting, applying, and protecting knowledge (Iddris, 2016) are important for employee performance. Knowledge sharing aims at swapping skills and sharing information among employees to develop good work performance in the organization (Abou-Shouk et al., 2022) and also find innovative solutions (Ghulam Ilmam et al., 2024).

Employee performance can be improved and the success of both employee and organization is influenced by the exchange of information and expertise as well as the offering of support and guidance. This can be supported that sharing internal knowledge among employees improves the process of innovation in achieving goals (Abou-Shouk et al., 2022). It is believed that knowledge sharing is a valuable tool for enhancing employee performance, which is necessary for achieving high performance within an organization (Hasudungan et al., 2020). It is therefore hypothesized that:
H2: Knowledge sharing has a significant relationship with employee performance.

Creativity: Creativity is a key factor that contributes to innovation and employees' creativity depends on their ability to create opportunities, foster a creative environment, and give themselves the tools they need (Amabile, 1997). Creativity is defined as a genuine, suitable, beneficial, truthful, or valued retort to the task at hand. (Ferreira et al., 2020) and considered as the ability to provide opportunities, foster an enabling atmosphere, and supply the necessary resources (Amabile, 1997). The indicator of creativity that is most appreciated in improving performance is the ability to develop personally, reflected in a sense of desire to improve work performance (Sumarsono, 2023). Therefore, the hypothesized is developed:
H3: Creativity has a significant relationship with employee performance.

Technology Capability: Technology capability is defined as the ability of organizational members to use technology (hardware, software, computer network, telecommunication, content, etc.) for innovating, making decisions, and interacting with their environment (Ibujés-Villacís & Franco-Crespo, 2022). The accumulation of technology resources such as knowledge and skills is contingent upon a company's consistent efforts and investments in both innovations (Valdez-Juárez & Castillo-Vergara, 2021) and employees' participation. Although there is an argument for focusing on the capabilities of technology, it is essential to remember that individual talents are required for each work and hence individual skills must be continuously enhanced (Yalcin & Daim, 2021) with the support of the organization. Mustafa et al. (2023) highlighted that employees who have the ability to operate technology particularly information technology in the form of computers and systems can be used to simplify and speed up the work process. Consequently, it is hypothesized that:
H4: Technology capability has a significant relationship with employee performance.

Figure 1: Conceptual Framework



3. Research Methodology

The main purpose of this study is to investigate the factors of innovation capability that influence employee performance in the public sector especially federal agencies located in the vicinity of Kota Samarahan, Sarawak, Malaysia. The sampling frame was employees from lower to middle management in the fields of administration & support, finance, engineers, and information technology at *Pejabat Pendidikan Daerah Samarahan, Pejabat RISDA Bahagian Samarahan, and Pejabat Belia dan Sukan Bahagian Samarahan*. In total, 122 respondents participated in this study by employing a convenience sampling technique. The online questionnaire was used as the main method of collecting data for this study. To ensure a high response rate, a follow-up email was made five days before the appointment, which serves as a reminder.

The questionnaire is comprised of three sections, Section A is focused on Demographic Information. Section B measures factors of innovation capability. A total of 20 items were adopted from the previous studies, i.e. supportive leadership (Shirazi et al., 2014), knowledge sharing (Sudibjo & Prameswari, 2021), creativity (Volery & Tarabashkina, 2021), and technology capability (Valdez-Juárez & Castillo-Vergara, 2021) respectively. In measuring employee performance (Section C), a total of 10 items were adopted from Chiganze & Sağsan (2022). A 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree) was used to measure the level of respondents' agreeableness on the statement. The study employs SPSS version 27 to analyze the model.

4. Results

This section presents sets of results relating to the identification of respondents' profiles, analyses for normal data, items' consistency level to be understood by respondents, and the relationship between factors of innovation capability and employee performance.

Profile of Respondents: Table 1 displays a summary of the characteristics of the total sample of employees who participated in the study.

Table 1: Demographic and Geographic Information Pertaining to Respondents (n=122)

VARIABLE	FREQUENCY	PERCENTAGE
GENDER		
Males	54	44.3%
Females	68	55.7%
Total	**122**	**100%**
AGE		
20 – 29 years old	21	71.2%
30 – 39 years old	24	19.7%
40 – 49 years old	47	38.5%
50 – 59 years old	30	24.6%

Total	**122**	**100%**
POSITION AND GRADE		
Juruteknik Komputer FT19	7	5.7
Juruteknik Komputer FT22	1	0.8
Pembantu Akauntan W19	8	6.6
Pembantu Tadbir (Kew.) W19	12	9.8
Pembantu Tadbir (Kew.) W22	9	7.4
Pembantu Tadbir (PO) N19	27	22.1
Pembantu Tadbir (PO) N22	16	13.1
Penolong Akauntan W29	2	1.6
Penolong Akauntan W32	2	1.6
Penolong Akauntan W36	1	0.8
Penolong Jurutera JA29	5	4.1
Penolong Jurutera JA36	6	4.9
Penolong Pegawai Tadbir N29	11	9.0
Penolong Pegawai Tadbir N32	7	5.7
Penolong Pegawai Tadbir N36	5	4.1
Penolong Pegawai Teknologi FA29	0	0.0
Penolong Pegawai Teknologi FA32	3	2.5
Total	**122**	**100%**
HIGHEST LEVEL OF EDUCATION		
SPM	48	39.3%
STPM	5	4.1%
Diploma	37	30.3%
Bachelor's Degree	25	20.5%
Master's Degree	7	5.7%
Doctoral Degree	0	0.0%
Total	**122**	**100%**

122 employees participated in the online survey where 55.7 percent of them were females (n=68) and other 44.3 percent of them were males (n=54). 47 employees (38.5%) were between the age range of 40 to 49 years old, 30 employees (24.6%) were between 50 to 59 years old, 24 employees (19.7%) were between 30 to 39 years old, and 21 employees (17.2%) were between 20 to 29 years old.

This study involved the employees of the public sector especially those who serve in federal agencies in the vicinity of Kota Samarahan, 17 positions and grades have been chosen as stated in Table 1. The selections are made due to simply identifying which employees from the listed positions and grades were actively participating in the study.

The 3 highest selections of position and grade by respondents were 27 (22.1%) Pembantu Tadbir (PO) N19, 16 (13.1%) Pembantu Tadbir (PO) N22, and 12 (9.8%) Pembantu Tadbir (Kew.) W19. It can be assumed that most of those employees serve in the field of general services or financial operations in the office. As for the highest level of education, there were 48 employees (39.3%) as SPM holders, 37 employees (30.3%) as Diploma holders. Followed by 25 employees (20.5%) possessing a Bachelor's Degree, 7 employees (5.7%) with possess a Master's Degree holder, and 5 employees (4.1%) with STPM.

Based on the results, it was clear that the participating employees were from different demographic backgrounds across gender, age, position and grade, and educational level to ensure the assurance of the sample.

Descriptive Analysis: Descriptive analysis was conducted to determine the mean score and standard deviation of all variables in this study. The values of mean score were also used to measure the respondents' insight of each variable and Table 4 below displays the outcome.

Table 2: Descriptive Analysis

Variable	Descriptive Analysis Factor Name	Overall Mean Score	Std. Dev.
SL	Supportive leadership	4.08	.925
KS	Knowledge sharing	3.95	.922
C	Creativity	3.94	.838
TC	Technology capability	3.65	.984
EP	Employee performance	4.17	.854

The mean score ranges from 3.21 to 4.20 (high) based on Moidunny (2009) mean score range reference. It is evident that most employees had a high-level perception of factors of innovation capability and employee performance. Regarding factors of innovation capability, employees exhibited a high perception of their leaders as supportive individuals who encouraged them to explore different approaches to their work. Additionally, employees were able to cultivate a sense of expertise by actively sharing knowledge with their colleagues. They also demonstrated the capacity to establish connections between various tasks and effectively utilize technological tools when interacting with suppliers. Regarding employee performance, employees have shown high commitment in their execution of tasks both within the workplace and for their respective public organizations. Therefore, they were willing to do their jobs. Among the independent variables of innovation capability, supportive leadership (M=4.08) ranked the highest mean score compared to knowledge sharing (M=3.95), creativity (M=3.94), technology capability (M=3.65). This can be assumed that most employees for this study tend towards the attitude of a person the leader in supporting any work actions carried out at work. As for employee performance, employees were more inclined to their skills and deliverables at work.

Table 3: Multiple Regression - Coefficient Results

Model		Unstandardized B	Coefficient Std. Error	Standardized Coefficient Beta	t	Sig.
1	(Constant)	.314	.185		1.699	.092
	Supportive leadership	.178	.060	.193	2.982	.003
	Knowledge sharing	.159	.073	.172	2.185	.031
	Creativity	.431	.061	.423	7.119	<.001
	Technology capability	.219	.054	.252	4.018	<.001

a. Dependent variable: Employee performance

Based on Table 3, the multiple regression analysis indicates that supportive leadership has a significant and positive impact on employee performance (B= .193, t= 2.982). Besides, the relationship between knowledge sharing has a significant and positive impact on employee performance (B= .172, t= 2.185). Further, the results revealed that creativity has a significant and positive impact on employee performance (B= .423, t= 7.119). The technology capability has a significant and positive impact on employee performance (B= .252, t= 4.018). Overall, all factors of innovation capability (supportive leadership, knowledge sharing, creativity, and technology capability) were significant predictors of employee performance as their p values ($p<0.001$ and $p=0.001$) respectively. Therefore, H1, H2, H3, and H4 were supported.

Table 4: Model Summary

Model	R	R^2	Adjusted R^2	Std. error of the estimate	Change Statistics R^2 change	F change	Df1	Df2	Sig. F change
1	.894[a]	.800	.793	.38856	.800	116.843	4	117	<.001

a. Dependent variable: Employee performance
b. Predictors: (Constant) Supportive leadership, knowledge sharing, creativity, technology capability

Table 4 shows that R^2 value of .800, indicating that approximately 80% of the variance in employee performance can be explained by the included factors of innovation capability (supportive leadership,

knowledge sharing, creativity, and technology capability). The predictor variables played a crucial role in affecting employee performance. Therefore, the predictor variables collectively played a crucial role in shaping employees' performance.

Discussion

It was discovered that supportive leadership has a significant positive influence on employee performance. It is consistent with the studies conducted by Firmansyah et al. (2024) and Adikoeswanto et al. (2024). When employees receive supportive support from their leaders, their performance in doing work becomes better. This is compatible with the study of Qalati et al. (2022) which found that leaders provide more crucial support to their colleagues, resulting in enhanced performance and outcomes. Amelia and Kusmaningtyas (2023) believe that the higher motivation given by superiors, the more it will improve the performance of employees towards the organization.

The result indicates that knowledge sharing has a significant positive influence on employee performance where employees have good and communicable knowledge sharing, their knowledge and work performance increase. The result was in line with a few past studies like Leksono (2024) and Ghulam Ilmam et al. (2024). The engagement in knowledge sharing by employees not only improves their performance but also enhances their ability to express themselves better based on how they share their knowledge, experience, skills, and advice, and help to solve colleagues' problems (Abou-Shouk et al., 2022). Further, knowledge sharing becomes an institution reflects on employee's confidence in their abilities to think and act (Abdullahi et al., 2023). Besides that, the ability of employees to be exposed to the culture of knowledge sharing allows them to show good performance (Zhang, 2022).

Creativity has a significant positive influence on employee performance as employees have the opportunity to express their creativity for their work, their performance increases. The findings supported previous studies of Kusmayadi et al. (2023), Fahrul Kahar et al. (2023) and Ferreira et al. (2020) Which stated that creativity has a significant influence on performance. The impact of creating new novelty ideas is potentially to be expressed. (Ferreira et al., 2020) which in turn helps to improve performance, especially employee performance as they are the creators of novel ideas. Employees' ability to innovate and generate creative ideas not only can enhance efficiency and discover new solutions but also can improve organizational processes (Kusmayadi et al., 2023).

Technology capability has a significant positive influence on employee performance as employees are getting more involved with work-technological tools and information technology, their skills in handling technology become better and their performance also increases. This factor has supported the previous study of Mustafa et al., (2023) and Valdez-Juárez & Castillo-Vergara (2021) which have described that the use of technologies by employees significantly improves the innovation of an organization. When it comes to employee performance, employee performance is also enhanced by the availability of technologies that can enhance their technological capabilities and the contribution of innovation to the organization (Darwis et al., 2023). Singh et al. (2023) mentioned that employees use technology tools to aid in their tasks and facilitate their work processes.

In a nutshell, the findings indicate that factors of innovation capability which include supportive leadership, knowledge sharing, creativity, and technology capability have a significant relationship with employee performance as the factors influence the way participating public sector employees perform their work performances at the workplace. The analyses conducted have shown that all factors of innovation capability in the study have a significantly high positive correlation with employee performance as those factors significantly influence employee performance positively.

5. Implications and Recommendations

This study discovers a new experience and phenomenon for organizational management particularly in the public sector's context in Sarawak. Further, the model of this study could serve as a framework that will probably convey a message to policymakers, organizations and bodies of knowledge. In driving Malaysia to be one of the benchmark countries in the aspects of innovation, the Malaysian government policymakers may refer to the findings as insight into factors of innovation capability that do exist in affecting employee performance.

Perhaps current policies may be improved in terms of their value and understandable meaning for employees in the public sector. This could give insight into employees' perceptions of performing better as they show willingness and commitment to their work.

From the organization's perspective, the management should be able to manage the resources of employees and ensure that the welfare of employees is cared for. Welfare can be the employees' right to express their point of view on the innovation process at the workplace. This can also help the management to understand its employees and be able to approach them attentively. Besides that, this act of the management may enable employees to feel more comfortable carrying out their responsibilities without too much restraint from the management process.

From the body of knowledge, all the studied factors of innovation capability can be related to one another throughout the process of engaging employees to perform better in the workplace. For example, a good and supportive leader can lead subordinates or colleagues to get involved in the process of knowledge sharing where they can communicate to give or to receive useful work information. By doing so, the employees may have the ability to construct new ideas and the same goes for the capability to use technology as their informative tools to perform work in more efficient ways.

This study was conducted to determine how factors of innovation capability influence employee performance in the public sector and it is specifically limited to employees that served the federal public sector in the vicinity of Kota Samarahan, Sarawak. However, a few limitations were observed which limited the study population, type of management level, and innovation capability factor. In the future, further studies can expand the study population to different types of public sector other than the federal sector, examine the other different levels of management, and determine other factors of innovation capability.

Conclusion

Referring to the statistical significance of the tested hypothesized model indicates the gap filled by the study. This study examines the factors of innovation capability that affect the performance of employees in the public sector particularly in the vicinity of Kota Samarahan, Sarawak. Based on the findings, there is a significant relationship between supportive leadership and employee performance, knowledge sharing has a significant effect on employee performance, creativity has a significant effect on employee performance, and there is a significant relationship between technological capabilities on employee performance. Overall, all factors of innovation ability have their meaning and way of influencing the performance of employees in the public sector. In addition, it is hoped that this study will help employees who serve in any public sector to be active or optimal in providing adequate self-commitment while performing their duties in their respective offices. With it, they can enhance each other's self-sufficiency to innovate willingly in the present and beyond.

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Factors Influencing the Increase of Unclaimed Property Among Muslims in Klang Valley

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Abstract: The issue to be addressed in this study is regarding the increasing amount of unclaimed property in Malaysia. The increase is occurring every year with an excessive amount. A possible cause of this problem has been identified in that most Muslims failed to wisely plan their property estate, particularly by using Islamic instruments such as *wasiyyah*, *hibah*, and *waqf* rather than relying on the *faraid* in distributing inheritance property. Previous research has shown that some of them are hesitant to use Islamic instruments for estate planning. Based on the problem, this study is looking for factors that influence the increase of unclaimed property in Malaysia. The factors include the awareness of unclaimed property, the incentives of unclaimed property, the complexity of application and claim, and the legal issue A quantitative approach was used in this study and primary data were collected by distributing questionnaires to the respondents which are individual Muslim with the age of 25 years and above by using the face-to-face approach method. A total of 280 responses were successfully collected. Data were analyzed using PLS-SEM and the result showed a notable correlation between awareness of estate planning, incentives of estate planning, and legal were significant with unclaimed property. However, complexity does not have an impact on the unclaimed property. This study enhances the current body of knowledge by focusing on the scarce research about the increasing of unclaimed property in Malaysia. Besides that, this study also provides guidelines to government and state authorities to come up with mountainous strategies and initiatives to overcome the issue of unclaimed property among Muslims in Malaysia.

Keywords: *Wealth Management, Estate Planning, Unclaimed Property*

1. Introduction

Malaysia is a prominent emerging nation that aims to achieve high-income status. To effectively plan and manage the billion Ringgit assets, it is crucial to choose a suitable approach. Zahari, Yusoff and Sulaiman (2021) argue that individuals' wealth and precious assets can be harnessed for development and effectively utilized to enhance the country's economy. The considerable wealth and assets provide significant potential for generating money to foster the growth of Islamic economics and enhance Malaysia's economic standing. It is expected to address the problem of our national treasures, which are currently immobilized and have a worth in the billions of ringgits. To attain national progress, it is imperative to effectively and efficiently administer resources. Alternatively, it might exacerbate the problem of unclaimed property.

The problem of unclaimed property in Malaysia is getting worse by the year. It is because the Malaysian community failed to plan their estate planning option concerning reducing the abandoned property that causes billion Ringgit up until today. It has become an important issue, particularly for the Muslim community because it involves religious institutions, family institutions, societies, economics, and the state. In line with this, the country will be affected especially in the economy as the unclaimed property continues to rise because it is not possible to generate income or invest in the property that has been frozen. This is agreed by Mohamed Said et al. (2023) who stated that this should be prevented quickly because it would not only be harmful to Muslims' social and economic impact but would also foster a negative perception of the Islamic wealth management and planning system, particularly in Malaysia. Furthermore, the poverty rate is rising because the future heirs are not inheriting the property that should have been inherited.

Unmanaged unclaimed property is a waste of Allah's abundant resources. To avoid the inheritance becoming frozen and difficult to manage, all parties must work together and be accountable for carrying out their

respective trusts. Desertion on this might increase unclaimed property will continue to rise dramatically. Henceforth, unclaimed property may occur when people fail to properly plan their Islamic wealth. Hence, Muslims are permitted to transfer their assets during their lifetime through the utilization of estate planning alternatives. Noordin et al. (2012) argue that it is now imperative to create an Islamic will. This is supported by Bouteraa (2019) in which the will is the most fundamental component of comprehensive estate planning. Many of the estate planner's goals can be met with an effective will as such leave the heirs with sufficient wealth. Failure to prepare a will may result in major issues in property distribution. Without the permission of the heirs, unclaimed property assets cannot be liquidated or invested. This is such a waste because it cannot benefit and profit the heirs and well as being useless for the Islamic economy. In addition, unclaimed property has become a controversial issue. Zahari et al. (2021) have estimated that the value of the unclaimed property amounts to billions of ringgits. This figure holds great importance, and if no measures are implemented, it will not only affect society but also have repercussions for economic and national progress.

The issue of unclaimed property arose as a result of the community's difficulties in claiming property under the *faraid* procedure. There is a seventh reason why unclaimed property must be frozen. Include the heirs has no information about the property that must be claimed, the cost of claiming is expensive, the amount of property is small and does not meet the threshold to be claimed, no agreements between the heirs, a lack of time, a lack of knowledge in *faraid* laws, and the claiming process takes too long. These issues contribute to the increase in unclaimed property eventually. Thus, this situation affects the economy in Malaysia which suffers while wealth remains untapped (Hamidon et al., 2022). As agreed by Muhamad et al., (2023), unclaimed properties negatively impact Malaysia's economy by preventing assets and money from being utilized.

Prior studies have found several factors that contribute to the growing prevalence of unclaimed property in Malaysia. Bakar, Rapi, and Sallehuddin (2020) assert that public awareness, social issues, administrative and legal issues, and educational level are important factors in the rise of unclaimed property. They argue that educating people about this property will increase awareness and encourage action to prevent frozen inheritance. Bakar, Rapi, and Sallehuddin (2020) asserted that the causes that contribute to unclaimed property encompass legislation, behavior, societal difficulties, and inadequacies within agencies. Prior research has identified the primary elements that significantly contribute to unclaimed property. These factors include legislation, encompassing conflicts and provisions of the law, followed by behavior, which is determined by the amount of awareness, and finally, societal issues. Additionally, it is important to consider the vulnerabilities of agencies. According to a previous study conducted by Muhamad et al. (2023), it was shown that knowledge, awareness, and a complex administration process had a major influence on unclaimed properties among inhabitants of Selangor in a post-pandemic scenario.

The objective of this study is to determine the importance of many elements, such as awareness of unclaimed property, incentives for unclaimed property, the complexity of application and claim processes, and legal issues, which contribute to the rise of unclaimed property in Malaysia. Following the previous study conducted by Muhamad et al. (2023), the government and state authorities must develop strategic approaches to tackle this problem through the implementation of various programs. This study experimentally examines the motivations behind the accumulation of unclaimed property. Therefore, this study primarily examines the incentives associated with unclaimed property, which offers empirical evidence for the rise of unclaimed property in Malaysia.

2. Literature Review

Unclaimed Property

Unclaimed property has emerged as a significant factor that requires thorough understanding, particularly among both Muslim and non-Muslim communities. This is particularly relevant when it comes to the allocation of abandoned property, which entails the involvement of relevant authorities. Unclaimed property refers to assets that have been abandoned by their owner and are held by the state until the rightful owner claims them. In addition, a study conducted by Wilson and Slagle (2018) found that unclaimed property assets can exist in either liquid form, such as wages, gift certificates, dividends, stocks, money orders, or travellers' checks, or non-liquid form, such as safe deposit items. Unclaimed property can exist in two forms: tangible, such as the contents of a safe deposit box, and intangible, which includes security-related property and general ledger

property that is owed to a third party who is the rightful owner. This occurs when there has been no communication with the owner for a particular amount of time.

Moreover, previous literature highlighted that unclaimed property in Malaysian society can lead to many negative consequences. This is because, Bouteraa (2019) found that Islamic estate planning is being neglected among Malaysians, particularly Malaysian Muslims. The finding of this situation has demonstrated that there is an excessive number of properties, particularly lands, whose owners died many years ago without taking any action to transfer title to legitimate heirs (Shah et al., 2022). The author further noted that some recipients are unaware of the existence of the property. That is why, the volume of unclaimed property has continued to rise over the years (Abdullah, Awang & Nor Muhamad, 2022). This is agreed by Ahmad (2021) in which the amount of unclaimed property continues to rise over time, and this has become a significant problem that must be focused on immediately. However, a literature study conducted by Zahari et. al. (2021) assert that to maintain the optimal functioning of property management, it is crucial to implement good asset management and efficient estate planning for unclaimed property. According to Kamarudin and Abdul Basar (2022), several instances illustrate the unfavorable behaviors of heirs, including family members' lack of cooperation, avarice, and the perception that managing wealth is unimportant. Furthermore, a study conducted by Abubakar, Ogunbado, and Saidi (2019) determined that the indicators of unclaimed assets belonging to deceased Muslims include the intricacy of legal procedures, insufficient awareness, a protracted process, and the absence of a unified framework.

In addition, the increase in unclaimed property, as mentioned by Ali and Ahmad (2021), has become more complex and challenging for human intellectuals to reflect on unclaimed property. Along with that, the study also agreed with the symptom of lack of knowledge where if the general public takes things lightly, their knowledge will be limited to what they already know, and the problem of unclaimed property will never be solved in a long time. The authors suggested that the public's ignorance should be dissolved, and the public should participate in learning about property management, particularly the property that needs to be claimed to reduce the number of unclaimed properties. Ali and Ahmad (2021) also agree that some people are skeptical about property inheritance issues, particularly the Malays.

Awareness

The National Association of Estate Planners & Councils (NAEPC) congress officially declared the third week of October 2008 as National Estate Planning Awareness Week. This designation serves as a reminder to the public about the significance of estate planning. The objective is to enhance public consciousness of the significance of estate planning. Currently, estate planning information may be found on several platforms such as websites, newsletters, social media groups, local newspapers, radio, television, web-based shows, and other sources.

Malaysia offers a wide range of Islamic estate planning devices. For instance, the terms *Hibah* (gift), *Waqf* (endowment), *Wassiyah* (will), Trust, and, notably, *Faraid* (Kamarudin et al., 2019) are examples. Alma'amun (2010) states that estate planning in Malaysia for Muslims has the objective of expediting the process of estate claim by preventing the issue of frozen estate, safeguarding the estate from being fragmented into smaller sections that would diminish its worth, and ensuring the protection of the beneficiaries. Islamic estate planning is mostly disregarded by Muslims in general, and specifically by Malaysian Muslims. Simultaneously, as stated by Kamarudin et al. (2019) and Kamarudin et al. (2020), a lack of knowledge and a limited state of awareness are two reasons that contribute to the scarcity of Islamic estate planning tools, such as wills and *hibah* (gifts). The lack of widespread knowledge about *hibah* in the community, along with the absence of any proactive measures to implement *hibah*, is the reason for this situation. Kamarudin and Alma'amun (2013) found that only 31.7% of the 300 respondents received *hibah*, while the bulk of respondents (68%) have never utilized *hibah* as a method of estate distribution. Nevertheless, the figure remains relatively low when compared to the vast majority of Muslims in Malaysia, which amounts to 30 million individuals (Sabit, 2015). Consequently, based on the study's results, the Muslim community lacks complete awareness of alternative methods, aside from *faraid*, for distributing their lands. According to Zakinan (2018), the level of awareness among individuals regarding *hibah* is still quite low. Only 0.2% of Malaysia's population of 15 million have officially included *hibah* in their estate planning. This outcome indicates a subpar level of consciousness and promotes a rise in unclaimed assets.

In addition, Chin et al. (2021) found that the level of public awareness of estate planning in Malaysia is significantly lower compared to other developed nations like the United Kingdom and Australia. In these countries, over 40% of persons have a will. Ismail et al. (2013) further argue that the majority of Malaysians, over 90%, do not possess a will due to the limited prevalence of estate planning. Procrastination and a deficiency of urgency are two factors contributing to this issue. They hold the belief that wills are only necessary for the affluent and that one must amass fortune before creating a will. In addition, a lack of knowledge and limited understanding of estate planning contribute to the scarcity of Islamic estate planning tools, such as wills and *hibah* (gifts) (Kamarudin et.al, 2019; Wahab, Hashim & Ghani, 2019). According to Boon, Yee, and Ting (2011), the majority of Malaysian Muslims do not consider estate planning to be important, and as a result, it is not frequently carried out.

In addition, prior studies have highlighted various obstacles to utilizing *wasiyyah* services, such as limited understanding, lack of awareness, inadequate financial management, and a pessimistic mindset (Nasrul & Mohd Salim, 2018; Jamalurus, Mokhtar & Rahim, 2019). Mursidi, Razali, and Maulan (2022) have provided evidence that the penetration rate of *wasiyyah* services in Malaysia is still low. Less than 5% of Muslims in Malaysia have prepared a *wasiyyah* or written document before their death. However, as stated by Ghul, Yahya, and Abdullah (2015), individuals who possess information about *wasiyyah* have a greater level of awareness regarding the significance of this activity. Respondents with a higher level of understanding of Islamic estate planning are more inclined to have executed a *wasiyyah*. This has significantly contributed to the reduction of unclaimed property. According to Jamalurus, Mokhtar & Rahim (2019), it is imperative to guarantee that the Muslim community possesses knowledge and comprehension of *wasiyyah*. The more extensive their education, the more heightened their awareness of the practice of *wasiyyah*.

In summary, awareness represents a significant relationship to the increasing of unclaimed property among the Muslim community. To validate this claim, the study will conduct hypothesis testing to determine whether the awareness hypothesis (H_1) should be accepted or rejected. Thus, the hypothesis testing statement is as follows:

H_1: There is a significant relationship between the awareness of unclaimed property and the increase of unclaimed property in Malaysia

Incentives of unclaimed property

Incentives for unclaimed property relate to offerings provided by governments, agencies, and other organizations to motivate individuals to engage in estate planning. This incentive, such as the rebate granted by government agencies, involves exempting individuals from paying inheritance tax on their wealth when they engage in estate planning. Hong (2020) suggests that employing inter vivos or love and affection transfer in estate planning can effectively circumvent inheritance taxes. Property can be transferred to children either as a gesture of love and affection or through inter vivos means. Both techniques fundamentally entail the transfer of property to your children as a gift during your lifetime. Section 2 of the Stamp Duty (Remission) (No. 2) Order 2019 (P.U. (A) 369) came into effect on January 1, 2020. It specifies that 50% of the Stamp Duty applicable to any transfer of immovable property from parents to children as a voluntary disposition inter vivos is waived.

Chern (2023) stated that government entities are contemplating the implementation of an inheritance tax, which has the potential to generate significant tax revenue. Nevertheless, implementing the inheritance tax as an incentive is not feasible and will merely impose a financial burden on the population. Based on this, a prior investigation discovered that there was no statistically significant movement of affluent, elderly taxpayers between regions due to the imposition of the inheritance tax (Brülhart & Parchet, 2014). This is corroborated by the proposed wealth tax, which would create a motivation for affluent taxpayers to emigrate and renounce their US citizenship to evade the tax. This implies that the tax obligations of the wealthy place a burden on the general population. Nevertheless, a study done by Bakija and Slemrod (2004) discovered that bequest taxes have a statistically significant adverse impact on the quantity of estate tax returns filed within a state. A small fraction of society paid the federal estate tax on their bequests. Therefore, the most straightforward approach to evade tax payments is to allocate money following Islamic estate planning.

Consequently, individuals would be granted an exemption from inheritance tax and qualify for a 50% discount on stamp duty. The government's incentive is highly efficacious in motivating individuals, particularly those of

the Muslim faith, to proactively strategize the distribution of their wealth in their estates at an early juncture.

In summary, incentives represent a significant relationship between increasing unclaimed property among the Muslim community. To validate this claim, the study will test hypotheses to determine whether the incentives hypothesis (H_2) should be accepted or rejected. Thus, the hypothesis testing statement is as follows.
H_2: There is a significant relationship between the incentives of unclaimed property and the increase of unclaimed property in Malaysia.

Complexity of Application and Claim
A good application and claim procedure reveals how professional the management is in settling the required application procedure in the fastest and easiest way. Various legal procedures involving the deceased's assets must be followed in Malaysia and to carry out proper estate administration, the person managing the deceased's assets must be adequately competent in engaging such a process (Amrullah, Nasrul & Fathurrohman, 2021). According to Wajis, Sahid and Ab. Rahman (2018), the management system and division of this inheritance become less effective as many people are unsure where to begin the application for division of this estate planning instruments.

Apart from that, Noordin et. al (2013) stated that most of the customers are baffled and have little idea of what to do, where to go, or how much to spend on a petition to claim for the estate. Ali and Ahmad (2021) also agreed that some of them are oblivious to the procedure that must be followed to claim the estate. This is the difficulty that causes them to lose self-motivation in making and managing the distribution of inheritance among themselves. The previous literature, according to Bakar et al. (2020), stated that this has become a complicated process because the authorities want the inheritance to be distributed to the rightful heirs who are entitled to receive the estate and to avoid any fraud. Furthermore, the activities are unregulated, and the absence of a requirement by an appropriate body impeded the availability of standard practices (Rahman & Hassan, 2020). As agreed by Ghul, Yahya and Abdullah (2015), due to the complexities of the law and procedures, the heirs of the deceased may be perplexed. This may have an impact on his or her decision toward the estate distribution. This is proven by Muhamad et al. (2023) in which the complex administrative process has a significant impact on unclaimed property in Selangor. This study also mentioned that the direct result of this is a complex process of distributing inheritance. As supported by Ayyash et al. (2019), there is a large number of unclaimed inherited properties, particularly estates, where people are hesitant to go through all of the formalities to claim the inheritance properties. This demonstrates that society knows it is not easy to claim inherited properties due to a lengthy and complicated process.

In summary, complexity represents a significant relationship to the increasing of unclaimed property among the Muslim community. To validate this claim, the study will test hypotheses to determine whether the complexity hypothesis (H_3) should be accepted or rejected. Thus, the hypothesis testing statement is as follows:
H_3: There is a significant relationship between the complexity of application and claim and the increase of unclaimed property in Malaysia.

Legal Factor
Ahmad (2021) stated that the parallel legal system in Malaysia applies to personal law, and the implementation of inheritance law is overseen by two courts: the Syariah High Court and the Civil High Court. The former possesses the authority to adjudicate matters concerning substantive law, while the latter possesses the authority to adjudicate matters concerning procedural law. Several scholars have contended that the Syariah Court should possess jurisdiction over Muslim estate properties.

The presence of several entities responsible for overseeing Muslim trust property has consistently been a subject of disagreement. This is a result of the division of authority created by the Federal Constitution, namely in the Ninth Schedule, Legislative List, List 1, Federal List, 4 (e) (i). The involvement of specific Malaysian jurisdictions involved in the management of Islamic estates, such as the Civil High Court, Land Office, and Amanah Raya Berhad (ARB), is emphasized. Through the issuance of an Islamic inheritance certificate, the Syariah Court is responsible for officially certifying and confirming the distribution ratio of the Islamic estate (Nasrul et al., 2017; Halim & Ahmad, 2019; Abdullah et al., 2022). Bakar, Rapi, and Sallehuddin (2020) argued that the presence of multiple jurisdictions has led the public to perceive the management of estate partitions

as excessively intricate and perplexing.

In addition, the law regulates the management of all three categories of property, which is exceptional. Small estate (division) petitions with a property worth below RM2 million must be submitted to the Colonial Office of the states in Malaysia, under the Small Estates (Division) Act 1955. To apply for property valued at above RM2 million, one must apply to the Civil High Court. The Syariah Court oversees the estate division responsible for determining the *fair* share. In the earlier study conducted by Abubakar, Ogunbado, and Saidi (2019), it was noted that the department responsible for managing small estates experiences a notable bottleneck and delay in the process of distributing the estates. The Civil High Court, the Small Estate Office, the Department of the Director General of Lands and Mines (JKPTG), Amanah Raya Berhad, and the Syariah Court are responsible for overseeing and handling the management and administration of Muslim inheritance. Consequently, the presence of various bodies responsible for overseeing and distributing the inheritance of Muslims has left the heirs confused.

Rahman and Hassan (2020) state that unclaimed estates might arise from the concurrent jurisdiction of two courts under substantive law, and the intricate procedures involved in the process contribute to its protracted duration and high expenses. Section 3 of the Probate and Administration Act 1959 gives the High Court the authority to issue Probate in circumstances where there is no will, while Section 18 of the same Act allows the High Court to issue Letters of Administration in cases where there is no will. These difficulties reflect poorly on the current legislative system due to the lengthy process of obtaining a Letter of Administration and the minimum four-year duration required to resolve the case. According to Wan Yusoff, Hj Abdullah, and Ahmad Zaki (2021), the presence of overlapping powers between Islamic inheritance law and the existing civil law at the federal level has rendered the former's purpose meaningless. The inheritance of Muslims is subject to various civil statutes, including the Probate and Administration Act 1959, the Small Property Inheritance (Distribution) Act 1955, the Amanah Raya Berhad Corporation Act, the High Court Rules 1980, and the Wills Act 1959, among others. These federal laws have jurisdiction over inheritance matters, while the State Legislature's authority is limited to administration issues. The legal framework regulating unclaimed property exhibits a statistically significant and positive correlation with the turnover of unclaimed property (Wilson & Slagle, 2018).

In addition, a prior study conducted by Bakar, Rapi, and Sallehuddin (2020) emphasized the necessity of adhering to the *Hibah* law, which serves as a framework and limitation for asset owners when transferring their assets as *hibah* to the recipient. The divergent perspectives lead to disparate rulings given by the Shariah court and the Civil Court, increasing the number of instances containing *hibah* conflicts. Noordin et al. (2012) further affirmed that the decrease in the functions of Syariah courts and the growth in the authority given to Civil High Courts to handle Islamic inheritance have a noteworthy influence on the legal system, as well as the management and allocation of Islamic inheritance. Furthermore, as stated by Tagoranao (2009), the *Syariah* court possesses jurisdiction solely to issue *faraid* certificates, rather than having the complete ability to manage inheritances. This is the factor that causes the heir to disregard their responsibilities in managing the inheritance.

Furthermore, the authority for the execution of wills is restricted by the existing procedural law, namely the Wills Act of 1959. For instance, a will created by a Muslim individual must adhere to Syariah law, but a will produced by a non-Muslim testator is governed by the Wills Act 1959, which is derived from English law (Roslan & Ahmad, 2022). This is because certain clauses of the Rules of Court 2012 explicitly mention the Wills Act 1959, which does not apply to individuals who follow the Islamic faith. Consequently, the Civil High Court does not have the power to provide the Muslim individual with a letter of probate. Instead, it must issue letters of administration, which will be attached (Ahmad, 2021).

In summary, the legal factor represents a significant relationship to the increasing of unclaimed property among the Muslim community. To validate this claim, the study will conduct hypothesis testing to determine whether the legal factor hypothesis (H_4) should be accepted or rejected. Thus, the hypothesis testing statement is as follows:

H_4: There is a significant relationship between the legal factor and the increase of unclaimed property in Malaysia.

3. Research Methodology

This study employs a quantitative approach to investigate the factors that contribute to the rise of unclaimed property. Specifically, it examines the relationship between the complexity of the procedure, the knowledge of unclaimed property, and the legal element. The main focus of the study is on Muslim individuals residing in the Klang Valley, which encompasses the Federal Territory of Kuala Lumpur, Selangor, and Putrajaya. The participants in the study are aged 25 years and above. This study utilized a sampling size of 384 respondents, determined based on the total population using the Krejcie and Morgan table. The sampling technique employed was simple random sampling. Data is collected by the utilization of the questionnaire methodology. The questionnaires were modified according to the prior investigation and employed a five-point Likert scale. The Likert scale necessitates responders to choose a question corresponding to the provided perspective, where 1 signifies "Strongly disagree," 2 signifies "Disagree," 3 signifies "Neutral," 4 signifies "Agree," and 5 signifies "Strongly agree." The questionnaire is distributed through both personal interviews and postal delivery. The data collected was analyzed using Partial Least Squares (PLS) analysis conducted through the SmartPLS 4 program. The partial least squares (PLS) analysis comprises two distinct phases: the structural model and the measurement model. Evaluating the validity and reliability of the measurement model is essential. The measurement model's validity is evaluated by analyzing its convergent and discriminant validity, while the model's reliability is tested using the Composite Reliability Index (CR). After developing the measuring model, a structural model test was conducted using 5000 resamples to investigate the relationship between awareness, complexity, incentives, and legal variables with unclaimed property.

4. Results

In general, the information provided by respondents is summarized in Table 1.1 below.

Table 1: Demographic Profile

Profile	Details	Frequency	Percentage (%)
Gender	Male	105	39.9
	Female	158	60.1
Age	25 years	60	22.8
	Above 25 years	203	77.2
Educational level	Diploma/A-foundation/STPM/Matriculation/SPM	84	31.9
	Undergraduate	100	38.0
	Postgraduate	74	28.1
	Doctoral (PhD)	5	1.9
Occupation sectors	Government sector	102	38.8
	Private sector	97	36.9
	Self-employed	64	24.3
Total wealth (Assumption)	Below RM100k	142	54.0
	RM101k – RM200k	39	14.8
	RM201k – RM400k	38	14.4
	Above RM500k	44	16.7

By using a frequency distribution of 263 respondents, it is revealed that the majority of 158 respondents (60.1%) were female, while male respondents accounted for only 105 of the total respondents which represents 39.9%. In terms of the age group, the response indicates that the majority who answered the questionnaire are the respondents the age above 25 years with 203 respondents or 77.2%, while only 60 respondents or 22.8% are in the age 25 years category.

Furthermore, for the part of educational level, it is evident that most of them which are 100 respondents (38.0%) are undergraduates. This is followed by 84 respondents (31.9%) who have a Diploma/ A-Foundation/ STPM/ Matriculation/ SPM. Next, there are 74 respondents (28.1%) who are postgraduate holders. The rest of the respondents, which is 1.9%, have a doctoral (PhD) level. Moving on to the occupation sector, the majority are from the government sector with 102 respondents comprising 38.8%. The private sector comes in second

with 97 respondents or 36.9%. The occupation of self-employed people has a total of 64 respondents or 24.3%. The table also shows the respondent's total wealth assumption. Most respondents, which is 142 in total, have a total wealth of less than RM100,000, contributing 54.0% of the total wealth. Respondents with a total wealth of more than RM500k are 44 respondents with 16.7%. The range of RM101k to RM200k represents 39 responses or 14.8%. Meanwhile, RM201k to RM400k is the minority in the total wealth assumption with 38 respondents or 14.4%.

Partial Least Square – Structural Equation Modeling (Measurement Model)

Confirmatory factor analysis (CFA) was utilized to assess the reliability, discriminant validity, and convergent validity of the measures. When evaluating convergent validity, it is crucial to incorporate factor loadings (Hair et al., 2014). Composite reliability (CR) and average variance extracted (AVE) can be used to evaluate convergent validity. The majority of the item loadings have values more than 0.5, indicating statistical significance at a p-value below 0.01. In addition, all of the average extracted variances (AVE) in Table 2 are above 0.5. In addition, Ramayah et. al. (2018) revealed that the composite reliability (CR) of all variables is higher than 0.7.

Table 2: Discriminant Validity

Construct	Item	Loading	CR	AVE
Awareness	Aware 1	0.835	0.923	0.668
	Aware 2	0.806		
	Aware 3	0.83		
	Aware 4	0.764		
	Aware 5	0.787		
	Aware 6	0.876		
Complexity	Complexity 1	0.75	0.842	0.64
	Complexity 4	0.805		
	Complexity 5	0.842		
Incentive	Incentive 1	0.869	0.964	0.819
	Incentive 2	0.917		
	Incentive 3	0.923		
	Incentive 4	0.941		
	Incentive 5	0.927		
	Incentive 6	0.847		
Legal	Legal 1	0.839	0.902	0.607
	Legal 2	0.74		
	Legal 3	0.857		
	Legal 4	0.776		
	Legal 5	0.634		
	Legal 6	0.808		
Unclaimed Property	UP1	0.726	0.853	0.593
	UP3	0.74		
	UP5	0.808		
	UP6	0.802		

Note: Complexity 2, 3, 6, UP 2, and UP 4 were deleted due to low loading

The Heterotrait Monotrait (HTMT) was employed as the criterion in this study to assess discriminant validity, as proposed by Henseler, Ringle, and Sarstedt (2015). Discriminant validity is achieved when the correlation coefficient between constructs is less than one. Alternatively, if we select a more conservative criterion of 0.85, there will be a more evident and clear differentiation between the concepts (Kline, 2016). Table 3 displays the correlation estimates for HTMT evaluations. The correlation coefficient between the investigated constructs was less than 0.85. Therefore, this finding demonstrates that the required level of discriminant validity was successfully established by the assessment of HTMT.

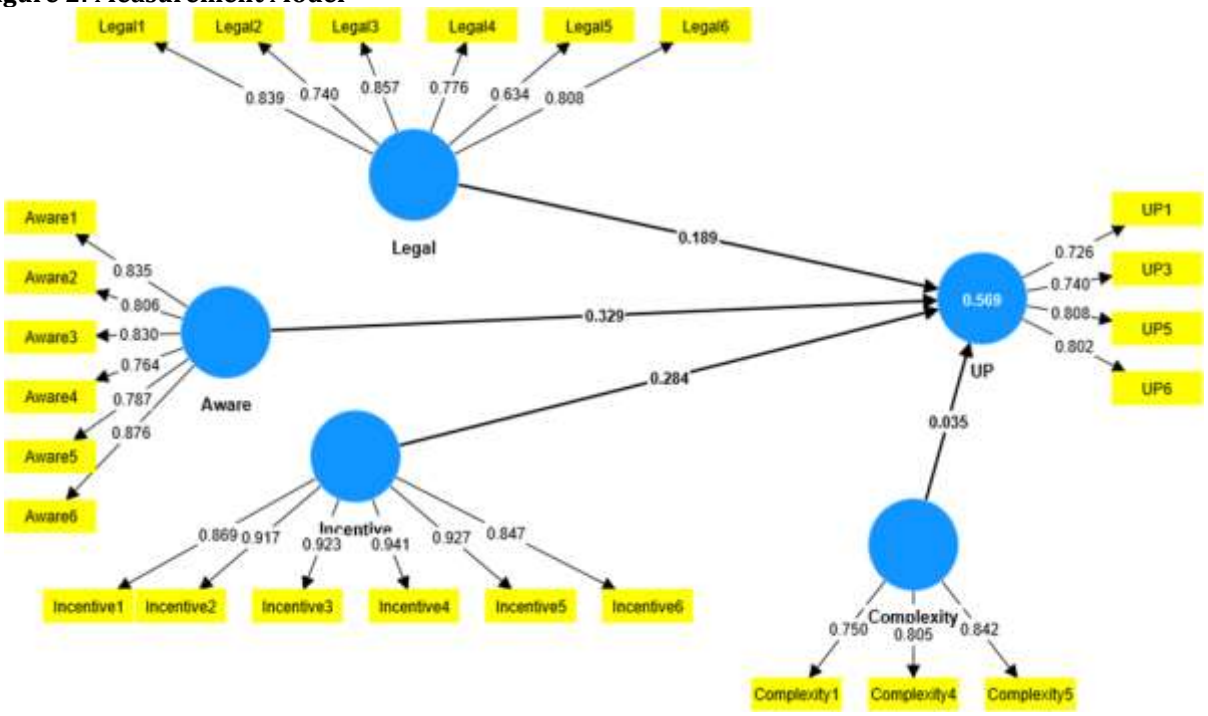
Table 3: HTMT

	Aware	Complexity	Incentive	Legal	UP
Aware					
Complexity	0.703				
Incentive	0.847	0.628			
Legal	0.757	0.842	0.728		
Unclaimed Property (UP)	0.829	0.663	0.799	0.75	

Partial Least Square – Structural Equation Modeling (Structural Model)

The R^2 score of the endogenous variable is used to calculate the amount of variance that can be explained. A coefficient of determination (R^2) beyond 0.60 implies a substantial value, while a range of 0.30 to 0.60 suggests a moderate value. A number below 0.30 signifies a low value (Sandin et. al., 2015). Based on the data presented in Figure 2, the R^2 value indicates that the combined influence of the external factors (Awareness, complexity, incentive, and legal) may account for 56.9% of unclaimed property.

Figure 2: Measurement Model



Every connection between two constructs in the structural model signifies a hypothesis. The researcher used a structural model analysis to investigate and refute each hypothesis, while also quantifying the level of correlation between the independent and dependent variables. The path coefficients of all the variables were assessed by comparing the beta (β) values in the route model. The conclusion is derived from the observation that high values indicate the most significant correlation between the foreign constructions and the endogenous construct. The degree of correlation between the independent and dependent variables was evaluated by analyzing the output of the Smart PLS. To determine the level of significance in partial least square structural equation modeling (PLS-SEM), t-statistics were computed for each path using the PLS-SEM bootstrapping method. The t-statistics result has determined the significance level of each relationship. Table 4 displays the path coefficients, observed t-statistics, and significance levels for all of the projected pathways. The study conducted by Hair et.al. (2014) proposes that the suitable t-values for establishing the significant level in a one-tailed test are 1.28 (for a 10% significance level at $p<0.10$), 1.645 (for a 5% significance level at $p<0.05$), and 2.33 (for a 1% significance level at $p<0.01$).

According to the examination of the path coefficients in Table 4, just one of the paths did not offer evidence in favor of the hypotheses. These findings indicate a mixture of favorable and unfavorable outcomes. The majority of the t-values were below the critical threshold of 0.05 or 5%, which is the minimum value required for statistical significance (Hair et.al, 2014). The inherent concept of unclaimed property is strongly and significantly linked to Aware (β=0.329, t=3.815, p<0.01), Incentive (β=0.284, t=3.268, p<0.01), and Legal (β=0.189, t=2.105, p<0.05). After examining the existing evidence, it has been determined that three hypotheses (H1: The awareness factor has a statistically significant positive effect on unclaimed property; H3: The presence of incentives has a statistically significant positive effect on unclaimed property; and H4: The legal aspect has a statistically significant positive effect on unclaimed property) have been validated. Nevertheless, the variable Complexity (β=-0.035, t=0.464, lacking statistical significance) did not influence the unclaimed property. Therefore, the hypothesis H2, which states that complexity has a positive and large impact on unclaimed property, is not supported.

Table 4: Result of hypotheses tests based on the path coefficients, t-statistics, p values, and Confidence Interval

Hypotheses	Relationship	Beta	Std Error	T statistics	P values	LL	UL
H1	Aware -> UP	0.329	0.086	3.815	0.001	0.15	0.49
H2	Complexity -> UP	0.035	0.075	0.464	0.643	-0.11	0.181
H3	Incentive -> UP	0.284	0.087	3.268	0.001	0.119	0.458
H4	Legal -> UP	0.189	0.09	2.105	0.035	0.015	0.364

*Note: one-tailed: *p <0.05 (t ≥ 1.645), **p <0.01 (t ≥ 2.33), UP=Unclaimed Property*

5. Conclusion and Recommendations

Resolving unclaimed property is crucial for sustaining economic growth. Although the acceptance rate of estate planning property is still in its early stages, it is anticipated that the community, especially the Muslim society, would take charge of and enhance estate planning management. If a property is abandoned and consistently has a detrimental effect on the economy, individuals will start to acknowledge this and take measures to prevent the assets from becoming frozen by implementing an Islamic estate planning strategy for the benefit of future generations.

The results indicated that there is a substantial correlation between awareness and the rise in unclaimed property. This study aligns with previous research conducted by Ibrahim, Idris Shazali, and Rusgianto (2024), Muhamad et al. (2023), and Chin et al. (2021), which emphasized the significance of individual awareness in effectively managing their money. This awareness is crucial to guarantee that wealth is dispersed to those who are entitled to get it. They must be aware that there are numerous platforms available to help them achieve their goals, and they must not add to the growing problem of unclaimed property in Malaysia. When it comes to estate planning in wealth management, various approaches can be employed, including the use of a *wasiyyah*, *hibah*, and *faraid*. For Muslims, although wealth is typically dispersed through the *faraid* system, *hibah,* and Islam will nevertheless serve as alternate platforms, albeit limited to one-third of the total fortune. Bouteraa (2019) asserts that in the context of Islamic wills, the prevailing belief is that it is crucial to ensure the allocation of money for the benefit of both heirs and the bank. In their study, Ahmad and Peyman (2008) concurred that the knowledge and awareness of the concept of *Wasiyyah* among Muslim societies might effectively mitigate the issue of unclaimed property within the Muslim community. Therefore, it is imperative for Muslims to efficiently handle their wealth to ensure sufficient asset management for future generations. To ensure a better future for future generations, it is crucial to raise awareness among the community about the importance of estate planning. Muslim individuals possess a deliberate and strong inclination to engage in estate planning to mitigate the problem of unclaimed property. This is corroborated by Hove and Troskie (2019) who asserted that when individuals, particularly owners of family businesses, acknowledge the necessity of organizing their assets, they become cognizant of the importance of estate planning, which in turn may incentivize them to seek professional guidance.

In addition, incentives are also a crucial element contributing to the increase in unclaimed property. Although the absence of research has emphasized the importance of motivation and unclaimed assets, it can be regarded

as a significant factor in the discourse on wealth management. The reason for this is that incentives in estate planning, such as tax reductions or refunds, can mitigate the growth of unclaimed property. Government or authoritative agencies should consider providing multiple potential incentives to foster the growth of the estate planning business. In addition, Islamic financial institutions can also create a stimulus to encourage clients to participate in Islamic estate planning. Alternatively, the issue of unclaimed property growth remains unsettled.

Hence, various authorities must pay attention to the legal component and the growing issue of unclaimed property. This is because the findings demonstrate a substantial correlation between the rise of unclaimed assets. The growth in unclaimed property can be attributed to the complexity of the legal process and the involvement of multiple administrative components across various jurisdictions. This aligns with the prior research conducted by Halim and Ahmad (2019), which found that the presence of many distinct laws regulating different types of unclaimed property contributes to the rise in unclaimed property in Malaysia. Mohammad and Suratman (2017) found that the process of claiming all sorts of estates under Malaysian law is confusing and cumbersome due to the involvement of many agencies. Consequently, the legal matter has emerged as a significant concern that could lead to a rise in unclaimed assets. Therefore, the affiliated organization should suggest a plan to decrease the number of jurisdictions responsible for managing Muslim trust property and establish a dedicated entity to aid in the distribution of estate planning. This may enhance the sense of comfort within the Muslim community when navigating property jurisdiction. By expediting the probate procedure and ensuring the distribution of assets aligns with the deceased's desires, it will alleviate the administrative burden on families during times of bereavement (The Star, 2023). According to a previous study conducted by Yusmita (2023), it is recommended that the government prioritize the establishment of judicial organizations to ensure the effective enforcement of inheritance rules. According to a previous study conducted by Muhammud and Shazari (2022), there are four primary entities, namely The Civil High Court, the Small Estate Office, the Department of the Director General of Lands and Mines (JKPTG), Amanah Raya Berhad (ARB), and the Syariah Court, which are accountable for the management and administration of Muslim inheritance. Haque (2020) argues that the government should streamline legal procedures to facilitate the transfer of inheritance ownership, especially for cases involving taxes.

One of the elements that yielded inconsequential results in this study is the intricacy associated with the rise in unclaimed property. This statement indicates that complexity is not a contributing cause to the increase of unclaimed property. The decrease in Muslims' belief in the lengthy and complex application and claim procedure in estate management may be attributed to their lack of confidence in the reliability of its complexity. The discovery aligns with the research conducted by Ghul, Yahya, and Abdullah (2015), which highlighted that the intricacies of the procedures can influence an individual's decision on the distribution of their inheritance. The more the complexity of a process or method, the less inclined individuals are to become involved with it. This problem leads to a loss of self-motivation in the process of creating and overseeing the distribution of inheritance. Community education is crucial in estate management planning. This can be achieved by offering easily accessible rules and flowcharts for each step involved. Noordin et. al (2012) established a single Syariah-compliant network model that educates customers by providing explicit instructions for processes and beneficiaries involved in the distribution and estate management process.

To address the problem of unclaimed property in Malaysia, individuals are accountable for managing the assets and property they accumulate over their lives; otherwise, these assets will diminish owing to a lack of effective planning. Regrettably, negative views on estate planning often result in delaying the execution of the plan, causing assets to be held up for an extended period and creating difficulties for the beneficiaries. Interestingly, Muslims possess a profound comprehension of estate planning, although they exhibit reluctance when it comes to putting it into practice. This may be attributed to the lack of suitable platforms for Muslims to acquire knowledge, insufficient time for learning, or limited exposure to reliable estate planning resources. The financial obstacle hindering the completion of estate planning may be the primary cause of Muslims' failure to engage in this process. Enhance knowledge regarding the extensive advantages of estate planning, the potential repercussions of disregarding estate planning, and the exploration of further estate planning tools using Shariah principles, among other topics. This approach facilitates individuals in acquiring a deeper understanding of the unclaimed property matter, thus preventing the possibility of their assets being immobilized in the future. Regularly promoting and marketing the benefits of estate planning instruments helps reduce the future growth of unclaimed property. It is necessary to have a wide range of promotion and

marketing efforts from financial sectors and private enterprises to widen the reach of Islamic estate planning and increase awareness among the community.

Moreover, several entities must assume responsibility for educating the community about the significance of wealth management, particularly in the context of estate planning. Presently, both the government and the Islamic estate planning industry must prioritize the task of enlightening and encouraging individuals, regardless of their religious affiliation, to engage in the process of organizing and overseeing their financial assets. Therefore, to enhance Malaysians' comprehension of the significance of estate planning, it is recommended that the government assess prominent Islamic studies educational programs and expand the target audience to encompass high school and university students.

Finally, regulatory bodies should offer incentives such as tax rebates or other forms of encouragement to motivate individuals to create wills or *habits* to manage their wealth. This study found that incentives are a contributing element in lowering unclaimed property among Muslims. Simultaneously, the Malaysian Institute of Estate Planners (MIEP) has also put forward Budget 2024 to tackle the complex challenges of estate planning and unclaimed funds. MIEP suggests extending a personal tax relief of up to RM500 per individual taxpayer for will and estate planning. This measure aims to incentivize individuals to actively organize their estates and resolve the problem of unclaimed property. MIEP proposed the implementation of tax deductions for the expenses incurred in attending estate planning seminars and consulting with certified estate planners.

In line with this, future researchers should consider using secondary data. Components such as the number of unclaimed properties, the value of savings investments, and money transfers like cash savings amounts can also be included. These elements must be considered for estate property planning. Based on the respondents' methods, discussions often focus on abandoned money in savings accounts that has not been claimed by heirs, due to the emphasis on physical property such as houses and land. Additionally, external economic factors that contribute to the increase in unclaimed property should also be included as secondary data. These factors may include per capita income, taxation policies, fiscal policies, technological advancements, inflation rates, and more. Considering these elements is essential for comprehensive estate property planning.

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Revisiting Okun's Law: Evidence from Malaysia

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Abstract: Okun's Law explains an inverse relationship between unemployment and GDP. To re-examine the validity of Okun's Law to the Malaysian economy through the period of 1988 until 2021, this paper employed the Ordinary Least Squares (OLS) approach with several diagnostic tests. The findings indicate that there is a significant relationship between GDP and unemployment. The control variables - population, inflation rate, and FDI also significantly affect unemployment. While the country's GDP and inflation rate have a negative relationship with unemployment, population and FDI have a positive relationship with unemployment in Malaysia. Therefore, Okun's Law is valid in the case of Malaysia.

Keywords: *Okun's Law, unemployment, gross domestic products, inflation, population, FDI*

1. Introduction and Background

In Malaysia, the unemployment rate was around 3.3% for the last decade, however, due to the pandemic Covid-19, it surged to 5.3% in May 2020 coinciding with the government's imposition of restriction orders, and then plateaued at 4.6% for the subsequent months. This uptick in unemployment was attributed to employers' struggles to sustain their businesses. Tan Sri Noh Omar, the former Minister of Entrepreneur Development and Cooperatives, noted that with the introduction of Movement Control Order 3.0 (MCO 3.0) in May 2021, around 37,415 enterprises shut down (as reported by the New Straits Times, 2021). The unemployment rate saw a significant rise due to layoffs and the inability of individuals to access the formal job market amid the pandemic. The continued high unemployment, especially for graduates and youth unemployment in Malaysia has given rise to a discussion of the reasons for this persistence of unemployment over the years. According to Department of Statistics Malaysia data, the percentage of unemployed graduates in 2000 was less than 10% of the total unemployment rate. This ratio increased to over 40% in just 20 years. In addition, in the same year, the youth unemployment rate was as high as 10%. The COVID-19 pandemic has made things worse for young people who are looking for work because they now must compete with people who have lost their jobs to get back into the formal job market which led to a higher unemployment rate.

From the supply side, there are several reasons why they are unable to enter the formal labor market. One of the factors is the assertion made by job seekers that there are no suitable positions available in the market. (Jamaludin et al, 2021). However, in the market, there are millions of job vacancies available. Table 1 shows the distribution of job vacancies based on occupation in the recent years, 2000-2021. Elementary Occupations, categorized as low-skilled jobs, constitute 25% of all job openings, while Clerical support workers, Service & sales workers, Skilled agricultural, forestry, livestock & fisheries workers, Craft & related trades workers, and Plant & machine operators and assemblers which categorized as middle-skilled jobs make up 40-44% of the total job openings. The unbalanced distribution of job vacancies might contribute to the issue of unemployment, which sends signals of a mismatch in the labor market in Malaysia (Said et al., 2021).

Unemployment or mismatch is a problem that shouldn't be disregarded as it may inhibit long-term economic development and productivity. One way to explain this would be through resource allocation, as resource allocation may be a factor in why some nations are more productive than others (Bartelsman, Haltiwanger, & Scarpetta, 2013; Hsieh & Klenow, 2009). The buildup of human and physical capital is negatively impacted by resource misallocation when the labor market is unable to absorb workers and offer employment opportunities (Zulkiply, 2017). The underutilization of the country's human resources and the potential for low labor productivity are caused by these situations (Mukoyama & Sahin, 2009).

Table 1: Job vacancies by group of occupation 2020 and 2021

Types of skills	Group of occupation	2020	2021
High-skilled	Managers	35964	97700
	Professionals	110175	457153
	Technicians & associate professionals	89954	298578
Middle-skilled	Clerical support workers	55985	180164
	Service & sales workers	135058	395450
	Skilled agricultural, forestry, livestock & fisheries workers	3846	8270
	Craft & related trades workers	49426	176050
	Plant & machine operators and assemblers	81418	220626
Low-skilled	Elementary occupations	183478	646586
Total		745304	2480577

Source: Social Security Organization (SOCSO) & Ministry of Human Resource Malaysia (MOHR)

Specifically, it can be explained in terms of Okun's Law. Okun's Law is an economic concept that describes the inverse relationship between changes in Gross Domestic Product (GDP) growth and changes in unemployment. The law was first proposed by economist Arthur Melvin Okun in 1962. The theory emphasizes the economic concept that if unemployment falls by 1%, GDP rises by 3% (Okun, 1962). When the economy is growing and hiring more people, unemployment tends to decline when it is at or over its potential. On the other hand, the output gap grows during recessions and downturns in the economy, which raises unemployment rates.

Thus, the primary focus of this study is to revisit Okun's Law or the correlation between unemployment and GDP in Malaysia. To broaden the inquiry, other macroeconomic variables including inflation, population, and foreign direct investment will be examined for the regression.

2. Literature Review

Theoretical Review

Okun's Law

A notion in economics known as Okun's Law states that changes in unemployment and changes in GDP growth have an inverse connection. Economist Arthur Melvin Okun first proposed the law in 1962. When the economy is growing and hiring more people, unemployment tends to decline when it is at or over its potential. On the other hand, the output gap grows during recessions and downturns in the economy, which raises unemployment rates. Although the precise strength of this relationship may vary between economies and historical periods, economists have generally observed a consistent association over time between changes in the unemployment rate and changes in real GDP growth.

Okun's Law states that a 1% increase in the unemployment rate is usually correlated with a 2-3% decline in GDP (Okun, 1962). Recent data indicates that to lower the unemployment rate by 1% over a given year, the real GDP must grow by 2% more than the potential real GDP. The unemployment rate will drop by 1%, for instance, if the real GDP growth rate is 4% and the potential GDP growth rate is 2% (Md Kamrul I, 2021; Louail, 2021; Dunsch, 2016). The law has been thoroughly examined, and although it is true in most situations, there are several exceptions to the rule. For instance, the 2008 financial crisis demonstrated that the law was untrue. Despite clarifying the relationship between unemployment and economic growth, Okun's Law has several drawbacks. First of all, as a general rule, it is untrustworthy since the relationship it portrays isn't always stable.

Second, there are different versions of the Law, and choosing the correct one can have a big impact on how accurate it is. Unanticipated factors like labor hours and capacity utilization can skew the results. Important ideas like the natural unemployment rate and potential GDP are also difficult to quantify, which makes them difficult to understand and use. Finally, the accuracy of its depiction of the employment-productivity link has been questioned by certain economists. These drawbacks emphasize the necessity of exercising caution when applying Okun's Law and underscore the significance of taking other variables into account for thorough

economic research. Notwithstanding its shortcomings, Okun's Law is nevertheless a helpful resource for companies and policymakers to comprehend the connection between unemployment and economic growth. Using the law has allowed for the development of successful plans to combat unemployment and foster economic expansion.

Philips Curve

Philips Curve which was founded by A. W. Phillips represents a theory on an inverse relationship between unemployment and inflation rate in the economy. Labor demand and supply is a notion that helps explain the fundamental theoretical underpinnings of the Phillips Curve. A surplus of labor demand can drive up wage rates, leading to high inflation in the nation. The unemployment rate would stay low in this scenario, and it would be simple for people to obtain employment. On the other hand, if there is a labor supply excess over demand, wages would decline, and the nation's inflation rate would decrease. At the same time, workers would find it difficult to find jobs due to the oversupply of labor, and unemployment would be quite high (Furuoka and Munir, 2014). However, Friedman (1977) criticized the theory and claimed that there is no trade-off between unemployment and inflation. In response to Friedman's contention, Greenwood and Huffman (1988) carried out research by building a stochastic general equilibrium model to investigate the covariance characteristics between unemployment and inflation depending on the conditional and unconditional state of exogenous real and monetary factors. The outcome validates the Phillips Curve theory, which holds that there is a negative correlation between unemployment and inflation.

Empirical Review

Unemployment and GDP

Economic theory and empirical study have proven a strong correlation between GDP and unemployment. In general, unemployment falls when GDP rises, and vice versa. Chand (2017) did a study in India to quantify the country's unemployment situation and discovered a strong negative correlation between the jobless rate and economic growth. Using information from secondary sources like the World Bank, researchers have used regression and correlation analysis to look at the kind and degree of effects that economic growth has on the unemployment rate.

Ellen and Abeti's (2019) recent study looked at the relationship between unemployment and economic development in the Chinese economy from 1991 to 2018. After applying the ARDL limits test to cointegration, the empirical results demonstrated that the relationship between unemployment and economic growth was negative in both the short and long terms. The Granger causality data indicated that the two components had no causal relationship. Bal-Domańska (2022) studied the impact of macroeconomics on unemployment on gender and confirmed the inverse relationship between GDP and unemployment in 28 European Union (EU) countries. Kalinová and Kroutlová (2023) provide evidence for this inverse relationship, which verifies the direct correlation between GDP and the overall unemployment rate in the Moravian-Silesian Region of the Czech Republic. Meanwhile, another study by Rhee (2018) and Jo et al. (2023) found that GDP growth has a significant negative effect on unemployment in Korea, confirming Okun's Law.

Some research has been done to test the validity of Okun's Law during Covid-19. An et al. (2022) stated that according to official statistics, Covid-19 caused a break in Okun's law in every region of Spain. With the help of the temporary layoff procedures (ERTE), many employees were able to keep their employment. From a productive perspective, the law persisted in the affected regions, demonstrating a robust correlation between untapped labor resources and economic activity. Al-kasasbeh (2022) demonstrates the presence of Okun's law in the Jordanian economy, showing that a 1% decline in GDP is associated with a 0.276% rise in the unemployment rate. Based on these empirical findings, several policy suggestions are developed to attract more foreign direct investment (FDI), which is necessary to reduce the high unemployment rate in the nation.

In a study in Malaysia Liyana and Masih (2018) confirmed that GDP is comparatively more endogenous or lagging while the unemployment variable is comparatively more exogenous or leading. These findings have obvious policy ramifications in that the Government's proactive policy to lower the jobless rate, at least in Malaysia, can help promote economic growth to achieve a sustained increase in living standards. Numerous studies have been carried out on the relationship between unemployment and economic growth, but their

findings have produced mixed results, leading some experts to attribute their findings to unrelated factors. Thus, to understand the effect that unemployment has on the expansion of the contemporary Malaysian economy and to contribute to the corpus of literature, a study of this nature must be carried out.

Unemployment and inflation

The inflation rate contributes to unemployment through the inverse relationship described by the Phillips Curve, which suggests that a lower unemployment rate can be maintained indefinitely if a higher inflation rate can be tolerated (Freund & Rendahl, 2020). However, the relationship between inflation and unemployment is more complex than it appears at first glance, and it has broken down on several occasions over the past 50 years. Study in the USA, Qin (2020) reported the existence of unidirectional Granger causality from unemployment to inflation, which demonstrates that the regulation of unemployment contributes to the control of inflation. In a study published in the same year, Korkmaz and Abdullazade (2020) examined the correlation between the unemployment rate and the inflation rate in nine G6 nations—Australia, Brazil, Canada, France, Germany, Italy, the Russian Federation, Turkey, and the United Kingdom—and discovered a unidirectional Granger causal relationship between the two variables.

Furuoka and Munir (2014), who carried out a study in Malaysia, verified the relationship. They supported the validity of the Phillips Curve relationship by using the Error Correction Model to find an equilibrium relationship between Malaysia's inflation and unemployment rates. Recently, Naqibullah (2020) found statistics significantly verified the long-term inverse causative association, running from unemployment to inflation. However, the study revealed no association between unemployment and inflation in the short term. The response of fiscal and monetary policy to shocks and imbalances in the economy can also affect the short-term link between inflation and unemployment. In addition, Michael and Geetha (2020) in their recent research show that there is a negative correlation between youth unemployment with GDP and inflation. In the meantime, FDI and youth unemployment have a favorable correlation. A thriving economy may encourage entrepreneurship and creativity by giving young people the chance to launch their own companies or take part in creative endeavors that employ both themselves and others.

Unemployment and population

The population can affect unemployment rates through variations in terms of education and demography. For instance, a European study from Dvouletý et al., (2020) that examined the impacts of demographic and educational changes on unemployment rates discovered that shifts in the population's age distribution and educational attainment have a major influence on unemployment rates. Another study conducted by Doon (2021) found that defining unemployment in developing countries requires a focus on individual labor market behavior and demographic characteristics. Both studies have significance in comprehending the connection between unemployment rates and population.

In a study in Malaysia, Ramli (2018) confirmed that population was a significant factor in unemployment. This finding has been agreed by the study of Pillay and En (2021) who also found a significant relationship between population growth and unemployment in Malaysia. Indeed, Baba and Ali (2021) revealed the presence of short-run and long-run causality among the unemployment and population. Growing populations can put pressure on the labor market because they can't be employed at the rate the economy can produce. Rapid population expansion is also contributing to Malaysia's present mismatch problem.

Unemployment and FDI

Foreign Direct Investment (FDI) can have both positive and negative effects on unemployment rates, depending on the type of investment and the economic conditions of the host country. Alalawneh and Nessa (2020) found that FDI can lead to job creation and lower unemployment rates. This finding is also consistent with Kokotovic & Kurecic (2022) who examined the impact of FDI on foreign capital flows. The impact of FDI on unemployment rates is complex and can be influenced by various factors, including the type of investment, the economic conditions of the host country, and the labor market regulations. Understanding the relationship between FDI and unemployment is crucial for policymakers and businesses to develop effective strategies to address unemployment and promote economic growth. Recently, Ishchenko et al., (2023) conducted a study in Europe and found that only efficiency-oriented FDI of industries and services can result in net unemployment in investing economies.

In the meantime, a 2016 study conducted in Malaysia by Muhd Irpan discovered that foreign direct investment significantly affects the country's unemployment rate. Their research focuses on the impact of FDI on Malaysia's employment rate while controlling for other variables. They employed yearly data spanning from 1980 until 2012. The autoregressive distributed lag (ARDL) model is used to determine the long-term relationship between the variables. It is significant how foreign direct investment (FDI) affects unemployment in Malaysia. This emphasizes how important it is to foster long-term investment inflows, support workforce participation and skill development, and implement inclusive growth strategies to fully realize the potential of FDI to drive economic growth and reduce unemployment rates in the country.

3. Research Methodology

Sources of Data

This study aims to examine the relationship between macroeconomic parameters in Malaysia, including unemployment, GDP, inflation, population, and FDI by employing secondary data from the Department of Statistics Malaysia (DOSM) and the World Bank Data for the long period from 1988 to 2021.

The variables of this study were determined by following the research done by Mohd Azhar (2021) and Chen (2017). The first variable is unemployment (UR), proxy by the total number of people in the labor market who are actively looking for work but are having difficulty finding positions that suit them in Malaysia. The entire labor force is used as the unit of measurement (million). GDP, or gross domestic product, is a proxy by proportion of GDP per capita. It is a monetary representation of the entire amount of goods and services produced inside a nation's boundaries over a given time frame, usually a quarter or a year.

This study has also included the inflation rate (IR) that is proxied by the Consumer Price Index (CPI) which is a measure of the percentage change in the average level of prices for goods and services in an economy over a given time frame. Next is population (POP) which is the total number of people living in a specified geographic area, such as a nation, region, city, or community, either at a given time or over a predetermined period. All people who are counted inside the area's defined limits, regardless of their age, gender, ethnicity, or socioeconomic status, are included. It is expressed in terms of the total number of Malaysian residents (million). Foreign Direct Investment (FDI) is another variable, proxy by percentage of net inflows. It describes the financial commitment that a corporation or individual from one nation makes to support ventures in another.

Model specification

The econometric model is as follows. The ordinary least squares (OLS) were used to regress the model to capture the relationship between the independent variable towards the dependent variables. By employing the OLS, it offers an accurate linearly biased estimator.

$$UMP = \beta_0 + \beta_1 GDP + \beta_2 INF + \beta_3 POP + \beta_4 FDI + \mu$$

Where;

UMP	= Unemployment (million)
GDP	= Gross Domestic Product per capita (%)
INF	= Inflation rate (%)
POP	= Population (million)
FDI	= Foreign Direct Investment (million)
$\beta_0, \beta_1, \beta_2, \beta_3, \beta_4$	= Coefficient
μ	= Error term

Diagnostic test:

Diagnostic tests are techniques used to assess the validity and reliability of a regression model and identify any potential problems or unmet assumptions. These tests help to verify that the regression model is appropriate for the provided data and that the results' interpretation may be relied upon. By performing these diagnostic tests, researchers can assess the robustness of their regression model and identify any potential issues that need to be addressed, such as data translation, changes to the model specification, or the elimination of notable

outliers. This improves the reliability and validity of the results of the regression analysis. Among the tests are normality test, autocorrelation test, serial correlation test, heteroscedasticity test, and multicollinearity test.

4. Results

Based on the results of data regression using the OLS results obtained all the independent variables have a substantial effect on Malaysia's unemployment rate. Referring to the regression result, an R^2 value of 0.962, or 96.2%, indicates that the independent variables in the regression model are significant in explaining the dependent variable. It also reflects a strong relationship between the independent and dependent variables in the regression model.

Dependent Variable: UMP Method: Least Squares Date: 02/17/24 Time: 15:49
Sample: 1988 2021
Included observations: 34

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	30.24399	12.75443	2.371253	0.0246
POP	1.387150	0.558119	2.485399	0.0190
GDP	-0.586382	0.215127	-2.725745	0.0108
INF	-6.830431	2.708168	-2.522159	0.0174
FDI	1.229900	0.050416	24.39498	0.0000

R-squared	0.961739	Mean dependent var	1.381715
Adjusted R-squared	0.956461	S.D. dependent var	0.861343
S.E. of regression	0.179728	Akaike info criterion	-0.459695
Sum squared resid	0.936759	Schwarz criterion	-0.235230
Log-likelihood	12.81481	Hannan-Quinn criteria.	-0.383146
F-statistic	182.2356	Durbin-Watson stat	1.631518
Prob(F-statistic)	0.000000		

The result of regression is as follows:

UMP = 30.24 + – 0.58GDP – 6.83INF + 1.39POP+1.23FDI

All the variables significantly affect unemployment. In terms of GDP, there is an inverse relationship between unemployment and GDP, which is consistent with Okun's Law. As shown by the regression analysis, an increase in GDP per capita of 1% corresponds to a 0.58 million drop in unemployment in Malaysia. This relationship is also consistent with Liyana and Masih (2018) and Baba & Abang Ali (2021). A rising GDP frequently corresponds with higher consumer confidence and expenditure, which stimulate the economy and generate employment chances. Increased consumer expenditure may result in higher output and, therefore, a demand for additional labor. Apart from that, fiscal and monetary policies, as well as other government initiatives that promote economic growth, can have a favorable effect on GDP and help reduce unemployment. Fiscal measures like tax relief or infrastructure spending, for instance, can stimulate the economy and create jobs. The dynamics of the labor market may also be the reason for the inverse association. In times of economic optimism, firms may increase the number of employees to accommodate increased demand for their products and services. Consequently, hiring chances typically increase in sectors of the economy that are growing, which lowers unemployment rates.

The relationship between unemployment and inflation is also consistent with the Philip Curve theory and other studies (Furuoka and Munir, 2014; Daniel et al., 2021). A 1% increase in inflation will result in a 6.83 million reduction in Malaysia's overall unemployment. Cost-push inflation or a spike in production costs resulting from factors such as rising salaries or raw material prices could cause firms to pass those costs on to consumers in the form of higher prices for goods and services. Businesses may reduce employment and production if costs rise, which would raise unemployment. The COVID-19 epidemic also had a significant impact on inflation and unemployment in Malaysia. Since the start of the outbreak, there has been a sharp decline in demand for goods

and services because of widespread lockdowns, transportation limitations, and economic hardships, which have also significantly reduced employment losses in several industries.

In terms of population, regression analysis reveals that population has a major and positive impact on unemployment. An increase of 1 million of population will increase 1.39 million of unemployment in Malaysia. This result is aligned with the previous study done by Ali (2021), Afolabi and Olayinka Bobola (2020), and Ramli et al. (2018). All these academics concurred that rising rates of unemployment follow population increases. Rapid population expansion can outstrip the rate at which jobs are created in developing nations. Higher unemployment rates could be the outcome of the economy's inability to produce enough job opportunities to accommodate the growing number of individuals joining the labor market. Innovations in technology and automation have the potential to create or destroy jobs.

However, the percentage of the population 65 years and older (old age) increased from 7.2% in 2022 to 7.4% in 2023, encompassing 2.5 million individuals, according to the most recent projections from DOSM. This suggests that Malaysia is witnessing a population aging process. The aging population in Malaysia will affect unemployment. For instance, when older people depart from the workforce, an aging population usually results in a fall in the labor force participation rate. It can lead to a declining workforce and possible labor shortages in some industries if the decline in older workers' engagement in the labor force is not compensated by an increase in younger workers' participation. Furthermore, older workers may find it difficult to keep up with technological advancements and acquire the new skills that changing industries require, which could result in structural unemployment in some age groups.

Next, in terms of FDI, the findings showed a positive correlation between FDI and unemployment, with an increase in FDI of 1 million corresponding to a rise in unemployment overall in Malaysia of 1.23 million. This result is consistent with Muhd Irpan et al. (2016), however contradicts Karimov (2020) and Alkofahi (2020). They noted in their study that FDI can lower unemployment. The country's current economic circumstances may be the cause of the discrepancy in the results. In the case of Malaysia, the introduction of automation and cutting-edge technologies by foreign investors may result in the replacement of physical labor. Machines or automated processes may replace jobs that were formerly performed by many workers, which could cause those workers to lose their jobs (Tan, 2022).

Diagnostic test

Below are the diagnostic tests that have been performed which are normality, autocorrelation, serial correlation and heteroscedasticity:

Table 2: Diagnostic test

Test	Result	Remark
Normality	0.3915	P value > 0.05. Passed.
Autocorrelation	1.6315	P value is between 2 to 4 which indicates that this model has negative autocorrelation. Passed.
Serial correlation	0.1964	P value > 0.05. Passed.
Heteroscedasticity	0.1754	P value > 0.05. Passed.

We discovered that the model passed every test once it was put through its paces. This improves the validity of the model and regression coefficients by demonstrating that the residuals are regularly distributed. We also observed that the temporal dependencies in the data were well-represented by the model.

5. Conclusion and Recommendations

To wrap up, this paper examines the intricate nexus between macroeconomic factors including GDP, Inflation, Population, and FDI and how this affects unemployment in Malaysia. The findings indicate that all factors significantly affect unemployment. Both GDP and inflation had a negative correlation with unemployment, which confirms Okun's Law and Philips Curve theory. Population and FDI, on the other hand, both had a positive correlation with unemployment. To create policies that can effectively reduce unemployment and promote

economic resilience, it is essential to recognize the dynamic nature of the relationships between population dynamics, inflation, GDP per capita, FDI, and unemployment.

Governments may focus on infrastructure projects priority to boost both employment and the economy, such as infrastructure investments related to energy, transportation, and technology. They can encourage investments in less developed regions to create jobs and decrease migration to urban centres, as well as balanced regional development to lessen the concentration of economic activity in particular places. For instance, job seekers in the four states of Pahang, Kelantan, Terengganu, and Selangor may find it easier to use the East Coast Rail Project (ECRL). Additionally, this can help the local economy and tourism industry. It will also, inadvertently, create job possibilities for locals. Since there are a large number of East Coasters who move to Kuala Lumpur and Selangor to find employment, thus such investments can lessen the concentration of economic activity in particular regions. Future studies could be improved by incorporating additional control factors, such as technology and R&D, and examining how they affect unemployment through the use of alternative economic methods, like ARDL and others.

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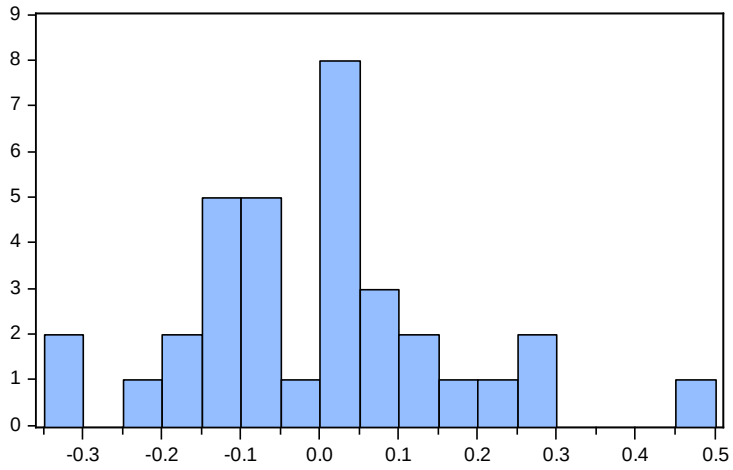
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Appendices

Normality test



Series: Residuals	
Sample 1988 2021	
Observations 34	
Mean	1.01e-14
Median	0.018140
Maximum	0.472778
Minimum	-0.335659
Std. Dev.	0.168483
Skewness	0.486837
Kurtosis	3.613028
Jarque-Bera	1.875446
Probability	0.391518

Autocorrelation test

Dependent Variable: UMP
Method: Least Squares
Date: 12/11/23 Time: 22:24
Sample: 1988 2021
Included observations: 34

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	30.24399	12.75443	2.371253	0.0246
POP	1.387150	0.558119	2.485399	0.0190
GDP	-0.586382	0.215127	-2.725745	0.0108
IR	-6.830431	2.708168	-2.522159	0.0174
FDI	1.229900	0.050416	24.39498	0.0000

R-squared	0.961739	Mean dependent var	1.381715
Adjusted R-squared	0.956461	S.D. dependent var	0.861343
S.E. of regression	0.179728	Akaike info criterion	-0.459695
Sum squared resid	0.936759	Schwarz criterion	-0.235230
Log likelihood	12.81481	Hannan-Quinn criter.	-0.383146
F-statistic	182.2356	Durbin-Watson stat	1.631518
Prob(F-statistic)	0.000000		

Serial Correlation Test

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

F-statistic	1.429194	Prob. F(2,27)	0.2570
Obs*R-squared	3.254871	Prob. Chi-Square(2)	0.1964

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/02/24 Time: 22:17
Sample: 1988 2021
Included observations: 34
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.541371	13.17989	-0.192822	0.8485
POP	-0.157871	0.627565	-0.251562	0.8033
GDP	0.070015	0.242505	0.288715	0.7750
IR	0.525098	2.803295	0.187315	0.8528
FDI	0.003473	0.049731	0.069838	0.9448
RESID(-1)	0.224984	0.195624	1.150081	0.2602
RESID(-2)	-0.280969	0.212330	-1.323263	0.1968

R-squared	0.095732	Mean dependent var	1.01E-14
Adjusted R-squared	-0.105217	S.D. dependent var	0.168483
S.E. of regression	0.177125	Akaike info criterion	-0.442677
Sum squared resid	0.847082	Schwarz criterion	-0.128426
Log likelihood	14.52550	Hannan-Quinn criter.	-0.335508
F-statistic	0.476398	Durbin-Watson stat	1.869645
Prob(F-statistic)	0.819818		

Heteroscedasticity test

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	1.660796	Prob. F(4,29)	0.1860
Obs*R-squared	6.336928	Prob. Chi-Square(4)	0.1754
Scaled explained SS	6.023251	Prob. Chi-Square(4)	0.1974

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/02/24 Time: 22:18
Sample: 1988 2021
Included observations: 34

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.028371	3.086871	1.305001	0.2022
POP	-0.102155	0.135078	-0.756268	0.4556
GDP	-0.001657	0.052066	-0.031820	0.9748
IR	-0.778806	0.655440	-1.188218	0.2444
FDI	-0.019043	0.012202	-1.560644	0.1295

R-squared	0.186380	Mean dependent var	0.027552
Adjusted R-squared	0.074157	S.D. dependent var	0.045207
S.E. of regression	0.043498	Akaike info criterion	-3.297137
Sum squared resid	0.054871	Schwarz criterion	-3.072672
Log likelihood	61.05133	Hannan-Quinn criter.	-3.220588
F-statistic	1.660796	Durbin-Watson stat	1.841578
Prob(F-statistic)	0.186041		

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Food Consumption Preference Among Young Adults Based on Social Media Influence in Malaysia

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Abstract: Food consumption amongst young adults has potentially been influenced by social media. Businesses also utilize social media as a medium of promotion. Thus, cultural food has gone viral on social media, causing the demand for cultural food to rise. Several factors in social media influence could be the reason for young adults discovering international cultural foods. Therefore, the focus of this study is to identify how social media influences young adults' tastes and preferences for international foods. Data was collected from 115 respondents who are young adults. The implications and consequences of the study findings for food consumption are further discussed. Social media influence on cultural food includes audio-visual appearance, information sharing, and delivery, finally, peer pressure on social was investigated in this study.

Keywords: *Food preference, social media, information sharing, peer pressure, audio-visual preference*

1. Introduction

In the food sector, social media impact is critical since it provides customers with knowledge about food. Photos, videos, links, and writings shared on social media may also be classified as natural occurrences that transmit knowledge to other people (Ventola 2014). This is extremely influential in determining the influence of foreign cultural cuisine. According to Fotis (2015), social networking is the reason for individuals to share their thoughts. Consumer reviews of food, services, and decorations can help to increase the impact of worldwide ethnic cuisine (Li et al., 2020). YouTube and Instagram have aided businesses in the construction of their own branded communities by allowing them to create their customized profiles and extend crucial information. As a result, counting the number of likes, comments, shares, and interactions is crucial in determining the impact of worldwide cultural gastronomy (Yu & Sun, 2019). The ratio is used to compute the number of likes, and then the posting likes are calculated as a percentage of the overall reach. Second, the total numberof comments is calculated by looking at the number of comments received by each post.

One of the methods to assess the effect of international cultural food is to look at the number of shares (Dwivedi et al., 2021). Finally, interaction may be used to determine popularity. The term 'Engaged Users' refers to the number of people who have visited thepage and clicked on the shared content. This entails like, commenting on, and sharing the content that has been watched, such as videos, links, and photographs (Edosomwan et al., 2011). On the other hand, the younger generation is more prone to tailor their behavior to their peer group (Rubin et al., 2008).

International cultural food has spread to the community, especially young adults. The "growing adulthood" years are a potentially fragile and pliable transitory stage for youngadults aged 18 to 24 (Barrett & Ii, 2006). During this stage of development, young people go through substantial life changes that consent them to gain responsibility and independence, as well as perhaps acquire long-term health-related attitudes. (Kim et al., 2017). Even though young people are less likely to have serious health concerns than older age groups, they are nonetheless prone to the detrimental effects of poor lifestyle practices that can continue into maturity, possibly leading to significant health consequences later in their lifetime (Salleh et al., 2021). They have money and social media has taken their attention to new things to try (Appel et al., 2020). Young adults are thus a crucial age group to comprehend to adapt to the progress and maintenance of vigorous habits, as well as to safeguard persons from the impacts of food promotion (Bonnie et al., 2015).Television (all forms), radio, print (magazines and newspapers), and billboards are all traditional food advertising channels. Advertising, on the other hand, takes happen on social media platforms like Twitter and Instagram in the digital age (Appel et al., 2020). "The use of social media technology, channels, and programs to produce, communicate, distribute, and trade valuable products" is how social media advertising is described. Social marketing, which tries to use marketing concepts to alter people's behavior for thebetterment of society, also makes a habit of social media. Together the food and health sectors use social media as an advertising instrument to spread brand

information and awareness (Dwivedi et al., 2021). Young adults are among the supreme energetic social media handlers, with Malaysians aged 18 to 29 spending the utmost time on several social media sites on a regular (Ahmad et al. 2015). Because of the widespread use of social media, young individuals are frequently exposed to advertisements for food and beverages (Potvin Kent et al., 2019).

Marketers can link and involve potential clients at any moment they are using social media platforms like YouTube, Instagram, Facebook, Twitter, TikTok and even some of the newest websites such as TikTok are excellent platforms to begin (Folkvord et al.,2020). Marketers who have a great social media strategy and the capacity to provide engaging content can engage their audience (Aydin et al., 2021). By using social media, a brand can build trust with potential clients, communities, and allies (Vance, 2006). This is exclusively correct if other people are spreading positive words regarding your company or services or products (Dwivedi et al., 2021). Friends and family are almost more likely to be trusted with advice or suggestions than authorized brand channels.

In addition, Mukbang (broadcast of eating) is a sort of Korean live web audio-visual broadcast in which a host or creator consumes a significant quantity and variety of dishes (Kang et al., 2020). Viewing mukbang by internet streaming is an alternate option to please the need for social dining in this generation. Individuals watch videos of mukbang while consuming their dishes, rendering YouTube commentaries; in other terms, several young Koreans regard mukbang to be their new consuming mate (Kang et al., 2020). Second, mukbang viewers get vicarious delight, analogous to "food porn" or "eating shows." Mukbang creators tenaciously eat vociferously or assemble the meals near the watching spectators to maximize spectator gratification. Mukbang audiences have confidence in their hunger and are gratified vicariously over this audible and visual stimulus. As mukbang videos become more popular, many young adults are becoming more concerned about the influence of mukbang on their food consumption (Strand et al., 2020).

Food-related programs transmitted through the media have been demonstrated in previous research to inspire and rouse overeating, and youngsters are identified to be predominantly impacted by these food-related broadcasting. Similarly, the meal intake of influencers like mukbang makers is believed to influence the food feasting of viewers. The sorts of meals and consumption habits depicted in these media may have an important part in determining the influence of mukbang (Strandet al., 2020). Despite the logical connection between food consumption and social media influence, only a few studies have examined this connection, especially in the Malaysian context. Hence it is appropriate to investigate this connection and analyze it quantitively.

First, this study might give helpful information about social media content as well as data for forecasting the popularity of cultural food consumption videos. This study evaluates the social media's viewpoint on cultural food consumption by analyzing the reflection of Malaysian young adults' point of view. These findings might aid the development of future research goals and serve as a foundation for decision-making in any organization.

Therefore, this study attempts to determine (i) the association between the audio-visual appearance of food preferences on social media; (ii) the information shared and delivered on social media; and (iii) the peer pressure impact through social media.

2. Literature Review

Cultural food preference

Our biological responses to the food we eat are one of many diverse aspects that influence our eating preferences and decisions. Such responses are connected to the perception of sensory modalities and physiological post-digestive repercussions.According to Costell et al. (2010), consumers' responses to food products are determined by four different components. Consumers initially notice a product's sensory attributes. Second, a product's general reaction from the customer is an important element. The thirdstep involves the consumer using a cognitive component that is based on the knowledge they have about the product as well as their attitudes and opinions. Fourth, the response is affected by a behavioral component that involves the person's intentions or actions for future behavior.

Today, social media is incredibly accessible since it includes a lot of information that people require (Richins,

2015). "Social media serves three purposes: communication tools as a location to exchange information, and a self-tracking system for keeping track of one's data (Chau et al., 2018)". Because the organization will use social media to inform consumers about the items that the organization sells, social media plays an important role in the cuisine's appeal. Food preferences are the choices made by consumers on the type of food that they are compelled to purchase because of a variety of factors. One obvious reason is that biological determinants such as hunger, appetite, and taste are involved.

Culture, family, and peers are all social determinants that can play a role. A person's food choices can be influenced by their social environment, whether they are aware of it or not. Also, attitudes, behavior, and food knowledge are all factors that can influence food choices. Social media can influence and have an impact on people who use it for good or bad. The way people use social media as a platform for information sharing or communication about food determines the relationship between social media and food preferences. Most people all over the world use social media to interact with others about food intake, dietary guidelines, and suggestions - all of which can influence their food choices.

People currently do not place as much faith in advertisements as they do in social postings about food products made by other consumers (Aydin et al., 2021). There is research that looks at the association between peer popularity and university students' eating habits (König et al., 2017). Many others were drawn to eat the cuisine that their famous peers had previously tried because they had posted specific types of food photographs on their social media accounts. "Because of the increased use of social media,migration of people is no longer a concern, as each migration has its eating patterns and dietary habits (Choudhary et al., 2019). As we all know, everyone's eating habits vary, but as more people migrate for media, migration eating habits are no longer a concern. This is because people learn about a person's eating habits. Thus, via the use of social media, their culture's food will become more acceptable to a wider audience (Di Renzo et al., 2020).

Audio-visual appearance of social media

Users of social media are exposed to stimuli, particularly for their hearing and visual senses. "Audio" and "visual" refer to what may be heard and seen respectively in their literal senses (Yu et al. 2019). Audio-visual media (or simply audio-visual media) are mass communication mechanisms that transmit your messages not merely through the sense of sight as in traditional print media, but also through the sense of hearing (Uda, 2014).

Media use multimedia technology to combine the visual benefits of the printed model with the immediacy of spoken radio, creating a more complicated format that resembles real presence in the order of the transmitted events. Food preferences are a multifaceted construct that is not solely influenced by our internal incentives. Indeed, sensory scientists, consumer psychologists, and marketers have demonstrated that externalambient cues, such as background music, can influence a wide range of subconscious consumer behaviors, resulting in increased sales of food and beverages. This is true of television, movies, and, more recently, the Internet. Thus, "Audio Visual Aids" or "Instructional Material" refers to all such tools that try to educate us by appealing to our senses. As hearing and sight influence a person's decision-making, audiovisual content is extremely important (Fotis, 2015).

The ability to share photographs and videos on social networking sites such as Instagram makes photo editing more appealing. This allows people to improve the appearance of their food images on Instagram, which may lead other users to believe the meal is tasty. Koniq et. al (2017) discovered that social roles or images are one of the crucial factors to be taken into account when university students are targeted by food advertisements on social media, and consumers value neither the good nutrition nor the cozy sentiment." Instead, they like eating quickmeals, frozen foods, and unhealthy snacks easily available at convenience stores.

Information sharing and delivery of social media

People can only learn about something if it is successfully conveyed to and received by them, hence information transmission and sharing are crucial. Social media isundeniably at its peak right now in terms of content delivery and sharing. Nowadays, sharing anything throughout the world only takes a single click. Socialmedia has gained popularity as a tool for communication and could significantly influence social norms through its effectiveness in information exchange. On a related note, social media has developed over the past ten years

into a vital tool for disseminating and obtaining information in a variety of spheres of life (Chau et. al 2018). The growing popularity of social media raises a few concerns about the extent to which it is used, and the types of information shared. As a result, one possible solution to persuade consumers tomake healthier food choices is to provide new varieties of healthier foods, as well as appropriate food information.

Grafstrom (2018) argued that viewers of unhealthy food-related television commercials can expect to eat more food overall, both healthy and unhealthy, than viewers of healthy advertisements. According to Rutsaert et al. (2014), the online information environment has changed from Web 1.0, in which users could only use the internet to look for and seek out information, to Web 2.0, a setting in which they could independently develop and share information. In the meantime, Sogari et al. (2018) discovered that it is evident that social media has, to a certain extent, succeeded in penetrating organizations' long-established question and complaint services.

Cultural food has gone viral on social media, causing the demand for cultural food to rise (Dewbre et al., 2014). While social media has become a key source of product information for many of its users, particularly young adults, they are outside of the traditional advertising realm hence, their behavior is out of marketers' control (Dwivedi et al., 2021).As a result, there is evidence that consumer content is becoming more significant in the decision-making process of consumers (Oke et al., 2016). Similarly, other recent studies have investigated how social media technology is helping to enhance customer-relationship management and organizational performance (Rodriguez et al., 2015). As aresult, internet marketing management is consuming an increasing amount of marketers' time and money (Nezamabad, 2011). These interests ranged from networking to entertainment, and from professional assignments to academic material. The information-sharing behavior via social media varies from culture to culture, people to people and society to society. The literature on monocultural individuals' information-sharing behavior is extensive; however, the literature on multicultural individuals' information-sharing behavior via social media platforms is still limited.

Peer pressure through social media

In a society, peer pressure is inevitable. Whether or not they are aware of it, it has the power to affect someone. The key platform of peer pressure received from engagement in social media. The influence of social media can be a major source of impact to peer pressure for young adults. No one wants to feel left out, so when coworkers or acquaintances post about their lifestyle on social media, it encourages others to follow suit. According to Rubin et al. (2008), social media posts on food can affect young adults' appetites and dietary preferences. Their decisions aboutwhat food to eat are influenced by this. Social media seems to play a significant role in our lives today. According to Rubin et al. (2008), there is some evidence that social media helps many young people feel more self-assured and extroverted and enhances their social connections. The younger generations typically do not use Instagram to express their daily experiences, but rather for aesthetic reasons. Beautiful breakfasts, get-togethers, birthday tributes, and other events are shown inInstagram stories. Additionally, users of social media could manage how theyshow themselves to their social network and how others perceive them Rubin et al. (2008).

Peer pressure can have a positive impact on one's sense of self, sense of support and belonging, confidence, exposure to healthy hobbies and interests, and sense of self. According to Byrne et. al (2017) strategic network-driven initiatives should be taken into consideration for engaging teenagers in the promotion of beneficial dietary behaviors. With social media platforms increasingly acting as the main setting for peer encounters, social media has significantly changed the worlds of teenagers.

The transformation framework identifies various ways in which social media can change adolescents' perceptions of peer influence (Nezamabad, 2011). Social media, for instance, allows teenagers to be exposed to their friends' actions in an unprecedented volume and frequency, at all hours of the day and night, via images, videos,and text due to its openness, permanence, and accessibility (Nezamabad, 2011).

Impact of social media on food preferences

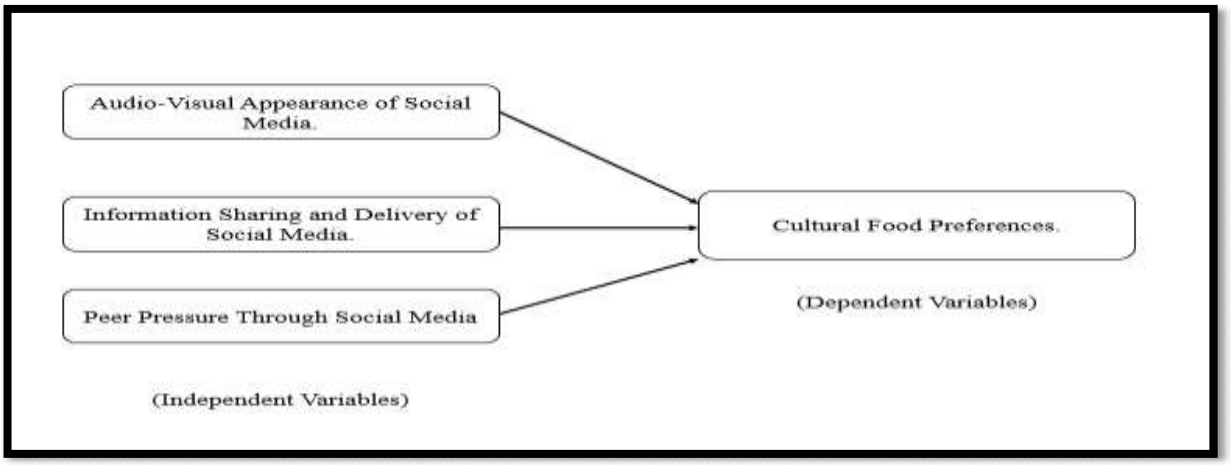
Nowadays, most people utilize social media to find information on their interests. Finding someone who has never used social media would be ludicrous and out of date. The word "social media" became popular in the last years to describe the various World Wide Web(WWW) apps such as Twitter, video-/image-/file-sharing, or other sorts of applications that may be shared with others. According to Folkvord (2020), disparaging

remarks about certain companies can spread through hundreds or even millions of people in a matter of hours. Online word-of-mouth and complaint behavior directed towards a specific individual, company, or organization can occur during an online firestorm, which is characterized by a sudden influx of numerous messages. These comments frequently show ferocious fury without citing any specific complaint. The younger generation has different food choices and portions are known to be influenced by social engagement. Even though social media greatly affects consumer behavior, some of the top food and beverage companies in the world employ it in creativeways.

Being continuously responsive and aggressively creative is necessary to maximize social media's influence. Simply keeping an eye on and replying to tweets and hashtags related to your company can improve your social media presence and the experience for your present or potential clients. People are being exposedto cuisines they may have never seen before thanks to social media platforms. It can also introduce people to new foods and cultures. Better cultural understanding and communication may result from this exposure. According to certain studies,how much customers trust the information on food blogs can affect how they choose to eat. As a result, businesses use the Internet to market their goods and interact with consumers through online brand communities, social media, forums, websites, blogs, andonline gaming platforms.

Thus, the framework of this study is as below, this research is progressed by the independent variables comprised of three main foundations which are the audio-visual appearance of social media, information sharing and delivery of social media and peer pressure through social media. Meanwhile, the dependent variable is food consumption preferences. The framework of social media is one of the focal elements influencing cultural food (Uda, 2014). Hence, this study's framework is shown in Figure 1.

Figure 1: Proposed Theoretical Framework.



3. Methodology

This study utilized a correlational study research design. A self-administered survey questionnaire was distributed to all respondents online. Quantitative research method to describe the association between food consumption preference and social media influence. According to Ahmad et. al (2015), young adults are most of the food bloggers and social media influencers who have followers in this age gap. In addition, according to the statistics, the majority of social media users in Malaysia are youth aged 13-34. Data was collected from young adults as respondents aged between 16 to 30 years old because this age group shows a higher level of competencies in using social media. Hence, this age group is very trendy with the current situation in social media.

Quantitative research is described as the numerical illustration and management of data to define and interpret thephenomena reflected in those observations (Salkind, 2013). This research technique is expressed and altered in numeric data of observation to define and further understand the processes that those observations reflect (Salkind, 2013). This research explores the link between social media and food preferences among

young adults in Malaysia. Other aspects and factors are used from earlier studies as referrals and comprehension in this research. This study describes the factors regarding cultural food preference that are audio-visual, the appearance of social media, information sharing and delivery of social media and peer pressure through social media seeking among Malaysian young adults. This objective is to investigate any relationship between the influence of social media and cultural food preferences targeted to young respondents.

The total group of individuals that the researcher wants to study is referred to as the target population. The respondents in this study were concerned citizens who were frequent users of social media across all platforms. These people were chosen since they use social media to publicize their daily activities and get access to food-related information. The target range of the target population is people between the ages of 16 – 30. The researcher has distributed the questionnaires to 115 respondents who actively using social media platforms among Malaysia young adults.

The population's size determines the size of the sample. The sample size for this study should be representative or generalizable. According to Taherdoost (2018). Developed a formula for calculating sample size, the number of independent variables thatare used is n>50+8(m) where n for thesample and m is the number of independent variables. Since the independent variable in this study is four, therefore the number of sample sizes is n>50+8(3) = 74 and the total of sample size that predictor variable is 74. As the result of the questionnaires were spread in the form of Google Form links is 115 respondents.

Since the target respondents' personal information is unavailable, a non-probability convenience sampling method is used in this study to select the sample. Respondents are selected via convenience sampling because they are frequently readily and easily accessible.

Next, for data analysis, SPSS was used to determine the frequency statistics, which gave information on the frequencies, means,and standards. The relationship between independent factors anddependent variables is established using deviation, central tendency (mean, median, and mode), and range. Pearson Correlation was applied to determine how the variables related to one another. In addition, regression analysis was utilized to estimate the values for the independent and dependent variables as well as to calculate their combined effects.

4. Findings

The reliability conducted involved both independent variables and dependent variables. In this study, independent variables consist of appearance, information, peer, and preference. Based on Table 1, it is shown that Cronbach's Alpha for appearance is 0.896, information is 0.850, pear is 0.948 and for preference is 0.849. From the results, it is shown that the reliability for both independent variables is good and excellent. According to Hair et al. (2010), values above 0.7 were considered as reliable. The Cronbach's alpha for 15 items was found to be 0.948, indicating that there was good internal consistency among the items.

Table 1: Reliability Analysis

	Cronbach's Alpha	No of Items
Audio Visual Appearances	.896	8
Information Sharing and Delivery	.850	8
Peer Pressure	.948	15
Food Preference	.849	6

Based on the results, it was found that all variables have mean values ranging from 4.34 to 5.13; with audio-visual appearance having the highest mean value of 5.13. The total score is the highest for the mean (m = 5.13, sd = 7.56) for audio-visual appearance. Next for the second higher (m = 4.93,sd = 7.22) is Information sharing and delivery. Last is the lowest (m = 4.78, sd = 9.18) is peer pressure. Table 2 indicates the inter-correlation values among variables. It was found that all independent and dependent variables used in the study were significantly inter-correlated.

Table 2: Descriptive Statistics

	Mean (m)	Std. Deviation (sd)
Audio Visual Appearances	5.13	.756
Information Sharing and Delivery	4.93	.722
Peer Pressure	4.78	.918
Food Preference	4.34	1.068

Data was collected from 115 young adults aged between 16 to 30 years old. Based on the findings, most of the respondents were female (65.2%) and male (34.8%) young adults spend more than three hours a day on social media. 94.8% of young adults preferred TikTok and Instagram as their first choice for social media preference. The two main reasons to use social media are shopping and socializing. In addition, the findings show about duration spent per day by respondents where the majority 53.9% (n=62)of respondents spend time more than 3 hours per day, followed by 26.1% (n=30) of respondents spend time between 30 minutes to 1 hour per day, followed by 16.5% (n=19) of respondent spend time between 15 to30 minutes per day and last but not least is 3.5% (n=4) of respondent none spend time per day.

Table 3: Respondents background

Gender	Frequency	Percent
Female	75	65.2
Male	40	34.8
Age	***Frequency***	***Percent***
16 - 21 years old	3	2.6
22 - 25 years old	23	20.0
26 - 29 years old	89	77.4

From the correlation analysis in Table 4, there is a relationship between audio-visual appearance and food preference among Malaysian young adults (r= .281**, p=<0.01) the finding showed that there is an association between these two variables based on the Pearson Correlation Coefficient Index (Salkind, 2003). Next, there is a relationship between information sharing and delivery and food preference among Malaysian young adults (r= .574**, p=<0.01) which has a higher score than audio-visual appearance. Finally, peer pressure and food preference indicated the most association with food preference among Malaysian young adults (r= .585, p=>0.01).

Table 4: Correlation Analysis

	Audio Visual Appearances	Information Sharing and Delivery	Peer Pressure	Food Preference
Audio Visual Appearances	1			
Information Sharing andDelivery	570**	1		
Peer Pressure	.425**	.643**	1	
Food Preference	.281**	.547**	.585**	1

One obvious reason is that biological determinants such as hunger, appetite, and taste are involved. “People currently do not place as much faith in advertisements as they do in social postings about food products made by other consumers (Aydin et al., 2021)”. There is research that looks at the association between peer popularity and university students’ eating habits (König et al., 2017). Many others were drawn to eat the cuisine that their famous peers had previously tried because they had posted specific types of food photographs on their social media accounts. “Because of the increased use of social media, migration of people is no longer a concern, as each migration has its eating patterns and dietary habits (Choudhary et al., 2019)”. Customers can provide comments on the food product on social media, which can improve the relationship between the company and its customers (Lee et al., 2017).

There is an association between information sharing and delivery and food preference. Table 4.4 indicated that information sharing and delivery had a relationship with the statistics among Malaysian young adults (r= .574**, p=<0.01) the finding showed that there is a moderate relationship between these two variables based on the Pearson Correlation Coefficient Index (Salkind, 2003). The growing popularity of social media raises a few questions about the extent to which it is used, and the types of information shared. As a result, one possible solution to persuade consumers to make healthier food choices is to provide new varieties of healthier foods, as well as appropriate food information. The information-sharing behavior via social media varies from culture to culture, people to people and society to society. One of the methods to assess the effect of international cultural food is to look at the number of shares (Dwivedi et al., 2021). The term 'Engaged Users' refers to the amount of people who have visited the page and clicked on the shared content. This entails like, commenting on, and sharing the content that has been watched, such as videos, links, and photographs (Edosomwan et al., 2011). Young adults are among the supreme energetic social media handlers, with Malaysians aged 18 to 29 spending the utmost time on several social media sites on a regular (Ahmad et al. 2015). Because of the widespread use of social media, young individuals are frequently exposed to advertisements for foods and beverages (Potvin Kent et al., 2019). Young individuals often use social media to discuss, gather, and exchange food and health-related information. People will simply locate what they are searching for and need thanks to the numerous social updates that are provided and have been uploaded by users (Boyd & Ellison, 2007). Auditory and visual senses are two fundamental senses employed in social media.

5. Conclusion

According to the analytical outcomes of this study, the independent variables of the type of social media, the role of influence and food globalization were examined, thus, the findings demonstrate that in the social media influence, cultural food has a strong variance on the connection between them.

This study helped us to gain a better grasp of the social media influence on food consumption based on characteristics and behavior. The study's findings show that exposure to healthy food photographs on social media, particularly those that are widely endorsed with 'likes,' may encourage consumers to pick healthier meals over less nutritious items (Sogari et al., 2018). One reason for this might be that participants are compelled to change their behavior to fit in with what they consider tobe the norm when they believe that others 'enjoy' and consume fruits and vegetables (Pem & Jeewon, 2015).

Another finding of this research is that type of social media influences cultural food consumption. The food industry can promote its food review on social media becausethe influence of food consumption through social media is high (Folkvord et al., 2020). Type of social media is used to spread the food culture and affect the person's food consumption. The results will help Malaysia's food culture spread globally (Karim & Krauss, 2018).

Additionally, research findings recommend that firms, communications, and dealers must hold insights into the impacts and effects of influencers on the buying decision of clients to launch marketing tactics that fit consuming inclination as well as exploit successful influencer marketing (Petit et al., 2019). Moreover, developing influencer marketing will help save more advertising and promotion expenses than old-style promotion events, so, maximize the firm's income (Dwivedi et al., 2021).

Furthermore, social media posting can be a model to spread the cultural food of some countries that never usuallyheard of. For example, Malaysia country is not as popular as other country around them like Thailand and Indonesia, because it is a lot less mainstream through social media than a lot of other countries (Hampton and Hampton, 2008). Further research is required to discover whether and how these findings can be rendered into digital interferences to support persons who want to make healthier beverage selections and to comprehend how social media podiums can be applied as an instrument to back vigorous eating attitudes. To determine the effect of these communications on nutrition selections, consumption, and eating attitudes, more research is needed. Furthermore, this research should be expanded to include a wider range of samples in the future. Other than that, other influence factors might be added to make the proof that socialmedia influences cultural food consumption. Finally, this study should be conducted with more respondents in different regions to explain more generality.

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Non-Shariah Compliance Risks (NCR) and the Danger of Potential Fraud in the Islamic Financial Institutions: A Conceptual Framework

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Abstract: This research paper is a conceptual study that aims to examine financial fraud and its relation to non-compliance to Shariah for the Islamic financial institution in Malaysia. The study is unique because it seeks to understand how deviations from Shariah guidelines could contribute to financial misconduct, examining the specific non-Shariah compliance risks that arise when the deviation of internal control fails to align with Islamic law. Utilizing quantitative methodology, this study adopts and adapts from an existing structured questionnaire survey to collect data. This study also employs Structural Equation Modelling (SEM) in its analysis of the data. The implication of this study for policymakers includes the development of an effective strategy for mitigating financial fraud and ensuring Shariah compliance, thus ensuring the integrity and reputation of the Islamic financial sectors. This will undoubtedly contribute to the stability of the economy.

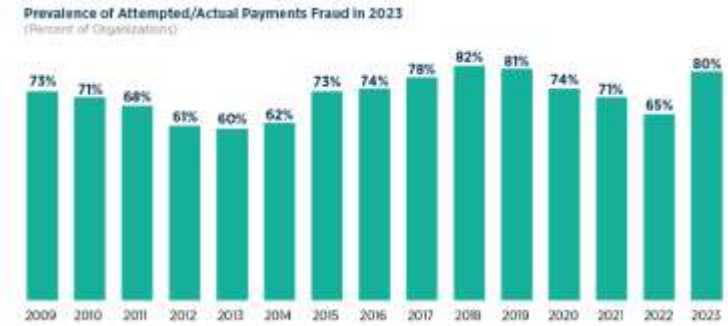
Keywords: *Non-Shariah compliance risk, financial fraud*

1. Introduction and Background of Study

As an ethical and Shariah-compliant alternative to traditional banking, the Islamic banking sector has grown into an essential part of the international monetary system. Financial institutions in Islamic finance are defined and validated by their adherence to Shariah principles, which is more than simply a legislative requirement. Non-compliance with Shariah principles in financial products, services, or activities is categorized as a Non-Shariah Compliance Risk (NCR). Shariah Non-Compliance Risk (SNCR) refers to the potential danger that arises from failing to adhere to the Shariah rules and principles set by the Shariah board of an Islamic Financial Institution (IFI) or the relevant authority in the IFI's operating jurisdiction, according to Islamic Financial Services Board (IFSB) (Ali & Hassan, 2019). This risk is significant due to the potential for monetary losses, damage to reputation, legal ramifications, and operational interruptions resulting from the deviation from Shariah. Since adhering to Shariah law is essential in Islamic finance, this risk is specific to that sector. Since Islamic money differs from mainstream finance in that it demands adherence to Islamic law in all dealings, this is crucial to Islamic finance. Financial products that are discovered to contain riba (interest), gharar (extreme uncertainty), or maysir (gambling) are deemed non-compliant and could result in financial losses and a betrayal of stakeholders' confidence. Therefore, Islamic financial organizations must remain true to themselves and their validity by following Shariah principles. Apart from that, keeping the confidence and integrity among stakeholders is crucial.

Despite the ethical guidelines and strict adherence to Shariah, Islamic financial institutions are not immune to financial fraud. This financial crime has been claimed to result in significant annual revenue losses for the organization. According to the 2024 ACFE Report on Occupational Fraud, organizations experience a loss of around 5% of their yearly income as a result of fraudulent activities. This translates to an average financial loss of $1.7 million per individual fraud case. The 2024 Association for Financial Professionals (AFP) Report on Payment Fraud and Control Survey reported that 80% of organizations payments fraud in 2023, as shown in Figure 1. Figure 1 also illustrates a sharp rise in the occurrence of attempted or actual payment fraud in the year 2023. The rapid evolution of fraud techniques has far exceeded some organizations' ability to adequately defend themselves against this fraud threat, resulting in a higher incidence of attempted fraud. The complexities of some transactions could also exacerbate these cases of attempted fraud.

Figure 1: Prevalence of Attempted/Actual Payment Fraud in 2023



Source: Association for Financial Professionals (AFP) Payment Fraud and Control Survey (2024)

The 2024 ACFE Report on Occupational Fraud revealed that 50% of fraud cases in 2023 were caused by a deficiency in internal controls, as illustrated in Figure 2, below. Internal control encompasses the systematic protocols and regulations established by an organization to guarantee the precision and dependability of financial and accounting data, foster responsibility, and deter fraudulent behavior. The purpose of these controls is to protect assets, guarantee the accuracy of financial reporting, and adhere to laws and regulations. Internal control systems typically consist of various essential components, such as the control environment, risk assessment, control activities, information and communication, and monitoring activities.

Figure 2: Sources of 50% of Occupational Fraud



Source: Association of Certified Fraud Examiners (ACFE) Report on Occupational Fraud (2024)

Previous studies on Shariah non-compliance risk mostly focused on its relation to governance (see: Basiruddin & Ahmed, 2020; Hassan, Othman, Omar, Napiah, Abdullah Arifin, Karim, 2017), documentation (Mohd Noor, 2024; Ali & Hassan, 2019; Rosly, Naim, & Lahsasna, 2017), audit or accounting (see: Shafii, Salleh, & Shahwan, 2010; Ahmad, Razali, & Said. n.d; Hanefah, Kamaruddin, Salleh, Shafii, & Zakaria, 2020) and sources of non-shariah compliance (Ilias, Nasrun and Muhamed, 2024; Hassan,2016). Despite the extensive research on Shariah non-compliance risk, there is a dearth of studies that examine the impact of non-Shariah compliance on the incidence of financial fraud in Islamic financial institutions. Consequently, this study aims to address the disparity by examining the risks associated with non-compliance with Shariah principles in the context of financial fraud. It aims to explore how deviations from Shariah guidelines contribute to financial fraud, examining the broader implications and specific risks that arise when financial activities fail to align with Islamic law. The deviations from Shariah guidelines include any failure to adhere to Shariah regarding products, services, operations and other aspects. Through this analysis, the study intends to offer a thorough understanding of the potential risks associated with non-compliance to Shariah principles which can exacerbate or contribute to fraudulent practices in the financial sector.

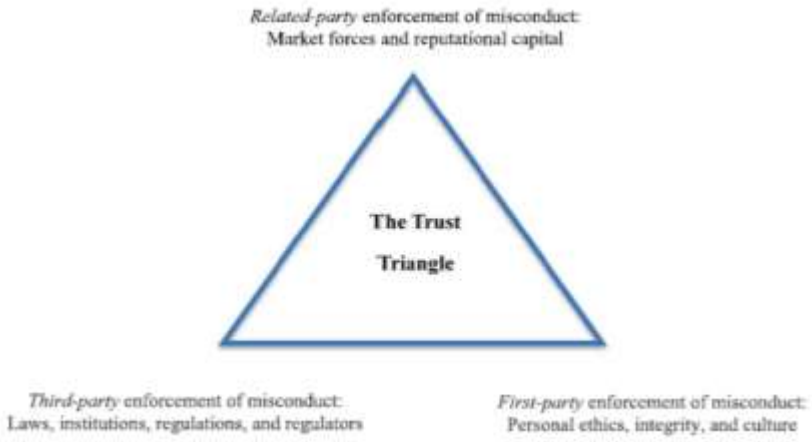
2. Literature Review

Financial fraud: Financial fraud can manifest in many different forms, including embezzlement, fraudulent documentation and cybercrime (Othman, Aris, Mardziyah, Zainan and Amin, 2015). The intricate operational framework of the Islamic financial institution, mudharabah, tawarruq and others, can unintentionally give rise to the chances for fraudulent activities, particularly when certain Shariah requirements are disregarded.

According to Othman et. al. (2015), staff fraud in the form of theft of funds, theft of resources, cybercrime and manipulation of documents as the leading forms of fraud in the Islamic Financial institution. The complexity of the Islamic bank products coupled with departure from the prescribed procedure and the need to comply with both Shariah and conventional financial rules may create a loophole in supervision, exacerbated by inept personnel which can be exploited by fraudulent individuals.

The Trust Triangle, as depicted in Figure 3, was developed by Dupont and Karpoff (2020). This framework identifies three pertinent components that are meant to explain the deterrent mechanism of opportunistic or fraudulent behavior, thereby fostering trust and facilitating economic transactions. The deterrent will only be implemented if these three "legs" of the triangle are present and functioning. The potential for financial fraud will arise in the event of its absence or dysfunction.

Figure 3: The Trust Triangle



Source: Dupont and Karpoff (2020)

Sources of Non-Shariah Compliance Risks: Non-Shariah Compliance Risk (NCR) emerges when Islamic financial institutions (IFIs) do not fully conform to Shariah principles in their operations, products, or services. This risk can manifest in various forms, each carrying distinct implications and challenges. These types of NCR include operational failures where processes do not align with Shariah guidelines, product non-compliance where financial products or services violate Islamic laws, and service-related issues where customer interactions or service delivery are inconsistent with Shariah requirements (Shah, Sukmana, and Fianto, 2020). Understanding and addressing these different types of NCR is crucial for ensuring that IFIs operate within the bounds of Islamic law and maintain their integrity and credibility. The discussions of these sources of non-Shariah compliance risks are as follows:

Operational Non-Compliance: Non-compliance with Shariah principles can arise from operational failures within Islamic financial institutions (IFIs). Operational non-compliance refers to risks stemming from deficiencies or breakdown in the organization's internal processes, systems, or personnel, which lead to deviations from Shariah guidelines. Research by Shah, Sukmana, and Fianto (2020) highlights that Shariah risk materializes when IFIs do not adhere to Shariah principles and guidelines in their daily operations and transactions. This risk can manifest through system inefficiencies, such as outdated or inadequate technology that fails to support Sharia-compliant activities, leading to potential non-compliance issues. Additionally, insufficient staff competency—resulting from inadequate training or a poor understanding of Shariah

principles—can further exacerbate operational non-compliance, as discussed by Basiruddin and Ahmed (2019). For instance, an Islamic bank might inadvertently incorporate riba (interest) into a financing transaction due to a clerical error or a misunderstanding of the product's structure. According to Ali and Hassan (2019), such operational discrepancies can have severe implications, including significant financial losses and reputational damage.

Financial Non-Compliance: Participating in speculative transactions (may), earning or paying interest (riba), or investing in businesses that are involved in activities that are prohibited (haram) are all examples of behaviors that fall under the category of financial non-compliance for Muslims. According to Ali and Hassan (2019), this danger is most pronounced when revenue is obtained from sources that do not comply with Shariah requirements. For example, interest or investments in enterprises that do not adhere to Shariah guidelines also fall under this category. In addition, infractions of investment limitations can also potentially result in financial non-compliance. According to Basiruddin and Ahmed (2019), Islamic financial institutions (IFIs) are obligated to steer clear of investments that constitute immoral acts or involve an excessive amount of uncertainty (gharar). SNCR may be triggered by investments of this nature because they are in direct opposition to the precepts of Shariah. As an illustration, a Shariah-compliant Islamic bank would violate the law if it were to invest in conventional bonds. This is because the Shariah prohibits them from earning interest on these bonds.

Reputational Non-Compliance: Reputational non-compliance refers to situations where incidents of Shariah non-compliance become known to the public, resulting in a substantial loss of trust and confidence among important stakeholders, including consumers, investors, and regulatory agencies. Violations of Shariah principles can result in significant and enduring consequences for the institution's reputation and market position. Basiruddin and Ahmed (2019) argue that upholding Shariah compliance is crucial for preserving stakeholder trust, as stakeholders naturally anticipate Islamic financial institutions to strictly abide by Islamic principles. Publicized incidents of non-compliance might generate unfavorable perceptions, which may lead to a decline in business. For instance, if it is discovered that an Islamic bank is involved in non-compliant operations, such as speculative trading (gharar), the bank's reputation could be permanently damaged. Such public exposure has the potential to cause consumers to withdraw their deposits to distance themselves from unethical financial activities. This not only weakens the financial health of the institution but also does substantial harm to its reputation (Basiruddin & Ahmed, 2019). As a result, the institution may encounter both immediate and long-term difficulties in rebuilding the confidence of its stakeholders and reclaiming its place in the market.

Legal Non-Compliance: Legal non-compliance occurs when an institution fails to comply with the legal and regulatory frameworks that govern Shariah-compliant financial activity. This type of non-compliance can occur for several reasons, such as inadequacies within the legal system, disputes between conventional legal frameworks and Shariah law, or insufficient regulatory supervision. According to Mustapha, Kunhibava, and Muneeza (2020), in some places, the lack of a thorough legal system that properly includes Shariah principles leads to uncertainty in the law and increases the chances of not following the rules. Furthermore, the implementation of contracts that adhere to Shariah principles is frequently hindered by the judiciary's limited knowledge of Shariah affairs and the absence of dedicated legislation designed for Islamic finance. These legal problems provide substantial barriers to ensuring that Islamic financial transactions are carried out by Shariah law. In Nigeria, the absence of Shariah-based laws has created challenges in enforcing contracts for Islamic financial institutions. This has resulted in a higher risk of legal non-compliance and worsened Shariah Non-Compliance Risk (SNCR) (Mustapha, Kunhibava, & Muneeza, 2020).

3. Methodology

This study performs a comprehensive examination of pertinent literature, encompassing scholarly journal articles, with a specific focus on the ideas of financial fraud and the hazards linked to non-compliance with Shariah principles in Islamic Financial institutions. The study utilizes a quantitative research technique, collecting data through a questionnaire survey. The questionnaire has been derived from a prior investigation that examined the origins of non-Shariah compliance concerns and financial fraud inside the Islamic banking framework. This study specifically utilizes and adapts the questionnaires initially created by Kadoya, Khan, and

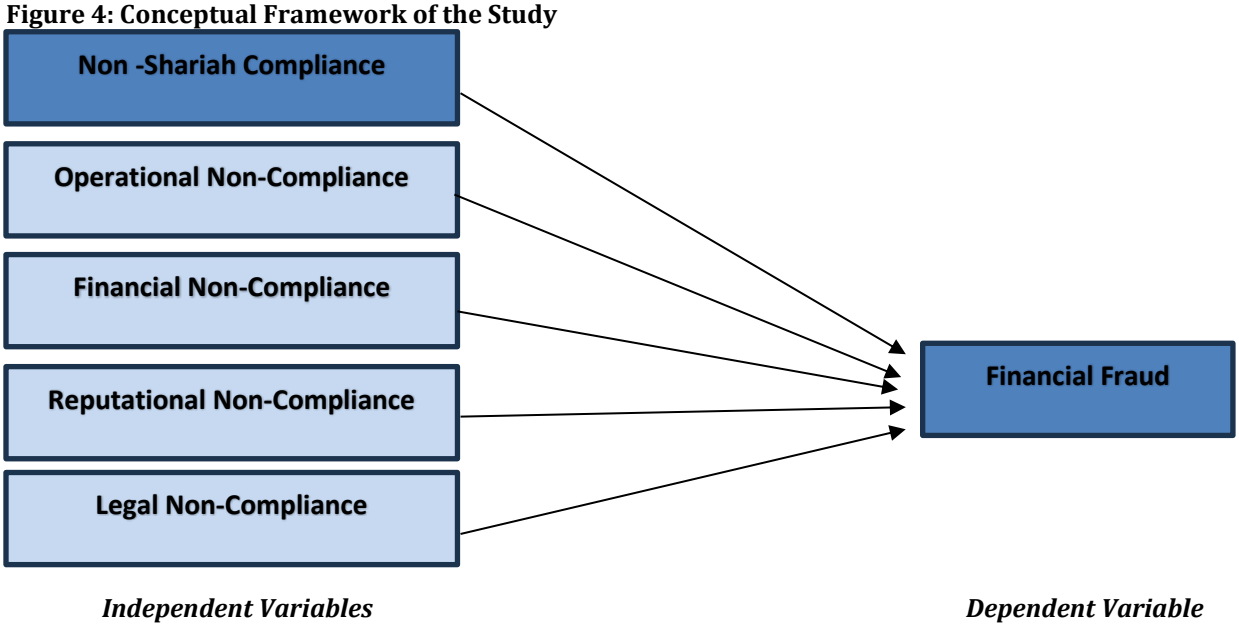
Yamane (2020), which focused on financial fraud as the variable being influenced. In addition, the study introduces a novel set of questions to evaluate the risk of non-Shariah compliance as an independent variable, along with certain demographic characteristics that are also treated as independent factors. This holistic approach seeks to offer a more profound understanding of the interaction between financial fraud and non-Shariah compliance concerns in Islamic Financial institutions.

This study intends to collect data from both prospective and current customers of Islamic financial institutions situated in the Klang Valley, an urban area in Malaysia that includes Kuala Lumpur, Putrajaya, and Selangor. The Malaysia Department of Statistics (DOS) reported that the population of the Klang Valley reached 9.21 million in 2023. Based on Krejcie and Morgan's (1970) sampling table, it is advised to have a sample size of 384 when dealing with a population of 1 million. Therefore, this study will utilize a sample size of 384 participants to accurately represent the entire population of Islamic bank clients in the Klang Valley. For this study, with a confidence level of 95% and a margin of error of 5%, a sample size of 384 is considered suitable, even when dealing with a bigger population, such as the 9.21 million individuals residing in the Klang Valley. This approach is by the widely recognized sample principles set forth by Krejcie and Morgan (1970).

To guarantee the sample's representativeness, respondents will be chosen using random sampling techniques. The survey will utilize a 5-point Likert scale, which spans from Strongly Agree to Strongly Disagree, to capture the views and impressions of the participants. The surveys will be sent to the chosen participants using diverse digital platforms, such as WhatsApp, Telegram, and other social media channels. The survey will be distributed over three months, ensuring ample time to reach a wide and varied range of respondents. This approach is specifically developed to guarantee that the data obtained is thorough and accurately represents the perspectives of the intended demographic.

The survey data analysis included confirmatory factor analysis, which consists of a measurement model and structural modeling. This study will employ Structural Equation Modeling (SEM), an influential statistical methodology that provides numerous benefits in analyzing the connections between independent and dependent variables. Zainuddin (2012) highlights that SEM is highly successful in evaluating the dependability and validity of variables, as well as managing the complexities associated with complicated models. Structural Equation Modeling (SEM) is particularly well-suited for assessing complicated models due to its ability to test the correlations among various variables. After conducting a comprehensive analysis of the existing literature, the pertinent factors have been chosen to establish the theoretical framework for this research, which is outlined as follows:

Figure 4: Conceptual Framework of the Study



4. Conclusion

In summary, financial fraud poses substantial hazards to the financial health of institutions and the overall integrity of financial systems. The necessity of rigorous legal framework enforcement and robust preventive measures is emphasized by the escalating number of financial fraud cases, as evidenced by a variety of studies. The Quran and Hadith explicitly condemn fraud in the Islamic context, emphasizing the importance of transparency, fairness, and justice in financial transactions. Fraudulent activities are subject to severe penalties under the Islamic legal system, which underscores the significance of upholding ethical standards and trust in financial transactions. Islamic financial institutions (IFIs) are acutely aware of non-Shariah compliance risks (NCR). These risks can result from operational, financial, reputational, and legal noncompliance, each of which presents obstacles that can undermine an institution's credibility and market position. These risks are further exacerbated by the absence of judicial expertise, regulatory supervision, and adequate legal frameworks in Shariah matters. The results will be instrumental in the development of more effective strategies to mitigate these risks, understanding the financial fraud and thus, guarantee the stability and integrity of Islamic financial institutions.

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From Click to Cuisine: Navigating the Landscape of Customer Satisfaction in Online Food Delivery Apps

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Abstract: Technological advancements have revolutionized the food industry, enabling restaurant food delivery to homes. In Malaysia, families with children prefer online food delivery apps (OFDA) over singles, citing crowd avoidance, time-saving, and craving satisfaction. This research analyzes sociodemographic factors (age, income, gender, occupation, marital status, education, order frequency) influencing OFDA satisfaction. Through convenience sampling with 447 responses obtained via Google Forms, results indicate no significant differences in satisfaction based on age, income, gender, occupation, or education. However, marital status and order frequency show distinctions. The research concludes with limitations, recommendations, and implications for practitioners.

Keywords: *Food delivery applications, human-computer interaction, Malaysia, food ordering*

1. Introduction and Background

Technological advancements have altered the landscape of the food and beverage industry. In addition to dining in restaurants, restaurant-quality food can now be consumed from the comfort of one's home. For example, customers can taste sumptuous restaurant-quality food while watching television at home. This food delivery culture became prevalent during the COVID-19 pandemic when people were confined to their homes and restricted from buying food or groceries. On a global scale, the food delivery business gained prominence in developed markets, such as Australia, Canada, the United Kingdom, and the United States, following the lockdown imposed in 2020 to curb COVID-19. Most consumers were millennials and Generation Z'ers (Ahuja, Chandra, Lord, and Peens, 2021). In Malaysia, young families with children are more inclined to order via online food delivery apps (OFDA) than single people to avoid crowds, save cooking time, and satisfy cravings (Grab, 2022).

Despite the emergence of OFDA, the satisfaction in utilizing the apps relies on customers' demographic profiles. The ensuing variances lead to inconsistent and questionable outcomes. Youngsters and women are more satisfied with using OFDA than older adults (Dela Rosa and Separa, 2022) and men (Hwang, Lee, and Kim, 2019; Techarattanased, 2019).

As such, this study aims to analyze the key differences between sociodemographic profiles (age, monthly income, gender, occupation level, marital status, education level, and order frequency) and the satisfaction of using OFDA within Malaysia.

2. Literature Review

Customer satisfaction in using online food delivery applications (OFDA)

The intention to use OFDA was first examined to assess consumers' satisfaction with using the apps (Rita, Eiriz, and Conde, 2023). Only counterparts who intend to use OFDA would do so in reality and evaluate the OFDA quality (dissatisfied, satisfied, or delighted). This scenario denotes the effects of the OFDA quality spillover on satisfaction (Lin, Au and Baum, 2023). Hence, the current work analyzed the notable variances between sociodemographic profiles and satisfaction in using OFDA within Malaysia.

Age and satisfaction in using OFDA

The age-consumer satisfaction link in food delivery applications is intricate and multidimensional. In line with current studies, young adults in their 20s demonstrate specific preferences and attributes that significantly influence their satisfaction level in using these apps. Lee (2022) highlighted the significance of lifestyle factors,

such as dietary preferences, in influencing young individuals' happiness levels. As age is crucial in mediating the relationship between happiness and other factors, the apps' influence varies among age cohorts (Verhoef et al., 2002). Dela Rosa and Separa (2022) claimed that age determines consumers' satisfaction with online meal delivery services.

In particular, most individuals between 29 and 40 years old demonstrate significant preferences and opinions. Muninggar et al. (2022) revealed a positive and statistically significant relationship between age, customer satisfaction, and loyalty in the OFDA context. This finding underscores the need to internalize the requirements and inclinations of different age groups. From a scholarly perspective, young individuals between 16 and 30 years old reflect the highest level of engagement with OFDA. This strong inclination denotes that younger customers prefer convenience and prompt services (Borgohain, 2019). Students under 30 are more inclined to use OFDA (Pal et al., 2021; Anbumathi, Dorai, and Palaniappan, 2023). Regardless, contradictory findings were found regarding the variances between age and satisfaction in using the apps. Allah Pitchay et al. (2021), Belanche, Flavian, and Perez-Rueda (2020), and Hong et al. (2023) found no key differences between attitude, age, and intention to use OFDA.

Other factors involving sensorial experience (Molinillo-Jimenez et al., 2022) and intrinsic (perceived enjoyment and involvement) and extrinsic (perceived ease of use, convenience, and perceived usefulness) motivators (Meena and Sarabhai, 2023) provided significant differences concerning age group and satisfaction in using OFDA. These inconsistencies led to the development of the first hypothesis:
H1: A significant difference exists between age and satisfaction with using food delivery apps.

Monthly income and satisfaction in using OFDA
Current studies denote a nuanced relationship between sociodemographic variables of age and income and consumer satisfaction in OFDA. The impact of monthly income on customer satisfaction regarding OFDA is intriguing. Essentially, youngsters' choices and actions significantly affect their satisfaction levels, with income also playing a pivotal role in developing users' perceptions and expectations of these apps.

Shafiee and Abdul Wahab (2021) underscored a significant relationship between individuals' income levels and purchase intentions. Based on this outcome, affluence notably impacts users' interactions with and perceptions of the value associated with OFDA. Prasetyo et al. (2021) identified several aspects of price, promotions, and overall service quality, which are vital in influencing customer satisfaction and loyalty towards OFDA. Although Senthil, Gayathri, and Chandrasekar (2020) did not emphasize monthly income, significant correlations were identified between discounts and satisfaction in using the apps. Consumers' economic levels potentially impact their responsiveness to these attributes, subsequently influencing their overall happiness with OFDA. Based on the critical role of monthly income in affecting satisfaction in using the apps, the second hypothesis was developed:
H2: A significant difference exists between monthly income and satisfaction in using food delivery apps.

Gender and satisfaction in using OFDA
Gender could affect consumers' satisfaction with using OFDA (Muhammad et al., 2023). For example, Kanwal et al. (2022) highlighted more differences than similarities regarding the impact of gender on online purchases. Hwang, Lee, and Kim (2019) and Techarattanased (2019) also identified key differences between gender and satisfaction in using OFDA, specifically among women, when the purchases involve routine items (Francioni et al., 2022). Nevertheless, the findings derived by Hussien and Mansour (2020) proved contradictory. The third hypothesis was developed based on these inconsistencies:
H3: A significant difference exists between gender and satisfaction in using food delivery apps.

Occupation level and satisfaction in using OFDA
Asgari et al. (2023) disclosed that unemployed individuals or part-timers seldom use online delivery apps. Meanwhile, other researchers revealed no significant variances between occupation level, online grocery shopping (Eriksson and Stenius, 2022), and satisfaction with using online shopping (Balderaz and Campos, 2020). Balderaz and Campos (2020) indicated the high frequency of online purchases among permanent teachers compared to their part-time counterparts. Similarly, Shafiee and Abdul Wahab (2021) found no significant link between occupation level and the intention to purchase food using apps in Malaysia. Given the

lack of in-depth examination and conclusive outcomes, the fourth hypothesis was developed:
H4: A significant difference exists between occupation level and satisfaction in using food delivery apps.

Marital status and satisfaction in using OFDA
In Malaysia, single and married individuals revealed notable differences in their intention to order food via delivery apps (Shafiee and Wahab, 2021). Likewise, a key difference was identified between married and single Taiwanese respondents' satisfaction in using food delivery apps (Foodpanda). In Taiwan, single respondents were more satisfied using OFDA than their married counterparts (Liu, Chen, and Zhang, 2021). No significant differences were identified between marital status and the willingness to order online food in India (Laddha, 2019). Following these contradictory outcomes, the fifth hypothesis was developed:
H5: A significant difference exists between marital status and satisfaction in using food delivery apps.

Education level and satisfaction in using OFDA
Highly educated people are more price-sensitive to the additional fees charged when making online purchases. As such, these individuals spend more time seeking suitable products pre-purchase (Asgari et al., 2023). Shafiee and Abdul Wahab (2021) noted a lack of substantial connections between education level and the propensity to purchase food via apps. Nguyen (2014) identified significant differences between education level and online vendor satisfaction. Regardless, Richa (2012) revealed contradictory findings. These inconclusive results led to the development of the sixth hypothesis:
H6: A significant difference exists between education level and satisfaction in using food delivery apps.

Order frequency and satisfaction in using OFDA
The frequency of food ordering from OFDA may or may not affect customer satisfaction with the apps. Compared to novice customers, customers who utilize the same OFDA may find the delivery apps convenient to use and place frequent orders (Sobika and Raj, 2021). As revealed by Martha et al. (2021), online customers who are satisfied with OFDA tend to order 3.8 times more than dine-in customers. Chotigo and Kadono (2021) also disclosed the exact connection between order frequency and satisfaction in using OFDA among the Thai and Chinese populations (Wang et al., 2022). In this vein, the seventh hypothesis was developed:
H7: A significant difference exists between order frequency and satisfaction in using food delivery apps.

3. Research Methodology

This section presents the research samples and instruments, respondent selection, and questionnaire distribution. Essentially, the current work chose OFDA users as respondents. Empirical data were gathered via purposive sampling. Only individuals who fulfilled the researchers' criteria were selected. Hence, the study recruited consumers who live in Malaysia and have used OFDA in the past month.

The criteria above were set in the screening questions, which are used to choose respondents that complement the study aim. Counterparts who did not meet the criteria were excluded from answering the remaining questionnaire. Alalwan (2020) and Cyr et al. (2008) adopted the instruments to measure satisfaction. With purposive sampling, questionnaires were distributed online via Google Forms and analyzed with IBM SPSS 28.

4. Results

447 respondents were recruited based on gender, age, marital status, occupation level, monthly income, and education level. Regarding gender distribution, 325 (72.7%) of the respondents were women, while the remaining 122 (27.3%) were men. Based on the demographics of occupation level, 322 (72%) of the individuals were self-employed, while 322 (72.0%) were between 21 – 30 years old. In terms of marital status, 411 (91.9%) respondents were single, 35 (7.8%) of them were married, and 1 (0.2%) was divorced. The diversity of occupation levels is evident, with 382 (85.5%) respondents encompassing students, followed by 33 (7.4%) civil servants. Based on monthly income patterns, 308 (68.9%) respondents earned under RM2,500, 38 (8.5%) of them earned from RM 2,501 to RM 5,000, 28 (6.3%) earned between RM 5,001 and RM 10,000, 7 (1.6%) earned RM 10,001 and above, and 65 (14.5%) were categorized under 'others.' With regards to education level, 366 (81.9%) respondents were categorized as 'others,' 2 (0.4%) of them attended high school, 10 (2.2%) attended matriculation, 38 (8.5%) graduated with a diploma, 22 (4.9%) held a Master's degree, and 9 (2.0%) held a

Doctoral degree.

Profile of Respondents: Table 1 summarizes the characteristics of the total sample of customers or subscribers who participated in the study.

Table 1: Demographic Information

Demographic Profile	Frequency	Percentage (%)
Gender		
Male	122	27.3
Female	325	72.7
Total	447	100
Age		
Below 20 years old	90	20.1
21 – 30 years	322	72.0
31 – 40 years	21	4.7
41 – 50 years	10	2.2
51 – 60 years	4	0.9
Total	447	100
Occupation level		
Self-employed	322	72
Students	21	4.7
Unemployed	10	2.2
Others	4	0.9
Total	447	100
Marital Status		
Single	411	91.9
Married	35	7.8
Divorce	1	0.2
Total	447	100
Occupation level		
Civil servants	33	7.4
Self-employed	7	1.6
Students	382	85.5
Unemployed	4	0.9
Others	21	4.7
Total	447	100
Monthly Income		
No income	1	0.2
Below RM2,500	308	68.9
RM 2,501 – RM 5,000	28	8.5
RM 5,001-RM 10,000	28	6.3
RM 10,001 and above	7	1.6
Others	65	14.5
Total	447	100

Education Level		
High School	2	0.4
Matriculation	10	2.2
Diploma	38	8.5
Masters	22	4.9
Doctorate	9	2.0
Others	366	81.9
Total	447	100

Hypothesis testing

This study performed hypothesis testing via ANOVA and t-test analyses. Table 2 below summarizes the research results.

Table 2: Summary of Findings

Hypotheses	Findings	Hypotheses (Supported/Not Supported)	Test
H1: A significant difference exists between age and satisfaction in using food delivery apps.	No significant difference (p = 0.534)	Not supported	One-way ANOVA
H2: A significant difference exists between monthly income and satisfaction in using food delivery apps.	No significant difference (p = 0.505)	Not supported	One-way ANOVA
H3: A significant difference exists between gender and satisfaction in using food delivery apps.	No significant difference (p = 0.816)	Not supported	Independent Sample T-test
H4: A significant difference exists between occupation level and satisfaction in using food delivery apps.	No significant difference (p = 0.691)	Not supported	One-way ANOVA
H5: A significant difference exists between marital status and satisfaction in using food delivery apps.	Significant difference (p < 0.001)	Supported	One-way ANOVA
H6: A significant difference exists between education level and satisfaction in using food delivery apps.	No significant difference (p = 0.451)	Not supported	One-way ANOVA
H7: A significant difference exists between order frequency and satisfaction in using food delivery apps.	Significant difference (p < 0.001)	Supported	One-way ANOVA

H1: A significant difference exists between age and satisfaction in using food delivery apps.

A one-way between-groups analysis of variance served to explore the impact of age on satisfaction in using OFDA. Respondents were divided into five groups by age (Group 1: below 20 years old; Group 2: 21-30 years old; Group 3: 31-40 years old; Group 4: 41-50 years old; and Group 5: 51-60 years old). No statistically significant difference was determined at the $p < .05$ level in satisfaction scores for the five age groups: $F(4,442) = 0.787$, $p > .05$. Overall, H1 was not supported.

H2: A significant difference exists between monthly income and satisfaction in using food delivery apps.
A one-way between-groups analysis of variance served to explore the impact of monthly income on satisfaction in using OFDA. Respondents were divided into six groups by monthly income (Group 1: no income; Group 2: under RM2,500; Group 3: RM 2501-RM 5000; Group 4: RM 5,001-RM 10,000; Group 5: RM 10,001 and above; and Group 6: others). No statistically significant difference was identified at the $p < .05$ level in satisfaction scores for the six groups of monthly income: $F (5, 441) = 0.864$, $p > .05$. Summarily, H2 was not supported.

H3: A significant difference exists between gender and satisfaction in using food delivery apps.
An independent-sample t-test was conducted to compare the satisfaction scores of men and women using OFDA. No significant difference existed in scores for men (M= 5.0020, SD = 0.87266) and women (M = 5.0226, SD = 0.8145; $t (445) = -0.233$, $p = .816$, two-tailed). The magnitude of the differences in means (mean difference = .85, 95% CI: −1.80 to 1.87) proved to be very small (eta squared = .0001). As such, H2 was not supported.

H4: A significant difference exists between occupation level and satisfaction in using food delivery apps.
A one-way between-groups analysis of variance explored the impact of occupation level on satisfaction in using OFDA. Respondents were divided into five groups by occupation level (Group 1: civil servants; Group 2: self-employed; Group 3: students; Group 4: unemployed; and Group 5: others). No statistically significant difference was evident at the $p < .05$ level in satisfaction scores for the five occupation level groups: $F (4, 442) = 0.560$, $p > .05$. Hence, H4 was not supported.

H5: A significant difference exists between marital status and satisfaction in using food delivery apps.
A one-way between-groups analysis of variance served to explore the impact of marital status on satisfaction in using OFDA. Respondents were divided into three groups by marital status (Group 1: single; Group 2: married; and Group 3: divorced). A statistically significant difference was identified at the $p < .001$ level in satisfaction scores for the three groups of order frequency: $F (4, 444) = 12.343$, $p < .001$. Despite this statistical significance, the actual difference in mean scores between the groups proved to be relatively small. Computed with eta squared, the effect size reflected .05. As such, H5 was supported.

H6: A significant difference exists between education level and satisfaction in using food delivery apps.
A one-way between-groups analysis of variance explored the impact of education level on satisfaction in using OFDA. Respondents were divided into six groups by occupation level (Group 1: high school; Group 2: matriculation; Group 3: diploma; Group 4: masters; Group 5: doctorate; and Group 6: others). No statistically significant difference was identified at the $p < .05$ level in satisfaction scores for the six education level groups: $F (5, 441) = 0.945$, $p > .05$. As such, H6 was not supported.

H7: A significant difference exists between order frequency and satisfaction in using food delivery apps.
A one-way between-groups analysis of variance served to explore the impact of order frequency on satisfaction in using OFDA. Respondents were divided into five groups by order frequency (Group 1: 1 to 3 times a month; Group 2: once a week; Group 3: 2-3 times a week; Group 4: 4-5 times a week; and Group 5: every day of the week). A statistically significant difference existed at the $p < .001$ level in satisfaction scores for the five groups of order frequency: $F (4, 442) = 6.126$, $p < .001$. Despite reaching statistical significance, the actual difference in mean scores between the groups was relatively small. Calculated via eta squared, the effect size denoted .05. Post-hoc comparisons with the Tukey HSD test revealed the mean score for Group 5 (M = 3.3125, SD = 1.72) to significantly vary from Group 2 (M = 4.95, SD = 0.89), Group 3 (M = 5.07, SD = 0.955), Group 4 (M = 5.407, SD = 1.72), and Group 1 (M = 5.0031, SD = 0.73). In this regard, H7 was supported.

Discussion
The OFDA gained much prominence during the Covid-19 outbreak. Following the movement control order (MCO) enforcement, customers were forced to remain at home and either consume home-cooked meals or buy them from OFDA. Other factors involving a hectic work life also increased OFDA usage. Hence, the current work aimed to analyze the significant differences between (i) sociodemographic profiles of age, monthly income, gender, occupation level, marital status, education level, and order frequency and (ii) satisfaction in using OFDA within Malaysia. Online survey forms were distributed to 447 respondents and gathered with an almost equal spread of the demographic distribution. Notably, SPSS 10.0 was used for data analysis. Two statistical tools, an independent sample t-test, and one-way ANOVA, evaluated the elicited responses. Resultantly, H5 and H7 were

supported while H1, H2, H3, H4, and H6 were not.

The empirical outcomes revealed no significant difference between age and OFDA satisfaction. Thus, H1 was not supported. Past works revealed young users' tendency to be more tech-savvy (Fikry et al., 2023 and Muhammad et al., 2023), which reflects a higher satisfaction level in using OFDA compared to older users (Eriksson and Stenius, 2022; Liu, Chen, and Zhang, 2021). Mobility issues among older adults may increase online purchasing frequency (Asgari, Azimi, Titiloye, and Jin, 2023) via OFDA, subsequently improving their satisfaction when using online apps. In other words, contentment leads to satisfaction (Gupta and Chandan, 2020). Notwithstanding, this study revealed no significant difference between age and satisfaction (Balderaz and Campos, 2020; Gupta and Chandan, 2020) when using OFDA.

In line with Shafiee and Abdul Wahab (2021), no significant differences were evident between monthly income and educational level satisfaction in using OFDA. As such, both H2 and H6 were not supported. Past scholars associated a high education level with a high income bracket. Highly educated users spend more time searching for products online and consider additional online fees inconsequential (Asgari, Azimi, Titiloye, and Jin, 2023). In this vein, these users became more satisfied with OFDA than their counterparts with a low education level and income bracket. Laddha (2019) explained that most dual earners in the family possess surplus income, which leads them to use OFDA frequently. This scenario indirectly reflects dual-income earners' satisfaction in using OFDA. Individuals with little satisfaction using OFDA would not increase their order frequency using these apps.

Although past works reflected women's strong inclination to purchase online compared to their male counterparts (Balderaz and Campos, 2020), the current study generated contradictory outcomes. No significant difference existed between gender and satisfaction in using OFDA. Thus, H3 was not supported. This finding corroborated Shafiee and Wahab's (2021) study, which was also performed in Malaysia. Similar satisfaction levels across genders were discovered in India (Gupta and Chandan, 2020).

This study coincided with past empirical works (Nguyen, Nguyen, and Tan, 2021), which revealed significant differences between marital status and satisfaction in using OFDA. In this vein, H5 was supported. Specific factors potentially affect satisfaction in using online OFDA based on marital status. For example, single customers were more satisfied using these apps than their married counterparts and evaluated their contentment based on price affordability. Contrarily, married customers were more concerned about the convenience of using these apps and less price-sensitive (Liu, Chen, and Zhang, 2021). Single customers demonstrated insufficient knowledge of meal planning and home meal preparation. Hence, simple (Algheshairy et al., 2022) and user-friendly OFDAs address their need for quick meals.

The current research results revealed an increased frequency of ordering food with online apps, reflecting high satisfaction with using OFDA. As such, H7 was supported (Pal et al., 2022). Several factors may influence the significant difference between order frequency and satisfaction in using OFDA. For example, married customers with children frequently use OFDA, which may increase their satisfaction in using the apps. They try to avoid eating out with family and the stress resulting from the need to fulfill small children's demands while eating (Laddha, 2019). Furthermore, the ease of using OFDA may increase the order frequency via such apps. Customers who experience convenience in using OFDA would repeat their order with the same app, thus reflecting their satisfaction in using OFDA (Prasetyo et al., 2021).

This study also revealed no significant difference between occupation level and satisfaction in using OFDA. As such, H4 was not supported. The finding aligned with Gupta and Chandan (2020) and Eriksson and Stenius (2022) but contradicted Laddha (2019). Working individuals experienced higher satisfaction when using OFDA, which is evident from their frequent purchases via similar OFDA owing to fatigue after long hours (Laddha, 2019).

5. Limitations and Recommendations for Future Research

This research encountered several limitations. The current work only included Malaysia, so the empirical outcomes could not be generalized to other countries. Customers' online behavior, such as satisfaction with

OFDA, may differ across countries. As such, future works could use the same sociodemographic variable and satisfaction level in different nations when using OFDA. The research results may vary based on culture and country setting.

Variables of trust, perceived usefulness, and perceived ease of use may be used to test the effects on Malaysians' OFDA usage. Furthermore, this study assessed the impact of sociodemographic factors on customer satisfaction when using OFDA. Further research could emphasize the effect of sociodemographic elements on customer loyalty or retention to assist practitioners and researchers in segmenting these lucrative online markets.

Implication for Practitioners

The diverse demographics of OFDA users regarding gender, age, education level, marital status, and order frequency potentially affect their satisfaction level in using the apps. Such diversity is vital in strategizing market segmentation for online retailer products. In this vein, several implications for practitioners were highlighted based on the study findings.

The current work revealed significant differences between marital status, order frequency, and customer satisfaction when using OFDA. Hence, industry stakeholders may segment their market based on marital status and order frequency by providing promotional monthly packages of OFDA for households with children. Relevant companies may offer attractive promotions for returning customers to increase their food purchases from the OFDAs.

Based on the empirical outcomes, significant differences existed between married people and satisfaction in using OFDA. Online food delivery service providers and restaurant owners should understand that the specific segmentation of marital status and order frequency determines the success of online food delivery services and applications. The stakeholders can focus on both market segmentations to increase the target population's acceptance and usage (Allah Pitchay et al., 2022). For example, restaurant owners can provide package menus for adults and children or married couples via OFDA.

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Customers on the Move: Predicting Customer Satisfaction among Mobile Banking Users in Malaysia

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Abstract: In recent decades, the financial industry has seen rapid modernization of information technology and increased competition. Nevertheless, numerous past studies have shown that technological adoption in mobile banking is relatively low in certain Southeast Asian countries. Customers' opposition to mobile banking services is mostly attributed to a lack of knowledge, security worries, and technological difficulties. Therefore, financial service providers need to comprehend and meet customer expectations to enhance the mobile banking experience. In relation to this, the present research seeks to examine the determinants of customer satisfaction with mobile banking among Malaysian consumers. The findings demonstrate that perceived ease of use, efficiency, and responsiveness were significant in influencing customer satisfaction. However, interoperability, privacy and security, and reliability were not significant in affecting mobile banking satisfaction. The findings have implications for both theoretical and practical perspectives, highlighting the need for efficient mobile banking services, enhancing financial inclusion, and empowering individuals.

Keywords: *Customer Satisfaction, Ease of Use, Efficiency, Interoperability, Privacy and Security, Responsiveness, Reliability*

1. Introduction

Mobile banking is a platform that allows consumers to interact with banks via mobile devices and access financial services (Alrizq & Alghamdi, 2024). It is distinct from conventional banking, which refers to the use of a mobile device as a form of payment to complete the purchasing process. Mobile banking provides a real advantage to users because it allows them to use the services at any time and in any location (Beanning, 2024). Mobile banking services often include popular banking functions such as mobile cheque deposits, mobile money transfers, and mobile bill payments. These services are designed for those who are always on the move and often include practical elements such as peer-to-peer payments via various platforms. The conduct of financial transactions is an integral aspect of everyday life, whether they are carried out in a bank branch or via other online channels (Shankar & Jebarajakirthy, 2019).

According to Alalwan et al. (2016), mobile banking services acceptance is still at an early stage in certain Southeast Asian countries. Factors determining mobile banking adoption include infrastructural facility, self-control, social influence, and perceived risk. The lack of infrastructure and facilities are the primary factors contributing to the present low adoption rate (Ahmad, 2018). The acceptance level of mobile banking is substantially influenced by both the perceived dangers and advantages of using mobile banking.

Due to this notion, this study aims to investigate the antecedents of customer satisfaction with mobile banking services and the respondents were selected among Malaysian consumers. By understanding the factors that influence customer satisfaction, banks can work towards providing excellent financial services by reducing the amount of service failures.

2. Literature Review

This section will review the literature related to the variables used in this study which includes customer satisfaction, efficiency, interoperability, privacy, security, ease of use, responsiveness, and reliability.

Customer Satisfaction: Customer satisfaction can be regarded as an emotional state that surfaces from the relationship developed over time between a customer and an online service provider via their interactions

(Pazarbasioglu et al., 2020). The level of customer satisfaction can be demonstrated by how effectively its products or services connect with consumers which will lead to long-term relationships. In today's digital age, customer satisfaction should not be neglected as customers are becoming more sophisticated and everything can be performed with a few mouse clicks. This is especially true in banking, where people can conduct transactions, make payments, pay bills, check account balances, and create account statements in a few seconds using their cell phones.

Customer satisfaction is typically attained by comparing the customer's perceived performance of the product or service with their initial expectations (Sampaio et al., 2017). When the performance of the product or service surpasses the customer's expectation, it leads to an increase in customer satisfaction (Sucandra & Rinnova, 2024). Conversely, customers will experience feelings of discontent if the perceived performance does not fulfill their expectations.

Customer satisfaction is one of the critical aspects of a company's long-term success and competitiveness. It involves the assessment of the difference between a customer's expectations and the actual performance of a product or service (Chungu & Phiri, 2024). A service provider's ability to generate high levels of satisfaction is vital for distinguishing their offerings and cultivating robust client relationships (Deng et al., 2010).

Maintaining a high level of customer satisfaction is essential for a company's earnings and reputation. Satisfaction is a person's sentiments, and it can lead to either good or negative feelings regarding a product or service if it lives up to the individual's expectations. Online firms, in particular, face increased customer satisfaction as it is easier for dissatisfied consumers to move to other online companies if they are unhappy with the items or services they are currently receiving from the first online company (Mamakou, Zaharias & Milesi, 2024)

Mobile banking service failure is a significant factor determining whether or not mobile banking is successful. Studies have shown that faulty internet banking, such as browsing and selecting services to squander their time, may cause customers to feel a sense of loss in their minds. Service failure in mobile banking can result in a major change in users' use patterns as a direct result of the disaster.

In conclusion, customer satisfaction is a critical aspect of a company's success, especially in this digital era. It requires continuously assessing the surprise element of a product purchase or consumption experience, which is crucial for businesses to address to ensure customer satisfaction and achieve overall success.

Efficiency: Efficiency is crucial in both online and offline service settings. In an online setting, the speed at which a bank’s digital transactions are processed is essential to achieve efficiency (Raza et al., 2019). The Technology Acceptance Model (TAM) found that perceived simplicity of use and perceived utility of new technologies are essential components in determining the adoption of mobile banking. A friendly user interface and design make it easier for users to navigate the app and complete transactions, which subsequently will lead to increased satisfaction. Responsive customer assistance is also another essential component of efficiency.

Efficiency in mobile banking can positively affect customer satisfaction, trust, and retention. It involves the swiftness and dependability of transactions, user-friendliness of the interface, proactive customer assistance, and smooth integration of financial services (Sharma & Malviya, 2011). An efficient digital service platform aligns with customers' needs and minimizes information requirements, providing a variety of financial aid and answering customer service demands quickly. Enhancing operational efficiency in the banking industry can provide strategic advantages, such as improved customer retention. Efficiency significantly influences customer satisfaction and retention intentions in mobile banking services.

The E-SERVQUAL model highlights the importance of timely and effective responses to customer questions and concerns (Ahmed et. al., 2020). The idea consists of four essential dimensions: efficiency, fulfilment, system availability, and privacy. Each of these characteristics has a significant impact on customer satisfaction, especially among users of mobile banking. The many components of E-SERVQUAL have a major impact on customer satisfaction by effectively addressing the primary concerns and expectations of users of mobile banking (Campbell et al., 2020). Gaining knowledge and using these aspects may assist banks in improving

their service quality, resulting in increased customer satisfaction and loyalty (Mujinga, 2020). In particular, efficiency guarantees that consumers may expeditiously and effortlessly carry out their financial operations while on the go (Campbell et al., 2020). Therefore, this leads to the development of the first hypothesis of this study that is:
H1: Efficiency can positively influence customer satisfaction among mobile banking users.

Interoperability: Interoperability is essential as it enhances user comfort, promotes financial inclusion, and fosters a competitive financial environment. It encompasses technological, regulatory, and operational aspects. Interoperability enables efficient communication and data exchange across different financial systems. Regulatory elements include the implementation of rules and procedures to guarantee the protection of security, privacy, and adherence to financial legislation in various countries (Brunnermeier et al., 2023).

In Malaysia, the use of interoperable mobile banking services has been significant in promoting financial inclusion. Bank Negara Malaysia, the nation's primary financial institution, has spearheaded endeavors such as the Real-time Retail Payments Platform (RPP), which encompasses the DuitNow service. DuitNow enables consumers to promptly transfer cash across several banks by only utilizing a cell number or ID, showcasing the tangible advantages of interoperability. This technology not only simplifies the payment process but also enables a larger segment of people to engage in the digital economy, hence promoting national financial inclusion objectives and economic expansion. Currently, banks are integrating their digital services into several platforms so that users can easily transact business with many service providers.

Interoperability refers to the ability of a technology to exchange information, communicate, and cooperate with other systems without the need for substantial adjustments to its underlying structure (Shirowzhan et al., 2020). Therefore, comprehending this environment might provide valuable perspectives for e-wallet administrators and the government. For example, banks in Ghana have included their digital platforms in the nation's mobile money interoperability infrastructure, enabling customers to transfer funds between two distinct cellular or bank accounts (GSMA, 2020). In the absence of interoperability, the exchange of financial information will persist inside closed and exclusive systems. Therefore, the following hypothesis is proposed based on the above discussion:
H2: Interoperability can positively influence customer satisfaction among mobile banking users.

Privacy and Security: The rise of mobile banking has made financial services more accessible but concerns over privacy and security have become critical in influencing customer satisfaction. Privacy concerns, particularly regarding how personal data is handled, can significantly affect trust and satisfaction. Recent studies highlight that customers who feel their privacy is at risk are less likely to be satisfied with mobile banking services (Bansal & Gefen, 2020). Ensuring transparency in data practices and implementing strong privacy measures are essential for maintaining customer trust.

Security concerns, such as fears of unauthorized access and fraud, are also pivotal in shaping customer satisfaction. Research shows that perceived security directly impacts customer satisfaction, with secure systems fostering higher levels of trust and satisfaction (Cheng et al., 2020). Financial institutions are increasingly adopting advanced security technologies like multifactor authentication and biometric verification to address these concerns and enhance customer experience.

The interplay between privacy, security, and customer satisfaction is complex, with trust acting as a crucial mediator. When customers trust that their privacy and security are well-protected, their satisfaction with mobile banking services increases (Zhang et al., 2022). Balancing robust security measures with user convenience and clear privacy policies is key to sustaining customer loyalty and satisfaction in the competitive mobile banking landscape. Therefore, the following hypothesis is proposed based on the above discussion:
H3: Privacy and security can positively influence customer satisfaction among mobile banking users.

Ease of Use: Ease of use is a crucial factor influencing customer satisfaction in mobile banking, as it affects how easily customers can navigate and utilize banking services. Recent studies emphasize that a user-friendly interface and seamless navigation directly contribute to positive user experiences, which are key to customer satisfaction (Alalwan et al., 2020). When mobile banking applications are easy to use, they reduce the cognitive

load on users, making the experience more enjoyable and leading to higher levels of satisfaction (Yoon & Occeña, 2019).

Moreover, ease of use significantly impacts customer trust and perceived security in mobile banking. Customers who find an application easy to navigate are more likely to feel in control and confident in managing their financial transactions, which enhances their overall satisfaction (Tam & Oliveira, 2019). This is particularly important as trust and perceived control are vital for the adoption and continued use of mobile banking services (Wang et al., 2021).

Finally, ease of use is essential for ensuring accessibility to a broader audience, including those who may not be tech-savvy. By simplifying the user interface and minimizing the learning curve, mobile banking providers can enhance customer satisfaction across diverse demographic groups (Malaquias & Hwang, 2019). As ease of use improves the overall service quality, it becomes a critical factor in retaining customers and ensuring their long-term engagement with mobile banking platforms. Thus, the following hypothesis is derived based on the above discussion:
H4: Ease of use can positively influence customer satisfaction among mobile banking users.

Responsiveness: Responsiveness in mobile banking refers to how quickly and effectively banks address customer needs, from resolving issues to providing timely updates. In the mobile banking context, quick transaction processing, real-time notifications, and efficient in-app customer support are crucial elements of responsiveness. Research highlights that these factors significantly contribute to customer satisfaction, as users value prompt responses and real-time information (Wu et al., 2020).

Empirical studies underscore the strong link between responsiveness and customer satisfaction in mobile banking. For instance, Wu et al. (2020) found that prompt service delivery, including real-time information and quick customer support, is a significant predictor of customer satisfaction. Similarly, Chandio et al. (2021) emphasized that the ability of mobile banking platforms to swiftly address technical issues and provide timely updates enhances customer trust and satisfaction.

However, maintaining high responsiveness can be challenging due to technical issues, network problems, and resource limitations. Banks need to invest in robust IT infrastructure and continuous training for customer support staff to sustain high levels of responsiveness (Chandio et al., 2021). Overall, the literature suggests that responsiveness is a critical factor in customer satisfaction, influencing the overall success of mobile banking services. Therefore, the following hypothesis is proposed based on the abovementioned discussion:
H5: Responsiveness can positively influence customer satisfaction among mobile banking users.

Reliability: Reliability is a crucial factor influencing customer satisfaction in mobile banking. Reliability refers to the consistent performance of mobile banking services, including accurate transactions and system uptime. Recent studies confirm that a reliable mobile banking system significantly impacts customer satisfaction by ensuring that services are consistently available and secure. For instance, Sharma and Sahi (2020) highlight that customers who experience fewer technical issues and reliable service are more likely to be satisfied and loyal to their banking provider.

Conversely, when mobile banking systems fail or encounter frequent issues, customer dissatisfaction can rise. According to Singh and Sinha (2021), problems like application crashes or transaction errors lead to decreased trust and satisfaction among users. Their research indicates that customers who face these reliability issues may switch to competitors offering more stable services. This underscores the importance of maintaining a high level of reliability to retain customers and prevent negative experiences.

Overall, reliability not only affects immediate customer satisfaction but also has long-term implications for customer loyalty. Reliable services foster trust and encourage customers to remain with their current provider. As noted by Kumar and Patel (2022), banks that prioritize and enhance the reliability of their mobile banking platforms are better positioned to achieve higher customer satisfaction and long-term loyalty. Ensuring consistent and reliable service is, therefore, key to maintaining a positive relationship with customers. Therefore, the following hypothesis is proposed based on the above discussion:

H6: Reliability can positively influence customer satisfaction among mobile banking users.

3. Research Methodology

This section discusses the methodology involved in conducting this study which includes the research design, sampling technique, instrument, and statistical data analysis to achieve research objectives within the scope of the study. The research design for this research is quantitative and correlational as involves the examination of relationship between variables. Specifically, this research investigates the relationship between ease of use, privacy and security, responsiveness, efficiency, interoperability, and reliability on customer satisfaction among mobile banking users. A purposive sampling technique was employed as this study focuses on iRakyat mobile banking users in the area of Klang Valley, Malaysia. Screening questions were included at the beginning of the questionnaire to ensure only iRakyat users participated in this study. The study utilized G*Power software to determine the sample size and a minimum number of 89 respondents was required. However, the researcher distributed 107 questionnaires considering the possibilities of problematic responses that may lead certain respondents to be discarded. This study utilized SPSS for descriptive, correlational, and multiple regression analysis to test all the hypotheses. The following table 1 shows the instrument used in this study and all the items were derived from past studies.

Table 1: Instrument of the Study

Section	Description of Instrument	Scale
Section A	Demographic profile of the respondents	Nominal and Categorical
Section B	Independent variables (Ease of Use, Responsiveness, Privacy and Security, Reliability, Interoperability, and Efficiency) Questionnaire items were adapted from Egala et al., (2021) and Sharma and Malviya (2011).	5-point Likert Scale (Strongly Disagree to Strongly Agree)
Section C	Dependent variable (Customer Satisfaction) Questionnaire items were adapted from Egala et al., (2021) and (Sharma & Malviya, 2011)	5-point Likert Scale (Strongly Disagree to Strongly Agree)

4. Results of Data Analysis

Table 2 shows the means and standard deviations for the independent and dependent variables. The independent variables are Ease of Use, Interoperability, Efficiency, Privacy and Security, Responsiveness, and Reliability. While Customer Satisfaction is the dependent variable.

Table 2: Descriptive Statistics

No	Variables	Mean	Std Deviation
	Efficiency	**3.8224**	
1	iRakyat mobile banking apps are easy to navigate.	3.9533	0.80544
2	iRakyat mobile banking registration process is simple.	3.6168	1.02465
3	iRakyat mobile banking creates a positive experience for me.	3.8972	0.75153
	Interoperability	**3.8255**	
1	The user experience when accessing mobile banking services is seamless across different platforms.	3.8224	0.77476
2	iRakyat mobile banking users can easily link their mobile banking accounts with third-party financial management apps or payment platforms.	3.8505	0.78673
3	Mobile banking apps work seamlessly across different mobile networks.	3.8037	0.91568
4	The user experience when accessing mobile banking services is seamless across different platforms.	3.8224	0.77476

5	iRakyat mobile banking users can easily link their mobile banking accounts with third-party financial management apps or payment platforms.	3.8505	0.78673
	Privacy and Security	**4.1196**	
1	I have full trust in iRakyat mobile banking services.	4.0467	0.71879
2	I feel safe with my transactions while doing mobile banking.	4.0654	0.60300
3	I feel secure in providing sensitive information while doing a mobile banking transaction.	4.0374	0.62834
4	I believe my bank does not share my personal or financial transaction details with other third parties.	4.2430	0.65648
5	iLock Maintenance is usable and important if there is suspected fraud (Security Feature for iRakyat Mobile Banking)	4.2056	0.59460
	Ease of Use	**4.0140**	
1	iRakyat mobile banking services and transactions are very simple and easy to use.	4.0467	0.78167
2	I can confidently navigate the iRakyat mobile banking digital service platform.	4.07477	0.735885
3	I feel comfortable anytime using the iRakyat mobile banking digital service platform during perform the transaction.	3.9533	0.74458
4	iRakyat mobile banking screen incorporates a good color scheme, is easy on the eye, is visually attractive, and has an efficient layout.	3.9813	0.87934
	Responsiveness	**3.7352**	
1	iRakyat mobile banking provides prompt responses if my transaction is not processed.	3.7664	0.91713
2	The bank quickly resolves mobile banking-related problems.	3.6262	0.88513
3	iRakyat mobile banking provides me with exactly as promised.	3.8131	0.79064
	Reliability	4.0467	
1	iRakyat mobile banking services provided by Bank Rakyat are timely.	3.8411	0.77884
2	iRakyat mobile banking transactions are processed accurately.	4.1776	0.62666
3	I know exactly when my transaction will be performed.	4.1215	0.60983
	Customer Satisfaction	**3.9416**	
1	I will recommend iRakyat mobile banking digital services to other customers.	4.0280	0.82939
2	I am satisfied with the way digital banking services are delivered by my bank.	3.9065	0.83024
3	I am satisfied with the quality of the digital banking services I received.	3.9159	0.77850
4	Overall, I am satisfied with the quality of digital banking services I received from my bank during COVID-19.	3.9159	0.80237

Subsequently, a reliability analysis was performed. Reliability analysis quantifies the degree of internal consistency among indicators used to measure a construct (Hair et. al., 2013). The researcher uses the term "reliability" to describe the consistency and stability an instrument exhibits when testing a concept and evaluating the usefulness of a measurement. Based on the results in Table 3, high internal consistency was demonstrated as Cronbach's Alpha values are above 0.8 for all variables.

Table 3: Reliability Analysis

Variable	Cronbach Alpha (α)	Interpretation
Ease Of Use	0.887	Good
Interoperability	0.844	Good
Efficiency	0.858	Good
Privacy and Security	0.841	Good
Responsiveness	0.893	Good
Reliability	0.808	Good
Satisfaction	0.935	Excellent

Next, correlation analysis was conducted between all the variables. Table 4 depicts the correlation matrix between Ease of Use, Interoperability, Efficiency, Privacy and Security, Responsiveness, Reliability, and Customer Satisfaction. These correlations reflect the inter-correlation that exists between the variables that were examined. It can be claimed that there is a significant correlation between each of the variables that were investigated in this study. According to these results, the variables have a discriminant validity, which means that although they are associated, they do not overlap with one another.

Table 4: Correlation Analysis

	Ease Of Use	Interoperability	Efficiency	Privacy & Security	Responsiveness	Reliability	Satisfaction
Ease of Use	1						
Interoperability	.628**	1					
Efficiency	.790**	.759**	1				
Privacy & Security	.438**	.491**	.474**	1			
Responsiveness	.587**	.757**	.737**	.546**	1		
Reliability	.658**	.653**	.712**	.574**	.740**	1	
Satisfaction	.721**	.673**	.806**	.511**	.760**	.717**	1

***. Correlation is significant at the 0.01 level (2-tailed).*

Subsequently, multiple regression analysis was employed to assess all the hypothesized relationships. The model tested H1, H2, H3, H4, H5, and H6 by regressing all the independent variables (Ease of Use, Interoperability, Efficiency, Privacy and Security, Responsiveness, Reliability) towards the dependent variable (Customer Satisfaction). Additionally, a diagnostic test was performed to check for multicollinearity and collinearity. Hair et al. (2013) and Sekaran and Bougie (2010) suggested that a tolerance value of less than 0.10 is problematic. As none of the tolerance values fell below 0.10, multicollinearity was not considered to be a problem in the data. As for the VIF, Hair et al. (2013) and Sekaran and Bougie (2010) suggested that a value above 10 indicates multicollinearity. As the VIF values for the current data fell below 10, thus multicollinearity was not evidenced. Based on the results in Table 5, it can be concluded that Efficiency (H1), Ease of Use (H4), and Responsiveness (H5) significantly contribute to Customer Satisfaction in the context of mobile banking among Malaysian consumers.

Table 5: Results of Hypothesis Testing Using Multiple Regression

	Beta (β)	t-value	Sig (*p*)	Tolerance	VIF	Decision
Efficiency (H1)	0.372	3.479	0.001	0.231	4.324	Supported
Interoperability (H2)	-0.058	-0.649	0.518	0.334	2.993	Not Supported
Privacy & Security (H3)	0.048	0.738	0.462	0.632	1.583	Not Supported
Ease of Use (H4)	0.187	2.159	0.033	0.352	2.845	Supported
Responsiveness (H5)	0.314	3.327	0.001	0.296	3.378	Supported
Reliability (H6)	0.108	1.231	0.221	0.344	2.903	Not Supported

5. Discussion and Recommendations

This study has proven the positive relationship between efficiency, ease of use, and responsiveness on satisfaction among mobile banking customers. Consistent with Mbama and Ezepue (2018), perceived value positively can influence customer experience and perceived usability of digital banking or mobile banking

innovation. Additionally, mobile banking innovation can positively impact employee-customer engagement and enhance user satisfaction with mobile banking services. Due to this notion, it is recommended that iRakyat mobile banking developers invest in enhancing user experience (UX) design, conducting regular usability testing, and gathering user feedback to identify and address weaknesses to be improved.

In the context of ease of use, the finding is supported by Mbama and Ezepue (2018) denoting that the simplicity of use of digital banking can have a beneficial impact on customer satisfaction and perceived usefulness. Besides, mobile banking innovation has a beneficial effect on the level of interaction between employees and customers, and it also improves customer satisfaction with mobile banking services. A study by Bakri (2020) also found that ease of use is the most powerful predictor in mobile banking and therefore we can claim that it can have the most impact on the acceptance of mobile banking services.

In terms of responsiveness, the finding is consonant with studies conducted by Egala et al. (2021), which found that the level of responsiveness, service charges, and range of services offered by digital banking services, or mobile banking have a major impact on the happiness and intention of customers to continue using the service. Prior research also has confirmed that the level of responsiveness exhibited by mobile banking has a direct impact on customer satisfaction and retention (Al-Ghraibah, 2020).

For the recommendations, future researchers are suggested to replicate the current framework in other settings such as airlines, hospitality, food services, or healthcare services as mobile applications are also widely used in these sectors. It may yield different results as compared to mobile banking and customers may have different perceptions. Additionally, future researchers are also suggested to enhance the current framework of study by integrating a moderator or mediator variable. Researchers may consider adding moderator variables such as age, gender, relationship age, culture, or type of customers. For the mediator variable, researchers may consider including customer loyalty, trust, brand equity, repurchase intention, or customer experience.

Conclusion

Overall, the results of this study have fulfilled the research objectives specified at the beginning of the study. This highlights the importance of user experience and service efficiency in determining the level of customer satisfaction provided by mobile banking services. These findings brought to light the need for continuously improving and optimizing both the services and the customer experience. The study's findings imply that mobile banking service providers, such as iRakyat, have to consider the initiatives to improve user-friendliness, address security concerns, and enhance the user experience to increase overall consumer happiness and adoption of mobile banking services. The incorporation of user input and feedback into service enhancements and the prioritization of client wants are both essential components for achieving higher levels of customer satisfaction and gaining wider adoption of mobile banking services.

Furthermore, regulators should focus on enhancing privacy and security regulations to foster a more secure technological environment and maintain customer confidence. It is crucial to educate customers about the many advantages of mobile banking since many individuals are unaware of these benefits. By presenting users with the advantages of the mobile application, such as uninterrupted accessibility, time, money, and effort savings, as well as the avoidance of physical contact and waiting in the queue, they will be motivated to change their routines and begin using the mobile application. Consequently, the utilization of mobile banking will likely increase if users perceive that it enhances their productivity and effectiveness in their professional tasks.

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Unveiling A Century of Research on Retirement Schemes: A State-of-the-Art Bibliometric Review

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Abstract: This bibliometric study investigates research on retirement schemes from 1985 to 2023, using data from the Scopus database. It comprises a qualitative assessment of influence using citation measures including citation counts, h-index, and g-index, as well as a quantitative assessment of publication output among authors and journals. The study offers a thorough overview of the field by identifying significant works and important contributors. Co-word occurrence analysis also identifies important study themes and emphasizes understudied topics in the literature on retirement plans. This method lessens the subjectivity present in conventional literature evaluations while providing insights into research trends, significant writers, and hot themes. The study also fills gaps in the literature and makes recommendations for future research directions to guide future investigations and support the creation of retirement plan policy.

Keywords: *Bibliometric, Retirement Scheme, Pension Scheme, Scopus, VOS Viewer*

1. Introduction and Background

Retirement schemes are crucial financial frameworks created to guarantee that people have enough money to sustain their quality of life after they stop working. Although these programs differ greatly across the globe, they all aim to give participants financial security in retirement. Retirement schemes in Malaysia are designed to give people a secure financial base during their post-employment years. The Employees Provident Fund (EPF), a required savings plan for workers in the private sector and non-pensionable public sector, is the main vehicle for retirement savings (Zabri, Ahmad & Lian, 2016). One of the oldest and most dependable retirement plans in the nation, the Employees Provident Fund (EPF) was created in 1991 under the Employees Provident Fund Act to encourage employees to set aside a percentage of their salary for retirement (Shah et al, 2023).

Complementing the EPF are Private Retirement Schemes (PRS), which are voluntary investment schemes introduced to provide an additional layer of financial security. These schemes, managed by approved private sector providers, offer flexibility in contributions and are designed to supplement the mandatory savings of the EPF.

All these retirement schemes work together to provide a complete framework that protects Malaysian retirees' financial future. Malaysia aims to establish a retirement system that is inclusive, sustainable, and flexible enough to adjust to changing economic conditions and demographic changes through the combination of government-backed pensions, required savings, and voluntary contributions. This comprehensive strategy emphasizes how crucial it is to be financially ready for retirement and how various savings options contribute to long-term financial security. Thus, by performing a bibliometric analysis of retirement scheme research, this work seeks to close this gap. Finding the most common themes and interesting directions for further investigation is the aim.

2. Literature Review

Retirement schemes are critical components of social security systems globally, and understanding their development through scholarly research is essential for policy and academic purposes (Hassan et. al., 2016).

Bibliometric analysis offers a thorough overview of the evolution, trends, and key themes within the research on retirement schemes and how retirement schemes have evolved. Many studies recently have utilized bibliometric techniques to dissect the extensive body of literature on this topic, providing insightful analysis of its intellectual framework and future directions (Li et al., 2022; Qian & Feng, 2023).

Research on retirement schemes has increased tremendously over the past century. In 2023, Owusu, Onumah and Essel-Donkor analysed 6,661 papers published between 1910 and 2022. It highlighted 5 primary themes such as pension plans, retirement systems, pension schemes, demographic factors, and socio-economic determinants of retirement decisions. This thorough analysis showed that, in response to changes in economic situations, demographic trends and government new policies.

Additionally, a study conducted by Li et al. (2022) and Zheng et al. (2023) supported the finding which how retirement schemes have evolved in responding to changes in the global population and financial crises. These findings demonstrate how the aging population is affecting retirement schemes and the increased focus on better retirement schemes.

There are many important researchers and publications have contributed to the research on retirement schemes (Hashim, Shin & Lajis, 2024; Ponthiere, 2023; Qian & Feng, 2023). Key bibliometric indicators such as citation counts and h-indices help identify leading articles and authors. The works of authors such as Hansen (2001) and Becht et al. (2009) have been frequently cited, highlighting their substantial contributions to understanding the economic and policy dimensions of retirement schemes.

Although much research has been conducted in this area, several gaps remain. More longitudinal study is needed in this area to fully understand the long-term effects of different types of retirement schemes and the change in demographics. In addition, more research is needed on the emerging topic of how technological developments affect retirement management and retirement planning. Future studies should concentrate on the effects of changes in the global economy, such as the rise of the gig economy and how it affects conventional retirement schemes. More research is required to fully understand how digital tools fit into retirement schemes and how behavioral economics influences people's retirement savings habits (Owusu et al., 2023). Future research should also investigate on how automated savings tools and digital financial education programs might boost retirement readiness.

Research Objectives

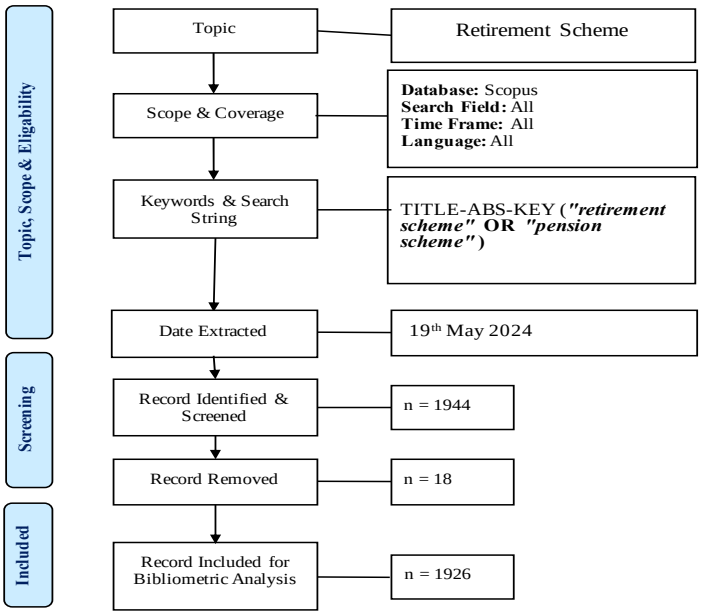
The purpose of this study is to employ bibliometric analysis to identify the important themes, subjects, and research areas related to retirement plans. Hence, the research objectives are:

To examine trends and patterns in the retirement scheme literature over time
To identify the most influential publications, authors, and journals on the topic of retirement schemes using bibliometric markers
To determine the degree of cross-disciplinary research, the categories of authors and institutions involved, and the level of collaboration and interdisciplinarity in the literature on retirement schemes.

3. Research Methodology

This study utilizes bibliometric analysis techniques to evaluate current trends in academic literature regarding retirement schemes. Using network visualization and bibliometric indicators, the study provides an extensive overview of its findings. The detailed summaries of this method are illustrated in Figure 1.

Figure 1: PRISMA Flow Diagram



Source: Moher et al (2009).

Data Screening

Data screening in this study entailed the exclusion of publications written in languages other than English, encompassing Chinese, Czech, French, German, Italian, Spanish, and Ukrainian. Furthermore, a filter was employed to narrow down the focus exclusively to publications within defined research domains, such as Biochemistry, Genetics and Molecular Biology, Mathematics, Chemistry, Energy, Immunology and Microbiology, and Physics and Astronomy. After going through this screening process, the chosen data were carefully chosen to make sure they met the objectives of the study and strict quality and relevance criteria.

4. Results

Document and Source Types

Table 1 presents the dataset under investigation, which consists of a wide range of publications categorized according to the categories of documents they are. The table also shows the distribution of various categories of academic publications in a collection of 1,926 items. The majority, 1,457 publications, or 75.65%, are articles. The next most prevalent content type is book chapters, with 232 (12.05%), and reviews, with 98 (5.09%). 52 publications (2.70%) are conference papers, and 38 (1.97%) are books. The remaining small percentages are made up of notes, editorials, conference reviews, errata, and brief surveys; the last three categories each have only four publications (0.21%). In this collection, articles make up the majority of the publications.

Table 1: Document Type

Document Type	Total Publications (TP)	Percentage (%)
Article	1457	75.65
Book Chapter	232	12.05
Review	98	5.09
Conference Paper	52	2.70
Book	38	1.97
Note	32	1.66
Editorial	5	0.26
Conference Review	4	0.21
Erratum	4	0.21
Short Survey	4	0.21

Total	**1926**	**100.00**

Table 2 shows that most publications are in journals, with 1,566 out of 1,926, which is about 81%. Next up with 238 publications, or 12%, are books. There are 56 publications (3%), book series, and 34 (2%), conference proceedings. Two undefined sources, or less than 1%, and thirty publications (2%), respectively, are found in trade journals. This distribution makes clear that academic papers are primarily found in journals.

Table: Source Type

Source Type	Total Publications (TP)	Percentage (%)
Journal	1566	81.31
Book	238	12.36
Book Series	56	2.91
Conference Proceeding	34	1.77
Trade Journal	30	1.56
Undefined	2	0.10
Total	**1926**	**100.00**

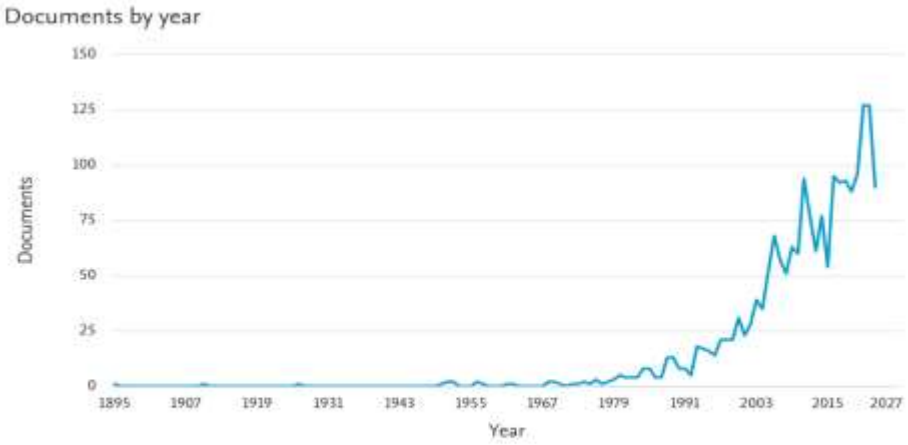
Year of Publications/Evolution of Published Studies

Table 3 and Figure 2 show publication numbers over 20 years. There were 90 publications in 2023, representing 4.67% of the total. 2022 and 2021 accounted for 127 publications apiece or 6.59% of the total for those years. 96 publications (4.98%) were made in 2020, while 88 publications (4.57%) were made in 2019. There were 93 publications in 2018 and 92 in 2017, representing 4.83% and 4.78%, respectively. 95 publications, or 4.93% of the total, were published in 2016. With just 35 publications (1.82%), 2004 had the fewest. 369 publications, or 19.16% of the total, were published between 1895 and 2023. Overall, there were 1,103 publications in the 20 years.

Table 3: Year of Publications (20 years)

Year	Total Publications	Percentage (%)
2023	90	4.67
2022	127	6.59
2021	127	6.59
2020	96	4.98
2019	88	4.57
2018	93	4.83
2017	92	4.78
2016	95	4.93
2015	54	2.80
2014	77	4.00
2013	61	3.17
2012	77	4.00
2011	94	4.88
2010	60	3.12
2009	63	3.27
2008	51	2.65
2007	57	2.96
2006	68	3.53
2005	52	2.70
2004	35	1.82
1895-2023	369	19.16
Total	**1103**	**100.00**

Figure 2: Document by Year



Languages of Documents

Table 4 provides an overview of the languages used for publications, with a focus on the dominance of English. The data reveals that all 1,926 publications were prepared in English, constituting 100% of the total. This shows that this dataset's exclusive language of publishing is English. Notably, even when one document was created in two languages, the total number and % show a preference for one language. As so, the information emphasizes how commonplace and unique English is in the distribution of academic research in this compilation.

Table 4: Languages Used for Publications

Language	Total Publications*	Percentage (%)
English	1926	100
Total	**1926**	**100.00**

*one document has been prepared in dual languages

Subject Area

Table 5 shows the distribution of publications across different subject areas. The largest category is Economics, Econometrics, and Finance, with 1,000 publications (29.8%). Social Sciences comes next with 829 publications (24.7%), followed by Business, Management, and Accounting with 527 publications (15.7%). Medicine and Mathematics each have 172 and 170 publications, respectively, both at 5.1%. Other fields like Decision Sciences, Arts and Humanities, and Environmental Science have smaller shares, ranging from 2.5% to 4.9%. The remaining subjects, including Engineering, Computer Science, and Psychology, each have fewer publications, with percentages ranging from 0.1% to 2.3%. There are also 6 publications classified as "Undefined," making up 0.2%. Overall, the data shows a strong focus on Economics and Social Sciences.

Table 5: Subject Area

Subject Area	Total Publications	Percentage (%)
Economics, Econometrics and Finance	1000	29.8
Social Sciences	829	24.7
Business, Management and Accounting	527	15.7
Medicine	172	5.1
Mathematics	170	5.1
Decision Sciences	165	4.9
Arts and Humanities	85	2.5
Environmental Science	85	2.5
Engineering	77	2.3
Computer Science	54	1.6

Psychology	51	1.5
Nursing	39	1.2
Agricultural and Biological Sciences	21	0.6
Energy	12	0.4
Biochemistry, Genetics and Molecular Biology	10	0.3
Chemical Engineering	9	0.3
Multidisciplinary	8	0.2
Earth and Planetary Sciences	6	0.2
Physics and Astronomy	6	0.2
Health Professions	5	0.1
Materials Science	5	0.1
Veterinary	4	0.1
Chemistry	3	0.1
Pharmacology, Toxicology and Pharmaceutics	3	0.1
Dentistry	2	0.1
Undefined	6	0.2

Most Active Source Titles

Table 6 shows the most active publication sources. Out of all the publications, the "International Social Security Review" has the most, with 123, or 11.3%. The next two journals are "Journal of Pension Economics and Finance" with 34 publications (3.1%) and "Insurance Mathematics and Economics" with 45 publications (4.2%). With 22 publications each, "Pensions" and "European Journal of Social Security" have a 2.0% overall. Additional resources include the 17 publications each from "Geneva Papers on Risk and Insurance Issues and Practice" and "Aging and Society" (1.6%). A few journals have 14 publications apiece, including the "Journal of the Economics of Ageing," "Applied Economics," "Good Governance for Pension Schemes," and the "Scandinavian Actuarial Journal" (1.3%). The journals "Annals of Actuarial Science" have 12 publications (1.1%), while "Fiscal Studies," "International Journal of Social Welfare," and "Journal of Population Economics" each have 13 publications (1.2%).

Table 6: Most Active Source Title

Source Title	Total Publications	Percentage (%)
International Social Security Review	123	11.3
Insurance Mathematics And Economics	45	4.2
Journal Of Pension Economics And Finance	34	3.1
Pensions	32	3.0
European Journal Of Social Security	22	2.0
Social Policy And Administration	22	2.0
Ageing And Society	17	1.6
Geneva Papers On Risk And Insurance Issues And Practice	17	1.6
Journal Of The Economics Of Ageing	16	1.5
Applied Economics	14	1.3
Good Governance For Pension Schemes	14	1.3
Scandinavian Actuarial Journal	14	1.3
Fiscal Studies	13	1.2
International Journal Of Social Welfare	13	1.2
Journal Of Population Economics	13	1.2
Annals Of Actuarial Science	12	1.1

Keywords Analysis

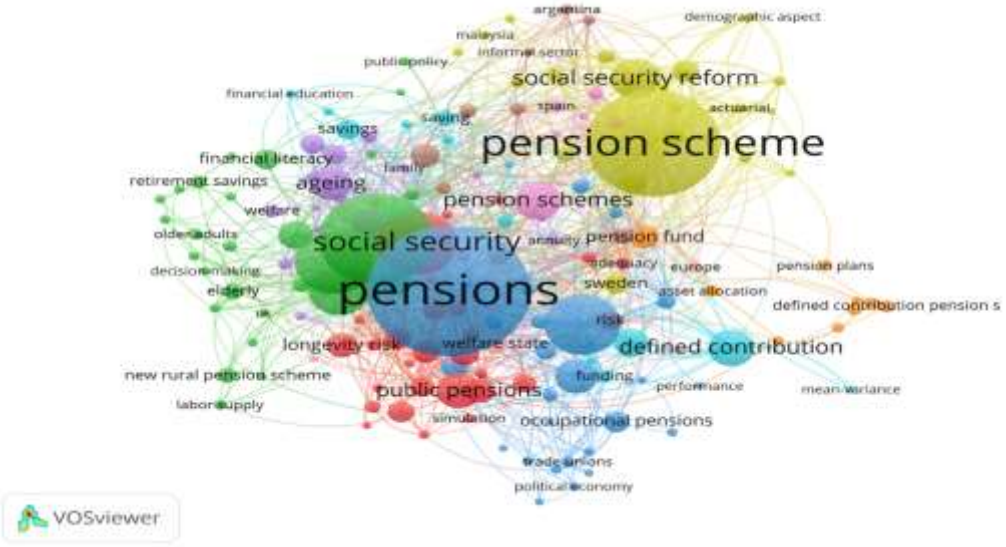
Table 7 shows the top 20 keywords used in publications. "Pension System" is the most common, found in 241 publications (4.92%). "Retirement" comes next with 196 mentions (4.00%), followed by "Pensions" with 189 mentions (3.86%). "Pension" appears in 148 publications (3.02%), and "Human" in 145 publications (2.96%). Other popular keywords include "Article" with 124 mentions (2.53%) and "Social Security" with 112 mentions (2.28%). "Humans" and "Pension Scheme" both have 104 mentions (2.12%). Keywords like "Female" (1.84%),

"Male" (1.71%), "China" (1.57%), and "United Kingdom" (1.51%) are also listed, along with "Aged" (1.47%) and "Adult" (1.35%). The table shows which topics are most frequently discussed in the publications. It can also be seen in Figure 3.

Table 7: Top 20 Keywords

Author Keywords	Total Publications	Percentage (%)
Pension System	241	4.92
Retirement	196	4.00
Pensions	189	3.86
Pension	148	3.02
Human	145	2.96
Article	124	2.53
Social Security	112	2.28
Humans	104	2.12
Pension Scheme	104	2.12
Female	90	1.84
Male	84	1.71
Social Policy	82	1.67
China	77	1.57
United Kingdom	74	1.51
Aged	72	1.47
Adult	66	1.35
Europe	63	1.29
Employment	61	1.24
Middle Aged	55	1.12

Figure 3: Network visualization map of the author keywords



Geographical Distribution of Publications - Most Influential Countries

Table 8 lists the top 20 countries by publication count. The United Kingdom has the most publications with 407 (17.38%). Germany and the United States follow with 159 (6.79%) and 155 (6.62%), respectively. The Netherlands has 127 publications (5.42%), and Italy and China have 114 (4.87%) and 112 (4.78%). Other countries with significant contributions include Australia (78 publications, 3.33%) and India (69 publications, 2.95%). France and Spain have 65 (2.78%) and 60 publications (2.56%), respectively. Belgium, Denmark, and Sweden have 51 (2.18%), 47 (2.01%), and 45 publications (1.92%). Canada, Malaysia, Switzerland, Finland, Poland, Japan, and South Korea also contribute, with numbers ranging from 33 to 27.

Table 8: Top 20 Countries contributed to the publications

Country	Total Publications	Percentage (%)
United Kingdom	407	17.38
Germany	159	6.79
United States	155	6.62
Netherlands	127	5.42
Italy	114	4.87
China	112	4.78
Australia	78	3.33
India	69	2.95
France	65	2.78
Spain	60	2.56
Belgium	51	2.18
Denmark	47	2.01
Sweden	45	1.92
Canada	42	1.79
Malaysia	38	1.62
Switzerland	36	1.54
Finland	33	1.41
Poland	31	1.32
Japan	28	1.20

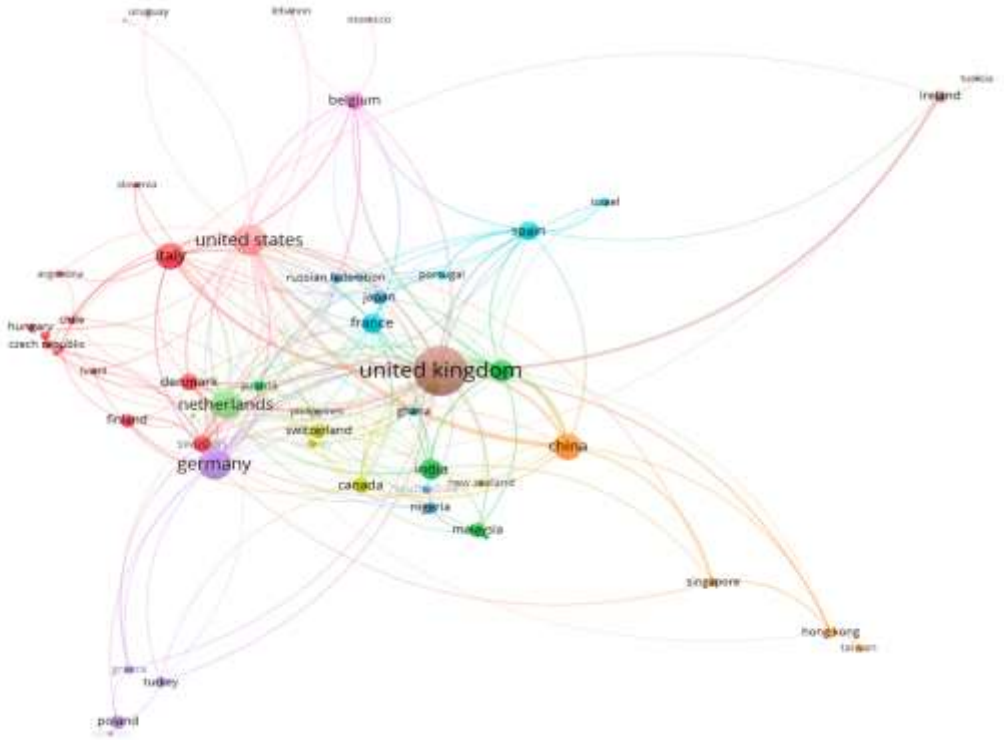
Authorship

Table 9 shows the most productive authors by the number of documents published. With 18 documents or 2.52% of the total, Haberman is the most active author. With 16 documents (2.24%), Devolder comes next of the documents, Blake has ten (1.40%), and Holzmann has eleven (1.54%). With nine documents (1.26%), Barrientos, Gough, Meijdam, Vigna, and Williamson are among the other noteworthy writers. Contributing 1.12% each, authors Sutcliffe, Tonks, Verbon, and Vidal-Meliá each have eight documents. In conclusion, the following individuals have the most documents such as Ayuso, Bravo, Ginn, and Pestieau have seven (0.98%), Alonso-García, Boado-Penas, and Bovenberg have six (0.84%). The top contributors in terms of publication production are shown in this table. The network visualization of co-authorship can be seen in Figure 4.

Table 9: Most Productive Authors

Author's Name	No. of Documents	Percentage (%)
Haberman, S.	18	2.52
Devolder, P.	16	2.24
Holzmann, R.	11	1.54
Blake, D.	10	1.40
Barrientos, A.	9	1.26
Gough, O.	9	1.26
Meijdam, L.	9	1.26
Vigna, E.	9	1.26
Williamson, J.B.	9	1.26
Sutcliffe, C.	8	1.12
Tonks, I.	8	1.12
Verbon, H.A.A.	8	1.12
Vidal-Meliá, C.	8	1.12
Ayuso, M.	7	0.98
Bravo, J.M.	7	0.98
Ginn, J.	7	0.98
Pestieau, P.	7	0.98
Alonso-García, J.	6	0.84
Boado-Penas, M.d.C.	6	0.84
Bovenberg, L.	6	0.84

Figure 4: Network visualization map of the co-authorship



Unit of analysis = Countries
Counting method: Fractional counting
Minimum number of documents of a country = 3
Minimum number of citations of a country = 5

Most Influential Institutions

Table 10 shows the most influential institutions with at least ten publications. Tilburg University is the leading contributor with 41 publications (3.28%). Of the publications, the Network for Studies on Pensions, Aging and Retirement has 27, (2.16%), and City, University of London has 28, (2.24%). Each university has 24 publications (1.92%), including Université Catholique de Louvain and Universiteit van Amsterdam. A total of 21 articles (1.68%) are shared between UNSW Sydney and Bayes Business School. The London School of Economics, Heriot-Watt University, and the University of Oxford have as many publications as Universität Bremen (15) and Vrije Universiteit Amsterdam (1.20%), respectively. The global contribution to the topic is considerable, as seen by the 13 publications (1.04%) and the 11 or 10 publications of many more institutions.

Table 10: Most influential institutions with a minimum of ten publications

Institution	Total Publications	Percentage (%)
Tilburg University	41	3.28
City, University of London	28	2.24
Network for Studies on Pensions, Aging and Retirement	27	2.16
Université Catholique de Louvain	24	1.92
Universiteit van Amsterdam	24	1.92
Bayes Business School, City University of London	21	1.68
UNSW Sydney	21	1.68
Universität Bremen	16	1.28
Vrije Universiteit Amsterdam	15	1.20
The University of Edinburgh	15	1.20
London School of Economics and Political Science	14	1.12
Heriot-Watt University	14	1.12

University of Oxford	14	1.12
UNSW Business School	14	1.12
CNRS Centre National de la Recherche Scientifique	13	1.04
The Australian National University	13	1.04
L'Organisation de Coopération et de Développement Economiques	13	1.04
Universiteit Maastricht	13	1.04
Stockholms universitet	13	1.04
Aarhus Universitet	13	1.04
Universitat de Barcelona	12	0.96
The University of Sheffield	12	0.96
University of Westminster	11	0.88
The University of Manchester	11	0.88
University of Kent	11	0.88
Università degli Studi di Torino	11	0.88
Renmin University of China	11	0.88
Boston College	11	0.88
The World Bank, USA	11	0.88
University of Glasgow	10	0.80
Universitat de València	10	0.80
Universiteit Utrecht	10	0.80
University of Reading	10	0.80
CPB Netherlands Bureau for Economic Policy Analysis	10	0.80
Imperial College London	10	0.80
Università degli Studi di Napoli Federico II	10	0.80
University of Liverpool	10	0.80
University of Warwick	10	0.80
Erasmus Universiteit Rotterdam	10	0.80
Københavns Universitet	10	0.80

Citation Analysis

Table 12 provides citation metrics for publications from 1895 to 2023. 1,926 papers have received a total of 16,859 citations, averaging 130.69 citations per year. Each paper has an average of 8.75 citations. Each author has published 123.31 papers and received 10,200.26 citations on average. The g-index, which takes into consideration the number of citations in the most cited works, is 76, while the h-index, which gauges the productivity and influence of the author's publications, is 53. Table 13 shows the most cited articles. The top article, by Hansen, was published in 2001, with '18 citations (18.17 per year). The second most cited article, by Becht and others, discusses shareholder activism and has 220 citations (14.67 per year). Other highly cited articles include Taylor's 1994 study on ageing workers with 216 citations and Lynge's 1985 study on cancer with 138 citations. The table lists influential articles on topics like pension reforms and investment strategies, showing their significant impact. The citation by country can also be seen in Figure 5.

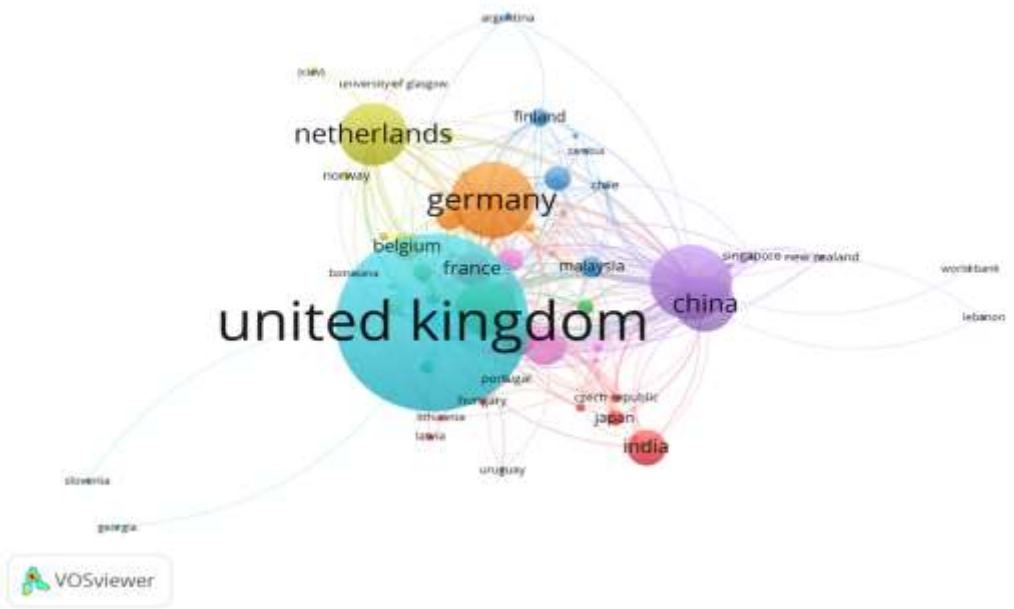
Table 12: Citations Metrics

Metrics	Data
Publication years	1895-2023
Citation years	129 (1895-2024)
Papers	1926
Citations	16859
Citations/year	130.69
Citations/paper	8.75
Citations/author	10200.26
Papers/author	123.31
h-index	53
g-index	76

Table 13: Highly cited articles

No.	Authors	Title	Year	Cites	Cites per Year
1	J. Hansen	Increased breast cancer risk among women who work predominantly at night	2001	418	18.17
2	M. Becht, J. Franks, C. Mayer, S. Rossi	Returns to Shareholder Activism: Evidence from a Clinical Study of the Hermes U.K. Focus Fund	2009	220	14.67
3	P.E. Taylor, A. Walker	The aging workforce: Employers' attitudes towards older people	1994	216	7.2
4	E. Lynge	A follow-up study of cancer incidence among workers in the manufacture of phenoxy herbicides in Denmark	1985	138	3.54
5	N. Barr, P. Diamond	Reforming pensions: Principles, analytical errors and policy directions	2009	118	7.87
6	M. Becht, J. Franks, C. Mayer, S. Rossi	Returns to shareholder activism: Evidence from a clinical study of the Hermes UK focus fund	2010	109	7.79
7	P. Langley	In the eye of the 'perfect Storm': The final salary pensions crisis and financialization of Anglo-American Capitalism	2004	106	5.3
8	M. Boldrin, A. Montes	The intergenerational state education and pensions	2005	105	5.53
9	S. Haberman, E. Vigna	Optimal investment strategies and risk measures in defined contribution pension schemes	2002	102	4.64
10	O.P. Attanasio, S. Rohwedder	Pension wealth and household saving: Evidence from pension reforms in the United Kingdom	2003	100	4.76
11	K. Hinrichs	Elephants on the move. Patterns of public pension reform in OECD countries	2000	98	4.08
12	M. Evandrou, K. Glaser	Combining work and family life: The pension penalty of caring	2003	96	4.57
13	L. Cheng, H. Liu, Y. Zhang, Z. Zhao	The health implications of social pensions: Evidence from China's new rural pension scheme	2018	95	15.83
14	R. Gerrard, S. Haberman, E. Vigna	Optimal investment choices post-retirement in a defined contribution pension scheme	2004	91	4.55
15	S. Vickerstaff, J. Cox	Retirement and risk: The Individualization of retirement experiences?	2005	91	4.79
16	E. Vigna, S. Haberman	Optimal investment strategy for defined contribution pension schemes	2001	89	3.87
17	T. Schils	Early retirement in Germany, the Netherlands, and the United Kingdom: A longitudinal analysis of individual factors and institutional regimes	2008	88	5.5
18	K. Hinrichs, O. Kangas	When is a change big enough to be a system shift? Small system-shifting changes in German and Finnish pension policies	2003	87	4.14
19	J. Hansen, O. Raaschou-Nielsen, J.H. Olsen	Increased risk of lung cancer among different types of professional drivers in Denmark	1998	85	3.27
20	M.A. Orenstein	Pension privatization in crisis: Death or rebirth of a global policy trend?	2011	83	6.38

Figure 5: Network visualization map of the citation by countries



Minimum number of documents of an author = 1
Minimum number of citations of an author = 5

5. Conclusion and Recommendations

This bibliometric study offers a comprehensive analysis of retirement scheme research from 1985 to 2023 using Scopus data. It assesses publication productivity and impact through citation metrics such as citation counts, h-index, and g-index, identifying key contributors, influential works, and emerging themes. The co-word occurrence analysis reveals both core research areas and notable gaps, providing a structured overview that minimizes the subjectivity inherent in traditional literature reviews.

The study highlights significant trends and patterns, showing the impact of leading researchers and seminal works on the field. It also uncovers underexplored areas, suggesting that while substantial research has been conducted, opportunities remain to delve deeper into specific aspects of retirement schemes. The findings emphasize the significance of interdisciplinary collaboration and wider geographic representation to address a variety of retirement scheme difficulties.

Future investigations should concentrate on the gaps and new trends found in the study, such as the impact of recent developments in technology and changes in the world economy. A more thorough understanding of retirement schemes can be obtained by fostering multidisciplinary collaboration and including viewpoints from the fields of economics, sociology, public health, and policy studies. Additionally, research is becoming more geographically diverse, which can also provide insights into how various cultural and economic circumstances influence retirement planning. It is recommended that researchers publish in high-impact journals to increase the impact and visibility of their research. The comprehension of research trends and theme advances will be improved by filling in the gaps in the literature and making use of cutting-edge bibliometric technologies. These actions will promote retirement planning techniques, contribute to policy creation, and expand on the body of current research.

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Retirement Preparedness among Malaysia's Low-Income Private Sector Employees: A Conceptual Model

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Abstract: Retirement in Malaysia starts when individuals reach 60 years old. This is when individuals' income will stop streaming in, and they need to use their savings, pensions or retirement scheme to support themselves post-retirement. There are two primary retirement schemes in Malaysia, which include (1) Defined Benefit (DB) for government servants and (2) Defined Contribution (DC) for private-sector workers managed by the Employee Provident Fund (EPF). The increasing aging population and the rise in retirees in Malaysia with a lack of retirement savings emphasize the significance of retirement preparedness. The life expectancy in Malaysia has increased, with males and females having an average lifespan of 71.8 years and 77.2 years, respectively. Malaysia's income groups can be divided into three groups: T20 (top 20%), M40 (middle 40%), and B40 (bottom 40%). This study will only focus on private sector employees with EPF accounts and the B40 group with an income of RM4850 and below. The B40 has the lowest savings in EPF, with only 1.01%, compared to the M40, which amounts to 16.56%, and the T20, which holds the most savings at 82.42%. The main objective of this study is to investigate retirement preparedness among low-income (B40) private-sector employees. By focusing on the direct relationship between attitude and social influence and their impact on retirement preparedness, the findings are intended to support financial institutions, policymakers, and organizations in designing and implementing effective financial education and literacy programs tailored to the needs of the low-income (B40) group.

Keywords: *Retirement Preparedness, Private Sector Worker, Low-Income Earners, B40, Malaysia, Theory of Planned Behavior*

1. Introduction

Retirement can be defined as the end of an individual's career or the period that follows the permanent discontinuation of a full-time profession or vocation. It signifies a significant transition from being actively employed to a stage that requires diligent financial planning to ensure financial stability, security, and well-being throughout an individual's retirement years. This stage encompasses the process of retirement planning for financial stability through the utilization of social security, pensions, retirement schemes and other methods of saving for retirement. Retirement is a stage in life that typically starts at the age of 65, during which individuals must adapt personally and socially to a life without employment (Merriam-Webster, n.d.). In Malaysia, the legal retirement age is 60 years old. The 12th Malaysian Plan (2021-2025) highlights the need for improved financial planning among older persons to prevent financial instability and poverty in retirement (Economic Planning Unit, 2024). As of 2023, Malaysia's population is estimated to be approximately 32.4 million people. In the first quarter of 2024, total employment rose to 16.40 million from 16.20 million in 2023, an increase of 0.2 million (Department of Statistics Malaysia, 2023). The workforce is divided into public and private sectors. The public sector has 1.7 million employees, including public administration, healthcare, education, defense, security, and public utilities (Abas, 2019). The private sector employs 14.5 million individuals across industries like manufacturing, services, technology, and commerce (Department of Statistics Malaysia, 2023). Private sector employees typically participate in defined contribution (DC) plans managed by the Employees Provident Fund (EPF). These plans require mandatory contributions from both employers and employees, with employers contributing 12% to 13% of the employee's wages to their EPF accounts and employees contributing 11% of their salaries to their EPF accounts.

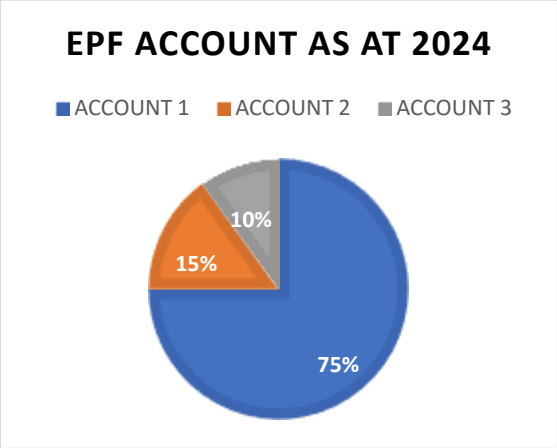
Table 1:EPF Accounts

EPF Contribution by		Malaysian citizens and permanent residents (PR) (mandatory)		Expatriates and foreign workers (without PR status) (voluntary)	
		% of contribution of employee's wages (minimum)			
		Employer	Employee	Employer	Employee
Below age 60:	Income > MYR 5,000	12.0%	11.0%	MYR 5 per person	11.0%
	Income ≤ MYR 5,000	13.0%			
Age 60 and above:	Income > MYR 5,000	- Malaysian: 4.0% - PR: 6.0%	- Malaysian:0% - PR: 5.5%	MYR 5 per person	5.5%
	Income ≤ MYR 5,000	- Malaysian: 4.0% - PR: 6.5%			

Source: https://taxsummaries.pwc.com/malaysia/individual/other-taxes (Developed by the researcher for the current study)

The EPF plan for private sector employees in Malaysia includes three accounts: Account 1 (Retirement Account), Account 2 (Wellbeing Account), and Account 3 (Flexible Account, effective from 11 May 2024). Account 1, receiving 75% of contributions, is for retirement savings and is accessible at age 55, except in exceptional cases like serious health issues. Account 2, with 15% of contributions, allows pre-retirement withdrawals for purposes such as housing, medical expenses, and education. The new Account 3, receiving 10% of contributions, offers flexible access to emergency funds and allows withdrawals anytime. Account 3 is optional; if not chosen, contributions remain 70% to Account 1 and 30% to Account 2 (Employee Provident Fund, 2024).

Figure 1:EPF Accounts



Source: Employees Provident Fund, 2024

Public sector employees, on the other hand, have historically benefited from defined benefit (DB) plans, offering a predictable retirement income. However, the government announced the phase-out of the DB scheme for new hires, shifting towards a system that requires contributions to the EPF and Social Security Organization (SOCSO) to manage the rising pension costs and national debt (Bedi, 2024). The current national debt of Malaysia, including liabilities, stands at RM1.5 trillion, which surpasses 80% of the country's gross domestic product (GDP). In 2024, the yearly pension liabilities or entitlements of KWAP members amounted to RM32

billion, accounting for 10% of the government's expected operating expenses. This is in contrast to the RM11.5 billion pension payout in 2010. This indicates a growth of RM20.5 billion for 14 years from 2010 to year 2024.

By 2040, the government is expected to require an allocation of almost RM120 billion to cover pension payments. This indicates a substantial rise of RM88 billion in the government's allocation for pensions within the period of 16 years, from 2024 to 2040 (Saieed, 2024: Singh, Yun, & Ibrahim, 2024). The transition from DB to DC plans signifies a broader shift in retirement planning responsibility from employers to employees. Under the DB, employees will have a constant monthly stream of income paid by the employer as long as they live together with the medical benefits. However, when it shifted to DC, there would no longer be a constant stream of income, but it would be a lump sum of money without any medical benefits. This shift poses challenges, especially for those with limited financial literacy, who may need help with investment decisions and risk management, potentially leading to inadequate retirement savings (Ali & Frank, 2019; Lusardi & Mitchell, 2014). The COVID-19 pandemic further strained retirement preparedness, as the EPF allowed members to make extraordinary withdrawals to cope with economic hardships, resulting in reduced retirement savings for many, particularly those in the B40 and M40 income groups (Tan, Carvalho, & Rahim, 2023). Approximately 6.7 million members, mainly from the B40 group, now have less than RM10,000 in their EPF accounts, a concerning statistic given the longevity of retirement periods (The Malaysian Reserve, 2023). Furthermore, 3.6 million members have savings of less than RM1,000, highlighting the severe impact of the pandemic on retirement security for the most vulnerable income group, which is B40.

Table 1: Savings of EPF Members by Income Level

Savings Level Group	No. of Members (Million)	Savings (RM Billion)	Average Savings (RM)	Median Savings (RM)
B40	6.43	11.01	1,713	1,063
M40	6.43	180.23	28,032	20,660
T20	3.21	896.70	278,941	170,266
Total	16.07	1,087.94	67,686	10,898

Source: EPF (2023)

Table 2: Savings of EPF Members by Race Group

Race Group	No. of Members (Million)	Savings (RM Billion)	Average Savings (RM)	Median Savings - All Age (RM)	Median Savings - Age Below 55 (RM)
Bumiputera	9.76	371.24	38,039	7,320	8,254
• Malay	8.13	332.00	40,827	7,838	8,950
• Other Bumiputera	1.63	39.24	24,110	5,183	5,889
Chinese	4.37	613.68	140,285	43,595	48,627
Indian	1.33	89.67	67,602	14,488	17,375
Other Races	0.61	13.36	21,795	1,996	2,181
Total	16.07	1,087.94	67,686	10,898	12,053

Source: EPF (2023)

Data from the EPF, as shown in Table 1 above, indicates a considerable savings gap between income groups, with the B40 group having significantly lower average and median savings compared to the M40 and T20 groups. As for the total savings, B40 only owns 1.01% (RM11.01 billion) of total savings compared to M40 and T20, which have 16.56% (RM180.23 billion) and 82.42% (RM896.70 billion), respectively. There is also a considerable gap in median savings among different income groups, with B40 only standing at RM1,063 as compared to M40 and T20 with RM20,660 and RM170,266, respectively (Employees Provident Fund, 2023). This gap highlights the vulnerability of the B40 group in achieving financial security in retirement. Moreover, as shown in Table 2, racial disparities in EPF savings exacerbate the situation, with Bumiputera members typically having lower savings than their Chinese and Indian counterparts. Chinese members have the highest average savings of RM 140,285 and median savings of RM 43,595. This is followed by Indian members with average savings of RM 67,602 and median savings of RM 14,488. The lowest is Bumiputera and other races,

with average savings of RM 38,039 and RM21,795 and median savings of RM 7,320 and RM1,996 respectively (Employees Provident Fund, 2023). The low amount of savings among the low-income group worsened during the COVID-19 pandemic, where the economic situation at the time was challenging for individuals to earn a living, for economies to expand, and for governments to collect taxes. In response to this, EPF implemented a few exceptional withdrawal provisions measures to address the adverse economic impact of the pandemic. It resulted in a total withdrawal of RM145 billion by 8.1 million members (Tan, Carvalho, & Rahim, 2023). The total amount comprises RM20.8 billion contributed by 5.3 million members via the i-Lestari program, RM58.7 billion contributed by 6.6 million members via i-Sinar, RM21.4 billion contributed by 5.2 million members via i-Citra, and RM44.6 billion contributed by 6.6 million members through a unique EPF withdrawal scheme in 2022. Most of the estimated 8.1 million EPF members who withdrew funds due to pandemic-related financial constraints belong to the B40 and M40 income segments, further worsening the savings gap with the T20 group. Additionally, the disparity in savings among different races in Malaysia is also widening (The Malaysian Reserve, 2023).

On the other hand, Malaysia's demographic shift towards an aging population further complicates the retirement landscape. With increasing life expectancy—average male life expectancy at 71.8 years and female at 77.2 years—retirement periods are extending, necessitating larger savings to maintain quality of life (Jaafar, Abdul Halim, & Ismail, 2022). This demographic trend, coupled with rising healthcare costs and an increasing dependency ratio, underscores the urgent need for adequate retirement preparedness. Individuals with inadequate financial knowledge often make poor investment decisions and deplete their funds quickly, resulting in inadequate savings and the risk of outliving their savings (Andonov, Bauer, & Cremers, 2017). Many Malaysians must continue working beyond retirement age to accumulate additional savings, as indicated by the 2015 EPF Annual Report. Additionally, Hassan et al. (2015) found that fifty percent of retirees deplete their EPF savings within five years after they stopped working and started their retirement life. This shows that the mandatory EPF contributions alone are not adequate for secure savings during retirement. Regarding this, the implementation of voluntary private retirement schemes (PRS) can be a good option to boost retirees' retirement savings. The government plays a significant role in encouraging an individual to save their money in the PRS by introducing tax exemptions of up to RM3,000 per year for individuals who participate in the PRS.

Still, according to Chek & Ismail (2023) and Rasiah et al. (2022), the effectiveness of these strategies strongly depends on individuals' financial literacy and proactive saving behavior. The financial constraints experienced by many Malaysians, particularly during the COVID-19 pandemic, have made it challenging for them to save sufficiently for retirement. Moreover, low-income levels and high levels of debt become significant barriers for individuals who want to achieve optimal savings during retirement. The purpose of this study is to examine the factors influencing retirement preparedness among Malaysia's low-income private sector employees. Focusing on the individual's attitudes towards retirement and the social influence role, the study aims to understand how these variables impact retirement preparedness. This study aims to analyze these determinants to provide valuable insights that can improve retirement preparedness among the vulnerable low-income group, hence ensuring more individuals from this income group can attain financial stability and security in their retirement years.

2. Literature Review

Retirement Preparedness: Retirement preparedness can be defined as a state of being sufficiently prepared for retirement, which encompasses having adequate financial resources, planning, and literacy to sustain a comfortable standard of living after retiring (Kumaraguru & Geetha, 2021). This entire preparedness includes proactive planning, accumulation of assets, investment actions and acquisition of insurance coverage. Furthermore, retirement preparedness is characterized by the anticipated sources of income during one's older years, including pension funds, government subsidies, proceeds from property sales or rental income, and assistance from friends or families. This definition encapsulates a broad spectrum of financial strategies and support systems that individuals may depend on to secure a financially stable retirement (García, 2021). Furthermore, Shabor and Marimuthu (2022) define retirement planning behavior as the actions and attitudes individuals exhibit toward their retirement planning and overall preparedness, emphasizing the proactive steps people take to ensure a secure future. Yuh, Montalto, and Hanna (1998) state that a household or a person is deemed prepared for retirement when their savings generate income comparable to their pre-retirement

level of spending. Retirement preparedness is critical for life after work, encompassing both the readiness and confidence to retire without financial worry. This notion is supported by Han, Ko, and Choe (2019), who found that the majority of people believe planning for post-retirement life, particularly financially, is essential.

Individuals who are satisfied with their retirement funds exhibit higher levels of confidence. As Malaysia's population is expected to age significantly by 2030, retirement preparedness becomes crucial for covering living expenses over extended periods. Despite this, many individuals remain unprepared for retirement due to insufficient savings. Effective retirement preparedness requires complex financial planning, which is incredibly challenging for those lacking financial knowledge. Consequently, a significant number of people worldwide are either inadequately prepared or not prepared at all for retirement, potentially leading to disappointment in their post-retirement lives (Ramli et al., 2018). Retirement preparedness involves securing a steady income once employment ends, becoming more crucial due to increasing financial demands and societal issues. Russell and Stramoski (2011) state that retirement income is primarily dependent on savings; thus, comprehensive pre-retirement preparation is essential for a stable retirement. The escalating cost of living poses a significant burden for working individuals, rapidly diminishing their savings. This issue is particularly concerning as many workers continue to financially assist family members after retirement, causing their wealth to decrease faster than anticipated (Ramli et al., 2018). Most workers anticipate and desire leisure time during their retirement years, expecting to maintain their current lifestyle. However, many lack the knowledge to effectively manage their finances to achieve this goal (Choi, Laibson, Madrian, & Metrick, 2002). Consequently, the importance of financial literacy and proactive planning cannot be overstated in ensuring a comfortable and financially secure retirement. This highlights the importance of proper education, financial literacy and proactive planning in achieving a secure and confident retirement. With appropriate financial strategies and savings, individuals can avoid facing significant financial challenges in their later years, emphasizing the need for early and continuous retirement planning. The EPF is a mandatory savings scheme for private-sector employees. Still, many contributors need to reach the fund's suggested minimum savings of RM240,000 by age 55, which is deemed necessary to retire at the poverty line (Goh, 2023).

In 2020, only 36% of active EPF members had met this target, and the percentage dropped to 29% in 2022, highlighting a significant shortfall in retirement savings. The COVID-19 pandemic exacerbated the retirement savings crisis in Malaysia. To alleviate financial hardship during the pandemic, the government allowed EPF members to withdraw funds under special provisions. This led to a significant depletion of retirement savings, particularly among the B40 and M40 income groups. Financial literacy is a critical factor in effective retirement planning. Individuals who possess a superior level of financial knowledge are more likely to engage in retirement planning and achieve an incredible amount of money for their retirement than those with a lower level of financial knowledge (Klapper & Panos, 2011). Nonetheless, a significant number of Malaysians view retirement planning as a low priority and rely primarily on EPF savings without any supplementary financial sources. This reliance is troublesome because the EPF alone is insufficient to achieve a desired lifestyle and preferred standard of living throughout retirement (Caraher, 2000; Tan, 2015). These problems highlighted the significance of attitudes and social influence in molding financial behaviors.

According to Han, Ko, & Choe (2019), an individual's level of retirement preparedness is significantly influenced by their attitudes towards retirement, which includes their confidence in handling finances and their opinions of its importance. In addition, Ramli et al. (2018) state that social influence, encompassing the influence and standards set by family members, partners, friends, and financial advisors, has a substantial effect on either promoting or discouraging proactive retirement planning. The goal of this study is to investigate retirement preparedness among low-income (B40) private-sector employees in Malaysia. It utilizes the Theory of Planned behavior to analyze the impact of attitudes and social influence on financial planning and savings behavior. The study seeks to examine these aspects to gain a deeper understanding of how it can enhance retirement preparedness among vulnerable populations, thereby promoting more financial well-being and stability for Malaysians during their retirement years.

Theory of Planned Behavior: The theory of Planned Behavior (TPB), developed by Ajzen, encompasses attitude, subjective norms, and perceived behavioral control as factors that influence behavioral intentions and actions. Based on this approach, attitudes toward behavior significantly influence an individual’s intention to engage in that behavior. Retirement planning is an example of the attitude whereby a positive attitude toward

retirement planning increases the probability of engaging in proactive financial behaviors. This is due to individuals being more motivated to prepare for their future needs (Ajzen, 1991). Subjective norms refer to the social influences individuals perceive from important people in an individual's life, influencing their intentions to behave in a certain way. The expectations of friends, family, spouses and society will shape these norms in individuals. When individuals perceive strong social support or feel pressured to participate in retirement planning, they are more likely to do so (Wahab & Lim, 2022; Ajzen, 1991). This is particularly pertinent in financial decision-making, as the input, guidance and approval from an individual's social circle can significantly influence an individual's behavior. Research supports the significance of attitudes and subjective norms in retirement planning. Individuals who possess positive attitudes about retirement are more inclined to save and plan for their retirement, demonstrating a proactive approach to safeguarding their financial future (Joo & Pauwels, 2002). Furthermore, individuals are frequently motivated by the expectations, support and encouragement of their close social networks. Thus, retirement savings behavior can be significantly influenced by subjective norms (Wood et al., 2012).

The TPB framework emphasizes the importance of attitudes and subjective norms in predicting retirement savings behavior. Positive attitudes towards saving and strong supportive subjective norms are associated with increased retirement preparedness. These factors provide individuals with a framework for making well-informed financial choices, which is crucial for achieving financial security throughout retirement years (Ajzen, 1991). In the setting of Malaysia's low-income (B40) group, these psychological factors are particularly relevant as the B40 group frequently faces financial challenges and may lack financial literacy and resources for effective retirement planning. Analyzing the influence of attitudes and subjective norms on the behavior of this particular group can help identify strategies to improve their retirement preparedness. This study aims to apply the Theory of Planned Behavior (TPB) to explore the roles of attitude and subjective norms in influencing retirement preparedness in Malaysia's low-income (B40) group of private sector workers.

Attitude: Attitude refers to individuals' internal psychological tendencies characterized by positive or negative judgments and actions towards a particular subject (Eagly & Chaiken, 1993). Human behavior, according to Ajzen (1991), is oriented by "beliefs about the likely consequences or other attributes of the behavior," and these beliefs "produce a favorable or unfavorable attitude towards the behavior." According to Louis et al. (2017), an individual's positive or negative judgment of retirement is reflected in their "attitude towards retirement." This means people with positive attitudes towards a particular behavior are more likely to engage in it or plan to engage in it. Within the context of this research, the attitude toward retirement and retirement planning behavior relates to an internal psychological condition shaped by favorable or unfavorable assessments linked to those behaviors. This relationship has received support in the context of retirement planning. Multiple studies have shown that possessing a positive attitude toward retirement has a beneficial impact on individuals' behavioral intentions, financial conduct, and fundamental money management abilities. These factors all contribute to an individual being adequately prepared for retirement (Tomar et al., 2021; Segel-Karpas & Werner, 2014; Lim et al., 2018; Hoffmann & Plotkina, 2020; Kim & Moen, 2001).

According to the study by Joo and Grable (2002), those who held favorable attitudes about personal finance and retirement planning demonstrated a greater tendency to pursue professional assistance for their retirement planning requirements actively. Similarly, Kim and Moen (2001) found that people with negative attitudes about retirement generally had lower rates of retirement planning and information seeking. These findings emphasize the significance of attitudes in influencing individuals' behaviors and choices about retirement planning. They also emphasize the need to cultivate favorable attitudes toward retirement to enhance financial preparedness. Segel-Karpas and Werner (2014) found that individuals' retirement plans were enhanced by their optimistic attitude toward retirement and their capacity to prepare for unexpected expenses. According to Millar and Devonish (2009), individuals demonstrate optimistic attitudes by prioritizing saving for retirement so that they have more chances to invest and save. Research findings indicate that individuals who have a positive attitude toward saving money are more likely to have a favorable intention to engage in sound financial habits (Rüfenacht et al., 2016; Lim et al., 2018). An individual's attitude toward retirement planning significantly influences their intention and preparedness for retirement (Zandi et al., 2021). Multiple studies, including the findings by Zandi et al. (2021), have demonstrated that individuals with a positive attitude or perception toward retirement are more likely to be financially prepared for this life stage.

As highlighted by Nosi et al. (2017), empirical evidence further confirms that attitude plays a role in shaping young adults' intentions to acquire retirement-related financial products. These findings collectively emphasize the importance of cultivating positive attitudes and perceptions toward retirement planning as they positively influence individuals' intentions and behaviors related to financial preparedness for retirement. Prior studies have established a substantial correlation between individuals' attitudes toward retirement and their level of retirement preparedness. Turner, Bailey, and Scott (1994), have discovered a significant correlation between attitudes and retirement planning. This relationship is particularly evident among individuals with dependent children who have a higher financial reliance on them. According to Whitaker and Bokemeier (2018), nonparents will usually retire earlier than parents due to less dependency on them. The same study found that older persons who have achieved higher levels of education, employment status, and income are more likely to have good views toward retirement and are more actively involved in planning for their retirement. Attitudes toward retirement play a crucial role in shaping retirement planning behavior, with individuals who hold positive attitudes being more likely to engage in adequate retirement savings and experience a sense of relaxation (Hassan et al., 2015; Moorthy et al., 2012). However, according to Lusardi and Mitchell (2007), retirement planning and income level do not correlate. This study's findings suggest that increased income does not necessarily result in any changes in attitude that lead to increased retirement planning. Conversely, attitude constitutes the most critical determinant in the planning process. Retirement planning entails investing in open-market instruments such as pension funds or fixed assets to fund retirement in the future (Zhu & Chou, 2018). A future-oriented perspective encourages young adults to save for retirement as adopting a forward-thinking mindset motivates an individual to look at a long-term perspective rather than just a short-term (Rolison et al., 2017).

In general, long-term financial stability is more important than short-term spending since retirement planning involves preparing for when an individual no longer earns income from work (Kumar et al., 2019). Mutran, Reitzes, and Fernandez (1997) discovered that individuals who actively participated in retirement planning exhibited more positive attitudes toward retirement, potentially reflecting their belief in having a sense of control in creating a positive retirement experience. A previous study showed that 49.8 percent of Malaysian academicians had a generally positive attitude toward retiring, and they agreed that it is crucial to start retirement planning in 20 years (Moorthy et al.,2012). García Mata's (2021) study revealed a strong and positive correlation between financial attitude and the inclination to engage in retirement planning. Individuals have optimistic attitudes toward retirement savings since there are more options to invest and save (Millar & Devonish, 2009). Financial attitudes pertain to the psychological inclinations exhibited when evaluating suggested financial management strategies, which varying levels of agreement or dissatisfaction may accompany. Financial attitude refers to an individual's inclination or mindset towards finance, which is evident in their actions and choices related to financial matters (Owusu, 2021). Financial attitude refers to an individual's consistent and systematic approach to managing their financial resources. Financial attitude encompasses an individual's cognitive and affective inclination, encompassing their ideas, opinions, and evaluations regarding financial matters (Talwar et al., 2021). A financial mindset creates and maintains wealth by making sound financial decisions and managing resources (Johnson & Kornelsen, 2021). Therefore, the following hypotheses are proposed:

H1: *There is a positive relationship between attitude and retirement preparedness of Malaysian low-income (B40) private sector employees.*

Social Influence: Subjective norms within the Theory of Planned Behavior (TPB) are shaped by social influences that guide individual behavior, with social pressure from significant others playing a crucial role in retirement preparation (Ajzen, 1991). Social influence is categorized into normative beliefs, reflecting community opinions, and motivation of compliance, which is an individual's response to these beliefs (Wahab et al., 2022). When people perceive that their actions align with normative beliefs and are motivated to conform, there is a positive correlation between social influence and behavior. Subjective norms are formed through the thoughts, opinions, support, and approval of key individuals in one's social circle, such as family, friends, peers, colleagues, and supervisors. These influences, along with personal experiences, media, environment, and knowledge, shape attitudes toward behavior (Ajzen, 2011; She et al., 2023). Advice from significant others encourages participation in financial activities (Phan & Zhou, 2014). Individuals often form intentions to engage in specific actions when subjected to social pressure, even if they initially lack the desire to perform these behaviors (Akhtar & Das, 2019). Research shows that social influences positively affect

retirement preparedness (Kimiyaghalam et al., 2017; Whitaker & Bokemeier, 2018).

Greater social support from friends, family, and societal regulations enhances retirement savings planning. Co-workers, household decision-makers, and spouses significantly influence retirement savings choices (Wood et al., 2012). For instance, individuals are more inclined to continue working after retirement if their spouses continue to be employed, and those under pressure from their spouses to retire early are more likely to do so. Parental influence is pivotal in financial socialization, shaping financial attitudes and behaviors in adulthood (Kimiyaghalam et al., 2019). Parents' money management skills impact children's financial behavior. Learning financial skills from parents significantly influences young individuals, with parental support being a reliable predictor of higher overall savings in young adults (Harrison et al., 2017). Active discussions about financial matters with children help inculcate good financial habits (Hanson & Olson, 2018).

College students' financial well-being is positively correlated with their parents' financial literacy (Shim et al., 2010). Parental financial socialization persists with age, though its impact declines as children transition into adulthood (Bucciol & Veronesi, 2014; Harrison et al., 2017). Friends and spouses become more influential in young adults' lives as they age, reducing parental influence (Curran et al., 2018). Older employees often start retirement preparation to meet normative goals graded based on their age, recognizing the importance of adhering to social expectations (Hershey et al., 2002). Peer and social surroundings significantly influence older individuals' participation in volunteer activities and retirement planning (Ng et al., 2020). Subjective norms significantly impact saving for voluntary retirement funds. Family norms and altruism primarily motivate elderly care in European countries, with cultural expectations influencing financial planning for retirement (Klimaviciute et al., 2017). In China, the number of dependents correlates with passive retirement planning, reflecting reliance on children for financial support. This phenomenon is seen in various cultures, where married individuals often expect to care for elderly relatives, incorporating these expenses into their retirement planning. Cultural and familial conventions thus significantly shape retirement planning behavior. Moreover, in various cultural contexts, the influence of subjective norms on retirement planning behavior extends beyond immediate family and friends to encompass broader societal and cultural expectations. For example, in many Asian cultures, the expectation of filial piety means that children are often expected to provide for their parents in old age, which in turn affects the financial planning behaviors of both generations.

In Western contexts, social norms may encourage more individualistic approaches to retirement planning, where personal financial independence is highly valued. These cultural nuances highlight the importance of understanding subjective norms within specific societal contexts when examining retirement preparedness(Zhu & Chou, 2018). Subjective norms not only influence the practical aspects of financial planning but also shape the psychological readiness for retirement. The perceived support and approval from one's social circle can enhance an individual's confidence in their retirement plans, thereby improving their overall sense of preparedness. As societal values and norms evolve, so too do the subjective influences on retirement planning, underscoring the dynamic nature of these factors in shaping financial behaviors. Recognizing the interplay between social influences and individual financial planning can provide deeper insights into how different populations prepare for retirement and highlight areas where targeted interventions can improve retirement preparedness. Therefore, the following hypotheses are proposed:
H2*: There is a positive relationship between social influence and retirement preparedness of Malaysian low-income (B40) private sector employees.*

Classification of Income Group in Malaysia: According to the Department of Statistics Malaysia's Household Income Report 2022, the Malaysian population is categorized into three income brackets: T20 (top 20%), M40 (middle 40%), and B40 (bottom 40%). The mean incomes for these groups are RM19,752, RM7,971, and RM3,401, respectively. This study focuses on the B40 group, which has become Malaysia's largest income segment, especially after the COVID-19 pandemic pushed approximately 20% of M40 households into the B40 category due to income reductions (Department of Statistics Malaysia, 2023).

Table 3: Household gross mean and median income by state 2022.

State	Mean Income (RM)	Median Income (RM)
MALAYSIA	**8,479**	**6,338**
W.P. Putrajaya	13,473	10,094
W.P. Kuala Lumpur	13,325	10,076
Selangor	12,233	9,983
Johor	8,517	7,338
Pulau Pinang	8,267	6,998
W.P. Labuan	8,250	6,943
Melaka	8,057	6,210
Negeri Sembilan	6,788	5,688
Terengganu	7,248	5,384
Sarawak	6,457	4,978
Sabah	6,171	5,577
Pahang	5,777	4,753
Perak	5,779	4,594
Perlis	5,494	4,402
Kedah	5,500	4,173
Kelantan	4,885	3,564

Source: Developed by the researcher for the current study.

The selection of the B40 group is crucial due to the significant income disparities across Malaysia, as highlighted in Table 3. The national average mean income is RM8,479, with states like W.P. Putrajaya, W.P. Kuala Lumpur, Selangor, and Johor having the highest mean incomes above this average. In contrast, states such as Kelantan, Perlis, and Kedah exhibit the lowest mean incomes, reflecting varied economic conditions nationwide (Department of Statistics Malaysia, 2023). Malaysia's poverty rate, which significantly dropped from 49.3% in the 1970s to 1.7% in 2012, rose to 8.4% in 2020 due to the pandemic. Although there was a slight decrease to 8.2% in 2021, the rate returned to 8.4% in 2022, indicating ongoing economic challenges for low-income households. The average poverty line income (PLI) in 2022 was RM2,589, with an absolute poverty rate of 6.2%, meaning approximately 6 out of 100 households still struggle to meet basic needs (iMoney.my, 2023; Zainal et al., 2023). In 2023, the Malaysian government announced a transition from fixed income classification to net household disposable income to target aid and subsidies better, considering demographics, children, and locality. This shift, supported by the Central Database Hub (PADU), aims to ensure fairer distribution and address the current classification's limitations (Yamin, 2023; iMoney.my, 2023; Department of Statistics Malaysia, 2023).

Retirement Preparedness among Low-Income Groups: Retirement preparedness is crucial, particularly for low-income groups who often overlook proper retirement planning. This section explores the factors influencing retirement preparedness among Malaysia's low-income B40 group, emphasizing the roles of financial knowledge, financial stress, and socioeconomic factors. According to Siwar et al. (2019) and Abdullah (2021), the B40 group commonly needs help with financial difficulties, including running out of money before the next paycheck, insufficient savings, rising expenses, and debt burdens. Moreover, this low-income group often needs to pay more attention to adequate retirement planning, leading to a future need for financial assistance from the government and related bodies post-retirement. Based on the microdata from the 2019 Household Income and Expenditure Survey conducted by UPM's Malaysian Research Institute on Ageing (MyAgeing), approximately 31.2% of the 5,197 senior persons surveyed were from impoverished households. Additionally, figures from the Social Welfare Department (JKM) indicate that, as of August 2023, a total of 143,499 senior adults classified as living in absolute poverty were receiving assistance known as Bantuan Warga Emas (BWE) from the department (Bernama, 2023). This highlights the significant reliance on government support among the elderly poor. Furthermore, a World Bank (2021) report underscores that low-income individuals are the most vulnerable during pandemics, exacerbating their financial instability. These findings illustrate the urgent need for improved retirement planning and financial education within the B40 group to ensure better retirement preparedness and reduce future dependency on government aid.

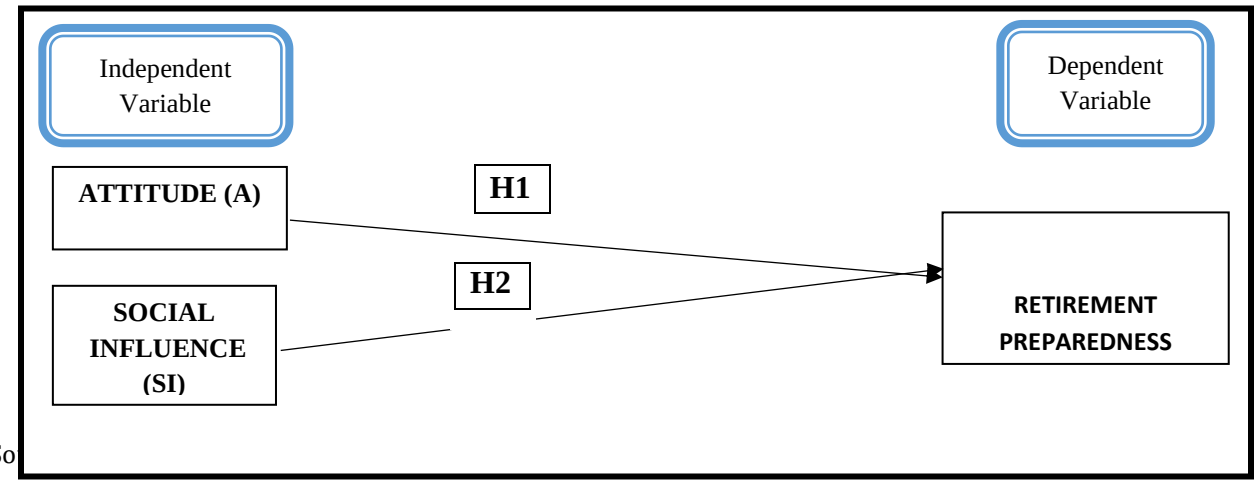
Addressing these issues can help create a more financially secure and independent aging population in

Malaysia. The COVID-19 pandemic worsened these issues, pushing many Malaysians into lower income brackets due to job and income losses, which drained their retirement savings in the Employees Provident Fund (EPF) (Rapi et al., 2022). Financial literacy is crucial for managing income, savings, and investments, particularly for the B40 group. Low financial knowledge correlates with reduced income and savings capacity, negatively impacting financial stability and quality of life (Kimiyaghalam & Yap, 2017). Financial illiteracy leads to poor financial decisions, increasing vulnerability to economic instability (Bianchi, 2018). Studies have shown that financial literacy enhances daily financial practices, including budgeting and retirement planning (Lusardi & Mitchell, 2011). However, low-income families often lack access to financial education, which hinders their ability to prepare adequately for retirement (Potrich, Vieira, & Mendes-Da-Silva, 2016; Hastings et al., 2013). Financial stress, driven by concerns over debt and meeting financial obligations, is particularly severe for the B40 group, exacerbating their financial insecurity and affecting their overall well-being (Suprapto, 2020; Yusof et al., 2018). Higher financial stress is linked to poorer financial health, perpetuating a cycle of financial difficulties (Mahdzan et al., 2019). Education and income levels significantly influence financial behavior and well-being, with lower levels contributing to financial stress and inadequate retirement planning (Shusha, 2016). Socioeconomic factors, including income, education, and job status, along with psychological factors like financial attitudes, significantly impact personal financial management behavior and retirement preparedness (Goyal et al., 2021). Individuals with lower income and less information about investing are most susceptible to being unprepared for retirement (Yao et al., 2003). Higher-income individuals, particularly those in professional roles, are more likely to engage in retirement planning compared to lower-income individuals (Power & Hira, 2004). These factors collectively underscore the importance of targeted interventions to improve financial literacy and reduce financial stress among low-income groups, thus enhancing their retirement preparedness.

3. Conceptual Framework & Hypotheses of the Study

Figure 1 below illustrates a conceptual framework designed to explore retirement preparedness among Malaysian low-income private sector employees. The framework is founded on a comprehensive review of the literature on retirement preparedness within low-income populations and is aligned with the Theory of Planned Behavior (TPB). The objective of this study is to examine the relationship between attitude, social influence, and retirement preparedness of Malaysian lower-income (B40) private sector workers.

Figure 1: Conceptual Framework



So

4. Potential Outcome and Direction for the Future Research

This current study is a conceptual study that focuses on the determinants of retirement preparedness among low-income (B40) private-sector employees by including two variables: attitude and social influence. Specifically, it will concentrate on workers categorized as part of the low-income group, with household incomes of RM4,850 and below. The study will include adults aged between 18 and 50 years old to scrutinize their preparation for retirement. Our future study will use the same foundation that we used in this study, but

it will include financial knowledge as a mediating variable. An exploratory research design will be employed in future research, which will involve integrating quantitative data to achieve research objectives. Data will be gathered using a 5-point Likert scale structured questionnaire. It will be collected from low-income individuals living in Projek Perumahan Rakyat (PPR) under Kementerian Perumahan dan Kerajaan Tempatan (KPKT) as the unit of analysis. The target respondents will complete the questionnaire either face-to-face or using an online questionnaire. The data will be acquired once using a cross-sectional time frame. The data will be analyzed using Statistical Package for the Social Sciences (SPSS) and the Partial Least Squares Structural Equation Modelling (PLS-SEM). In the first phase of data analysis, data purification and descriptive analysis will be conducted using SPSS 29. The first phase needs to be done to ensure the data is clean and that SPSS will also provide a summary of sample characteristics. In the second phase, the emphasis is primarily on conducting statistical analyses, particularly evaluating the measurement model and structural model and testing hypotheses using PLS-SEM. The PLS-SEM approach will help understand the relationship between independent variables, mediating variables and retirement preparedness and identify which variable is significant. This can help improve retirement preparedness and financial planning for low-income private sector employees in Malaysia.

5. Conclusion

This conceptual paper explores the theoretical relationships between attitude and social influence on retirement preparedness among low-income private sector groups in Malaysia. The proposed model suggests that a positive attitude towards retirement will encourage proactive retirement planning behaviors, which is vital for achieving retirement preparedness. Furthermore, social influence, particularly from family and friends, is hypothesized to play an essential role in shaping retirement behaviors. Based on the Theory of Planned Behavior (TPB), this study provides a conceptual framework that investigates the retirement preparedness of low-income groups. Several measures, including data collection using questionnaires and data analysis using SPSS29 and PLS-SEM, have been proposed to test the model and validate the hypothesis empirically. This study will significantly enhance the understanding of retirement preparedness by addressing critical literature gaps and practical issues as well as exploring variables, including attitudes and social influence, and how they impact retirement preparedness. This study also aims to fill the gaps in previous studies that often overlook the B40 groups and their unique and vulnerable financial challenges. It will provide valuable insight into the financial behavior of the targeted low-income groups in the Malaysian context. However, the conceptual nature of this paper has certain limitations. Firstly, the proposed model has not yet been empirically tested. This means the relationship in the hypothesis remains theoretical. Future research can validate this hypothesis using mixed methods or longitudinal data to understand more about how attitudes and social influences evolve and impact retirement preparedness. Secondly, future studies can include other income groups or do a comparative analysis between people who live in urban areas versus those in rural areas. In addition, future studies can also explore the determinants of retirement preparedness across various demographics such as ethnicity, gender, age, and others. This current study emphasizes the importance of tailored financial literacy programs to improve retirement preparedness for low-income employees. The findings and analysis will offer actionable recommendations for financial planners, organizations and policymakers to enhance financial education, financial knowledge and retirement preparedness initiatives. This study highlights the necessity for empirical research focusing on the low-income segment and advocating for better-informed policy decisions and comprehensive financial inclusion to reduce poverty as well as to ensure economic stability. In the end, this research will contribute to the development of practical approaches that enhance financial well-being and secure retirement for Malaysia's low-income (B40) employees.

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The Impact of Taxation on the Cost of Living: A Comprehensive Analysis

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Abstract: This study examines the taxation-related factors affecting Malaysia's cost of living. The rising cost of living, a persistent issue in economics and social well-being, is often linked to global challenges faced by emerging nations. Direct tax has been identified as a primary contributor to the financial strain on households, who must manage various essentials beyond food, clothing, and shelter, such as education, cellular services, and transportation. The study analyzes the relationship between seven independent variables—direct tax, unemployment rate, exchange rate, household consumption expenditure, house price index, subsidies, and net trade—and the cost of living in Malaysia, using 30 years of annual data (1992-2022) with EViews for econometric analysis. This study uses descriptive statistical analysis for the description of data, coefficient matrix analysis and regression analysis for determining the impact of dependent and independent variables. The findings show that the cost-of-living pressures are positively correlated with direct tax, housing price index, and net trade. Data was sourced from the National Property Information Centre (NAPIC), the World Bank, and the Economic Planning Unit (EPU). The analysis underscores the significant impact of direct tax on the cost of living. To mitigate this impact, governments could implement fair and progressive tax reforms, provide targeted subsidies, and promote economic growth to boost income levels. Additionally, social programs and efficient government investment can further reduce household financial burdens.

Keywords: *Cost of Living, Direct Tax, Unemployment Rate, House Price Index, Net Trade, Malaysia.*

1. Introduction and Background

According to data from Numbeo, 'the world's largest database of user-contributed data about cities and countries worldwide,' Malaysia's cost of living ranks 46th among Asian countries, with a Cost-of-Living Index of 34.6. This places Kuala Lumpur significantly lower than Singapore, which tops the list with an index of 81.9, and other major cities like Hong Kong (71.5) and Seoul (70.3). Even regional neighbors such as Bangkok (42.4) and Manila (37.6) have higher cost of living indices. Although Malaysia currently enjoys a relatively lower cost of living compared to these countries, this should not lead to complacency. The rising cost of living in Malaysia, influenced by factors such as inflation, currency fluctuations, and economic pressures, necessitates proactive measures to ensure that the gap does not widen further.

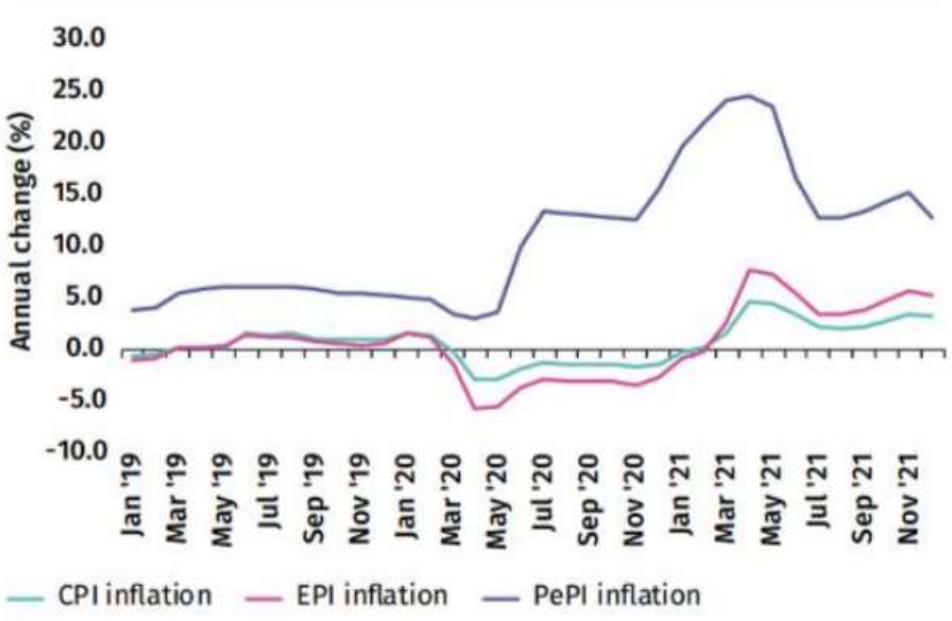
The issue of increasing living costs is not new; it tends to escalate over time for a variety of reasons. Malaysia is a developing nation that has seen steady economic growth. But starting in 2021, the cost of goods and services for basic needs including food, clothing, housing, and transportation has increased significantly. This is an unavoidable occurrence for Malaysian households as it is a global phenomenon. The rising cost of living will result in a decrease in Malaysian households' standard of living. Though Malaysia's inflation rate is currently modest and erratic, perceived rises in living costs have been a subject of continuous criticism and contention (Mazan et al., 2023).

The cost of living, on the other hand, is the amount needed at any given time to sustain a minimally respectable standard of living. It is sometimes referred to as the price of purchasing a wide enough variety of goods to keep up a minimal quality of living. In economic terms, a cost of living is "what is the minimum cost at this month's prices to achieve the actual level of utility attained in the base period," according to the Office for National Statistics (ONS) of the United Kingdom. In the meantime, the cost of living is defined as "How much more income would consumers need to be just as well-off with a new set of prices as the old" (Boskin, 2008). The total amount that households must spend on products and services in addition to paying off debt is referred to as the cost of living as stated by Bank Negara Malaysia (2015).

Since each consumer receives a specific amount of money to spend based on their overall income or financial limits, the concept of consumer choice also explains the cost of living. An increase in income or wage will enhance a person's purchasing power, allowing them to buy more of each common good. Consequently, the budget lines will advance and run parallel to one another in areas where the quantity of items required grows. This implies that living standards have increased. The intercept and slope of the budget restriction will change when prices fluctuate. The movement along the curve is the substitution effect. The shift in the curves that happens when real income rises, and utility levels rise is known as the income impact. The budgetary constraint rises in tandem with the price fall. This suggests that consumers' high purchasing power and utility maximization lead to an increase in their standard of life, from which a demand curve might be generated. The demand curve may shift as consumer preferences, income levels, or the price of other goods fluctuate. Prices reflect the standard of living as they change. Thus, upholding the previous standard of living or cost of living is contingent upon several variables that impact the demand function, including the price of related goods, the distribution of income, consumer preferences and tastes, and the probability of future changes in the prices of goods and services. Future prices, consumer preferences, and the cost of goods and services will all be directly impacted by government policy, which entails enacting taxes and subsidies. Meanwhile, a higher population and density of inhabitants suggest that there are many purchasers in the market (Latimaha, Ismal, and Bahari, 2020).

Bank Negara Malaysia states that the Consumer Price Index (CPI) inflation, which tracks price increases, is widely used to assess changes in the cost of living. In the meantime, changes in the cost of living for households can also be computed using the Consumer Price Index (CPI), according to the Department of Statistics Malaysia. The Malaysian consumer price index report's CPI figure is a weighted price index value that considers both changes in prices and household spending habits. An illustration of a figure format is provided below:

Figure 1: Evolution of CPI, EPI and PePI Inflation



Source: Bank Negara Malaysia, Department of Statistics, Malaysia and Bank Negara Malaysia estimates

The Consumer Price Index (CPI), which tracks a basket of items that represent normal household expenditure, is an essential tool for executing macroeconomic policies, especially monetary policy. It does not take changes in income into account, instead emphasizing the rate of price increases. The Everyday Price Index (EPI), which recognizes that regularly purchased products like groceries have a stronger impact on household opinions, focuses on these items to address frequency bias. Furthermore, the Perceived Price Index (PePI), which

assumes that decreased prices remain stable, only takes price increases into account when detecting memory bias. In addition to the overall CPI metric, the EPI and PePI provide more detailed viewpoints.

2. Literature Review

The Cost of Living: The minimal amount needed to buy a certain range of products and services to maintain a particular standard of life is referred to as the cost of living (Latimaha et al., 2020). The cost-of-living issue is unavoidable for Malaysian households due to rising prices for products and services, especially for necessities like food, housing, and transit, plus, there is a price differential between urban and rural areas, which raises the question of the cost of living experienced by households in the country as a result of the amount of urbanization (Ismail, Daud, Mohd, Samat, and Ridzuan, 2022). A previous study conducted by Ismail et al. (2022) stated that there is no separation between the expense of living and the standard of living. While economic progress might raise living standards, it can also drive-up costs. As a result, advances in one area can cause increases in the other. This can be supported by the study made by Latimaha et al. (2018) whereby they explored the variables of living standards and spending patterns which resulted in the high level of living in the city raising the household spending patterns and driving up the cost of living there. Furthermore, according to Latimaha et al. (2017), to mitigate the impact of rising living costs, salary rates should increase proportionately, allowing individuals to maintain or improve their standard of living by affording the same quantity of products and services as before. To go deeper into salary rates, Ahmad, Taha, Endut, and Baatwah (2021) concluded that it is necessary to understand the classification of Malaysian citizens based on income level whereby this study found that B40, M40, and T20 have median household incomes of RM3,166, RM7,093, and RM15,301 respectively, according to Department of Statistics Malaysia (2020).

Finally, the past study by Latimaha et al. (2020) found that the standard of living and the cost of living generally have a strong and causal relationship. By considering the lagged values of the cost of living instead of the lagged values of the standard of living, the cost of living may be utilized to forecast the standard of living more accurately. In the meantime, the Laspeyres index and Paasche index, $L > I > P$, are the boundaries around which the genuine cost of living is found. To further details about the Laspeyres index and the Paasche index, the Laspeyres index sets the highest limit for the actual cost of living, while the Paasche index sets the lowest limit. In essence, the true cost of living falls within the bounds defined by the Laspeyres and Paasche indices. The widely used Laspeyres price index serves as a foundation for calculating the overall cost-of-living index. Besides, the cost of living can also be explained by the theory of consumer choice, since each consumer is allocated a set amount of money to spend that matches their overall income or budgetary constraints (Latimaha et al., 2020).

Direct Tax: The relationship between direct tax and cost of living has been the subject of numerous research. Both direct and indirect taxes are significantly impacted by the cost of living, whereas direct taxes are primarily impacted by the house price index. Direct taxation affects the consumer burden and the house price index more than indirect taxation does. This implies that any modifications to policies that consider people's fluctuating purchasing power could have an impact on the government's capacity to collect taxes. Repayment of house loans has a stronger effect on direct taxation than on consumer goods since it accounts for over 40% of all consumer debt and influences industrial production more than consumer products. In addition, cutting the personal income tax can improve a household's disposable income and lessen their financial burden. On the other hand, if consumption-based taxes are imposed, people's burdens can rise depending on how they consume (Ahmad et al., 2021).

The concept of consumer choice also explains the cost of living since each consumer is allotted a certain amount of money to spend on their total income or financial limitations. A person's purchasing power will rise with an increase in income or wage, increasing the quantity of each common good they purchase. As a result, in places where the number of things required increases, the budget lines will advance and run parallel to each other. This suggests that the standard of living has risen. Future prices, consumer preferences, and the cost of goods and services will all be directly impacted by government policy, which entails enacting taxes and subsidies. Meanwhile, a higher population and density suggest that there are many purchasers in the market.

Furthermore, Latimaha et al. (2020) also found that the cost of living has no discernible effect on per capita

income and that its sign is uncertain. Gillingham and S. Greenlees (1987) found that the anticipated rate of inflation is significantly impacted by the addition of direct taxes. After dividing up the household sample, it is discovered that accounting for taxes considerably changes the inflation rate differences that are calculated only using consumption prices. The cost of living is demonstrated to be strongly correlated with per capita income due to higher overall pricing resulting from increased demand for goods and services.

A tax and price index (TPI), which can be used to incorporate direct taxes into the CPI, was found through research. A TPI requires significantly more computing resources to generate than a CPI does. To calculate the TPI, one must be aware of several household demographic and economic characteristics. As a result, CPI can be calculated using data on total usage, even though TPI should be established at the household level and then averaged. Both indicate that taxes affect living expenses and that the conditional cost of living index provides the most context for understanding the CPI. These metrics are referred to as an income cost of living index (ICOL), and the TPI is merely an upper bound on the actual ICOL (Gillingham & Greenlees, 1987).

Meanwhile, Balasoiu, Chifu, and Oancea (2023) investigated the impact of direct taxation on economic growth across 27 EU countries, revealing that corporate income taxes negatively affect growth in both high and low-fiscal efficiency countries. Personal income tax also hinders growth in countries with limited fiscal efficiency. These findings suggest that reducing direct taxes can boost disposable income, encourage spending, and promote economic growth. This relationship between direct taxation and economic growth can directly impact the cost of living, as increased growth and income levels generally lead to improved living standards and affordability. Coherently, another study by Elshani and Pula (2023) examines how different types of taxes—personal income tax (PIT), corporate income tax (CIT), and value-added tax (VAT)—affect economic growth in Eurozone countries. The study finds that PIT, social security contributions, and customs duties negatively impact GDP, while CIT and VAT positively influence growth. As tax revenue's share of GDP increases, its positive impact diminishes. The findings suggest that reducing PIT could increase disposable income, positively affecting the cost of living by enhancing purchasing power and economic growth.
Null Hypothesis (HO_1): There is no relationship between direct tax and cost of living.
Alternate Hypothesis ($H1_1$): There is a relationship between direct tax and cost of living.

Unemployment Rate: The second independent variable of this study is the unemployment rate. Unemployment refers to the condition in which an individual desires to work but cannot find employment. In other words, it is the actual exclusion of labor. Unemployment is typically categorized into three main types, which are frictional, structural, and cyclical. Globally, the natural rate of unemployment is typically between 3% and 5%. When an economy maintains an unemployment rate within the range of 3% and 5%, it can be argued that there is no significant unemployment problem (Korkmaz & Abdullazade, 2020). According to the study of Latimaha et al. (2017), the results from this study revealed that the unemployment rate is significant and negatively related to the cost of living at the 5% level in their model. In Malaysia, the long-term relationship is stable and consistent, preventing both inflation and the cost of living from rising. On the other hand, cyclical unemployment may have a favorable impact on living expenses. Because of the rising cost of living, cyclical unemployment contributes to social problems like increased crime rates among the unemployed. Depending on the type of unemployment, the effect of the rate on the cost of living may vary. For example, cyclical unemployment, which is caused by fluctuations in the business cycle may have a different impact on the cost of living than structural unemployment which is caused by changes in the structure of the economy. According to the study of Cebula and Todd (2004), the relationship between unemployment and the cost of living in Florida counties is not significant. The study suggests that a higher unemployment rate might reduce the demand for goods and services, potentially leading to a lower cost of living in the area. However, the study finds that the unemployment rate does not significantly affect the living-cost differentials in the countries analyzed.

The study of Mazan et al. (2023), suggests that the relationship between the unemployment rate and the cost of living in Malaysia is complex and may depend on various factors. Most previous studies found a significant relationship between unemployment and the cost of living, indicating that as the unemployment rate increases, the cost of living also tends to increase. Other studies have found a negative relationship between the unemployment rate and the cost of living, suggesting that as the unemployment rate increases, the cost of living tends to decrease. However, this study reviewed indicates that there is an insignificant association between the unemployment rate and the cost of living in Malaysia suggesting that the unemployment rate does not influence

the cost of living. Nonetheless, the study highlights the impact of unemployment on people's ability to make a living and their standard of living, leading to an increased risk of poverty.

In a more recent study by Feng, Lagakos, and Rauch (2024), they explored the relationship between unemployment and development. The study shows that unemployment rates are generally higher in wealthier countries than in poorer ones, especially for those with lower education levels. In rich countries, less-educated individuals are more likely to be unemployed, while the opposite is true in poorer nations. This relationship suggests that in wealthier countries, the cost of living could be higher due to increased unemployment among low-skilled workers, which reduces their income and purchasing power, thereby affecting their ability to meet living expenses.
Null Hypothesis (HO_1): There is no relationship between the unemployment rate and the cost of living.
Alternate Hypothesis ($H1_1$): There is a relationship between the unemployment rate and the cost of living.

Exchange Rate: Next, the independent variable is the exchange rate. An exchange rate is the value of one currency in terms of another currency. It represents the rate at which one currency can be exchanged for another currency. Fluctuations in exchange rates can have various effects on an economy, including influencing the cost of imported goods, affecting the competitiveness of exports, and impacting the purchasing power of consumers. In the context of the study by Latimaha et al. (2017), the exchange rate may have a significant impact on the cost of living in Malaysia. The decline in the world price of exports worsens the terms of trade that will cause the Ringgit Malaysia to depreciate, leading to a rise in the cost of living. The results of the study indicate that the exchange rate is significant and positively related to the cost of living in the short run. This suggests that changes in the real exchange rate may have a temporary impact on the cost of living in Malaysia.

The impact of the exchange rate on the cost of living is discussed in Lafrance and Schembr's (2000) study, which largely focuses on the relationship between Canada's and the United States' standards of living. According to the study, a drop in Canada's terms of trade, which is brought on by a drop in the price of some commodities globally, may result in a loss in the value of the currency and a drop in living standards. As a result, a given level of exports will buy fewer imports for domestic consumers, which could result in increased living expenses. For example, if a nation's currency gains value, imports may become less expensive, which could cut living expenses. On the other hand, a decline in the value of the currency could result in increased costs for imported items, raising living expenses. The cost of living in Malaysia appears to be significantly correlated with the exchange rate, according to a study by Mazan et al. (2023). It highlights how the two variables are related to one another and admits that various researchers will find different outcomes when examining the influence of exchange rates on the cost of living. The paper also covers the purchasing power parity (PPP) hypothesis. The exchange rate between two currencies that reflects changes in the relative price levels of the two countries is known as the Purchasing Power Parity (PPP) exchange rate, according to Sarno & Taylor (2002). The study's findings, however, suggest that the exchange rate has a detrimental impact on living expenses.
Null Hypothesis (HO_1): There is no relationship between the exchange rate and the cost of living.
Alternate Hypothesis ($H1_1$): There is a relationship between the exchange rate and the cost of living.

Household Consumption Expenditure: Latimaha et al. (2018) identified five categories of household expenditure: food, housing, transportation, communication, childcare and education. In previous studies, food and clothing were found to be more important than other components, indicating that household expenditure is critical for meeting basic needs. However, clothing expenditure was not considered a necessity but discretionary spending during festive seasons. Food is still the most important necessity, but transportation, communication, and electricity have all become crucial for maintaining an adequate standard of living. Household spending on education has also grown significantly in the late 20th and early 21st centuries. It is critical to recognize that the definition of basic needs evolves, with food remaining the most necessary. According to the study of Muhamad et al. (2023), the current economic climate is characterized by a rise in income that does not align with the cost of living, affecting consumers' purchasing power and saving abilities.

This has led to households spending more on necessities, particularly for low-income households. Price increases are closely related to consumers' purchasing power, as they pressure households and deteriorate the quality of goods available for purchase. Further, Muhamad et al. (2023) insisted that low-income groups are more vulnerable to risk due to their limited financial resources and lack of savings. However, rising living costs

due to economic uncertainty and rising prices for goods and services put pressure on everyone, especially the B40 group. Thus, low-income groups, particularly the B40 group, are more susceptible to risk due to their limited financial resources and lack of savings. At the same time, rising living costs and prices also impact everyone. According to Venkadasalam (2015), household consumption expenditure refers to the market value of all goods and services purchased by families, including durable goods like automobiles, washing machines, and home computers. It excludes home purchases but does include imputed rent for owner-occupied homes. It also includes provisions for paying governments for licenses and permissions. Household consumption expenditure (HCE) was found to be significantly related to the consumer price index (CPI). Household consumption expenditure includes the costs of nonprofit institutions that serve households, even when reported separately from land. This data consists of any statistical differences in resource utilization versus provision. The relationship between household final consumption expenditure (HCE) and the consumer price index (CPI) is critical to understanding inflationary dynamics and economic stability. Venkadasalam (2015) Malaysian study discovered that changes in HCE significantly impact the CPI, indicating a strong relationship between the variables. The study's findings suggest that increasing household consumption expenditure leads to a more than proportional increase in the CPI.

Null Hypothesis (HO_1): There is no relationship between household consumption expenditure and cost of living.

Alternate Hypothesis ($H1_1$): There is a relationship between household consumption expenditure and cost of living.

House Price Index: Based on the study that was conducted by Ahmad et al. (2021) stated that the amount that people may borrow from financial organizations, which is based on real income and interest rates, is often what determines the price of houses. The result of this study revealed that the Granger causality test reveals that home prices significantly affect consumer burden, particularly on direct taxes. Another finding that was observed by Latimaha et al. (2017) mentioned that when home prices are rising, mortgage approval standards are becoming more stringent, and options for middle-class consumers are scarce, it can be challenging to become a homeowner. Thus, this study summarizes that middle-income earners in capital cities face financial strain due to inadequate salaries, increased dependents, rising costs of goods and services, and escalating housing and rental expenses. Moreover, Drelichman and Agudo (2014) who investigated the effects of including rent in early modern pricing indices and living standard estimates, found that the effect of price indexes is moderate whereby rent cuts the difference between Toledo and two destinations in northern Europe by as much as 9.5%. In addition, the study calculated an ideal cost-of-living index, illustrating the disproportionate impact on the poor in high-rent cities by Albouy, Ehrlich, and Liu (2016). They confirmed that rising rents contribute to increased real income inequality, offering insights into the growing unaffordability of housing.

This analysis was supported by Ahmad et al. (2021) whereby concluded home ownership becomes more of a burden as the ratio rises, and rentals or other substitute effects are favored. On the other hand, Latimaha et al. (2017) found that the study that was conducted may serve as a foundation for upcoming research and as a reference for policymakers addressing matters about living expenses. It is intended that this study will serve as a foundational resource for upcoming research on a range of topics related to the budget for basic requirements and the cost of living. This study also added that even though the households are free to prioritize their needs, they would have to search more afield from the major cities for a reasonably priced home, which would increase their transportation expenses. For example, some working single-adult households may decide to purchase a car first and a house later. They might have to spend several months sleeping in a car in the worst situation.

Null Hypothesis (HO_1): There is no relationship between the house price index and the cost of living.

Alternate Hypothesis ($H1_1$): There is a relationship between the house price index and the cost of living.

Subsidies: Offering subsidies is one of the strategies the government uses. According to economic theory, subsidies can be used to counteract externalities and market imperfections to increase economic efficiency. If more subsidies were offered, the cost of living would rise but consumer prices would decrease. An industry can produce more items or services at a lower cost when government subsidies are implemented, increasing the quantity that is needed. Even if certain subsidies aim to increase output and reduce inequities in living standards, their inefficiency can increase the total economic burden on society (Latimaha et al., 2017). Economic theory states that when subsidies are provided, businesses can cut their cost of production and

provide customers with acceptable rates. The results of various research have demonstrated a strong correlation between subsidies and the cost of living (Mazan et al., 2023). Additionally, a study by Latimaha et al. (2017) demonstrated that the elimination of the energy subsidy will influence the economy since households will have to spend more money and have limited access to energy due to price rises, which will decrease household welfare. According to a World Bank Group study, the rationalization of gasoline subsidies in December 2014 and the implementation of the goods and services tax in April 2015 influenced Malaysia's rising cost of living (Latimaha et al., 2017). To ensure that subsidies reach the intended beneficiaries, the government streamlined the system of subsidy delivery, particularly for consumer items and petrol. This was done by widening the participation of middle-class groups and identifying suitable target groups. According to Sulaiman, Harun, and Yusuf (2022), the wealthiest 20 percent of the population receive a disproportionate 43 percent of the subsidy benefit, while the lowest 20 percent receive just 7 percent. From 2004 to 2010, the petroleum subsidy accounted for a significant portion of Malaysia's governmental spending, with a high of 26.4 percent in 2008 and a low of 10.1 percent in 2004.
Null Hypothesis (HO_1): There is no relationship between subsidies and cost of living.
Alternate Hypothesis ($H1_1$): There is a relationship between subsidies and cost of living.

Net Trade: The difference between a country's exports and imports refers to net trade, also known as the trade balance (Keho, 2021). Net trade is another factor that affects the cost of living. If a country exports more than it imports, it has a positive net trade balance known as a trade surplus. People will focus on buying local products which are less expensive than imported products. Meanwhile, if it imports more than it exports, it has a negative net trade known as a trade deficit. If the cost of imported goods increases, it can contribute to higher prices for consumers which will lead to an increase in the overall cost of living (Mazlan et al., 2023). The dynamics of international commerce play a critical role in altering the economic landscape of individual nations to secure an integrated global economy. There is a stronger positive association between the import ratio and CPI utilizing correlation and Granger causality approaches (Adetiloye & Adekunle, 2010). Indeed, the relationship between net trade and the cost of living is complex and influenced by several factors. Exchange rates play a critical role in determining the impact of net trade on the cost of living. A strong national currency resulting from a trade surplus can make imports more affordable, benefiting customers. Conversely, a weaker currency due to a trade deficit may increase the cost of imported goods, potentially leading to inflation and negatively affecting the cost of living (Krugman, 1995). Furthermore, tariffs and trade agreements implemented by the government can have a substantial impact on the cost of living. Import tariffs can raise the pricing of imported goods, affecting consumer affordability. Trade agreements that promote the cross-border movement of goods and services may have the reverse consequence of making imported items more accessible.
Null Hypothesis (HO_1): There is no relationship between net trade and cost of living.
Alternate Hypothesis ($H1_1$): There is a relationship between net trade and cost of living.

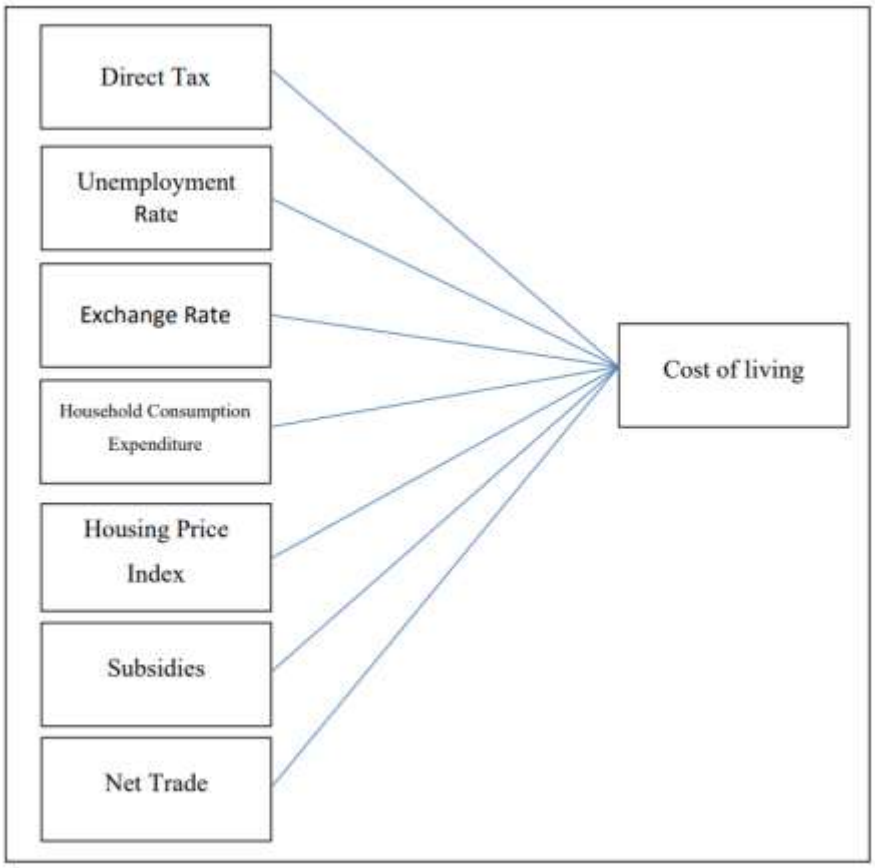
3. Research Methodology

This study will investigate the variables influencing Malaysia's cost of living based on the research base. Multiple linear regression is one of the main statistical techniques used to examine the relationship between one or more independent variables to forecast the result of a dependent variable (James, Witten, Hastie, Tibshirani, and Taylor, 2023). According to James et al. (2023), the technique allows analysts to determine the model's variation and the relative contributions of each independent variable to the total variance. This research aims to make a regression model and predict the variables using the regression coefficient. The sample applied in this study comprised cost of living data between the years 1992 to 2022. The study incorporated secondary data that comprised our independent variables, which include net trade, household consumption expenditure, housing price index, exchange rate, unemployment rate, and direct tax. The World Bank, Economic Planning Unit (EPU), and National Property Information Center (NAPIC) websites provided the data for this study. This study will use a time series of yearly data as its sample. A correlation analysis will be performed to find the multicollinearity issue in the regression and determine the correlation between the dependent and independent variables.

Figure 2 below depicts the relationship between the dependent and independent variables. The dependent variable responded to the independent variable. The dependent variable for this study is the cost of living. Meanwhile, the independent variables are taxation, unemployment rate, real exchange rate, household

consumption expenditure, housing price index, subsidies, and net trade. Hence, in this study, we will investigate how all these seven independent variables influence the dependent variable.

Figure 2: Research Framework



Before the analysis of the multiple regression model, two preliminary tests will be performed which are descriptive statistics analysis and correlation coefficient analysis. This was followed by statistical tests in the regression analysis such as the T-test and F-test were conducted and the R-squared and Adjusted R-squared were then determined.

4. Results

This section discusses descriptive statistics analysis, correlations, variance inflation factor, and multiple regression results.

Table 1: Descriptive Statistics

Variables	Mean	Maximum	Minimum	Standard Deviation
CL	94.55806	127.2000	62.10000	19.70424
DT	61.57286	71.35113	46.08892	8.222097
UR	3.382290	4.540000	2.450000	0.420187
ER	3.520328	4.401076	2.504404	0.579413
HCE	4.37E+11	9.08E+11	1.57E+11	2.34E+11
HPI	153.5242	216.8000	100.0000	39.74266

SUB	40.89571	48.43363	33.69598	3.784069
NT	1.05E+09	2.84E+09	1.37E+08	6.53E+08

Descriptive Statistics: Table 1 shows the result of the descriptive statistics of the variables for 31 observations from 1992 to 2022. The descriptive analysis includes cost of living, direct tax (DT), unemployment rate (UR), exchange rate (ER), household consumption expenditure (HCE), housing price index (HPI), subsidies (SUB) and net trade (NT). As demonstrated in Table 1, the mean cost of living is 94.55806 ranging from a minimum of 62.10000 to a maximum of 127.2000. The cost of living has a standard deviation of 19.70424, indicating that the amount of cost of living does not diverge too far from the mean of 94.

As for the independent variables, the direct tax had a maximum of 71.35113 percent in 2012 and a minimum of 46.08892 percent in 1996. While it has an average score of 61.57286 percent. This is because the direct tax was high in 2012 due to a household income survey, the top decile of households earns 32 percent of total household incomes and pays an effective income tax ranging between 15-25 percent (Washington, 2014), whereas the direct tax was low in 1996 due to the personal income tax rate was reduced in the 1996 budget to 30 percent (H Zee, 1996). The unemployment rate has a maximum of 4.540000 percent in 2020 and a minimum of 2.450000 percent in 1997 with a mean of 3.382290 percent. According to the Department of Statistics Malaysia (2020), it recorded the highest rate due to the COVID-19 pandemic which has affected the labor market (Samsudin and Khan 2020). Employers' cost-cutting efforts, including job losses and work schedule reductions, were seen in nearly all industries impacted by unemployment in 2020 when the number of unemployed people rose to 711,000 from 508,200 in 2019. The unemployment rate also jumped to 4.5 percent in 2020 from 3.3 percent in 2019 (Nga, Ramlan, and Naim, 2021).

In addition, this study reveals that the maximum value of the exchange rate was RM 4.401076 per USD in 2022 and the minimum value was RM 2.504404 per USD in 1995. While it has a mean of RM 3.382290 per USD. The highest exchange rate in 2022 is because the US Federal Reserve raised its policy interest rate aggressively by 425 basis points to a target range of 4.25-4.50% to address inflation. The minimum was in 1995 because of the restrictions were reversed in the third quarter of 1994, and the ringgit strengthened, reaching RM 2.43 per dollar in June 1995 (U.S. Department of State, 1995).

Next, the household consumption expenditure has a maximum of RM 908 billion (2022) and a minimum of RM 157 billion (1992) with a mean of RM 437 billion. This is because 2022 was largely driven by domestic demand, mainly from firm private sector expenditure. Improvements in labor market conditions and wage growth led to an increase in household spending (Bank Negara Malaysia, BNM). The housing price index has a maximum of 216.8000 which is in the year 1997 and the minimum is in 2020 by 100.0000 with a mean of 153.5242. The high housing prices may happen because of the Asian financial crisis. As the crisis hit the real estate sector, house prices rose by 1.9% in 1997 before they collapsed by 9.0% in 1998 and property prices dropped (Zulkarnain & Nawi, 2023).

The subsidies had a maximum of 48.43363 percent in 2000 and a minimum of 33.69596 percent in 2003. While the mean is 40.98571 percent with a mean of 40.89571 percent. The highest subsidies were in 2000 because of the recovery from the financial crisis in 1997. During this period, the Malaysian government implemented various economic policies to stabilize the economy and encourage growth (Nambiar, 2023).

Lastly, the net trade has a maximum of RM 2840 million in 2022 and a minimum of RM 137 million in 2013 with a mean of RM 1050 million. In 2022, it recorded the highest net trade because exports of agricultural goods were valued at RM120.94 billion, expanded by 23.3% from 2021 and comprised a 7.8% share of total exports. Increased exports of palm oil and agricultural products derived from it, which increased by 27.3% to RM96.53 billion, drove the expansion. The standard deviation for the variables of direct tax, unemployment rate, exchange rate, household consumption expenditure, housing price index, subsidies and net trade is 8.222097 percent, 0.420187 percent, RM 0.579413 per USD, RM 234 billion, 39.74266, 3.784069 percent, RM 653 million respectively.

Table 2: Correlation

Variables	CL	DT	UR	ER	HCE	HPI	SUB	NT
CL	1	0.7454	0.1664	0.6834	0.9746	0.2414	0.0917	**0.8910**
DT		1	0.0980	0.5468	0.6197	-0.2607	0.3494	**0.5869**
UR			1	0.3278	0.2220	-0.0452	-0.8168	**0.2496**
ER				1	0.6248	0.1182	-0.0850	**0.6932**
HCE					1	0.3803	0.0355	**0.9035**
HPI						1	-0.2813	**0.3082**
SUB							1	**0.0119**
NT								**1**

Correlation: According to the table, this study found that direct tax, unemployment rate, exchange rate, housing price index and subsidies are lower than the threshold for the correlation analysis at 0.8. Thus, this indicates that the mentioned independent variables are free from correlation issues. However, household consumption expenditure and net trade have a correlation issue as the values exceeded the threshold of 0.8. This shows that there is a multicollinearity issue between independent variables in this study. Therefore, this study decided to run the VIF to make a diagnostic check regarding the exceeded values for additional confirmation.

Table 3: Variance Inflation Factor

Variables	Coefficient Variance	Uncentered VIF	Centered VIF
DT	0.093190	147.3515	2.499598
UR	16.98214	80.84074	1.189639
ER	18.97625	98.94487	2.527691
HPI	0.002121	21.82171	1.328983
SUB	0.237455	164.1718	1.349078
NT_LOG	62.75580	2051.032	2.603122
C	3783.517	1551.220	NA

Variance Inflation Factor: Based on the VIF result, direct tax, unemployment rate, exchange rate, housing price index, subsidies, and net trade-centered VIF scores below 5. However, only household consumption expenditure exceeds 5. Hence, this study decided to drop the household consumption expenditure because the VIF score was 5.260342 from the model due to the high correlation among them. After dropping the Household Consumption Expenditure, the researchers rerun the Variance Inflation Factor. As a result, all the independent variables are below 5. Thus, there is no severe multicollinearity.

Table 4: Multiple Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Direct Tax	1.421338	0.305270	4.656006	0.0001
Unemployment Rate	2.405203	4.120939	0.583654	0.5649
Exchange Rate	1.903158	4.356174	0.436887	0.6661
House Price Index	0.168186	0.046050	3.652217	0.0013
Subsidies	-0.110823	0.487294	-0.227426	0.8220
Net Trade Log	20.89353	7.921856	2.637454	0.0144

Constant	-215.5071	61.51030	-3.503594	0.0018
R-squared	**0.844205**			
Adjusted R-squared	**0.805256**			
F-statistic	**21.67470**			
Prob (F-statistic)	**0.000000**			

Based on the result above, the F-statistic of 21.67470 indicates that the models are fit as the F-statistic is significant at a 1 percent level and proved with a probability lower than 0.05 (0.00000). This model is good for interpretation and free from multicollinearity issues after being fixed by the Newey-West test. The model is mainly to analyze whether the independent variables are significant or insignificant to the dependent variable. Thus, the researcher has conducted and developed the hypothesis statement where the null hypothesis (H0) determines there is no relationship between the independent variables and dependent variables (insignificant), meanwhile, the alternate hypothesis (H1) determines there is a relationship between independent variables and dependent variables (significant). Therefore, if the value of probability (p-value) is lower than 0.05, meaning that the model is significant, we reject the H0 and accept the H1.

Based on the regression results in the table above, R-squared shows 84.42 percent of the multiple cases of cost of living in Malaysia that could be explained by the variation of independent variables which are direct tax (DT), unemployment rate (UR), exchange rates (ER), housing price index (HPI), subsidies (SUB) and log net trade. Meanwhile, the adjusted R-squared indicates that only 80.53 percent of the cost of living in Malaysia can be explained by the variation in all independent variables. The remaining 19.47 percent show that there are independent variables that are not included in the above model also explaining the dependent variables in this study. Therefore, the researcher may suggest future research to further explore the reasons for the increase in the cost of living in Malaysia. This is because there are still factors that have not been studied by the researchers. Hence, we can see there are only three independent variables found to be significant to the dependent variables in this study.

As for the first independent variable which is direct tax (DT) based on the table above, we can see that the p-value of the direct tax (DT) is 0.0001 determining a positive and significant relationship with the cost of living (COL). The probability value shows that it is below 0.01 with a 99 percent confidence level and 1 percent error. Therefore, we need to reject the null hypothesis (H0) and accept the alternative hypothesis (H1) because there is a relationship between direct tax and cost of living.

The second of the independent variables which is the unemployment rate (UR) shows a positive and insignificant relationship whereby the probability is 0.5649 since it is higher than the threshold of 0.05 and a 1 percent increase in UR will indicate 2.41 units of cost of living (COL) which also can be obtained from the negative coefficient. Therefore, we accept the null hypothesis (H0) and reject the alternate hypothesis (H1) as it indicates there is no relationship between the unemployment rate (UR) and the cost of living (COL).

Moreover, the exchange rate as the third independent variable revealed that there is a positive insignificant relationship where the p-value is 0.6661 since it is higher than the threshold of 0.05. Plus, the positive relationship comes from the 1.903158 coefficient. In addition, a 1% increase in ER will indicate 1.90 units of cost of living (COL). Therefore, we accept the null hypothesis (H0) which indicates that there is no relationship between exchange rate (ER) and cost of living (COL), and reject the alternate hypothesis (H1).

Furthermore, the fourth of our independent variables, which is the housing price index (HPI), determines a positive significant relationship with the cost of living (COL). The probability value of the housing price index is 0.0013 at a 99% confidence level with a 1% error clearly showing that there is a relationship between the housing price index and the cost of living. Therefore, we must reject the null hypothesis (H0) and accept the alternate hypothesis (H1).

Apart from that, another of our independent variables, which is subsidies (SUB), presents a negatively insignificant relationship to the cost of living (COL) and a 1% increase in the subsidies will indicate -0.1108 units of cost of living (COL). Therefore, we accept the null hypothesis (H0) and reject the alternate hypothesis

(H1).

Finally, net trade (NT) has a positive and significant relationship with the cost of living (COL) as the p-value is 0.0144 with a 99 percent confidence level and 1% error since it is below the threshold level in which it is 0.01. Therefore, we reject the null hypothesis (H0) and accept the alternate hypothesis (H1) because there is a relationship between the net trade and the cost of living.

Table 5: Regression Results Summary

Independent Variable	Hypotheses (+/-)	Result (Significant/ Insignificant)	Confidence Level (%)	Support to Hypotheses (Yes/ No)
Direct Tax	Positive	Significant	99	**Yes**
Unemployment Rate	Positive	Insignificant	-	**No**
Exchange Rate	Positive	Insignificant	-	**No**
House Price Index	Positive	Significant	99	**Yes**
Subsidies	Negative	Insignificant	-	**No**
Log Net Trade	**Positive**	**Significant**	**99**	**Yes**

Discussion

The first independent variable, direct tax (DT), shows a p-value of 0.0001, indicating a positive and significant relationship with the cost of living (COL). Since the p-value is below 0.01, we can reject the null hypothesis (H0) with 99% confidence and accept the alternative hypothesis (H1), confirming that there is indeed a relationship between direct tax and cost of living. This finding aligns with previous research by Ahmad et al. (2021), which demonstrated that higher taxes, particularly on income, reduce disposable income, leading to increased financial strain. Additionally, Gillingham and Greenlees (1987) noted that direct taxes could be included in the conditional Consumer Price Index (CPI), though this requires more processing power. The findings are also supported by Balasoiu, Chifu, and Oancea (2023) who suggested that the relationship between direct taxation and economic growth can directly impact the cost of living, as increased growth and income levels generally lead to improved living standards and affordability.

The second independent variable, the unemployment rate (UR), exhibits a positive but insignificant relationship with a p-value of 0.5649, which is above the 0.05 threshold. A 1% increase in UR is associated with a 2.41-unit change in COL, as indicated by the negative coefficient. Therefore, we accept the null hypothesis (H0) and reject the alternative hypothesis (H1), suggesting that there is no significant relationship between the unemployment rate and the cost of living. This result is consistent with earlier studies, such as those by Cebula and Todd (2004), which found that higher unemployment might reduce demand for goods and services. Conversely, Latimaha et al. (2018) found a significant negative relationship between unemployment and the cost of living in Malaysia, highlighting the role of long-term stability in preventing inflation and rising costs.

For the third independent variable, the exchange rate (ER), the analysis reveals a positive but insignificant relationship, with a p-value of 0.6661, which is also above the 0.05 threshold. A 1% increase in ER corresponds to a 1.90-unit increase in COL. Hence, we accept the null hypothesis (H0) and reject the alternative hypothesis (H1), indicating no significant relationship between the exchange rate and the cost of living. This finding is supported by Mazan et al. (2023), who observed that exchange rate fluctuations, as explained by Purchasing Power Parity, impact the cost of living by influencing the prices of imported goods and services. Furthermore, Latimaha et al. (2018) noted that exchange rates and cost of living are closely linked in small, open economies like Malaysia, where any shifts can affect both.

The fourth independent variable, the housing price index (HPI), shows a positive and significant relationship with the cost of living (COL), with a p-value of 0.0013 at a 99% confidence level. This result indicates a significant relationship between the housing price index and the cost of living, leading to the rejection of the null hypothesis (H0) and acceptance of the alternative hypothesis (H1). Rising housing costs, especially in high-rent cities, disproportionately affect lower-income individuals, increasing income inequality and making housing less affordable. This finding is consistent with research by Ahmad et al. (2021) and Latimaha et al. (2017), who highlighted the financial strain faced by middle-income earners in urban areas due to rising rents, stringent mortgage approval standards, and limited housing options. Additionally, these findings are also

supported by Drelichman and Agudo (2014) who investigated the effects of rent and living standard estimates and another study by Albouy, Ehrlich, and Liu (2016) who confirmed that rising rents contribute to increased real income inequality, offering insights into the growing unaffordability of housing and subsequently higher cost of living.

Another independent variable, subsidies (SUB), displays a negative but insignificant relationship with the cost of living (COL), with a 1% increase in subsidies corresponding to a decrease of 0.1108 units in COL. As the p-value is not significant, we accept the null hypothesis (H0) and reject the alternative hypothesis (H1). This outcome is supported by previous studies, such as Latimaha et al. (2018), which suggested that while government subsidies aim to offset market failures and reduce the cost of living, their inefficiency may increase the overall economic burden on society.

Finally, net trade (NT) exhibits a positive and significant relationship with the cost of living (COL), with a p-value of 0.0144, below the 0.01 threshold. Thus, we reject the null hypothesis (H0) and accept the alternative hypothesis (H1), indicating that there is a significant relationship between net trade and the cost of living. This finding is consistent with the work of Adetiloye & Adekunle (2010), who noted that a country's net trade balance, the difference between exports and imports, influences the cost of living, where a positive trade balance leads to a surplus and a negative trade balance leads to a deficit. This finding is also supported by Mazlan et al (2023) whereby posited that if the cost of imported goods increases, it can contribute to higher prices for consumers that will lead to an increase in the overall cost of living.

5. Implications and Recommendations

Research has demonstrated a significant relationship between direct taxation and the cost of living, with direct taxes such as income and corporate taxes having a more substantial impact on consumer burden and the housing market than indirect taxes. Specifically, the repayment of house loans, which constitutes a large portion of consumer debt, influences direct taxation more significantly than other consumer goods. These findings suggest that policy adjustments aimed at accommodating fluctuations in purchasing power could affect the government’s tax revenue collection capabilities. Additionally, reducing personal income tax could enhance household disposable income, thereby alleviating financial pressures.

Given these insights, the study recommends that Malaysia's tax agencies, particularly the Inland Revenue Board, consider restructuring direct taxes to balance revenue generation with living costs. This could involve revising tax rates, exemptions, or incentives to align better with governmental goals, ultimately promoting economic growth while mitigating adverse effects on household affordability. Supporting this approach, previous studies have shown that tax policy adjustments that consider cost-of-living impacts can lead to more sustainable economic outcomes and improved quality of life for citizens (Ahmad et al., 2021).

In addition, this study will benefit the Ministry of Finance by enabling informed decision-making when formulating fiscal policies that balance revenue generation and citizens' living expenses. Understanding the significance of direct taxes in this study of the cost of living allows the finance ministry to create policies that reduce the tax burden on individuals while supporting economic growth. Additionally, it offers the tools necessary to develop fiscal policies that promote business growth, investment, and employment creation, all of which contribute to financial stability. By promoting transparency in taxation, these findings respond to issues related to the cost of living and build public confidence in the government's financial management.

Further, the results show the significance of direct tax, housing price index and net trade which has shown a strong dependence on cost of living. Thus, it implies a serious implication for employers. Employers know that direct tax and house prices change over time due to economic conditions, government policies, and market demand and supply. Therefore, wages and benefits must be taken seriously by the employer to ensure that employees can maintain a reasonable standard of living. Wages are also expected to vary because of cost-of-living differences across locations (Sturman, Ukhov, and Park, 2017). By doing so, employers can help reduce the pressure of rising living expenditures by demonstrating their commitment to helping their employees' financial well-being.

In general, the rising cost of living causes a change in the standard of living. The standard of living measures the quality of life, or the level of material prosperity enjoyed by individuals (Bank Negara Malaysia, 2015). It is required to maintain some minimum basic needs and wants. For example, housing, food, transportation, healthcare, and other necessities. Therefore, this study is important in enabling people to spread out their consumption of goods and services throughout their lives. Apart from that, this study found that direct tax, housing price index, and net trade have a positive significance on the cost of living. Therefore, those who have been in the workforce will tend to increase their daily expenses according to their income level.

An important limitation that needs consideration is the availability of data for the chosen independent variables, which impacts the study's time frame. Even though this study began in 1992 and lasted over 30 years, the recommendation for future researchers is to explore other independent variables that are characterized by continuously available data over a longer period. This suggestion promotes the creation of creative approaches to deal with missing data in particular years, providing a possible means of making use of a more extensive data set without compromising the accuracy of the findings of the research.

In terms of the study's research, the limited selection of independent variables presents a tempting direction for further research. Future researchers are urged to expand their scope as the current analysis of the association between only seven variables and the cost of living is so narrow. Enhancing the completeness and reliability of future findings can be achieved by identifying additional factors impacting the cost of living and performing sensitivity studies to assess the impact of integrating various independent variables. This suggestion calls for a more thorough comprehension of the relevant variables and acts as a call to action for researchers to negotiate the complex web of factors affecting the costs of living.

Finally, the study faces resource constraints, especially when it comes to locating articles and data associated with variables. It is recommended that future researchers investigate multidisciplinary methodologies, varied databases, and collaborations to increase the pool of available resources. Furthermore, it becomes imperative to critically assess the techniques of measurement, particularly regarding factors such as subsidies and taxes. Making sure that the applied formulas are accurate and fit the intended context will allow for more accurate and consistent outcomes across investigations. By providing a comprehensive toolkit to overcome resource constraints, this advice seeks to encourage a deeper analysis of variables and their effects on the cost of living for future researchers.

Conclusion

Using time series data from 1992 to 2022, the objective of this study was to investigate the determinants of the cost of living in Malaysia (i.e., direct tax, unemployment rate, exchange rate, household consumption expenditure, housing price index, subsidies, and net trade). This study uses the technique of empirical investigation, the multiple regression method, which allows us to analyze the effects of the cost of living on several variables. Based on the results, this study has found that household consumption expenditure and net trade have a multicollinearity issue as it has a value of more than the threshold of 0.8. Therefore, this study has conducted a Variance Inflation Factor (VIF) to validate the results. As a result, household consumption expenditure has been dropped due to its VIF value exceeding the threshold of 5, indicating a multicollinearity issue. Thus, the other independent variables which are direct tax, unemployment rate, exchange rate, housing price index, subsidies, and net trade are retained. Based on this study, the cost of living is significantly and positively related to the direct tax, housing price index, and log net trade. Also, the study reveals that the unemployment rate, exchange rate and subsidies have a negative relationship but are not significant. Further, this study found a positive significance between direct tax, housing price index and net trade to the cost of living with a 99% confidence level and the value of probability lower than the threshold of 0.05. which means, we can reject the null hypothesis (H0) and accept the alternate hypothesis (H1). Additionally, the R-squared is 84.42% which means that it can be explained by the variation of all independent variables in our study. Henceforth, this study will help the relevant authorities to understand the impact of direct tax on the cost of living of Malaysians.

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Evaluating Trust in Blockchain Technology for Waqf Adoption: Insights from Importance-Performance Map Analysis

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Abstract: Blockchain technology offers transformative benefits for waqf by enhancing transparency, security, and efficiency. Its decentralized ledger system allows for independent transaction verification, reduces central authority risks, and improves accountability. However, while the potential benefits are significant, the success of blockchain-based waqf initiatives hinges on the level of trust that stakeholders place in this technology. Therefore, the study aims to examine the effect of trust in blockchain technology on the intention to adopt waqf blockchain with insight from importance-performance map analysis to better understand the relations between trust and intention. The study adopted a survey research design and data was collected through questionnaires distributed throughout Malaysia. The collected data were then analyzed using Smart-PLS software. The results of the analysis indicate a strong positive relationship between trust in blockchain technology and the intention to adopt waqf blockchain. However, the importance-performance map analysis shows a critical disparity exists between user expectations and actual performance, especially regarding the transaction process, which scored the lowest in performance. This implies a need to focus on improving the transaction process to align with user expectations.

Keywords: *Trust, Blockchain, Intention, Waqf*

1. Introduction and Background

With the rapid advancement of financial technologies, blockchain presents a transformative opportunity for waqf, offering enhanced transparency, security, and efficiency in increasing public trust (Mohsin & Muneeza, 2019). Originating with Bitcoin in 2008, blockchain technology provides a decentralized ledger that allows all participants to independently verify transactions without the need for intermediaries (Yli-Huumo et al., 2016). This decentralization reduces risks associated with central authority manipulation and improves efficiency by eliminating bottlenecks inherent in traditional financial systems. The transparency of blockchain ensures that every transaction is visible and traceable to all network participants, fostering greater accountability and trust in the management of waqf funds. Additionally, the immutable nature of blockchain records prevents tampering and fraud, addressing major concerns related to fund integrity.

Blockchain also enhances data security and privacy, with encrypted, distributed data across multiple nodes making the system resistant to cyberattacks and unauthorized access. The technology supports user anonymity while maintaining transparency, which balances privacy with accountability (Marsal-Llacuna, 2018). By ensuring equal treatment of all network participants, blockchain aligns with the egalitarian principles of waqf, promoting fairness and inclusivity. Leveraging blockchain can therefore modernize waqf practices, improving fund collection and management while building greater public trust and efficiency in philanthropic efforts.

2. Literature Review

Several studies have underscored the transformative potential of blockchain technology for enhancing waqf management and accessibility. Mohamed and Lahsasna (2020) and Suryaningsih et al., (2020) both supported blockchain-based waqf systems that offer notable advantages, including improved transparency, secure record-keeping, and streamlined transactions between donors and administrators. Habib and Ahmad (2020) and Alharthi (2021) added the integration of smart contracts on blockchain platforms has the potential to further enhance the efficiency and operational performance of waqf institutions by automating processes and ensuring that the terms of waqf agreements are adhered to consistently. This capability has the potential to

rejuvenate the waqf system and restore its historical importance within Islamic social finance, thereby reinforcing its role in contemporary financial practices (Huda & Santoso, 2022). By modernizing waqf management through blockchain, technology could play a pivotal role in revitalizing this essential institution and making it more relevant in the digital age.

A practical application of blockchain-based waqf crowdfunding for fishermen groups in Surabaya has demonstrated its effectiveness in fostering trust and facilitating investments, as outlined by Sukmana (2020). By leveraging blockchain technology, waqf institutions can overcome traditional hindrances, such as the lack of transparency, inefficiencies, and mistrust, which have often plagued conventional waqf systems. Blockchain's decentralized and immutable ledger allows for greater transparency, enabling both donors and beneficiaries to track the flow of funds in real time. This transparency, coupled with the efficiency of automated smart contracts, streamlines the entire process, making it more accessible and trustworthy for all parties involved, as highlighted by Mohamed and Lahsasna (2020) and Huda & Santoso (2022).

However, while the potential benefits are significant, the success of blockchain-based waqf initiatives hinges on the level of trust that stakeholders place in this technology. It is supported by the study conducted by Fauzi et al., (2019) in the case of online cash waqf donation, consumers of internet banking use trust in online banking services as a deciding element before completing an online transaction. This finding underscores the importance of trust in the transaction medium, particularly in the context of online platforms. Mohd Thas Thaker et al. (2018), in their research on the behavioral intentions of crowd-funders to adopt the crowdfunding-waqf model (CWM), emphasized the need for waqf institutions and relevant authorities to foster trust in Web-based CWM platforms. A higher level of trust is crucial as it encourages individuals to engage more willingly in online interactions and transactions, fostering a greater sense of e-loyalty (Bart et al., 2005). Therefore, the study will investigate the relationship between trust in blockchain technology on intention to adopt waqf blockchain from the insights of importance-performance map analysis. By studying the importance-performance map analysis of trust in blockchain systems, waqf institutions can better design and implement blockchain-based solutions that not only meet technical requirements but also address the psychological and social dimensions of trust. This will ensure that the technology fulfills its promise of creating a more effective, transparent, and reliable waqf system.

3. Research Methodology

The study utilizes a survey research design to collect data. This approach allows the researchers to gain a wide range of insights from a diverse sample of individuals, which helps in analyzing the relationships and patterns between trust in blockchain technology and the intention to donate to cash waqf. The study focuses on individuals who have previously made several cash waqf contributions in Malaysia, with each individual serving as the unit of analysis. Due to practical considerations like the absence of a definitive population list, along with cost and time limitations, non-probability sampling techniques were employed. Specifically, the study used a convenience sampling method, where participants were selected based on their availability and proximity. In this method, the researcher also asked initial participants to refer to other potential participants who met the study's criteria. Data was gathered through questionnaires distributed across Malaysia, which included demographic questions and Likert-scale items designed to measure trust and intention, adapted from prior research (see Table 1). The gathered data was then analyzed using Smart-PLS software.

Table 1: Measurement Item

Construct	No. of Items	Source
Trust	4	Adapted from Alaeddin & Altounjy (2018)
Intention	4	Adapted from Kasri & Yuniar (2021) and Baber (2021)

4. Results and Discussion

Profile of Respondents

A total of 140 participants took part in the survey. The collected data was then input into IBM SPSS Statistics (Version 22) for screening and analysis. Of the respondents, 52.9 percent were male, and 47.1 percent were

female. The largest age group among the respondents was between 30 to 34 years old, comprising 40.0 percent of the sample, followed by those aged 20 to 24 years (15.7%), 25 to 29 years (14.3%), 35 to 39 years (12.1%), 40 to 44 years (7.9%), 50 to 54 years (7.9%), and 45 to 49 years (2.1%). Most respondents were from Pahang (25.7%), followed by Selangor (20.0%) and Terengganu (12.9%). Overall, the study successfully obtained participants from 12 states in Malaysia.

Regarding educational background, a significant portion of respondents held a bachelor's degree (40.0%), followed by those with a master's degree (25.7%), a doctoral degree (22.1%), and STPM/college diploma (10.7%), with only 1.4% having SPM or lower qualifications. In terms of income, most respondents earned less than RM1000 (29.3%), while others reported incomes of RM5001 and above (23.6%), RM3001-RM4000 (16.4%), RM1001-RM2000 (14.3%), RM4001-RM5000 (13.6%), and RM2001-RM3000 (2.9%).

As for their experience with giving cash waqf, 29.3 percent of respondents had done so a few times, 26.4 percent gave once a year, 18.6 percent contributed once a month, 17.9 percent donated once every two to three months, 5.7 percent made weekly contributions, and 2.1 percent gave daily. The most preferred method for making cash waqf contributions was online payment (48.6%), followed by giving directly to an individual collecting cash waqf (25.0%). Additionally, 18.6 percent of respondents preferred to go to a counter, and 7.9 percent opted for salary deductions.

Reliability and validity

To the requirements for PLS-SEM analysis, we first assessed the measurement model before moving on to the structural model evaluation. To evaluate the measurement model, we examined internal consistency reliability, discriminant validity, and convergent validity.

Internal Consistency Reliability

Table 2: Internal Consistency Reliability

Construct	Items	Loadings	Cronbach's Alpha	Rho_A	CR	AVE	R Square
Trust	TRUST1	0.845	0.854	0.863	0.901	0.695	-
	TRUST2	0.868					
	TRUST3	0.781					
	TRUST4	0.839					
Intention	INT1	0.901	0.900	0.912	0.930	0.768	0.63
	INT2	0.908					
	INT3	0.843					
	INT4	0.853					

When the Cronbach's Alpha value of each construct exceeds 0.7 (Nunnally & Bernstein, 1979) the rho_A coefficient value of each construct exceeds 0.7 (Dijkstra & Henseler, 2015), and the composite reliability (CR) of each construct exceeds the threshold value of 0.7, a measurement model has satisfactory internal consistency reliability (Hennington et al., 2009). The Cronbach's Alpha, rho_A, and CR of each construct in this investigation are all above the required threshold value, as shown in Table 2. Consequently, the findings suggest that the items used to represent the constructs are internally consistent and reliable.

Table 3 shows that all items exhibited loadings in the range of 0.70 to 0.95 on the construct they were measured. Whilst no items loaded higher on constructs they were not intended to measure. These results confirmed the convergent validity of the constructs.

Table 3: Factor Loading and Cross Loading

	Intention	Trust
INT1	0.901	0.761
INT2	0.908	0.774
INT3	0.843	0.607
INT4	0.853	0.613
TRUST1	0.693	0.845
TRUST2	0.726	0.868
TRUST3	0.544	0.781
TRUST4	0.665	0.838

The structural model

We performed bootstrapping which involved 500 samples whilst our actual sample stood at 140. The SEM result is presented in Table 5. It can be observed in Table 2 that the R^2 value is 0.63 suggesting that 63 percent of the variance in intention is explained by the trust construct. Table 4 shows the beta path coefficients (β0.794) were positive and in the expected direction with intention and were statistically significant at ($p<0.01$).

Table 4: Path Coefficient and hypothesis testing

Hypothesis	Causal Path	Std Beta	Std Error	t-value	Supported
H1	TRUST – INT	0.794	0.029	27.655**	Yes

Note: *p<0.05; **p<0.01

The positive and significant relationship between trust and intention aligns with the findings of Zakariyah et al. (2023), which demonstrate that perceived trust plays a crucial role in influencing the adoption of financial technology (fintech) solutions by Malaysian waqf institutions. In their study, Zakariyah et al. highlighted that trust is a key determinant in the decision-making process of stakeholders when it comes to embracing new technology platforms for managing waqf funds. This is because fintech platforms, much like blockchain-based systems, rely heavily on user confidence in the security, transparency, and reliability of the technology. When stakeholders perceive a high level of trust in the technology, they are more likely to engage with it, seeing it as a secure and efficient means to facilitate waqf contributions and management. This trust not only encourages the adoption of these platforms but also strengthens the overall intention to participate in waqf activities, thereby enhancing the effectiveness and reach of waqf institutions.

Importance-Performance Map Analysis (IPMA)

To complement the PLS-SEM analysis, an importance-performance map analysis (IPMA) was carried out to analyze the importance and performance of each dimension of trust against intention. Through IPMA, low-performing but important items can be identified for improvement purposes. The standardized total effects (importance) and the standardized latent variable scores (performance) are shown in Table 5 and Figure 2 below:

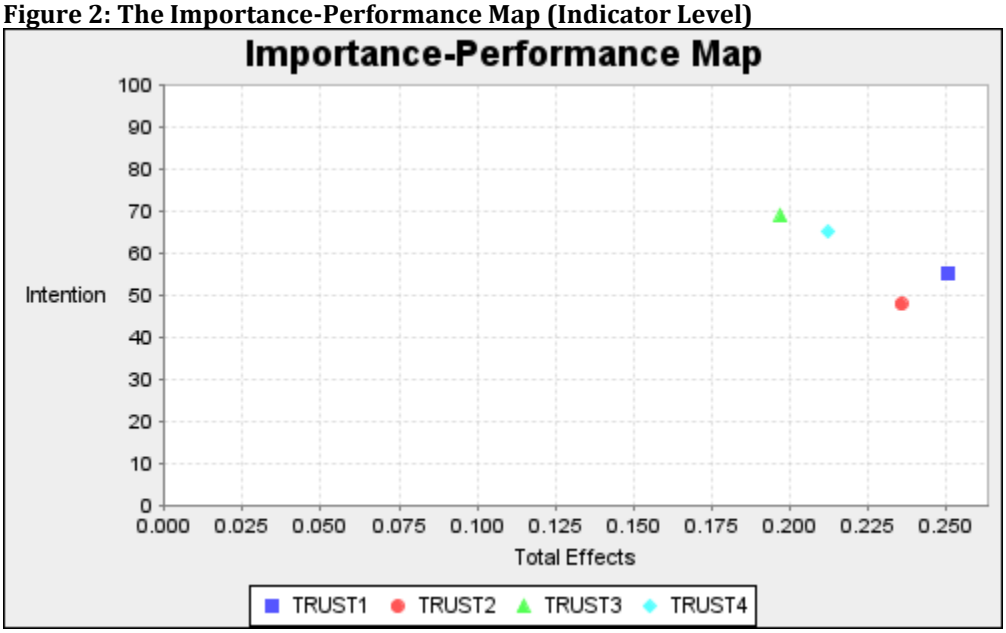
Table 5: Importance and performance of IPMA

Items	Total effects (importance)	Standardized latent variable scores (performance)
I have confidence in the service provided by the blockchain platform	0.250	55.0000
I believe the transaction process of the blockchain platform is correct	0.262	47.8570
I believe the transaction results of the blockchain platform are correct	0.197	68.8100
I believe the transaction system of the blockchain platform is secure	0.240	65.0000

In terms of importance, is the belief that the transaction process is correct, scoring 0.262. This indicates that users place a high value on the accuracy and reliability of the steps involved in a transaction. The following closely is confidence in the service, with a score of 0.250, reflecting the importance of trust in the service provider. Security also ranks highly, with a score of 0.240, showing that users prioritize the safety of their transactions. Lastly, the belief that the transaction result is correct has an importance score of 0.197, indicating that while still significant, it is slightly less emphasized compared to the process, service, and security.

In terms of performance, the belief that the transaction result is correct scores the highest at 68.810, suggesting that users are generally satisfied with the accuracy of the outcomes. The belief in the security of transactions also performs well, scoring 65.000, which reflects user confidence in the safety measures in place. However, confidence in the service, with a performance score of 55.000, indicates that there is room for improvement in how the service is perceived. The transaction process, despite being the most important factor, has the lowest performance score at 47.857, highlighting a significant gap between user expectations and their experience.

Figure 2: The Importance-Performance Map (Indicator Level)



The analysis reveals that while users place the highest importance on the accuracy and reliability of the transaction process, this aspect has the lowest performance score, indicating a significant gap between expectations and actual experiences. Users highly value security and the correctness of the transaction process and outcome, but the process itself needs improvement to meet their standards.

Confidence in the service is also critical, ranking second in importance, but its performance score suggests there is room for improvement in how the service provider is perceived. While the transaction outcomes are generally satisfactory, with the highest performance score, the lower scores in the transaction process and service confidence indicate areas where enhancements are needed to align performance with user expectations. The findings suggest that to improve overall user satisfaction, efforts should focus on enhancing the transaction process and building greater confidence in the service provider.

5. Managerial Implications and Recommendations

The findings indicate that users prioritize the accuracy and reliability of the transaction process, yet this aspect has the lowest performance score, highlighting a significant gap between expectations and actual experiences. To address this, managers should focus on refining and optimizing the transaction process by implementing more robust verification systems, automating critical steps, and conducting regular audits to ensure consistency. Additionally, security remains a key concern for users, and enhancing security measures, such as using advanced encryption and multi-factor authentication, is essential. Regular security updates, transparency

about protocols, and quick responses to breaches will bolster user confidence in the platform's safety. Moreover, building confidence in the service provider is crucial, as its current performance score suggests room for improvement. Managers should enhance customer support, ensure transparency in operations, and actively engage with users to address their concerns. Clear communication and responsive support services will significantly improve user confidence and satisfaction. The positive link between trust and the intention to adopt fintech solutions further underscores the importance of cultivating trust in these platforms. Managers should emphasize the security, transparency, and reliability of their fintech solutions through educational campaigns that alleviate concerns and encourage adoption.

Conclusion

In conclusion, the study underscores a critical disparity between user expectations and the actual performance of the transaction process, highlighting a key area for improvement. While users place substantial value on the accuracy, reliability, and security of transactions, current performance in these areas falls short, with the process itself receiving notably lower scores compared to transaction outcomes and service confidence. To bridge this gap and enhance overall user satisfaction, service providers need to focus on refining the transaction process and bolstering user confidence in the service. Improving these aspects will not only align performance with user expectations but also foster greater trust in the service provider, as evidenced by the positive relationship between trust and intention to use fintech solutions. This is particularly relevant in contexts like the management of waqf funds, where trust in technology plays a pivotal role in adoption and engagement.

However, a limitation of the study is the potential bias introduced by convenience sampling, which may impact the generalizability of the findings. To address this limitation, future research should aim for a more representative sample by employing rigorous sampling methods, such as stratified or random sampling, to ensure a diverse and balanced representation of stakeholder views. This approach will provide a more comprehensive understanding of the factors influencing blockchain adoption in waqf systems and enhance the robustness of the study's conclusions.

In essence, prioritizing improvements in transaction accuracy, reliability, and user confidence will not only address current performance shortcomings but also drive greater user satisfaction and engagement.

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Factors Affecting Green Purchase Behavior Among Undergraduate Students: A Conceptual Analysis

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Abstract: This study focuses on a literature review examining the factors affecting green purchase behavior among undergraduate students. In the modern world the latest technology adaptation, allows consumers to be exposed to such information about product quality and benefits to them and society before going to purchase and consume it. Therefore, many governments and manufacturers take proactive actions by producing more green and environmentally friendly products. With aggressive marketing strategies in targeting pro-environmental consumers, especially the younger generation. However, it could be one opportunity to study among undergraduate students as part of the younger generation who are commonly educated, this group could be a significant group for pro-environmental consumers. There are several factors could be studied such as environmental concern, perceived consumer effectiveness, environmental knowledge, attitude toward green products, willingness to pay, and green purchase intention. This conceptual analysis study can pave the way for developing a framework and further research analysis.

Keywords: *Green Purchase Behavior, Green Products, Consumers, Undergraduate Students*

1. Introduction and Background

In today's rapidly advancing technological era and age of digitalization, the proliferation of the internet and digital tools has revolutionized the way consumers access and process information (Naz et al., 2020). Therefore, consumers can easily find reviews, expert opinions, and even scientific studies on the product's effectiveness, safety, quality and benefits to them. Additionally, consumers can access data about a product's environmental footprint, such as how its production contributes to pollution, deforestation, or carbon emissions (Higueras-Castillo et al., 2019). Consumers can also learn about the ethical practices of the companies in producing products, including whether they engage in exploitative behaviors that severe damage to the environment (Sharma et al., 2019).

Due to easy access to information, consumers are increasingly aware of and acknowledge the broader implications of their purchasing decisions (Quoquab et al., 2020; Kautish et al., 2019). This awareness and acknowledgment has led to a shift in consumer behavior, with more people prioritizing green products that align with their values and ethical standards. Therefore, many consumers now prefer to buy from companies that are environmentally friendly, socially responsible, and transparent about their business practices (Kautish et al., 2019).

As awareness of environmental and social issues grows among the public, therefore, governments and manufacturers are responding by taking significant steps to integrate social ethics, responsibility, and environmental protection into their policies and practices (Indriani et al. 2019). Recognizing the increasing demand for sustainable products, these entities are actively shifting their focus towards creating and promoting goods that are not only high-quality but also environmentally friendly. To promote these green products, both governments and manufacturers (Cheung & To, 2019) are deploying aggressive marketing strategies. These campaigns often highlight the environmental benefits of their products, appealing to consumers who are concerned about issues such as climate change, pollution, and resource depletion. The marketing efforts are typically geared towards pro-environmental consumers—individuals who are not only aware of environmental issues but are also motivated to make purchasing decisions that align with their values. In purchasing green or eco-friendly products, consumer behavior is influenced by a range of factors that can either encourage or discourage such decisions. These factors can include consumers' concerns, having certain knowledge (Indriani et al., 2019), perceived green product effectiveness, attitude towards green products, willingness to pay and intention to purchase (Indriani, et al. 2019). Generally, younger generations, particularly those who are well-educated, tend to be more receptive to making lifestyle changes that contribute to a better

and more sustainable future. This group seems to be more aware of the environmental and social impacts of their consumption choices and is therefore more likely to prioritize sustainability in their purchasing decisions (Cheung & To, 2019; Chaudhary & Bisai, 2018).

Chaudhary and Bisai (2018) noted that societies in Western countries realized and started to focus natural environment in the early 1960s and 1970s. Since then, there has been growing awareness of environmental issues globally, however, the adoption of green products in developing countries can be hindered by various challenges (Chaudhary & Bisai, 2018). These may include limited access to green products, higher costs associated with eco-friendly alternatives, lower levels of environmental awareness, and economic constraints that make price a more significant factor in purchasing decisions. Cultural norms and societal values also play a role in shaping consumer behavior, and in some contexts, there may be less emphasis on sustainability compared to more immediate concerns like economic stability and affordability.

Problem Statement

Global warming, a widespread concern discussed globally by the United Nations and numerous countries, is largely driven by overpopulation and the resulting increase in demand for goods (Kautish et al., 2019). This surge in demand has led to heightened manufacturing and production, which, in turn, pollutes and damages the ecosystem in the global environment (Indriani et al., 2019). The demand for these manufactured products primarily comes from rapidly growing suburban areas, which have seen significant population growth since the 1950s (Kautish et al., 2019). These challenges are having a profound impact on the environment, society, and human health and need to cater intensively (Chaudhary & Bisai, 2018). Thus, the awareness began in Western societies in the early 1960s and 1970s and spread globally (Chaudhary & Bisai, 2018).

Since then, green consumerism emerged and increased among younger generations (Cheung & To, 2019; Chaudhary & Bisai, 2018). The younger generation especially from Generation Z (1996- 2012) and Generation Alpha (2023-2025) is typically recognized as a group with greater access to education and exposure to progressive developments. As a result, this group tends to be more aware and knowledgeable about green products (Lai & Cheng, 2016). Beyond focusing on this demographic, it is also valuable to explore the context of different countries. Research by Witek and Kuzniar (2020) and Ali et. al., (2011) noted that many studies on green products have been concentrated in Europe and North America. This highlights the importance of extending research to other regions, particularly developing countries like Malaysia. Furthermore, the number of publications on green products has been growing, with 106 publications recorded in 2020 alone (Sharma et al., 2022). This indicates that discussions about green products remain highly relevant.

The fundamental idea behind purchasing green products is to raise consumer awareness about the harmful effects of using conventional products or services. Han (2020) emphasized the importance of consumers valuing their environment, while Cheung and To (2019) found that consumers with strong environmental consciousness are more likely to prioritize eco-social benefits. Therefore, without consumer awareness and consciousness, green products are difficult to effectively distribute and reach their intended market. Moreover, this awareness and consciousness stem from knowledge. As consumers gain more knowledge, their environmental concerns, understanding of sustainability challenges, and awareness of environmental deterioration increase, leading to a greater inclination toward green products (Witek & Kuzniar, 2020; Kautish et al., 2019).

In addition to knowledge, consumer perception of green products is a significant factor influencing green purchasing behavior. Witek and Kuzniar (2020) and Ali et al. (2011) observed that much of the research on green products has focused on developed regions, particularly North America and Europe, largely due to the positive perceptions in these areas. Similarly, Cheung and To (2019) noted that organizations have targeted their marketing efforts for green products more heavily in Europe and China because of the favorable attitudes of consumers there. Consequently, positive attitudes and perceptions can significantly encourage people to adopt a more favorable view of green products.

The price of green products is another significant issue. Eco-friendly products and services are often considered expensive, which can impact green purchasing behavior. Consumers may struggle with the decision of whether to pay a higher price for the sake of long-term environmental protection and a healthier society. Witek and

Kuzniar (2020) found that a consumer's financial situation can influence their willingness to purchase and own green products. Therefore, financial stability and the willingness to pay a premium for green products become critical factors in consumer access to these products.

The most critical factor in consumers' green purchasing behavior is their intention to buy these products. Consumer awareness, knowledge, and attitude must align with a strong intention to act. Without this intention, consumers are unlikely to purchase green products, which are essential for minimizing environmental harm and achieving long-term societal benefits. Cheung and To (2019) observed that many organizations focus their green product marketing efforts in China and Europe because consumers in these regions show a higher intention to buy. Therefore, this study is necessary to address the issues and challenges related to green purchasing behavior.

2. Literature Review

Green Purchase Behavior (GHB): Green purchasing involves consumers making responsible choices by buying eco-friendly products and services to minimize their negative impact on the environment and society (Han, 2020). The core concept of green products offered in the market is to reduce their harmful effects on the environment, society, and health. Witek and Kuzniar (2020) support this, noting that green consumers consciously avoid products that may harm the environment during the manufacturing, consumption, and disposal stages.

Furthermore, consumer green purchasing behavior is a crucial element for the success of eco-friendly organizations and developed based on a theory of Green Purchase Behavior (TGPB) (Han, 2020). Cheung and To (2019) noted that many studies have explored the factors influencing green purchase behavior. However, this study will focus on the key factors that may impact green purchase behavior, including environmental concern, perceived consumer effectiveness, environmental knowledge, attitudes toward green products, willingness to pay, and green purchase intention.

Environment Concern (EC): Consumers began to develop environmental awareness in the mid-1980s (Lee, 2008). Since then, more individuals have become increasingly conscious of environmental and social issues. Environmental concern can be defined as an individual's awareness of environmental problems and their willingness to contribute to environmental protection (Naz et al., 2020; Kim & Choi, 2005). In general, environmental concern suggests that people are both aware of and engaged in addressing environmental challenges within society. Some researchers refer to environmental concern as environmental value (Han, 2020) or environmental consciousness (Cheung & To, 2019), emphasizing the same concept of awareness regarding the need to protect the environment.

Several studies have found that consumers who are genuinely concerned about the environment and adopt eco-friendly habits, such as becoming green consumers, can enhance environmental quality through green purchasing behavior (Naz et al., 2020). Cheung and To (2019) also discovered that consumers with strong environmental consciousness tend to prioritize eco-social benefits. Moreover, Kautish et al. (2019) noted a growing trend of environmental concern among consumers, suggesting that green purchasing could establish itself more prominently in society.

Perceived Consumer Effectiveness (PCE): Perceived consumer effectiveness was first introduced in the literature by Kinnear et al. (1974). They described it as the belief that individuals can positively impact the environment by reducing negative effects. Naz et al. (2020) and Kautish et al. (2019) further defined it as an internal sense of control that motivates individuals to protect the environment. Research on perceived consumer effectiveness has been emphasized for years to better understand consumer behavior. Unlike environmental concern and attitude, Kinnear et al. (1974) and Naz et al. (2020) noted that it centers on the belief that one's actions can produce meaningful and effective results. Thus, this feeling serves as an important factor influencing consumer behavior.

Environmental Knowledge (EK): Knowledge is essential for human survival and daily life. It can be defined as a collection of ideas, rules, procedures, and information that serves as a valuable asset for enhancing human

capabilities and performance (Lee, 2016). In the context of consumer behavior, knowledge plays a key role in influencing decision-making processes (Higueras-Castillo et al., 2019). Environmental knowledge, specifically, refers to an individual's ability to understand and comprehend issues related to the environment (Naz et al., 2020).

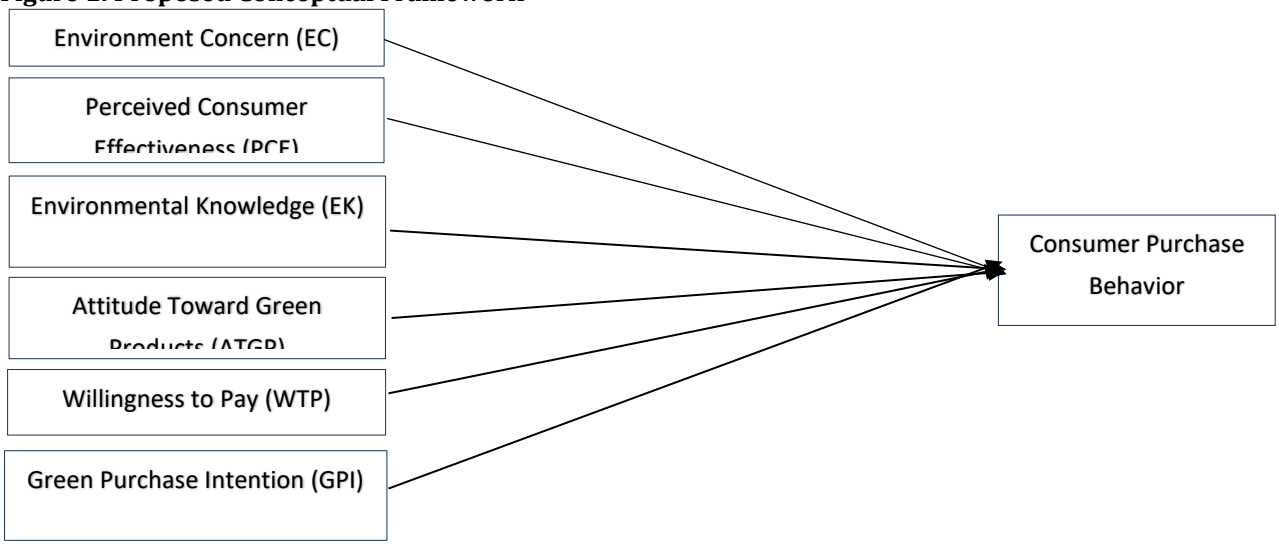
The concept of environmental knowledge was introduced by Laroche et al. (1996) to assess and analyze respondents' ability to understand and interpret environmental signs, behaviors, and concepts. Since then, research in this area has steadily progressed. For instance, Cheung and To (2019); and Indriani et al. (2019) found that individuals who possess knowledge about green products, including their quality and other relevant details, are more confident in purchasing them. Additionally, Witek and Kuzniar (2020) discovered that individuals with higher levels of education are more likely to buy green products compared to those with lower levels of education.

Attitude toward Green Products (ATGP): Attitude refers to a combination of emotions, beliefs, and behaviors directed toward a specific person, object, event, or idea. It can manifest cognitively, behaviorally, or effectively in a person's psychological response, including as a consumer. Consumer attitude is defined as an individual's positive or negative evaluation of a particular behavior (Indriani et al., 2019; Ajzen & Fishbein, 1980). Numerous studies have explored consumer behavior by examining their attitudes toward various factors.
Several studies have examined consumers' attitudes toward green products to explore the relationship between their attitudes and their purchasing behavior for such products. Cheung and To (2019) explained that this attitude forms when consumers become aware of environmental issues and the benefits to society. Witek and Kuzniar (2020) also emphasized that attitude plays a critical role in consumers' selection and choice, particularly when it comes to green and eco-friendly products.

Willingness to Pay (WTP): Willingness to pay refers to a consumer's maximum level of readiness to spend more on green products or services (Naz et al., 2020). This level of readiness can vary among consumers, especially when it comes to the additional cost associated with green products. Consequently, several studies have been conducted to examine and analyze consumers' willingness to pay a premium for green products or services as a way of mitigating negative impacts on society and the environment. Witek and Kuzniar (2020) found that a consumer's financial situation can influence their willingness to purchase green products.

Green Purchase Intention (GPI): Intention commonly refers to the aim or determination to take a specific action. In the context of purchasing green products, intention could be defined as a reflection of an individual's readiness to engage in the behavior of buying these products (Indriani et al., 2019). Numerous studies have investigated the relationship between intention and green purchasing behavior. Cheung and To (2019) emphasized that when consumers are motivated and have the intention to contribute something positively to society, they are more likely to purchase green products. Therefore, intention must precede the decision to buy these products.

Figure 1: Proposed Conceptual Framework



3. Conclusion

In the context of green consumer behavior, numerous studies have examined various factors that given their significant impact on consumer behavior in purchasing green products. Additionally, this conceptual paper is a vital part of an internal research grant from the faculty of Business and Management, UiTM Cawangan Selangor. Specifically, the study aims to investigate the relationship between six factors as independent variables in green consumer behavior. To ensure the study is relevant, the younger generation specifically undergraduate students will be randomly selected to participate and represent their generation towards green products in developing countries such as Malaysia.

The anticipated results of this study are expected to have significant implications for governments and manufacturers in improvising the policies as well as producing green products. By exploring these factors, the study seeks to offer valuable insights to understand consumer behavior in purchasing green products. Thus, in turn, can improve many parties to be involved and nurture a green environment as part of human life.

4. Contribution

The framework utilized in this research has been extensively applied by many scholars in previous studies to assess its relevance and applicability in various organizational contexts. However, this conceptual study aims to make a unique and significant contribution specifically to green products. It seeks to enhance the existing body of knowledge on consumer behavior and, ultimately purchasing green products among young generations in developing countries such as Malaysia.

The dimensions of the variables under consumer behavior—green products and services orientation—have the potential to offer a broader perspective on understanding these concepts. This research specifically aims to explain the elements of consumer behavior, including environmental concern, knowledge, consumer perceived effectiveness, attitude toward green products, willingness to pay and consumer purchase intention that is expected to significantly influence consumer purchasing. By exploring these dimensions, the study seeks to provide valuable insights and practical implications for industry professionals and academics alike.

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How Buy Now, Pay Later (BNPL) is Shaping Gen Z's Spending Spree in Malaysia

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Abstract: This study seeks to examine the determinants that impact the inclination to utilize Buy Now, Pay Later (BNPL) services, with an emphasis on the perspective of Generation Z. The study examines the relationships between materialism, money management skills, self-efficacy, attitude, subjective norm, perceived behavioral control, and moral obligation in determining the intention to adopt BNPL. It utilizes a quantitative approach with a descriptive research style. Questionnaires were distributed to the Gen Z demographic, and a total of 440 responses were collected using Google Forms. The data were gathered through comprehensive field research, which involved an online survey, and later examined using SmartPLS 4.0. The findings highlight the significance of materialism, money management abilities, self-confidence, attitude, subjective norm, perceived behavioral control, and moral obligation in influencing the utilization of BNPL. The outcomes are highly significant for both advancing theoretical understanding and improving practical operations for BNPL providers. It facilitates a comprehensive understanding of the elements that impact the propensity to utilize BNPL, particularly from the perspective of Generation Z. Although acknowledging the limitations of targeting only Gen-Z, the research offers interesting insights and practical recommendations for BNPL service providers.

Keywords: *Buy now pay later, theory of planned behavior (TPB), self-efficacy, extended TPB, attitude, Gen-Z*

1. Introduction

The rapid advancement of technology and the changing landscape of e-commerce have transformed the way customers shop. According to Stankevich (2017), consumer behavior has undergone significant shifts, especially in how people make decisions and their subsequent influence on purchase intentions. The Buy-Now-Pay-Later(BNPL) system has become popular, particularly among Gen Z, as it allows immediate purchases while delaying payment or breaking it into smaller, manageable installments (Nik Azmi et al., 2022). Since BNPL platforms do not charge interest, they are not considered formal credit, which means suppliers are not bound by financial hardship and responsible lending requirements (The Australian Securities and Investments Commission, 2018). This innovative payment method has revolutionized the traditional credit system and offers a new way for people, including Gen Z, to manage their finances and make purchases.

Understanding the psychological determinants of BNPL usage is crucial, as providers often emphasize features that appeal to consumers' temporal and social dimensions, such as deferred payment and cost spreading (Relja et al., 2023). Mukhtar (2023) proposes a framework for assessing BNPL adoption and its effects on consumer buying behavior, offering a structured approach to understanding the implications of these payment methods. Katterbauer et al. (2023) provide a legal analysis of AI-driven Islamic BNPL schemes, showcasing the intersection of technology and financial services in shaping payment options. Hegawan (2023) investigates the influence of the perceived usefulness and value of BNPL on consumer satisfaction, impulsive buying, and post-purchase intentions, emphasizing the behavioral aspects associated with these payment methods.

According to Research and Markets (2021), Malaysia's BNPL Gross Merchandise Value is projected to surge from US$ 271.8 million in 2020 to US$ 3,571.8 million by 2028. Despite this significant growth potential, Malaysia still trails behind countries like China in the acceptance of BNPL services. Several e-commerce and online platforms, including Atome, Shopee, Grab, and Fave, have started offering BNPL payment systems to attract more users. However, consumers remain cautious, fearing that BNPL could lead to a new debt trap and encourage reckless spending. The competitive market landscape further complicates the situation for BNPL providers, as new competitors, including traditional banks, enter the space. Therefore, it is crucial for BNPL

providers to thoroughly understand and address customer concerns to drive wider adoption of this platform's services in Malaysia.

Research indicates that BNPL services often emphasize features like "pay later" and "spread the cost," focusing on ease of transaction and promoting unplanned purchases (Schomburgk & Hoffmann, 2022). In Malaysia, the acceptance and usage of mobile payments have been studied extensively, with the Unified Theory of Acceptance and Use of Technology (UTAUT) being applied to investigate user acceptance of mobile payment services (Cao et al., 2021b). Additionally, Bank Negara Malaysia has launched a blueprint for the financial sector to shape the future of Malaysia's financial markets and payment systems, highlighting the importance of evolving payment methods in the country (Cao et al., 2021a), especially for Gen-Z.

BNPL services have gained significant traction among Gen Z in Malaysia, reflecting a broader trend seen globally. The rise of BNPL among this demographic is driven by their comfort with digital technologies and their preference for flexible payment options (Özdemir-Güzel & Baş, 2021). In Malaysia, Gen Z's adoption of BNPL is marked by their desire for efficiency and simplicity in transactions, aligning with their digitally immersed lifestyles (Khan & Mbanyi, 2022). Thus, the consumer financing sector has experienced significant transformation as a result of the increasing prevalence of BNPL services, particularly among the technologically adept Gen-Z cohort (Chuah et al., 2023). Nevertheless, organizations that use BNPL techniques encounter a significant challenge related to the possible influence on their marketing tactics (Schomburgk & Hoffmann, 2022).

Gen Z consumers are prone to making impulsive purchases because they are attracted to the option of deferred payments, which in turn raises the likelihood of experiencing financial trouble (Khan & Mbanyi, 2022). Therefore, businesses must address this issue to comprehend the factors that influence Gen-Z's intention to utilize BNPL and enhance their marketing strategies in this ever-changing environment (Schomburgk & Hoffmann, 2022). Furthermore, the changing legal environment around BNPL services brings about ambiguity and poses compliance difficulties for organizations operating in this industry (Chuah et al., 2023). Hence, businesses need to adopt responsible lending policies and mitigate the possible adverse effects of BNPL usage among Gen-Z to effectively navigate this rapidly expanding market. Comprehending the factors that influence Gen-Z's inclination to utilize BNPL is crucial for organizations to formulate efficient plans that prioritize both client contentment and fiscal prudence (Khan & Mbanyi, 2022).

Hence, the study examined various factors that influence the intention to use BNPL among Gen Z. These components include the groups of features under the theory of planned behavior (attitude, subjective norm, and perceived behavioral control), as well as the perceived moral obligation as an additional factor, as well as materialism, money management skills, and self-efficacy, Subsequently, in the following sections, we will delve into the approach, its key findings, and their consequences.

2. Literature Review

Theory of planned behavior

The Theory of Planned Behavior (TPB), developed by Icek Ajzen in the late 1980s (Ajzen, 2020), is a fundamental framework for understanding and predicting human behavior across various domains such as health psychology, social psychology, and consumer behavior (Yuen et al., 2020). This theory builds upon Ajzen's earlier work, the Theory of Reasoned Action (TRA), by incorporating the elements of attitude, subjective norm, and perceived behavioral control to determine individuals' intentions to engage in specific behaviors. Consequently, The TPB's ability to address behaviors influenced by external factors beyond individual control makes it a valuable tool for studying complex consumer decisions in the financial domain, where societal norms and perceptions significantly shape behaviors (Chang & Watchravesringkan, 2018). Studies in related fields, such as ethical consumption and sustainable purchasing, have utilized the TPB to explore the gap between intentions and actual behaviors (Yadav et al., 2022).

In the context of consumer behavior within the BNPL sector, the TPB offers a comprehensive framework for examining behaviors that may not be entirely under an individual's voluntary control (Sivaramakrishnan et al., 2017). This is particularly relevant in financial decision-making concerning BNPL services, where individuals

may be influenced by various factors when opting for deferred payment options. The TPB's emphasis on intention as a precursor to behavior aligns well with studying consumer decisions related to BNPL, allowing for the exploration of factors influencing individuals' intentions to utilize such services and the subsequent impact on their actual behavior (Mazambani & Mutambara, 2019).

By considering attitudes, subjective norms, and perceived behavioral control, researchers can delve into the motivations behind consumers' choices to engage with BNPL services, shedding light on the underlying drivers (Mushi, 2020). Powell et al. (2023) examine the relationship between responsible financial behaviors and financial well-being in the context of BNPL services, highlighting the impact of financial responsibility on overall financial health. Specifically, for BNPL services, the TPB offers a nuanced understanding of consumers' intentions and behaviors regarding deferred payment options (Ögel, 2022).

Through examining factors such as attitudes toward convenience, social norms surrounding financial decisions, and perceived control over payment obligations, researchers can identify key drivers of consumer behavior in the BNPL sector and develop strategies to enhance financial literacy and responsible spending practices among consumers (Alam et al., 2019). The TPB's applicability across diverse cultural and economic contexts; helps tailor interventions to local settings and specific market dynamics, promoting desirable behaviors in BNPL adoption (Schomburgk & Hoffmann, 2022). Various studies have incorporated additional elements into the TPB, such as self-identity, moral norms, and planning, to enhance its predictive capability (Cao et al., 2023).

Research indicates that attitudes significantly impact the intention to use BNPL services. According to Ajzen's TPB, positive attitudes toward a behavior increase the likelihood of engaging in it (Ajzen, 2020). Studies have shown that favorable attitudes towards BNPL, perceived as convenient and adaptable, enhance the intention to utilize these services (Alkadi & Abed, 2023). Similarly, consumers with positive views on BNPL consider it a feasible and appealing payment method, increasing their willingness to use it for future transactions (Relja et al., 2023). Acceptance of innovative payment methods like BNPL is also higher among individuals with positive attitudes toward these technologies (Chen et al., 2023). This underscores the crucial role of attitudes in shaping consumer behavior in financial services. Subsequently, Figure 1 illustrates the conceptual framework for this study.

Understanding the role of attitudes in BNPL adoption is vital for providers and retailers aiming to align with consumer preferences and promote ethical usage. Research shows that younger consumers and tech-savvy individuals with positive attitudes are more inclined to embrace BNPL as a payment method (Schomburgk & Hoffmann, 2022). Consequently, favorable attitudes towards BNPL are linked to a higher intention to use these services. This insight highlights the need for targeted strategies that address consumer attitudes, fostering responsible and widespread adoption of BNPL options. Thus, the proposed hypothesis is as follows:
H1: *Attitude influences positively the intention to use BNPL.*

Subjective norm refers to an individual's perception of social pressure or influence from others regarding a particular behavior (Anderson, 2023). This concept describes how individuals interpret the opinions and expectations of influential members of their social environment, including family, friends, coworkers, and social media (Li et al., 2023; Zhang et al., 2023). Subjective norms are founded on individuals' perceptions and interpretations of social influences and can be shaped by the beliefs and attitudes of close associates and broader societal and cultural norms (Anderson, 2023; Sia & Jose, 2019).

Subjective norms consist of two key components: normative beliefs and motivation to comply (Anderson, 2023). Normative beliefs refer to an individual's perceptions about whether significant others think they should engage in a specific behavior (Li et al., 2023). These beliefs are influenced by direct statements, observed behaviors, and social norms (Sia & Jose, 2019). The second component, motivation to comply, reflects an individual's desire to conform to others' expectations, driven by factors such as social acceptance, fear of judgment, and cultural norms (Zhang et al., 2023). Understanding these components is crucial in fields like psychology, marketing, and public health, as it helps predict and influence behavior by considering perceived social pressures (Anderson, 2023; Sia & Jose, 2019).

Subjective norms significantly influence the intention to use BNPL services. According to the TPB, subjective norms, which reflect perceived social pressure to perform or not perform a behavior, consistently influence behavioral intentions (Thomas & Subhashree, 2020). Positive social endorsements from influential people can lead to favorable subjective norms, increasing the likelihood of using BNPL service. Studies have shown that normative beliefs and societal expectations contribute to positive attitudes toward BNPL (Aji et al., 2020). The impact of subjective norms on usage intentions has been demonstrated in various contexts, including e-learning technology acceptance and formal financial services (Thomas & Subhashree, 2020). Consequently, we believe that :

H2: *Subjective norms positively influence the intention to use BNPL*

Perceived Behavioral Control (PBC) is a psychological construct essential to the TPB. PBC encompasses various elements such as personal beliefs, self-efficacy, prior experiences, and external situations, which collectively shape an individual's perception of their ability to control their actions. Within TPB, PBC significantly shapes behavioral intentions and behaviors, emphasizing not only subjective views but also the conviction in one's ability to exercise control effectively (Guo et al., 2023). This positive correlation between perceived control and likelihood of engaging in behavior is crucial in consumer decision-making, influencing preferences and payment choices (Vu et al., 2023).

The intention to use BNPL services is greatly influenced by perceived behavioral control (PBC), which reflects how easy or complex individuals perceive this financial option to be (Majid, 2021). People are more likely to use BNPL if they find the service user-friendly and efficient (Hegawan et al., 2023). Features like easy-to-navigate interfaces, clear terms and conditions, and straightforward communication about the BNPL process can enhance this perception. More importantly, financial capability is important; those who feel confident in managing BNPL payments are more likely to use the service (Johnson et al., 2021). PBC is strengthened by transparent BNPL terms, which build user confidence in the system's security and reliability (Shankar, 2022). Financial literacy also boosts PBC, as better financial knowledge gives individuals a greater sense of control over their financial choices (Hidayat, 2022).

BNPL allows consumers to engage in instant transactions while deferring payment, appealing due to its ease, transparency, and mitigation of immediate financial strain (Lupșa-Tătaru et al., 2023). Consumers' perceived ability to manage BNPL obligations, including financial stability, anticipated income, and ease of use, influences their intention to use these services. Empirical evidence supports a positive association between increased PBC and the intention to use BNPL (Raj et al., 2023). Techniques that enhance PBC can significantly influence consumers' intention to use BNPL, affecting their purchasing choices (Ji et al., 2023). Understanding PBC is crucial for comprehending customer behavior within the dynamic realm of modern payment systems, such as BNPL, and its extensive impact on consumer decision-making patterns in the financial domain (Ji et al., 2023). Consequently,

H3: *Perceived behavior control influences positively the intention to use BNPL.*

Perceived moral obligation (PMO) refers to an individual's sense of duty or responsibility rooted in moral principles or ethical norms, often surpassing legal or societal requirements and reflecting a personal commitment to one's values (Alsaad et al., 2020). PMO correlates with values, beliefs, and the ethical systems individuals adhere to, influenced by cultural, religious, philosophical, or personal factors (Chen, 2020). Alsaad et al. (2020) found PMO mediates the effect of idealism on ethical purchasing intention, highlighting its role in ethical decision-making. This sense of duty impacts behavior and decision-making, as evidenced by Uysal et al. (2022), who found that individuals with a strong moral duty and low harm perception are more likely to engage in collective action. Additionally, PMO significantly influences ethical decisions in organizational contexts, such as internal whistleblowing intentions among accountants (Sarikhani & Ebrahimi, 2021), and ethical behavior prediction accuracy (Drążkowski et al., 2020).

Incorporating PMO into the TPB provides a more comprehensive understanding of intentions to use BNPL services (Chen, 2020). Traditional TPB emphasizes attitudes, subjective norms, and perceived behavioral control but may overlook the ethical aspects inherent in financial decisions (Atiyah & Kusumawati, 2023). Including PMO addresses this gap, recognizing that moral obligations significantly influence attitudes towards BNPL, shaping whether individuals view it as ethically acceptable (Liang & Wu, 2023). PMO also affects

perceived control over using BNPL, either empowering or limiting it based on ethical considerations (Sabri et al., 2023). By integrating PMO, the expanded TPB captures the ethical deliberations intertwined with attitudes, norms, and control, offering a richer understanding of the psychological factors influencing BNPL usage intentions (Annamdevula et al., 2022).

The relationship between PMO and BNPL usage Intentions Is further complicated by the intrinsic connection between BNPL and indebtedness, highlighting the moral aspects of financial decisions (Zainudin et al., 2019). Transparency and clarity from BNPL providers regarding terms, charges, and repercussions significantly impact consumers' moral obligations (Relja et al., 2023). If consumers view BNPL as aligning with fiscal prudence and their ability to manage debt, it supports their ethical stance (Schomburgk & Hoffmann, 2022). Moreover, the moral need to avoid excessive borrowing is influenced by the potential risks of substantial debt accumulation through BNPL (Zainudin et al., 2019). Financial empowerment, enabling responsible short-term management within one's capabilities, is a critical aspect of this ethical consideration (Jang et al., 2021). Therefore,
H4: *Perceived moral obligation influence positively the intention to use BNPL.*

The antecedents and consequences of the extended TPB model
To comprehend the motivation behind utilizing BNPL services, an expanded version of the TPB has been employed to investigate the aspects that influence consumers' intentions. A study conducted by Hidayat (2022) revealed that technology readiness, perceived usefulness, and perceived simplicity of use significantly affect the intention to use a BNPL product. Notably, perceived usefulness was found to have the most prominent and direct influence on consumers' intentions. This illustrates the significance of the expanded TPB in comprehending consumer behavior towards BNPL services. More importantly, Yadav and Pathak (2017), offer a more thorough insight into human decision-making and behavior by considering additional aspects such as technology readiness, privacy concerns, and cultural effects. This expansion allows researchers to further investigate the complex relationship between psychological, social, and situational aspects that influence individuals' intentions to engage with BNPL services and other behaviors (Han & Kim, 2010).

A recent study has explored the consequences of BNPL services on materialism, Impulse spending, and financial well-being. The study highlights the significance of understanding the possible dangers linked to postponed payment choices (Chaudhary & Bisai, 2018). Researchers can utilize the extended TPB to examine the reasons and effects of BNPL usage. This approach allows them to discover the fundamental factors that influence consumer behavior and create tactics to promote responsible financial habits and reduce negative repercussions (Silvera et al., 2008). The TPB extension presented by Zaman et al. (2022) offers a comprehensive theoretical framework for analyzing the intricate nature of modern consumer behaviors. It specifically examines how evolving financial technology impacts individuals' decision-making processes and financial well-being.

Materialism, defined as the emphasis on material possessions and wealth in one's life (Pupelis & Šeinauskienė, 2023), intersects with the concept of BNPL in consumer behavior. Materialistic individuals prioritize acquiring goods and wealth as measures of success and fulfillment (Kim & Oh, 2022), which aligns with the allure of BNPL, a payment method allowing immediate acquisition of goods without full upfront payment (Gerrans et al., 2021). This connection between materialism and BNPL reflects societal norms where happiness and self-worth are associated with possessing certain goods (Ahmed et al., 2023).

Materialistic ideas can significantly impact subjective norms, which are the social pressures individuals feel to behave in certain ways (Moldes & Ku, 2020). People with materialistic values are more likely to be influenced by societal and peer expectations to pursue wealth and material success. These norms are reinforced in materialistic cultures, which emphasize the importance of wealth and the consumption of material goods. Additionally, materialism can affect perceived behavioral control by shaping how easy or difficult individuals believe it is to achieve financial success. Materialistic people might feel more capable of reaching financial goals or acquiring possessions because they prioritize these outcomes (Yolcu & Meyer, 2023).

More importantly, the continuous desire for the latest products, reinforced by materialistic ideals, fuels the popularity of BNPL, especially among younger consumers seeking identity through material belongings (Liu et

al., 2023). BNPL's appeal lies in its facilitation of immediate acquisition, resonating with individuals valuing material possessions as symbols of achievement and social standing (Manchanda, 2019). The accessibility of BNPL aligns with the materialistic mindset, enabling individuals to satisfy their desire for material goods without immediate financial constraints (Gogoi & Baruah, 2023).

Materialistic individuals, who prioritize material possessions and wealth, often BNPL as a convenient way to access desired goods and maintain a lifestyle associated with success and status (Manchanda, 2019). This aligns with their desire for instant gratification and the accumulation of tangible items indicative of achievement, fostering a positive moral obligation towards BNPL usage. They may also view the use of BNPL as ethically permissible or desirable, particularly when it aligns with their goal of material success (Chaudhary & Dey, 2019). Their focus on short-term gains and immediate gratification often leads them to overlook potential long-term financial implications, reinforcing a value system where the pursuit of wealth and status outweighs concerns about fiscal responsibility or ethical considerations.

The connection between materialism and BNPL underscores the complex interplay between consumer behavior, societal norms, and financial practices. While BNPL appeals to materialistic aspirations by offering immediate access to desired goods, it also reflects the broader societal emphasis on material possessions as indicators of success and happiness. However, consumer education and regulatory measures are essential to ensure responsible usage of BNPL and mitigate potential negative consequences associated with materialistic consumption patterns (Schomburgk & Hoffmann, 2022). Therefore, it can be considered that:
H5a: *Individuals with higher levels of materialism are more likely to perceive a favorable attitude toward BNPL*
H5b: *Individuals with higher levels of materialism are more likely to perceive a favorable subjective norm regarding BNPL.*
H5c: *Individuals with higher levels of materialism are more likely to perceive a favorable perceived behavioral control regarding BNPL.*
H5d: *Individuals with higher levels of materialism are more likely to perceive BNPL services as morally acceptable*

Secondly, proficient money management skills enable individuals to make informed financial decisions and exhibit responsible financial behavior, such as budgeting and saving (Boonroungrut & Huang, 2021a). This responsible fiscal conduct fosters a favorable mindset toward financial planning and prudent spending, which aligns with the principles of BNPL usage. Individuals adept at managing finances may perceive BNPL as a tool for facilitating planned purchases and managing cash flow effectively, thus cultivating a positive attitude related to its utilization (Lavonda et al., 2021). Moreover, individuals with strong money management abilities are more likely to view BNPL as a convenient and flexible payment option that complements their financial planning strategies. They may perceive BNPL as a means to access desired goods without compromising their budgeting goals or financial stability, thereby contributing to a positive attitude toward its adoption (Boonroungrut & Huang, 2021a; Rai et al., 2019).

Money management skills encompass the ability to effectively handle financial resources through informed decision-making on budgeting, saving, investing, debt management, and risk management (Rai et al., 2019; Lubis et al., 2019). Individuals who possess proficient money management skills are more likely to exhibit responsible financial behavior, such as budgeting, saving, and investing (Boonroungrut & Huang, 2021b). Research has shown that individuals with strong money management skills tend to foster favorable attitudes toward responsible fiscal conduct (Lavonda et al., 2021). As a result, they may perceive actions related to financial responsibility, including the use of BNPL services, as socially desirable or expected behaviors (Boonroungrut & Huang, 2021b).

Research has shown that individuals with strong money management skills tend to have greater perceived control over their financial behavior (Lavonda et al., 2021). They feel more confident in managing their finances and making informed decisions about their money (Hamid & Loke, 2020). Significantly, individuals with proficient money management abilities are likely to believe that they have the necessary skills and resources to exercise control over their financial decisions, including the use of BNPL services (Boonroungrut & Huang, 2021a). They may perceive BNPL as a tool that they can manage effectively within their overall financial strategy. Consequently, they may perceive that their peers, who are also financially savvy, view BNPL favorably.

Additionally, individuals with strong money management skills are more likely to consider the ethical implications of their financial decisions, including the use of BNPL services. They may feel a moral obligation to use BNPL responsibly, ensuring that they fulfill their financial commitments and avoid overextending themselves financially (Boonroungrut & Huang, 2021b). Therefore, based on these findings, it is reasonable to suggest that individuals with good money management skills are more likely to create a positive perceived moral obligation towards BNPL, viewing it as a responsible financial tool that aligns with their ethical values and principles. Consequently,

H6a: *Individuals with strong money management skills are more likely to perceive a favorable attitude toward BNPL.*

H6b: *Individuals with strong money management skills are more likely to perceive a favorable subjective norm regarding BNPL.*

H6c: *Individuals with strong money management skills are more likely to perceive favorable behavioral control over BNPL.*

H6d: *Individuals with strong money management skills are more likely to perceive a favorable moral obligation towards BNPL*.

Self-efficacy is a person's belief in their capacity to execute behaviors or tasks successfully (Massimino et al., 2023). It also refers to an individual's belief in their ability to accomplish specific tasks or goals. Albert Bandura, a psychologist, defined self-efficacy as the belief in one's capability to organize and execute the courses of action required to manage prospective situations (Saadat & Sultana, 2023). It has been extensively studied across various domains, including healthcare, education, and psychology. Those with a robust sense of self-efficacy regarding financial matters are likely to demonstrate an elevated perception of their capability and ability to control their monetary choices (Pang et al., 2021). Individuals with self-efficacy may also use BNPL services, where they may experience a sense of assurance regarding their capacity to manage the financial obligations that accompany such transactions (Zainudin et al., 2019).

Existing research indicates a positive association between high levels of self-efficacy and responsible financial behaviors (Zainudin et al., 2019). Eventually, the assurance in effectively managing the complexities of BNPL, such as repayment and financial strategizing, enhances one's ethical accountability (Johnson et al., 2021). Research suggests that individuals with high self-efficacy tend to approach tasks and challenges with confidence and optimism (Bandura, 1977). In the context of BNPL, individuals who believe in their ability to manage their finances effectively and make informed decisions may view BNPL as a convenient and beneficial payment option.

Moreover, it is common for individuals with a strong sense of self-efficacy to hold optimistic expectations regarding the outcomes of their endeavors, expecting favorable financial results in return (Johnson et al., 2021). This optimistic perspective might be consistent with the responsible utilization of BNPLs, thereby strengthening a perceived ethical duty to interact with these services in a fiscally prudent fashion. The connection between self-efficacy and perceived moral obligation stems from the perception of control and empowerment that individuals with a strong belief in their financial capabilities experience (Mushi, 2020). This perception influences their ethical deliberations regarding the use of BNPL. It is believed that:

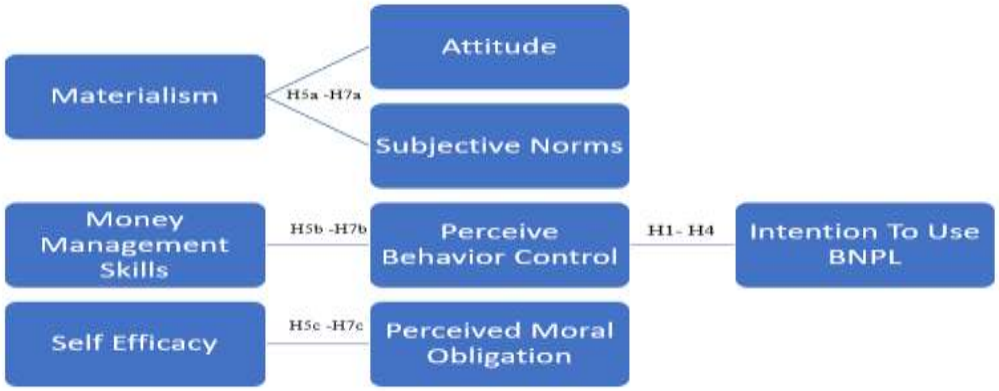
H7a: *Individuals developing financial self-efficacy are more likely to cultivate a favorable attitude towards BNPL.*

H7b: *Individuals developing financial self-efficacy are more likely to perceive a favorable subjective norm regarding BNPL.*

H7c: *Individuals developing financial self-efficacy are more likely to perceive favorable perceived behavioral control over BNPL.*

H7d: *Individuals developing financial self-efficacy are more likely to perceive a favorable moral obligation towards BNPL.*

Figure 1: Conceptual framework for this study



Source: Adapted from Chen and Tung (2014)

3. Research Methodology

Data collection procedures

This study exclusively utilized primary data collected through questionnaires. A purposive sampling was employed and this method subsequently, aids in selecting representative samples and reduces the potential for non-response bias. Primarily, the researchers identified a group comprising Gen Z individuals (born in 1997 to 2012) due to their particular traits, specifically in embracing new technologies and trends (Zou et al., 2023). Another trait is to identify their spending and payment habits which could provide insights into their financial decision-making processes (Zou et al., 2023). To ensure the appropriateness of potential respondents, that is Gen Z individuals, three pre-screening questions were incorporated as selection criteria for our sampling approach. The initial question sought confirmation of respondents being born between 1997 to 2012. The second question evaluated whether they have heard of or actively used at least one online shopping platform that offers BNPL options, including Shopee, Atome, Grabpay, or others. Participants failing to meet these pre-screening criteria were excluded from the study.

Table 1: Demographic Characteristics of the Respondents (N=440)

Demographic	Attribute	Frequency (*n*)	%
Gender	Male	170	38.6
	Female	270	61.4
Age	13-26	440	100
Education	SPM	16	3.6
	Diploma	103	23.4
	Degree	188	42.7
	Master	133	30.2
Occupation	Employed	116	26.4
	Self-Employed	31	7.0
	Unemployed	23	5.2
	Student	270	61.4
Monthly Income	Below RM1,000	290	65.9
	RM1,001 – EM2,999	70	15.9
	RM3,000 – RM4999	69	15.7
	RM5000 – Above	11	2.5
Marital Status	Single	334	75.9
	Married (Without Children)	85	19.3
	Married (With Children)	21	4.8

Demographic	Attribute	Frequency (*n*)	%
Have you Heard about Buy-Now-Pay-Later (BNPL)?	Yes	440	100
Total		440	100

Source: Author's creation (data from survey)

A total of 550 responses were initially gathered. After removing incomplete submissions and those with straight-line responses, 440 valid responses were confirmed for analysis. Table 1 presents the demographic details of the Gen Z participants who knew about BNPL services. Diving into gender distribution, the data revealed that 38.6% of participants were male, while 61.4% were female. The participants' educational backgrounds exhibited a diverse spectrum, with degree holders dominating the study at 42.7%, and those with SPM qualifications constitute a minor proportion, accounting for only 3.6% of the total participants. Regarding the survey's collection venue, the university setting yielded the highest student participation rate at 61.4%, while employed participants constituted 26.4%. For the financial landscape of the participants, a significant 65.9% reported a monthly income below RM1,000. Conversely, participants with a monthly income of RM5,000 or above represent a minimal 2.5% of the total. The participants' relationship status revealed that the majority, approximately 75.9%, are single. Married individuals without children account for 19.3%, and those married with children constitute the smallest proportion at 4.8%.

Measures

The measurement items for all constructs were modified from existing literature, with some adjustments made specifically for the BNPL setting. Since the survey was carried out in Malaysia, and all the items in the survey were first created in English, we decided to use the forward-back translation method to verify the precision of the translation (Brislin, 1970). Subsequently, a group of four specialists, consisting of marketing lecturers who frequently engage in BNPL services, evaluated all the items. They were asked to evaluate whether the statements in the questionnaire accurately represent the concepts being assessed. Before distributing the questionnaires, we ran a preliminary test (pre-test) with a group of 40 Gen-Z shoppers who engage in BNPL services. The results indicate that all questionnaire items in the exploratory factor analysis have Cronbach's α coefficients greater than 0.7 in the pre-test. This suggests that all proposed items for each construct are both valid and reliable (Hair et al., 2020).

Firstly, the measures of materialism were derived from Raj et al. (2023), while the money management skills were assessed using the scale developed by Singh and Malik (2022), and subsequently, self-efficacy was adopted from Zainuddin et al. (2019). The components of TPB including attitude, subjective norms, and perceived behavioral control used measures adopted from Hsiao & Tang (2014), Liu et al. (2020), and Chanda et al. (2023), whereas the instrument of perceived moral obligation was adopted using Mahdzan et al. (2023). Finally, the measurement items devised by Raj et al. (2023) were used to determine the scale of behavioral intention to use BNPL services.

4. Data analysis

The structural model was assessed, confirmed, and examined using Structural Equation Modelling (SEM). SEM is very beneficial for assessing intricate models and integrating hidden variables. To be more specific, we opted for the Partial Least Squares (PLS) SME technique, employing the SmartPLS 3.2.8 software (Ringle et al., 2015). Common method bias (CMB) is a frequently encountered issue in research. Considering the cross-sectional approach employed in the study design, the presence of CMBs may be a potential concern. To evaluate the CMB, we utilized two distinct methods of assessment. Initially, we utilized Harman's single-factor test and observed that the initial factor accounted for 28.9% of the variance, which is below the threshold of 40%. This indicates the absence of CMB as suggested by Fuller et al. (2016). Furthermore, the complete collinearity (FC) test demonstrated that the variance inflation factor (VIF) values ranged from 1.035 to 1.465, which is below the threshold of 3.33 (as shown in Table 2). This indicates that the presence of multicollinearity (CMB) is not a significant concern in this study (Kock, 2015).

Table 2: Results Summary for Measurement Models

Construct	Item	Loading	Full collinearity (FC)	Cronbach's Alpha	Composite Reliability	AVE
Materialism (M)	M1	0.870	1.234	0.789	0.877	0.705
	M2	0.889				
	M3	0.755				
Money Management Skills (MMS)	MMS2	0.917	1.056	0.770	0.896	0.812
	MMS4	0.886				
Self-Efficacy (SE)	SE1	0.842	1.74	0.799	0.881	0.711
	SE2	0.865				
	SE5	0.822				
Attitude (ATT)	ATT3	0.914	1.039	0.795	0.879	0.709
	ATT4	0.793				
	ATT5	0.815				
Subjective Norm (SN)	SN1	0.856	1.157	0.860	0.913	0.778
	SN2	0.875				
	SN5	0.915				
Perceived Behavior Control (PBC)	PBC3	0.910	1.284	0.868	0.919	0.791
	PBC4	0.883				
	PBC5	0.876				
Perceived Moral Obligation (PMO)	PMO2	0.865	1.279	0.812	0.889	0.728
	PMO3	0.804				
	PMO4	0.888				
Intention to Use BNPL	ITUB2	0.897	1.047	0.849	0.908	0.768
	ITUB3	0.857				
	ITUB5	0.875				

Source: Author's creation (data from survey)

Various methodologies were employed to ascertain the unidimensionality and dependability of the dataset. Construct reliability refers to the extent to which items are devoid of random errors and consistently yield reliable outcomes. In this study, the reliability of measures was assessed using the composite reliability (CR) and average variance extracted (AVE) indices. Both indices surpassed the evaluation criteria for all metrics, specifically 0.7 for the CR index and 0.5 for the AVE index. Convergent validity assesses the level of coherence among many constructs. As illustrated in Table 3, all values fell within the specified range, indicating that there is internal consistency, reliability, and convergent validity. (Hair et al., 2014). Discriminant validity was assessed using the HTMT criterion (Henseler, Ringle, & Sarstedt, 2015), which successfully met the .90 threshold, confirming the establishment of discriminant validity.

Table 3: Discriminant Validity

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Materialism (1)								
Money Management Skills (2)	0.787							
Self-Efficacy (3)	0.897	0.732						
Attitude (4)	0.789	0.773	0.786					
Subjective Norm (5)	0.900	0.802	0.895	0.747				
Perceived Behavior Control (6)	0.802	0.817	0.793	0.729	0.858			
Perceived Moral Obligation (7)	0.809	0.841	0.884	0.823	0.809	0.892		
Intention To Use BNPL (8)	0.801	0.773	0.858	0.708	0.728	0.824	0.829	

Source: Author's creation (data from survey)

Structural model

Sixteen hypotheses were formulated in this study, specifically relating to the constructs outlined in Figure 2. According to the evaluation of the path coefficients presented in Table 4, all of the hypotheses received were supported. Subsequently, the bootstrapping method employing 10,000 subsamples was employed to assess the statistical significance of the associations between the concepts (Hair et al., 2020).

Table 4 shows the attitude of BNPL positively influenced intention to use BNPL (β =0.1320, t = 2.4190, $p < 0.01$) supporting H1. Besides, subjective norms (β = 0.1150,t = 2.507,$p < 0.01$), perceived behavioral control (β =0.3410, t = 5.9590 $p < 0.01$) and perceived moral obligation (β= 0.2700, t = 5.0790, $p < 0.01$) had positive relationships with the intention to use BNPL, providing support for H2, H3 and H4. Next, materialism positively induced attitude towards BNPL (β =0.2350, t = 5.312, $p < 0.01$), subjective norms (β= 0.349, t = 10.829, $p < 0.01$), perceived behavioral control (β= 0.2230, t = 5.353, $p < 0.01$), and perceived moral obligation (β =0.135, t = 3.273, $p < 0.01$), delivering support for H5a, H5b, H5c and H5d.

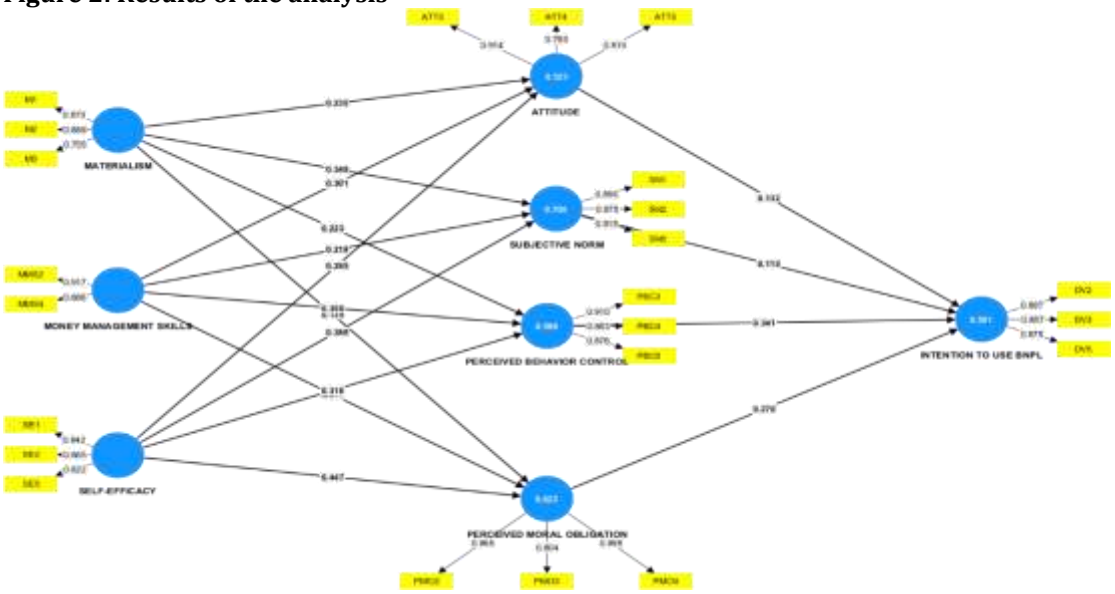
Subsequently, money management skills positively influenced attitude towards BNPL (β =0.310, t = 8.013, $p < 0.01$), subjective norms (β= 0.218, t = 5.984, $p < 0.01$), perceived behavioral control (β= 0.35, t = 7.706, $p < 0.01$), and perceived Moral Obligation (β =0.317, t = 7.749, $p < 0.01$), delivering support for H6a, H6b, H6c and H6d. Lastly, self-efficacy positively induced attitude towards BNPL (β =0.295, t = 5.962, $p < 0.01$), subjective norms (β= 0.3880, t = 13.525, $p < 0.01$), perceived behavioral control (β= 0.316, t = 9.891, $p < 0.01$), and perceived Moral Obligation (β =0.4470, t = 10.979, $p < 0.01$), delivering support for H7a, H7b, H7c and H7d.

The R^2 value suggested that the model accounted for roughly 58.1% of the variability of the intention to use BNPL and was predicted by the four external constructs (attitude, subjective norms, perceived behavioral control, and moral obligation). Subsequently, the proposed model accounted for roughly 52.30% of the variability of attitude, 70.6% of subjective norms, 59.8% of perceived behavioral control, and 62.3% of perceived moral obligation. Table 4 illustrates the result of the hypotheses testing.

Table 4: Result of the hypotheses

	Std. β	std. Error	*t*-value	p-value	Result
ATTITUDE -> INTENTION TO USE BNPL	0.1320	0.0390	2.4190	0.0000	Supported
SUBJECTIVE NORM -> INTENTION TO USE BNPL	0.1150	0.0480	2.5070	0.0080	Supported
PERCEIVED BEHAVIOR CONTROL -> INTENTION TO USE BNPL	0.3410	0.0570	5.9590	0.0000	Supported
PERCEIVED MORAL OBLIGATION -> INTENTION TO USE BNPL	0.2700	0.0530	5.0790	0.0000	Supported
MATERIALISM -> ATTITUDE	0.2350	0.0440	5.3120	0.0000	Supported
MONEY MANAGEMENT SKILLS -> ATTITUDE	0.3010	0.0380	8.0130	0.0000	Supported
SELF-EFFICACY -> ATTITUDE	0.2950	0.0490	5.9620	0.0000	Supported
MATERIALISM -> SUBJECTIVE NORM	0.3490	0.0320	10.8290	0.0000	Supported
MONEY MANAGEMENT SKILLS -> SUBJECTIVE NORM	0.2180	0.0360	5.9840	0.0000	Supported
SELF-EFFICACY -> SUBJECTIVE NORM	0.3880	0.0290	13.5250	0.0000	Supported
MATERIALISM -> PERCEIVED BEHAVIOR CONTROL	0.2230	0.0420	5.3530	0.0000	Supported
SELF-EFFICACY -> PERCEIVED BEHAVIOR CONTROL	0.3160	0.0320	9.8910	0.0000	Supported
MONEY MANAGEMENT SKILLS -> PBC	0.3500	0.0450	7.7060	0.0000	Supported
MATERIALISM -> PERCEIVED MORAL OBLIGATION	0.1350	0.0410	3.2730	0.0010	Supported
MONEY MANAGEMENT SKILLS -> PMO	0.3170	0.0410	7.7490	0.0000	Supported
SELF-EFFICACY -> PERCEIVED MORAL OBLIGATION	0.4470	0.0410	10.9790	0.0000	Supported

Figure 2: Results of the analysis



Source: Author's creation (data from survey)

Discussion

This study investigates the factors motivating consumers' intention to use Buy Now Pay Later (BNPL) platforms, proposing sixteen hypotheses related to these driving variables. Findings indicate that most participants in Malaysia are receptive to using BNPL applications, reflecting high digital literacy in the e-commerce sector. This is consistent with Özdemir-Güzel and Baş (2021), who noted that Generation Z is highly adaptable to technology and frequently utilizes smart devices and applications. Although not all respondents are familiar with BNPL, they maintain a positive attitude towards it. Previous research suggests that increased consumer awareness of technological advantages will enhance e-commerce application usage (Özdemir-Güzel & Baş, 2021). This study enriches the literature on BNPL app usage and emphasizes understanding purchasing behavior in developing nations like Malaysia.

The evidence suggests that attitude significantly influences Gen Z's decision to use BNPL, aligning with earlier consumer behavior studies and the Theory of Planned Behavior (TPB) (Rabaa'i et al., 2024). Attitudes can evolve due to persuasion, new information, cognitive dissonance, and influential individuals (Sia & Jose, 2019). Positive attitudes towards payment methods promote BNPL adoption, underscoring the necessity for businesses to comprehend user motivations to cultivate favorable perceptions of the platform. Moreover, the study reveals that subjective norms positively affect Gen Z's BNPL usage, ranking as the second most influential factor (Rabaa'i et al., 2024). Individuals are more inclined to use BNPL if it is deemed socially acceptable (Li et al., 2023). Subjective norms are influenced by societal and cultural standards, as well as peer opinions (Anderson, 2023), significantly impacting decisions due to perceived social expectations (Sia & Jose, 2019; Santos & Liguori, 2019).

Additionally, perceived behavioral control positively affects BNPL usage intention. Gen Z's confidence in managing technology correlates with increased BNPL use (Vu et al., 2023). This perceived control influences payment preferences and the ease of using BNPL services (Majid, 2021; Johnson et al., 2021). Financial competence and transparent communication of BNPL terms enhance perceived control, which is crucial in a volatile financial landscape (Shankar, 2022).

Perceived moral obligation exhibits the highest positive effect on Gen Z's BNPL usage intention. Respondents express a moral duty to repay debt, reflecting their financial responsibility (Bian et al., 2023). This relationship underscores the ethical considerations in financial decisions (Zainudin et al., 2019; Schomburgk & Hoffmann, 2022). BNPL providers' transparency plays a role in shaping consumers' moral obligations (Relja et al., 2023). This study extends TPB by integrating perceived moral obligation, highlighting its significant role in BNPL

adoption (Atiyah & Kusumawati, 2023).

Furthermore, materialism positively influences all four factors related to the expanded TPB and the intention to use BNPL. Respondents believe that possessing luxuries is essential for happiness, driving BNPL use for significant purchases with manageable payments. Materialism enhances perceived behavioral control, making BNPL appear affordable and manageable (Ali et al., 2020). This perception aligns with materialistic desires for immediate gratification and the acquisition of high-value items without immediate financial strain. Social comparison, a key aspect of materialism, also encourages individuals to maintain a certain lifestyle and status, further increasing their inclination toward BNPL services (Zhu et al., 2021).

Finally, money management skills positively correlate with attitude, subjective norm, perceived behavioral control, and perceived moral obligations, impacting BNPL use among Gen Z. Effective money management fosters positive financial attitudes (Lavonda et al., 2021), influences social norms (Hamid & Loke, 2020), and enhances perceived behavioral control (Balagobei & Prashanthan, 2021). Self-efficacy also impacts all factors, linking good money management skills to higher self-efficacy, which is crucial for handling BNPL obligations (Zainudin et al., 2019; Johnson et al., 2021).

5. Implications of the Study

To effectively target Generation Z with BNPL services, providers should implement a comprehensive marketing strategy that aligns with this demographic's preferences. BNPL campaigns should appeal to materialism by highlighting the latest trends and popular products, demonstrating how BNPL facilitates access to desired goods without immediate financial burden, which resonates with Gen Z's aspirational lifestyle. Emphasizing self-efficacy is crucial; positioning BNPL as a tool for financial empowerment with flexible payment options promotes financial independence. User-friendly interfaces and straightforward processes reinforce manageability and empowerment. Additionally, providers should offer educational content on responsible spending and financial literacy, including features in BNPL apps to help users track and budget expenditures, thereby increasing confidence in responsible BNPL use.

Marketing campaigns should also align with sustainability by incorporating eco-friendly messaging and partnering with sustainable brands, appealing to Gen Z's environmental values. Social media engagement is vital, leveraging popular platforms to create engaging content that illustrates BNPL's convenience and benefits. Encouraging user-generated content, testimonials, and influencer collaborations enhances visibility and appeal. Creating forums, discussion groups, or exclusive events tailored to Gen Z interests fosters a sense of community and shared experiences. Providers must emphasize ethics by highlighting responsible lending practices, transparency, and fair treatment of customers to build trust. Showcasing initiatives that contribute to social causes and committing to ethical business practices positions BNPL as a socially conscious financial tool. By integrating these strategies, BNPL providers can effectively appeal to Generation Z, driving their intention to use BNPL services while aligning with their attitudes, values, and behaviors.

This research significantly contributes to the literature by addressing the gap regarding Gen Z's intention to use BNPL services. Utilizing an extended Theory of Planned Behavior (TPB), the study examines the influence of Attitude, Subjective Norm, Perceived Behavioral Control, and Perceived Moral Obligation on Gen Z's intention to use BNPL. It also integrates Materialism, Money Management Skills, and Self-Efficacy into the TPB framework. The findings confirm that these variables influence the extended TPB and, indirectly, the intention to use BNPL, providing insights into Gen Z's decision-making processes. Furthermore, incorporating Perceived Moral Obligation into the TPB adds an ethical dimension, enhancing the understanding of decision-making processes by recognizing the interaction between attitudes, norms, perceived control, and moral considerations. This extension offers a comprehensive view of human behavior, emphasizing ethical influences.

The study enhances the TPB by integrating Materialism, Money Management Skills, and Self-Efficacy. Materialism highlights the impact of the desire for possessions on attitudes, while Money Management Skills address practical financial constraints, and Self-Efficacy reflects confidence in financial decisions. This nuanced framework captures the complexity of human decision-making, considering personal traits, social pressures, and internal beliefs, aiding in designing effective interventions to promote behavior changes aligned with core

values and goals. Finally, this study explores Gen Z's intention to use BNPL in developing countries like Malaysia. While many BNPL studies focus on Western consumers, research on Malaysian consumers remains limited. Understanding the local context is crucial, as findings from Western contexts may not generalize to regions like Asia, particularly Malaysia, which is experiencing a technological boom. Indeed, Malaysia's younger population, coupled with growing smartphone penetration, provides fertile ground for BNPL services.

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Employee's Work-Life Balance, Career Development, Motivation and Satisfaction as the Determinants of NGO's Performance

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Abstract: This study investigates the determinants of employee performance in the Service Industry in Malaysia, with a specific focus on work-life balance, job satisfaction, employee motivation, and career development. 300 survey questionnaires were distributed in total, and 170 respondents from both executive and non-executive groups were analyzed using IBM's SPSS version 23. The findings validate a substantial correlation among work-life balance, job satisfaction, employee motivation, career development and employee performance at Non-Government organizations (NGO's). This study provides significant insights that can be employed by NGO's in Malaysia to design effective strategies for enhancing employee performance. The proposals aim to advance research on employee management to improve corporate effectiveness and promote employee success in NGOs as its strategic influence on government policy at domestic and international levels.

Keywords: *Work-life balance, job satisfaction, employee motivation, career advancement, employee performance, International NGO*

1. Introduction and Background

The progress and development of a nation are not solely focused on the role of government alone. The role of private sector and non-governmental organizations (NGOs). It is also important to ensure the nation's sustainable development and continuously benefits society. Non-governmental organizations (NGOs) are increasingly recognized or promoted as healthcare service, community development, social justice contributions and education progress (Abiddin et al: 2022).

It is very alarming since Malaysian Non-Government Organisations have very dynamic roles and a distinct relationship with the government. NGOs in Malaysia tend to interact more with their government counterparts to bring in the best for the country, including bringing in good governance (Alatas, 2003). Hence there is a need to examine this phenomenon in Malaysia further and to equip Malaysian NGOs with the necessary capacities through organizational capacity building.

NGO's performance has an influence on government policy at the domestic and international levels (Ahmad & Arshad, 2022). For this reason, the researcher needs to contribute their findings by focusing on NGO's performance. There are five principles of good governance were recognized as significantly positively correlated with NGO's performance. This includes accountability, leadership, strategy management, performance monitoring, and transparency. Consistent assessment of the NGO's governance progression will always be required in a way that global governance is perceived as a fundamental principle (Omar et al, 2018).

However, measuring the organizational performance in for-profit and not-for-profit organizations requires different criteria due to their distinct goals and objectives. For the for-profit organization, it involves financial metrics, market position (share and growth), customer service and operational efficiency. While not-for-profit organizations put forth the importance on mission accomplishment, organizational effect, and efficient resource utilization to serve the community (Ibrahim et al; 2023). Measuring employee as the individual unit of organizational analysis differs significantly between profit-oriented organizations and nonprofit organizations for their distinct goals and operational focus. As for the profit-oriented organization, the financial impact, organizational sales and productivity, customer service, innovation and goal attainment become their key performance index. Unlike for-profit organizations, the nonprofit organization employee evaluation emphasizes their mission accomplishment, resource management, service quality and delivery, and community and collaborative engagement (Ibrahim et al;, 2023).

Considering that employees in NGOs do not prioritize monetary rewards, the organization needs to ensure that employees' motivation remains high, job satisfaction is positive, career development is supported, and there is a balance between work and life, as well as overall well-being to sustain organizational performance.

Problem Statement

Globally, there are over 8 million Non-Governmental Organizations (NGOs), with approximately 81,544 based in Malaysia. Not-for-profit organizations typically prioritize environmental initiatives, resulting in distinctive business cultures compared to their for-profit counterparts.

The complexity of performance assessment in NGOs, combined with a gap in scholarly research, presents a compelling reason for this study. Because of the different organizational performance measures between for-profit and not-for-profit organizations, the determinants for employee performance measures are also different. Culturally specific attributes within Malaysian non-governmental organizations (NGOs) can impact the acceptance of traditional performance measurement systems (Gowindasamy, 2019). Many existing methodologies primarily focus on financial metrics, which may not align well with the diverse objectives of NGOs that often encompass multiple dimensions beyond just financial outcomes. Non-profit organizations, including NGOs, face unique challenges compared to for-profit sectors, such as the absence of traditional financial incentives like performance bonuses or promotions. As a result, there is a need to develop comprehensive performance measurement tools that take into account a wider range of factors beyond just financial indicators to effectively evaluate and enhance performance within NGOs.

Supporting the statement that nonprofit organization employee measures resource management, service quality and delivery, and community and collaborative engagement, Skarpeta (2020) suggested that the internal service quality of nonprofit organizational employees is dependent on the level of responsibility of the respondent's job. Therefore, organizations need to ensure employee motivation, as it encompasses both intrinsic and extrinsic factors that drive enthusiasm and commitment to their roles (Aye et al., 2019). This motivation, in turn, contributes to improved internal service quality.

Other motivational factors that influence an employee's performance in a nonprofit organization are closely tied to the organization's mission-driven purpose, which is to create a positive impact and contribute to social change. Targeting specific components in HRM practices is vital, as they are significant predictors of reducing employee turnover intentions. One study found that organizational commitment, job stress, job satisfaction, and reward satisfaction have significant relationships with turnover intention in Malaysian NGOs (Mamat & Wan Abdul Aziz, 2021). HRM practices and supervisor behavior play a crucial role in decreasing employee turnover intentions, thereby increasing organizational performance (Tauqeer et al., 2021).

It is well known that effective management of intangible assets, including positive relationships within the organization and with customers, as well as a strong external image, enhances an organization's sustainable competitive advantage (Buonomo et al., 2020). Employee satisfaction with a collaborative and supportive work environment can be a significant motivator due to the strong sense of community and relationships with colleagues and beneficiaries. Job satisfaction, in this context, reflects an employee's positive regard for their work role (Hee et al., 2019). Additionally, the sense of personal fulfillment and satisfaction derived from contributing to a cause or helping others provides meaning to work beyond financial rewards.

As opposed to the statement, 59% of Malaysian workers are satisfied with their jobs, while others are seeking better financial opportunities (Mardhiah, 2022). Management literature has traditionally recognized that volunteers are a unique and critical human resource for NGOs, leading to the development of market-oriented strategies aimed at strengthening recruitment and retention. Volunteers are motivated to stay with organizations that provide them with enjoyable experiences (Zollo et al., 2017, p. 513). Therefore employee satisfaction and career development opportunities can significantly enhance employee morale, contributing to higher productivity levels (Hee & Rhung, 2019).

For employee well-being, an empirical model by Navajas et al; (2020) has supported their hypothesis that the marginal effect produced by an increase in job demands (physical and psychological) decreases the well-being of employees in the sector. Consequently, work-life balance is increasingly recognized as a vital issue by

corporate boards, anticipated to gain prominence among human resource professionals in the coming years (Abdirahman et al., 2018). For many managers, employees' requests to access work-life balance policies are perceived as conflicting with operational goals (Todd & Beans, 2010). A finding of work-life balance in Malaysia reflected only a medium level of balance (Saharan et al; 2021) Even though, research highlights that employees with positive work-life balance contribute significantly more effort compared to overworked peers (Kehl, 2012). There are still research gaps and scope for future research in the area of work-life balance were found (Thilagavathy & Geetha, 2023).

In addition to work-life balance, several factors such as psychological, social, physical, and financial aspects have affected employee satisfaction (Purwanto, 2018; Yadav, 2014). In certain workplaces, some factors create constraints and limitations on employees, potentially affecting their ability to maintain a healthy work-life balance. These constraints may include strict regulations, inflexible work hours, heavy workloads, limited opportunities for personal time, or other factors that make it challenging for employees to achieve a satisfactory balance between their work responsibilities and personal lives. This aligns with Guest's (2017) assertion that certain workplace factors impose restrictive limits and regulations on employees, necessitating the introduction of additional work sectors to facilitate this balance. A lack of healthy balance between professional and personal lives can lead to various personal challenges, ultimately diminishing the quality of both life domains (Johari et al., 2018).

Studying and understanding employee performance is not new to researchers and organizations; however, the methods used and the factors identified can vary based on the nature of the business, the organization, and contextual or environmental factors. How it is studied and understood is continually developing. An organization’s performance includes dimensions such as strategic planning, operational planning, financial planning, legal considerations, and its growth path. Enhanced organizational performance is achieved when employees have a clear understanding of their roles and responsibilities. Continuous and effective communication between leaders, management, and employees is vital to establishing performance expectations, monitoring progress, and attaining desired results. Organizational performance involves measuring all significant achievements crucial to the organization’s survival, indicating that success is tied to the effective execution of its objectives. Because human resource management practices have a positive and significant effect on employee performance (Da Silva et al; 2020), the focus on elements such as work-life balance, career development, motivation and satisfaction is chosen for research empirical evidence.

2. Literature Review

Human resource management strategies affect employees' abilities to maintain a healthy balance and their motivation levels, both critical for achieving organizational objectives (Thamrin & Riyanto, 2020) and their influence on employees' work-life balance and motivation (Oludayo et al., 2018). Notably, there is a scarcity of research focusing on NGO employees in Malaysia, often due to the perception that studies of non-profit organizations are irrelevant (as there are no profit gains). Many employees today face considerable stress from longer working hours resulting from modern technological expectations. Achieving a healthy work-life balance is a significant challenge for employees across various industries, including education. However, implementing necessary changes is a complex process that must be executed in phases (Garg & Yajurvedi, 2016). Human resource management helps employees achieve this balance (Nie, Lamsa & Pucetaite, 2018). We begin with a literature review on employee performance as the dependent variable, followed by the literature on employee well-being, Job satisfaction, motivation and career development as the independent variables.

Employee performance

The quality of employee performance is significantly improved by job satisfaction (Prihadini et al., 2021). According to research, the performance of millennial employees is significantly influenced by work-life balance. Consequently, to achieve high performance levels, companies must establish work-life balance policies that both motivate and guarantee employees' dedication to optimal performance (Wiradendi, 2020). Furthermore, the results emphasize the significance of employee engagement and job satisfaction in the attainment of effective HRM performance (Alsafadi & Altahat, 2021). Although employee engagement does not directly influence performance, its effects are mediated through motivation and job satisfaction, which can substantially impact overall employee performance (Riyanto, Hendri & Erlisha, 2021). Susanti et al; (2022) also supported

the statement with their finding of the positive influence of job satisfaction and work-life balance on job performance.

Work-Life Balance and Employee Performance

According to the findings of a study (Yasbek, 2004) on the topic of work-life balance and the association between the productivity achieved by workers, stress has impeded the employees' ability to maintain a healthy work-life balance, which has resulted in poor productivity or even less. There are several organizations, such as the Corporate Executive Board (CEB), that have collaborated with businesses that provide work-life balance to their staff members to reduce the amount of tension that exists between their professional and personal lives (Sekaran, 2006). When workers in any business are relieved of the weight of work-life conflict, studies show that they can perform effectively, prevent absenteeism, and maintain low turnover rates in terms of output, satisfaction, and devotion toward the concepts and mission of the firm or the organization. However, studies have found that employment factors have affected employee work-life balance (Che Nordin et al; 2023). More importantly, if workers can lessen the amount of tension between their jobs and personal lives, the firm will be able to significantly enhance the employees' standard of living in terms of their health and their financial contributions. Therefore, businesses of any kind need to institute work-life balance, friendly rules and frameworks, both for their workers and for the workplace as a whole. Aside from all of these issues, different workers are impacted in different ways; this may be owing to the coping tactics that have been put on through various firms, which in turn leads to an impact on the performance of the company (Pfeifer, 2009). Work-life balance and employee performance are said to have a substantial association (Anitha, 2014). Accordingly, the first hypothesis put forward in this study is as follows:

H1: There is a positive relationship between Work-Life Balance and NGO Employee Performance.

Job Satisfaction and Employee Performance

Organizations are moving in the direction of boosting the degree of job contentment among workers to keep the largest number of qualified employees possible. Job happiness may be established among representatives in several different ways. Workers who are happy in their jobs are more likely to contribute to the growth of their organization in areas such as administration, productivity, and relationships with customers. Creating a sense of purpose in the workplace is important for ensuring high employee performance (Ahmad, Abdul Sabian & Nawi, 2024). According to Badrianto & Ekhsan (2020), variable work environment and job satisfaction bring a positive and significant effect on employee performance partially and simultaneously. By providing job satisfaction and work-life balance, there will be a positive influence on employee job performance (Susanti et al; 2022). The degree to which an individual enjoys, determines the level of productivity and demonstrates an increase in work satisfaction may on occasion lead to irresponsible behavior among workers; yet, employees need a greater level of drive to do their jobs more effectively (Mariati & Mauludin, 2018). Based on the results of one study conducted by Rini & Handiman, (2020), compensation, job promotions and job satisfaction simultaneously had a significant effect on performance.

According to Allen & Blackham (2018), job satisfaction begins to move from top to bottom as the company can provide what is required to create employee job satisfaction in the industry. This is because management can provide what is required to create job satisfaction. Studies (Wang & Hsieh 2013) have shown that a few factors, including job happiness, have an impact on employees' organizational commitment. Employee satisfaction with their work undoubtedly resultsin excellent performance. Thus, the second hypothesis put forward in this study is as follows:

H2: There is a positive relationship between Job Satisfaction and NGO's Employee Performance.

Employee Motivation and Employee Performance

The arousal or urge to pursue a certain form of action or accomplish a particular goal is what we mean when we talk about motivation. When workers are motivated, they direct their efforts toward the accomplishment of the objectives that have been established for them. Several empirical investigations conducted decades ago, including Wright (2001), Chaundry & Sharma (2012), and Owusu (2012), have found evidence to support the hypothesis that there is a direct and positive correlation between employee motivation and performance on the job. Research continues to demonstrate that its importance is ongoing. According to Carvalho et al; (2020), motivation has a significant effect on employee performance. It is needed to support all company activities better. Employees who have high motivation tend to contribute all their abilities to the company to improve

performance both in quality and quantity. Apart from economic resources, human resource management is also crucial to an organization's managers to seek methods to encourage their subordinates to obtain optimal production (Martin et al., 2018). While Aldi & Susanti's (2019) also indicated that job performance is positively and significantly impacted by employee motivation. This finding is strongly supported by Fathiah et al; (2021) findings, whereby work environment and work motivation have a significant effect on employee performance. Variables of employee competence and work environment have a significant effect on employee work motivation. Work motivation has a significant effect on employee performance. Employees who are motivated to do their jobs are more productive overall and have a positive attitude toward both their co-workers and consumers. Therefore, management has a significant responsibility to fulfill to ensure that their staff is motivated to achieve their full potential at work (Kluczyk, 2013). Thus, the third hypothesis put forward in this study is as follows:

H3: There is a positive relationship between Employee Motivation and NGO's Employee Performance.

Career Development and Employee Performance

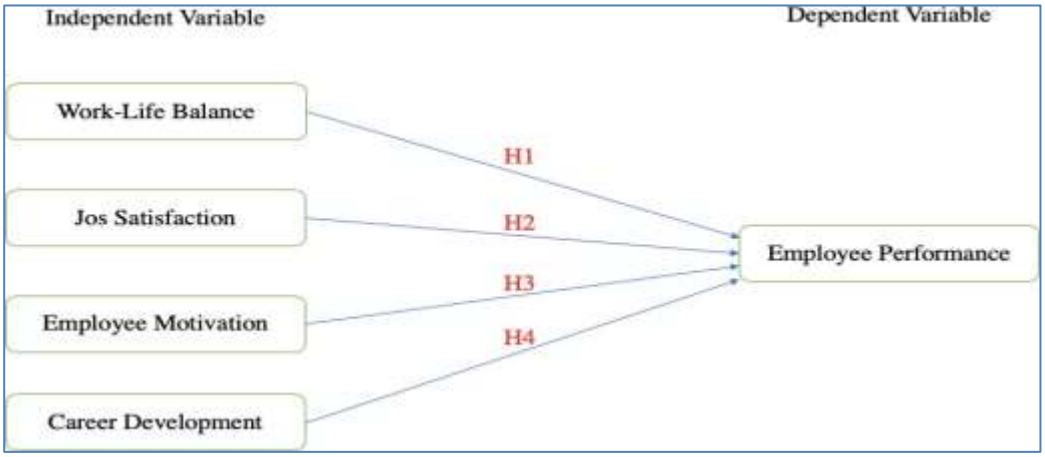
Enhanced performance is achieved by the cooperation among employees in terms of quality, quantity, punctuality, and attendance. When they fulfill the given duty, it impacts the interactions between individuals in the organization. Both personal and organizational careers are interconnected and inseparable. If an employee is unable to pursue their career path within the organization, there is the possibility that they will quit the organization shortly. Consequently, businesses are obligated to offer support to employees in navigating their career paths, enabling them to better meet one another's needs. An employee's career progression can manifest in various ways, representing the individual's professional improvement over their tenure.

According to the previous findings of research that was carried out by Mark & Nzulwa (2018), career development programs were shown to be responsible for 34.9% of the overall performance of employees. The outcomes of the research also showed that there was a significant statistically beneficial association between employee performance and employee training, career guidance, employee mentorship, and career development opportunities. At the same time as a worker's performance at work allows them to advance to higher positions, those jobs come to need an even greater level of output from the worker in question. This demonstrates that the progression of an employee's career may affect the improvement of that employee's performance. The findings of many studies have shown that employee performance may be significantly improved by the implementation of career development programs (Arifin et al, 2020; Febrianti & Suharto, 2020; Firman, 2021; Sapta & Sudja, 2018; Yunanti, 2020). One study by Firman (2021) indicated that career development had a positive and significant effect on employee performance in the hospitality industry. 116 employee performance at Delloite, Kenya as well established a result that career development was positively and significantly associated (Muringo & Kamau; 2021). As a result, the research concluded that career development programs had an effect on employee performance and made the subsequent recommendation that businesses should place a greater emphasis. Hence, the fourth hypothesis is put forward in this study as follows:

H4: There is a positive relationship between Career Development and NGO's Employee Performance.

Figure 1, illustrates the conceptual framework that provides a structured approach to designing and conducting research by defining key concepts and their relationships, guiding the development of the hypotheses, and organizing existing knowledge.

Figure 1: Conceptual Framework of Employee's Work-Life Balance, Career Development, Motivation and Satisfaction as The Determinants of Ngo's Performance.



3. Research Methodology

The study used a quantitative research design, as outlined by Sekaran & Bougie (2013), to identify relationships between dependent and independent variables. The study followed the phases of data collection, surveys, and data analysis. To describe and explain existing data about work-life balance, job satisfaction, employee motivation, career development, and employee performance, the research utilized a descriptive study method (Sekaran & Bougie, 2009). The investigation was correlational, focusing on whether work-life balance, job satisfaction, employee motivation, and career development significantly predicted employee performance. Data were collected through online questionnaires distributed to service industry employees. A cross-sectional study design was employed, gathering data at a single point in time to compare various variables simultaneously. This method facilitated examining demographic variables about both dependent and independent variables. The unit of analysis was individual employees. For the population, with 300 Human Resource Personnel at the selected Non-Government Organization in Malaysia, convenience sampling was used, to reach a minimum of 169 respondents who were readily available and willing to participate (Etikan, 2016). To collect information for this study, the researchers used convenience sampling as the nonprobability sampling design. 10 research instruments adapted from Ramos-Villagrasa et al. (2019) to measure employee performance, 10 instruments from Das and Khushwah (2015) for work-life balance, 10 instruments from Alpern et al. (2013) for job satisfaction, 10 instruments from Riyanto et al. (2021) for employee motivation, and 10 instruments from Park et al. (2019) for career development measures. All items of all sections were coded on a five-point Likert Scale.

Descriptive statistics was utilized to establish the demographic variable in this research. The outcomes stated that the respondents were 80 male (47.1%), while 90 were female (52.9). According to the data, 103 staff members or 60.6% of the respondents were between 31 and 40 years old. Ages 41 and over made up the second-largest age group, with a total of 47 employees (27.6%), followed by employees between the ages of 20 and 30 (11.8%), with a total of 20 employees. Those between the ages of 20 and 30 made up the smallest age group. For the job title, 138 respondents (80.0%) work as general employees, 6 respondents (4.7%) were managers or assistant managers, and the remaining 26 respondents (15.3%) were supervisors. 69 of the respondents (or 40.6%) had been employed for six to ten years while 34.1% of them had been employed for 1 to 5 years. The remaining of respondents (27.6%) have worked for at least ten years.

To ensure the reliability of the instruments used, a reliability test was conducted. Results have shown that the 10 items used to measure employee performance had an alpha of 0.805 which indicates a satisfactory level. A Cronbach alpha of 0.805 was stated for work-life balance, 0.874 for job satisfaction, 0.889 for employee motivation, and 0.830 for career development. All the reliability data reflected the signs of high and strong internal consistency and reliability.

4. Results

300 surveys were distributed to employees within the Human Resources department of the World Health Organization. The researcher deliberately disseminated 300 surveys, exceeding the initially intended sample size, and ultimately collected responses from 170 participants. To ascertain if there is a link between variables, correlation analysis is utilized. The strongest value and a strong association between the variables are indicated by a value that is closer to 1. The independent factors exhibit a substantial relationship with the dependent variable or employee performance. As shown in Table 1, both Work-life Balance and Job Satisfaction had positive correlations with the dependent variable (r=.613, p<0.05 and r=.615, p<0.05, respectively). Similar employee motivation likewise has a positive correlation with thedependent variable, which is employee performance (r=.526, p<0.05), while career development, has also reflected a good association with employee performance (r=.511, p<0.05).

Table 1: Coefficient Correlations

Correlations

		EmployeePerformance	WorkLifeBalance	JobSatisfaction	EmployeeMotivation	CareerDevelopment
EmployeePerformance	Pearson Correlation	1	.613**	.615**	.526**	.511**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	170	170	170	170	170
WorkLifeBalance	Pearson Correlation	.613**	1	.791**	.850**	.739**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	170	170	170	170	170
JobSatisfaction	Pearson Correlation	.615**	.791**	1	.824**	.676**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	170	170	170	170	170
EmployeeMotivation	Pearson Correlation	.526**	.850**	.824**	1	.769**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	170	170	170	170	170
CareerDevelopment	Pearson Correlation	.511**	.739**	.676**	.769**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	170	170	170	170	170

**. Correlation is significant at the 0.01 level (2-tailed).

In multiple regression analysis, the goal is to create a model that best predicts the value of the dependent variable based on the independent variables. The analysis provides insights into the strength and direction of the relationships between the variables, as well as the relative importance of each independent variable in predicting the dependent variable. Multiple regressions existed as a leeway of bivariate correlation, according to Coakes et al; (2013). Multiple regressions were employed in this study to ascertain the link between independent variables elements and job performance to investigate which of these characteristics had the greatest impact on employee performance among the human resource staff at the World Health Organization in Malaysia.

Based on the analyzed data in Table 2, the independent variables (work-life balance, job satisfaction, employee motivation, and career growth) collectively account for 43.8% of the variation in the dependent variable (employee performance) as indicated by the (R^2) value of 0.438. This means that 56.2% of the variation in employee performance is not explained by the included independent variables. This suggests that there are other factors not considered in the study that could potentially impact employee performance. The statistically significant F-value (with a significance level of 0.000) indicates that the overall regression model (including all independent variables) is a good fit for the data. This means that at least one of the independent variables has a significant relationship with the dependent variable. The findings suggest that while work-life balance, job satisfaction, employee motivation, and career growth are important factors in explaining employee performance, there are additional variables that could be included in the analysis to improve the predictive power of the regression equation.

The first hypothesis was tested using linear regression analysis to address Research Question 1. The results indicated a significant correlation between work-life balance and employee performance (β = 0.416, p = 0.05), thus validating H1 for this investigation. The second hypothesis was examined to address Research Question 2, and it was found that employee performance and job satisfaction were significantly connected (β = 0.431, p = 0.05), supporting H2 for this study. The analysis also revealed a substantial correlation between employee motivation and performance (β = 0.282, p = 0.05) Therefore, H3 was supported by this investigation. Additionally, the fourth hypothesis was verified through regression analysis, which showed a significant relationship between employee performance and career development (β = 0.130, p < 0.05). Consequently, H4 was supported in this study.

In conclusion, the regression analysis indicates that the included independent variables explain a significant portion of the variation in employee performance, but there are other factors not accounted for in the study that could further enhance the understanding and prediction of employee performance. Further research may be needed to identify and include these additional factors in the analysis.

Table 2: Results of Multiple Regression Analysis

Independent Variables	Standard Coefficients	t	Sig.	Collinearity Statistics	
	Beta			Tolerance	VIF
Work-life Balance	.416	9.024	.000	.239	4.188
Job Satisfaction	.431	3.479	.001	.290	3.445
Employee motivation	.282	3.980	.000	.191	5.236
Career Development	.130	2.114	.036	.381	2.624
R Square	.438				
Adjusted R Square	.424				
F	32.110				
Sig. of F Value	.000				

Dependent Variable = Employee Performance *p value < .05, **p value < .01

Discussion

In multiple regression analysis, the beta coefficients represent the strength and direction of the relationship between each independent variable and the dependent variable while controlling for the other variables in the model. The interpretations of the beta coefficients provided that a Work-life balance beta coefficient of 0.416 suggested a one-unit increase in work-life balance, and the predicted value of the dependent variable (employee performance) is expected to increase by 0.416 standard deviations, holding other variables constant. While a beta coefficient of 0.431 for job satisfaction indicates that for a one-unit increase in job satisfaction, the predicted value of employee performance is expected to increase by 0.431 standard deviations, all else being equal. Next, the beta coefficient of 0.282 for employee motivation suggests that for a one-unit increase in employee motivation, the predicted value of employee performance is expected to increase by 0.282 standard deviations. Lastly, the beta coefficient of 0.130 for career development implies that for a one-unit increase in career development, the predicted value of employee performance is expected to increase by 0.130 standard deviations, holding other variables constant.

Based on the beta coefficients provided, work-life balance, job satisfaction, and employee motivation all have positive relationships with employee performance, indicating that improvements in these areas are linked to higher performance. Career development also shows a positive relationship with employee performance, but its effect is weaker compared to work-life balance, job satisfaction, and motivation. This suggests that, when controlling for other variables, changes in job satisfaction have a stronger impact on employee performance than the other factors examined.

5. Managerial Implications and Recommendations

Based on the findings, several suggestions can be made for the organization to enhance employee performance. The organization should first focus on employee Job Satisfaction since the variable has shown the strongest

positive relationship with employee performance in the analysis. The organization should prioritize initiatives aimed at improving job satisfaction among employees. This could involve providing recognition for achievements, opportunities for skill development, a positive work environment, and clear communication channels. Secondly, by addressing work-life balance, the organization can consider implementing flexible work arrangements, promoting employee wellness programs, and encouraging a healthy work-life balance to support employees in managing their personal and professional lives effectively. It is to reflect the importance of Work-life balance as a significant role in employee performance. Since employee motivation was also found as another key factor influencing employee performance, the organization can provide opportunities for career growth, recognize and reward employee efforts, foster a positive and supportive work culture, and ensure that employees are engaged and aligned with the organization's goals.

While career development has a slightly weaker impact on employee performance as compared to job satisfaction, work-life balance and employee motivation, it is still a significant factor. The organization can offer training programs, mentorship opportunities, career advancement paths, and skill-building initiatives to support employees in their professional growth and development. On the other hand, the model did not account for 56.2% of the variation in employee performance, suggesting the presence of other influencing factors, the organization may benefit from conducting further research or surveys to identify and address these additional variables that could impact employee performance.

In summary, by focusing on improving job satisfaction, work-life balance, employee motivation, and career development, the organization can create a conducive environment that fosters employee engagement, productivity, and overall performance. Regular monitoring and feedback mechanisms can also help in assessing the effectiveness of these initiatives and making necessary adjustments to continuously support and empower employees for success.

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The Relationships Between Organizational Citizenship Behavior, Affective Commitment and Team Effectiveness in A Non-Profit Organization

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Abstract: Non-profit organizations play a crucial role in fostering healthy communities by providing vital services that contribute to economic stability and mobility. However, the effectiveness of these organizations hinges on the positive and engaged behavior of their employees. These organizations may face challenges in staffing and resource management that can hinder performance and funding, making team effectiveness and organizational citizenship behavior essential for success. This study investigates the relationships between organizational citizenship behavior (OCB), affective commitment, and team effectiveness in a non-profit organization based in Selangor. Utilizing a cross-sectional design and a quantitative approach, 118 employees across local and international branches of a non-profit organization participated in an online survey. Data analysis was conducted using SPSS version 26. The study found that conscientiousness, courtesy, and civic virtue are the dimensions of (OCB) that positively influence team effectiveness, while altruism and sportsmanship did not show a significant impact in the non-profit context. Conscientious employees who are diligent and responsible, along with those who exhibit courtesy by being considerate and communicative, and those who actively participate in organizational activities, contribute meaningfully to team success. Furthermore, affective commitment, or employees' emotional attachment and identification with the organization, was also found to enhance team effectiveness, highlighting the role of an engaged and committed workforce in driving positive outcomes.

Keywords: *Organizational Citizenship Behaviour, Affective Commitment, Team Effectiveness, Non-Profit Organisation*

1. Introduction and Background

Team effectiveness is a critical element for the success of any organization, including non-profit organizations. It refers to the ability of a team to work together efficiently and produce high-quality outcomes. As organizations increasingly rely on teams to tackle complex projects, the importance of fostering effective teamwork has become more pronounced (Goh, Tuckey, & Johnson, 2021). High team effectiveness leads to increased productivity, better decision-making, and improved organizational outcomes (Salas, Shuffler, Thayer, Bedwell, & Lazzara, 2021). However, achieving team effectiveness can be challenging due to various factors, such as team member behavior, organizational culture, and the external environment (Parker & Knight, 2020). While much research has focused on team effectiveness in profit-making organizations, there is a significant gap in understanding how these dynamics play out in non-profit organizations (Mahembe, 2014). In the context of non-profit organizations, team effectiveness is even more crucial due to the unique challenges these organizations face, such as fundraising difficulties, donor distrust, and a lack of skilled human resources (Uddin, 2019). The absence of effective teamwork can lead to wasted resources, missed deadlines, and ultimately, a failure to meet organizational goals. This inefficiency can result in increased operational costs and financial risks, potentially leading donors to withdraw funding (Bahati, 2013; Ross, 2008).

Additionally, effective teamwork is a result of higher levels of organizational citizenship behavior (OCB), which refers to the voluntary, extra-role activities that employees engage in to support their organization (Ng & Feldman, 2022). OCB has been shown to positively influence team effectiveness by promoting cooperation, reducing conflicts, and enhancing the overall functioning of the team (Li, Chen, & Yang, 2021). In non-profit organizations, where resources are often limited, fostering OCB among employees can lead to significant

improvements in team effectiveness and organizational performance (Tuan, Yuen, & Dinh, 2022). Within the social work profession, OCB can significantly enhance the effectiveness and efficiency of non-profit organizations. Social workers who practice OCB exhibit behaviors such as altruism, civility, and conscientiousness, which not only solve problems but also create a strong sense of belonging within the organization. These behaviors motivate social workers to take responsibility, show awareness, and value their time with the organization, which in turn inspires them to develop innovative methods for task completion (Gad, 2018).

Moreover, research suggests that team effectiveness is strongly influenced by leadership and the extent to which leaders can foster affective commitment among team members (Garavan, Carbery, & Rock, 2020). Affective commitment, which refers to the emotional attachment individuals feel toward their team or organization, has been found to enhance team cohesion and effectiveness (Caniëls, Semeijn, & Renders, 2021). Employees with high levels of affective commitment are motivated to contribute positively and voluntarily to their company, driven by a genuine desire to do so rather than by a sense of obligation (Meyer & Allen, 2002). This form of commitment reflects an employee's emotional connection to the organization, leading them to stay because they "want to," rather than because they "have to" (Ozdem, 2012). Leaders who can cultivate a sense of emotional connection among team members are more likely to achieve higher levels of team effectiveness, which is critical for the success of non-profit organizations (Hammond, Clapp-Smith, & Palanski, 2020). In all kinds of organizations, no matter whether they are for-profit or non-profit, organizational affective commitment has proven to be strongly related to the internalization of organizational values, dedication and loyalty, as well as with the alignment with the organization's goals (Beck & Wilson, 2000).

The non-profit organization in this study has experienced a notable increase in employee turnover for the past two years and also struggling with internal challenges of individuals who have attempted to disrupt the workplace environment. To overcome these challenges, it is essential for the organization to proactively develop strategies to enhance teamwork, foster a positive organizational culture, and promote OCB among employees. Therefore, the objectives of the study are to (1) determine the relationship between various dimensions of OCB and team effectiveness; and (2) determine the relationship between affective commitment and team effectiveness.

2. Literature Review

Team Effectiveness: In the context of non-profit organizations, team effectiveness is particularly crucial in overcoming challenges related to fundraising, donor engagement, and the retention of skilled personnel (Williams, 2020). Non-profit organizations often face unique difficulties, including limited resources and high employee turnover, which can impede their ability to achieve their goals (Bianchi, Sanches, & Labate, 2022). Research indicates that fostering a positive organizational environment and promoting teamwork can significantly enhance the effectiveness of non-profit teams, ultimately leading to better organizational performance (Borzaga & Tortia, 2021). In addition, non-profit organizations, which often operate under constraints such as limited resources and high employee turnover can undermine organizational performance, making it essential for non-profits to foster strong team dynamics.

Team effectiveness is widely recognized as a crucial approach to achieving complex objectives through the collaborative efforts of multiple individuals. Compared to solo efforts, individual achievement is often less effective without the support and collaboration of others with similar responsibilities. Recent studies by Johnson and Scott (2023) have demonstrated that teamwork can lead to more efficient and effective outcomes, including enhanced creativity, better management of diversity, improved financial success, and overall organizational performance. In non-profit organizations, team effectiveness is especially critical, as effective and efficient teams are essential for achieving organizational goals (Rodriguez, 2022). A report by Strub (2023) from Forbes reveals that 45 percent of non-profit organization employees are expected to seek new or different employment by 2025, highlighting the need for organizations to focus on improving team effectiveness to retain talent.

Organizations can address these challenges by enhancing team effectiveness. A survey by TeamStage (2023) found that effective teamwork can increase individual loyalty to an organization by 33 percent and boost

productivity by 20 percent to 25 percent. Bahati's (2022) research further supports the benefits of team effectiveness, noting that it can reduce operational costs, improve supervisory support, enhance planning and coordination of programs, streamline workloads, mitigate financial risks, and ensure tasks are completed on schedule.

Additionally, interpersonal relationships within teams play a vital role in building social capital, which is essential for innovation and productivity (D'Amato & Zijlstra, 2021). Teams that foster strong interpersonal connections are more likely to engage in information-sharing and collaborative problem-solving, which enhances their ability to meet organizational objectives (Lee, Kim, & Lee, 2020). Additionally, positive interpersonal interactions contribute to higher job satisfaction and employee motivation, leading to increased productivity and better team outcomes (Loch & Festing, 2021).

Organizational citizenship behavior (OCB) and team effectiveness: Organizational citizenship behavior (OCB) represents a set of discretionary behaviors by team members that collectively contribute to the effective functioning of the organization and consists of five dimensions which are altruism, conscientiousness, courtesy, sportsmanship, and civic virtue. Altruism involves voluntarily helping colleagues with work-related tasks and is driven by a genuine concern for the well-being of others within the organization (Organ, 1988). For instance, employees who demonstrate altruism might assist a colleague who is struggling with their workload or provide mentorship to new employees. This behavior not only supports individual team members but also promotes a collaborative culture. Conscientiousness refers to behaviors that exceed the basic job requirements, demonstrating a high level of responsibility and commitment to the organization (Podsakoff, MacKenzie, Paine, & Bachrach, 2009). Conscientious employees are those who adhere strictly to rules, complete tasks on time, and often take the initiative to improve work processes. This dimension is crucial because it ensures that organizational operations are carried out efficiently and effectively.

Courtesy encompasses actions that prevent work-related conflicts by being considerate and mindful of the impact one's actions may have on others (Podsakoff et al., 2009). This might include keeping colleagues informed about changes that could affect them or avoiding behaviors that could cause unnecessary stress. Courtesy helps maintain a harmonious work environment by reducing interpersonal conflicts. Sportsmanship is characterized by an employee's ability to maintain a positive attitude even when faced with challenges or frustrations (Organ, 1990). Additionally, employees who exhibit sportsmanship do not engage in complaining about trivial issues and remain supportive of their colleagues and the organization, even during tough times. This behavior contributes to a resilient organizational culture and can help buffer the effects of stress and adversity. Finally, civic virtue reflects an employee's active involvement in the organization's governance and a strong sense of responsibility toward the organization's well-being (Borman & Motowidlo, 1993). This includes behaviors like attending voluntary meetings, staying informed about organizational policies, and engaging in decision-making processes. Employees who display civic virtue are seen as those who take an active interest in the future of the organization, demonstrating a deep commitment to its success. Together, these dimensions foster a collaborative and efficient organizational culture (Organ, 1988; Podsakoff et al. 2009; Borman & Motowidlo, 1993). Initially conceptualized by Organ (1988), OCB was posited to significantly enhance an organization's overall effectiveness. Over the years, research has continued to explore and affirm the link between OCB and various organizational outcomes, including team effectiveness.

Karambayya (1990) conducted one of the earliest empirical studies investigating the association between OCB and team effectiveness. The findings indicated that high-performing teams exhibited higher levels of employee satisfaction and a greater prevalence of OCB. This relationship has been consistently supported in subsequent research, which suggests that OCB, particularly when driven by intrinsic motivation, leads to exceptional team performance and effectiveness (Ansari, 2021). A motivated employee, who is engaged in OCB, not only enhances their productivity but also contributes to the long-term effectiveness of the team.

Ansari (2021) further elucidates the significance of OCB and team effectiveness in service organizations, highlighting that these behaviors are integral to achieving organizational goals and objectives. The study indicates that the impact of OCB on team effectiveness is moderated by the motivation of team members. Specifically, OCB has been shown to enhance team effectiveness most significantly when motivation levels are high. This relationship underscores the dual role of OCB and motivation in driving team and organizational

success (Sevi, 2010). Moreover, Nawaz (2018) found that OCB contributes to a team's success by fostering a collective focus on maximizing efficiency. Furthermore, organizational success often hinges on the willingness of individuals to exceed their formal responsibilities to achieve the organization's mission (Makvandi, 2017).

According to Podsakoff et al., (2009), OCB enhances organizational performance by "lubricating" the social machinery, reducing friction, and increasing efficiency. Subsequent empirical research has demonstrated that OCB is associated with desirable outcomes across various industries, including higher sales effectiveness, increased profits, and improved workgroup performance. These findings collectively suggest that OCB has a positive impact on organizational outcomes, which in turn enhances team effectiveness. Based on these, the following hypotheses are proposed:
H1: *There is a positive relationship between OCB and team effectiveness*
H1a: *There is a positive relationship between altruism OCB and team effectiveness.*
H1b: *There is a positive relationship between conscientiousness OCB and team effectiveness.*
H1c: *There is a positive relationship between courtesy OCB and team effectiveness.*
H1d: *There is a positive relationship between sportsmanship OCB and team effectiveness.*
H1e: *There is a positive relationship between civic virtue OCB and team effectiveness.*

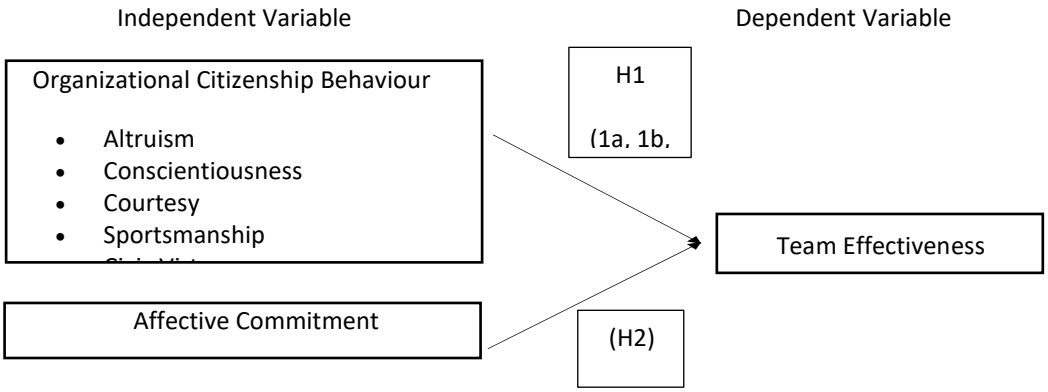
Affective commitment and team effectiveness: Affective commitment, defined as the emotional attachment, identification, and involvement an individual has with their organization or team, plays a pivotal role in determining team effectiveness. According to Mahembe (2014), when leaders actively cultivate a sense of affective commitment within their teams, they not only foster a more cohesive group dynamic but also enhance overall team performance. This occurs because affective commitment leads to a deeper emotional connection among team members, encouraging them to actively participate and collaborate, which ultimately results in heightened team effectiveness.

Affective commitment is developed through the emotional bonds that individuals form with their team or organization, often influenced by perceived opportunities for growth, support, and shared values (Hammond, 2008). When team members feel that their values align with those of the group, they are more likely to experience a strong sense of belonging and responsibility toward the team's goals. This alignment of values, often referred to as value congruence, is crucial for creating a team culture that supports effective commitment and, consequently, team effectiveness. The process of integrating and transforming values within a team culture is critical for fostering long-term commitment and success. Team members must not only understand the importance of the values being promoted but also genuinely embrace and commit to them. When this occurs, the team is better positioned to achieve the desired outcomes from these value shifts. As Hammond (2008) notes, the congruence between individual and team values significantly impacts the qualities that drive the development of practical team commitment.

Recent studies continue to support the idea that affective commitment is a significant predictor of team effectiveness. Affective commitment positively influences various team outcomes, including collaboration, communication, and overall performance. Moreover, it is often the most reliable predictor of these outcomes, making it an essential focus for leaders aiming to build successful teams. For example, more recent research by Klein, DiazGranados, & Salas (2021) found that teams with high levels of affective commitment demonstrated superior performance metrics, including productivity, innovation, and employee satisfaction. These findings have substantial implications for team-building interventions, suggesting that strategies aimed at enhancing affective commitment can lead to more effective, harmonious, and productive teams. Based on these insights, the following hypothesis is proposed:
H2: *There is a positive relationship between affective commitment and team effectiveness.*

Figure 1 shows the research framework of the study. The research framework predicts the relationship between organizational citizenship behavior, affective commitment, and team effectiveness.

Figure 1: Research Framework



3. Research Methodology

Given the small population size, a census sampling method was employed to include all eligible employees of the non-profit organization in the study. This encompassed individuals in full-time, contract, and part-time positions, ensuring comprehensive coverage and representation of the entire workforce. The employees, spread across various divisions such as operations, marketing, creative, public relations, finance, human resources, and others, were invited to participate in the survey via an online questionnaire. A total of 164 sets of questionnaires were distributed to all employees. Each questionnaire set included a cover letter explaining the study's objectives and purpose. The respondents were given two weeks of working days to complete the questionnaires. Only 118 questionnaires were returned and validated for further analysis.

The questionnaire was divided into four sections. Sections A, B, and C were designed according to established frameworks, incorporating validated measurement scales. Specifically, Section A assessed Organizational Citizenship Behavior (OCB) using a 22-item scale adapted from Podsakoff and Mackenzie (1994), which measured five dimensions: altruism, conscientiousness, courtesy, sportsmanship, and civic virtue. Section B measured affective commitment using a 6-item scale adapted from Allen & Meyer (1990), while Section C evaluated team effectiveness through a 6-item scale adapted from Larson & LaFasto (2001). Section D was dedicated to collecting demographic information, including gender, age, ethnicity, education level, volunteering preferences, years of volunteering experience, department, and overall work experience. Respondents were asked to indicate their responses on a six-point Likert scale, ranging from 1 (strongly disagree) to 6 (strongly agree).

The collected data from 118 respondents were then analyzed using the Statistical Package for the Social Sciences (SPSS) software, version 26, to draw insights and conclusions from the study. The data analysis process began with the use of descriptive statistics, such as percentages, means, frequencies, and standard deviations, to determine the demographic characteristics of the respondents. The study also utilized multiple regression analysis to investigate the predictive relationships between organizational citizenship behavior, affective commitment and team effectiveness.

4. Results

Demographic information of the 118 respondents was analyzed through frequency analysis. The gender distribution among respondents shows a predominance of female employees, who constitute 72 percent of the sample, while male employees represent 28 percent. Most respondents, 49 individuals (41.5%), fall within the age range of 26-30 years. Ethnically, most respondents are Malay, accounting for 106 individuals (89.8%). Academically, a significant proportion of respondents, (72.9%), hold a university degree. Volunteerism is strongly embraced among the respondents, with 88.1 percent expressing a positive attitude towards participating in volunteer programs. A smaller percentage, 9.3 percent, were uncertain about volunteering, and 2.5 percent expressed disinterest. Regarding volunteer experience, 26.3 percent of respondents have been active as volunteers for 7-10 years, while the departmental distribution shows that the largest group of

respondents, 35.6 percent, work in the operations department. In terms of work experience, most respondents (24.6%) have less than 1 year of experience in this non-profit organization, and the least 0.8 percent each with 21-25 years and over 26 years of work experience.

Reliability analysis of the study's scales, as indicated by Cronbach's alpha values in Table 1, shows a strong internal consistency across most measures. The values exceeded the proposed minimum threshold of 0.60 which has been proposed by Nunnally (1978). The scales for organizational citizenship behavior (OCB) exhibit good reliability, with altruism (α = .80), conscientiousness (α = .77), sportsmanship (α = .81), and courtesy (α = .88) demonstrating high reliability, while civic virtue (α = .67) is slightly lower but still acceptable. Affective commitment (α = .93) and team effectiveness (α = .94) show excellent internal consistency, indicating that the items within these scales reliably measure the intended constructs. Overall, the study's measures exhibit good to excellent reliability, supporting the dependability of the data for further analysis.

Table 1: Reliabilities (Cronbach Alpha) of the measures: (n=118)

Scales	Original Items	Reliability Cronbach Alpha (n=118)
Organizational citizenship behaviour		
Altruism	4	.80
Conscientiousness	5	.77
Courtesy	5	.88
Sportsmanship	5	.81
Civic virtue	3	.67
Affective commitment	6	.93
Team effectiveness	16	.94

The descriptive analysis provided in Table 2 demonstrates the distinct characteristics of each variable. Altruism exhibits a relatively high mean score of 4.89 (SD=.68) indicating that most participants consistently display altruistic behaviors. Conscientiousness has a slightly lower mean of 4.53 (SD=.83) suggesting some variability in the conscientious behaviors among the participants. Courtesy stands out with the highest mean score of 5.10 (SD=.76), implying that this behavior is the most exhibited among participants. Sportsmanship scored a mean of 4.61 (SD=.81). Civic virtue has a mean of 4.76 (SD=.79) showing moderate engagement in civic behaviors. Affective commitment scored a mean of 5.01 (SD=.91) indicating more variability in emotional attachment to the organization. Lastly, team effectiveness scored a mean of 4.89 (SD=.63) suggesting that participants generally perceive their teams as effective.

Table 2: Descriptive Statistic of All Study Variables (n=118)

Variables	Mean	Standard Deviation
Organizational citizenship behaviour		
Altruism	4.89	.68
Conscientiousness	4.53	.83
Courtesy	5.10	.76
Sportsmanship	4.61	.81
Civic virtue	4.76	.79
Affective commitment	5.01	.91
Team effectiveness	4.89	.63

Table 3 summarises the result of a multiple regression analysis on the relationship between organizational citizenship behavior (altruism, conscientiousness, sportsmanship, courtesy, and civic virtue), affective commitment, and team effectiveness. The R-squared value of .542 suggests that 54.2% of the variance in the dependent variable is accounted for by these predictors. Specifically, only three dimensions of OCB namely conscientiousness ($\beta = .19$, $p < .05$), courtesy ($\beta = .20$, $p < .05$), and civic virtue were found to have positive relationships with team effectiveness ($\beta = .20$, $p < .05$). In addition, affective commitment was found to have a positive significant relationship with team effectiveness ($\beta = .35$, $p < .01$).

Table 3: Regression Analysis

Model	*Unstandardized Coefficients*		*Standardized Coefficients*	*t*	*Sig.*
	B	*Std. Error*	*Beta*		
OCB					
Altruism	.06	.07	.07	.88	.38
Conscientiousness	.14	.06	.19	2.27	.02
Courtesy	.16	.07	.20	2.19	.03
Sportsmanship	-.03	.06	-.04	-.46	.65
Civic virtue	.16	.06	.20	2.53	.01
Affective commitment	.24	.05	.35	4.67	.00
F-value			21.93		
Sig.			000*		
Adjusted R^2			.52		
R^2			.54		

5. Discussion and Conclusion

The study examined the relationship between organizational citizenship behavior (OCB) and team effectiveness, focusing on five dimensions: altruism, conscientiousness, courtesy, sportsmanship, and civic virtue as independent variables. The hypotheses proposed that each dimension of OCB would positively influence team effectiveness. However, the findings indicate that the relationship between OCB and team effectiveness was only partially supported, with only three dimensions - conscientiousness, courtesy, and civic virtue - showing a positive relationship with team effectiveness. Thus, hypotheses H1b, H1c, and H1e were supported.

Based on this study, it was found that conscientiousness has a significant positive relationship with team effectiveness. A study from Hall et al., (2021) supports this finding, showing that conscientiousness is a key factor in team performance across various settings, including both virtual and face-to-face environments. They emphasize that teams with higher levels of conscientiousness tend to exhibit better task coordination, reliability, and overall performance, emphasizing the critical role of conscientiousness in enhancing team effectiveness. This study finding suggests that employees who are diligent and responsible in their work contribute meaningfully to the effectiveness of their teams. Most respondents believe in giving an honest day's work for an honest day's pay, which aligns with the concept that conscientious individuals set high expectations for themselves across all aspects of their lives (Ahmed Iqbal, 2021). In the context of this non-profit organization, conscientiousness is reinforced through organizational practices such as beginning meetings with a recitation of the Al Quran and engaging in regular Qur'anic circles to foster spiritual growth. These practices serve as internal motivators, strengthening the underlying drive to succeed, as suggested by Ahmed Iqbal (2021). Moreover, respondents noted that adherence to company rules and regulations, even in the absence of supervision, is another key aspect of conscientiousness that positively impacts team effectiveness. Gao (2021) supports this, highlighting that conscientious individuals are less prone to procrastination, take proactive steps in their work, and adhere strictly to rules, all of which contribute to their team's success.

Courtesy also showed a significant positive relationship with team effectiveness. The courtesy survey revealed high mean scores, with respondents particularly valuing the impact of their actions on co-workers and being mindful of how their behavior affects others' jobs. Ng and Van Dyne (2005) provide empirical evidence supporting the link between courtesy and team performance. Individuals who are mindful of the impact of their actions on co-workers and demonstrate considerate behaviors contribute to a supportive team climate. This supportive environment reduces friction, enhances communication, and allows for more efficient functioning of the team. Their findings reinforce the idea that courtesy plays a pivotal role in boosting team effectiveness by fostering a positive and collaborative team atmosphere. In non-profit organizations, where relationships are fundamental, fostering cooperation and maintaining a friendly workplace climate is crucial for organizational

success (Alexander, 2009; Asif, 2013).

The study also found a positive relationship between civic virtue and team effectiveness. Civic virtue involves active participation in the organization's governance and volunteering efforts. From the findings, 72 percent of respondents had been involved in volunteering for more than a year, which should have resulted in a stronger outcome. A study by Liao (2002) found that while civic virtue is generally positively associated with team effectiveness, the strength of this relationship is affected by several other variables, such as the quality of leader-member exchanges and the level of trust within teams. This finding aligns with the notion that while civic virtue contributes to team effectiveness, it is not the sole determinant and is often part of a more complex interplay of factors within teams.

Contrary to expectations, altruism and sportsmanship did not show a significant positive relationship with team effectiveness in this non-profit organization. This is aligned with a study by Lee and Allen (2002), in which it was found that altruism did not consistently correlate with team effectiveness in some organizational settings, suggesting that its influence may depend on specific contextual factors. Similarly, a study by Podsakoff et al., (2009), noted that sportsmanship may not always contribute significantly to team effectiveness, suggesting that its impact can be minimal in certain contexts where team dynamics or task structures do not align with the value of sportsmanship. The lack of significance in this study suggests that other factors may play a more critical role in influencing team effectiveness within this specific organizational context. The research model explained 54 percent of the variance in team effectiveness, indicating that other unexamined factors account for the remaining 46 percent. Briefly, while conscientiousness, courtesy and civic virtue positively contribute to team effectiveness, the roles of altruism and sportsmanship in this context may be less influential than previously thought. This highlights the importance of considering the unique characteristics of an organization when assessing the impact of OCB on team effectiveness.

Affective commitment refers to an employee's emotional attachment, identification with, and involvement in their organization. The results of this study supported Hypothesis H2, that there is a positive relationship between affective commitment and team effectiveness, indicating that affective commitment indeed enhances team effectiveness. A study by Joo and Park, (2010) indicates that teams with members who have high levels of affective commitment tend to perform better because such employees are more engaged, show higher levels of cooperation, and are more willing to go beyond their job requirements to help their team succeed. The study highlights that affective commitment contributes to team effectiveness by fostering a positive work environment and enhancing communication and trust among team members. The high affective commitment values among respondents can be attributed to the organization's focus on youth development, with 90.7 percent of respondents being under 35 years old. Weekly mentoring sessions in the organization further foster a sense of togetherness and alignment with the organization’s mission and vision. Ozdem (2012) emphasizes that such an organizational environment is crucial for employees to strongly identify with the company, feel proud to be a part of it and feel comfortable working there. Meyer & Allen (2016) argue that for organizational affective commitment to improve, the organization must ensure fairness and justice in its treatment of employees. Affective commitment is strengthened when employees perceive that their rewards are commensurate with their contributions and merits. These findings emphasize the importance of fostering an environment where employees feel valued and fairly treated, as these factors are crucial for building strong affective commitment.

Conclusion

The objective of this study was to investigate the relationship between organizational citizenship behavior (OCB), affective commitment, and team effectiveness within a non-profit organization. This study revealed that three OCB dimensions (conscientiousness, courtesy, civic virtue) and affective commitment were found to have a positive relationship with team effectiveness, while other dimensions in OCB (altruism and sportsmanship) do not have a positive significant relationship with team effectiveness. Based on the findings, it is recommended for future studies on the relationships of other variables with team effectiveness to enable better decision-making to help organizations make the necessary adjustments to their best practice standard operating procedures and re-design the future workforce in non-profit organizations.

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Easiness of Apps Usage, Reliability, Safety and Security Towards Customer Satisfaction on Online Banking in Malaysia: A Preliminary Study

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Abstract: People nowadays prefer to use online banking apps as their main applications to transfer money, make payments while shopping, pay their bills and else. Meanwhile, the banks also compete to upgrade their system so that the customers will keep using them without any hesitation or complaint. The main focus of this study is to find out the easiness of app usage, reliability, safety and security towards customer satisfaction with online banking in Malaysia. The research objectives were to analyze the factors that contribute to customer satisfaction in online banking, to examine the influence of ease of app use, reliability and safety and security towards customer satisfaction on online banking services, and to investigate the relationship between effectiveness, reliability and safety and security towards customer satisfaction on online banking. Thus, the preliminary was done using 47 respondents with various backgrounds to undertake the study. The findings have shown that all variables in the questionnaire have good and excellent internal consistency with the Cronbach alpha showing more than 0.80. The frequency distribution has also been done using the mean and ranking of each statement. Most of the statements agreed by the respondents on all parts of the questionnaire ranged from 3.00 to 4.32. This study is expected to benefit various parties, especially the banking sector and the end-users of online banking services.

Keywords: *Easiness of Apps, Reliability, Safety and Security, Customer Satisfaction, Online Banking*

1. Introduction and Background

Due to the growth of technologies, the banking sectors also do not miss computerizing their system and introducing bank transactions to online transactions (Omotayo, 2020). E-transactions are a new way for companies to communicate with their customers, which at the same time will support banks, especially in upgrading banking and financial services. (Raza et al., 2020). Nowadays, banks practice online banking as their main service. From online banking, customer can check their daily transactions, make transfers of money, pay bills and purchase anything online. This way can change from cash to cashless which is a good safety for customers (Gautam & Sah, 2023).

Referring to the lack of research on the benefits of online banking services, the data showed a few areas were not attracted to using online banking services as their main transaction banking services. This issue also makes customers paranoid about using online banking and assume this such not a good service (Zabri & Mohammed, 2018).

Mobile banking has gained popularity due to its ease of use and accessibility from any location. While the app, customers to access and review their account at any time and anywhere, which includes checking account balances, money transfers, bill payments, and checking transactions, mobile banking allows for easy access to our financial information, providing great convenience for everyday banking. Furthermore, another proof that online banking is convenient is the use of phones or computers for banking purposes can result in time and cost savings. It also includes the need for a paper statement, which is beneficial for the environment. Lastly, another benefit is the convenient way to manage and monitor account balances. With the ease of budgeting, we can now effectively manage our finances, track progress and prioritize spending wisely. As a result, mobile banking allows for convenient money management and future financial planning (Alayli, 2023).

Customer satisfaction is very important because it influences the attraction and continued use of online banking apps. Positive feedback from users often leads to a gradual shift from offline to online transactions. Nowadays, online banking is implemented across various locations and businesses, making it convenient for both customers and sellers. With the safety and security provided by these services, financial institutions can positively impact user confidence, leading to an increase in the adoption of online banking and assuring users they can conduct transactions without worries.

In terms of security and safety of online banking, the websites should implement various security measures to prevent potential risks. One of the ways is multi-factor authentication, where the method is crucial to protect the accounts. Such a verification process ensures that although someone has access to the password, they are still unable to access the account. Meanwhile, encryption data is also important to protect personal data from cyber threats during internet transmission. During online transactions, encryption will protect by converting into a code that can only be decoded by selected individuals. In addition, monitoring for issues and spotting potential risks is also part of security. The platform will be secure by identifying and minimizing potential threats before they escalate into a bigger issue. Therefore, customers should stay informed of the guidelines, and employ security measures to ensure their personal information is secured.

2. Literature Review

Customer Satisfaction with Online Banking Services

Indeed, customer satisfaction levels for online banking services can vary significantly based on individual requirements and experiences. Factors such as the convenience of making payments, receiving payments, online transfers, and other banking activities play crucial roles in shaping customer satisfaction. By distributing questionnaires to customers, researchers can gather valuable feedback that provides insights into these satisfaction levels. Analyzing this feedback allows researchers to understand overall customer satisfaction and identify areas for improvement in online banking services (Rupal & Singh, 2023).

Customer satisfaction with online banking services is crucial for ensuring continuous usage of these services (Matar & Alkhawaldeh, 2022). Customer satisfaction can be described as meeting the needs and expectations of customers regarding goods and services. Customers are fully satisfied with services when they meet or exceed their standards and ideal expectations. Therefore, providers must continuously improve their services to convince customers to keep using their online banking platforms. These improvements should surpass customer expectations, such as offering seamless online banking services that customers can use anytime and anywhere, even without carrying cash.

The behavior and reactions of customers can be used to gauge their satisfaction with online banking services (Hung et al., 2021). Satisfaction encompasses functional aspects, interface design, and holistic experiences. Customers are typically willing to continue using a service when it meets their satisfaction criteria. Customer loyalty can be observed when they are happy to continue using the services and recommend them to others. Satisfied customers will also share the benefits and positive aspects of the services, which can attract more users.

The Easiness of Apps Usage and Customer Satisfaction of Banking Services

With the advance of globalization, mobile apps have considerations such as portability, context sensitivity, and social interaction. Due to the ease of mobile apps, customers can easily use online banking services anytime, anywhere without any obstacles. Nowadays, apps are well-developed, following technological advancements to extraordinary effect, making them flexible and user-friendly. Additionally, many features are offered to customers while using mobile apps. For example, users can easily choose their preferred language. Furthermore, the best feature is the dashboard appearance upon logging into the mobile app, which allows customers to easily review their previous transactions (Criollo-C et al., 2021).

The convenience and efficiency of online banking play a crucial role in the development of e-commerce by providing seamless daily services. The adoption of high technology in online banking significantly reduces administrative costs, as information is readily accessible through these services. Customers are inclined to use online banking due to its unrestricted access, allowing them to manage their finances at any time and from any

location, thereby saving time and reducing costs. The positive experiences provided by online banking services led to customer satisfaction and loyalty. Satisfied customers are more likely to continue using these services and recommend them to others, creating a positive cycle of usage and growth. Therefore, maintaining customer satisfaction is vital for the continuous improvement and success of online banking services. Enhancing these services ensures that customer emotions remain positive, fostering a loyal customer base and driving the development of both online banking and e-commerce (Vu & Khanh, 2021).

The ease of use of apps in online banking services is crucial in maintaining customer loyalty. Providers frequently update their apps to ensure a seamless user experience and to address any issues promptly. When customers encounter problems with online banking services, they often raise complaints, which compels banks to maintain their services in optimal condition. Online banking is both innovative and creative, offering a variety of convenient services. Customers can effortlessly check their account balances, purchase goods online, make payments, and perform numerous other transactions without any hassle. This level of convenience not only enhances the customer experience but also solidifies their trust and loyalty to the service. By continuously improving and expanding their offerings, online banking providers can ensure that customers have access to reliable and efficient services, ultimately fostering a strong and enduring relationship between the customers and the banks (Gautam & Sah, 2023).

In conclusion, most customers prefer to use online banking as their primary method for daily transactions, seeking the best services for a seamless experience. Therefore, banks and service providers must deliver exceptional services to ensure continued customer satisfaction and loyalty. The relationship between the ease of app usage and customer satisfaction is a critical factor influencing customers' choice to use online banking services. By prioritizing user-friendly interfaces and reliable service, banks can foster strong, lasting relationships with their customers, ensuring the sustained growth and success of online banking.
H1: There is a relationship between the easiness of app usage and customer satisfaction of banking services in Malaysia.

The Reliability and Customer Satisfaction of Banking Services
The reliability of online banking services significantly influences customer usage. The ability to perform various transactions using a single device, anywhere with internet access, greatly enhances convenience. Researchers focus on the relationship between the reliability of online banking and customer satisfaction, examining both the positive and negative experiences of customers. Reliable online banking services ensure that transactions are processed smoothly, securely, and without interruptions. This reliability builds trust and satisfaction among customers, encouraging them to continue using these services. Conversely, any reliability issues can lead to dissatisfaction, highlighting the importance of consistent performance and prompt issue resolution by providers (Subramanian et al., 2023).

The young generation prefers online banking due to its convenience and their familiarity with technology and social networks. They favor cashless transactions over carrying physical money, aligning with their tech-savvy lifestyle. Banks cater to this preference by offering reliable services that minimize errors, leading to high customer satisfaction and happiness with their daily transactions. When issues arise, banks respond promptly to customer complaints, aiming to resolve problems quickly. This swift and effective response further enhances customer satisfaction and reinforces the reliability of online banking services. In summary, the combination of technological comfort, convenience, and efficient service makes online banking an attractive option for the younger generation (Lima-Vargas et al., 2021).

In conclusion, the reliability of banking services is crucial as it excites customers and encourages them to switch from traditional banking to online banking services. This transition not only enhances customer convenience but also aids banks in their development. By consistently providing reliable online banking services, banks can foster customer trust and satisfaction, ultimately driving growth and innovation in the banking sector.
H2: There is a relationship between reliability and customer satisfaction of banking services in Malaysia.

Safety and Security of Online Banking Services
Another variable considered by researchers is the security and safety of online banking services. In today's technologically advanced generation, security is paramount, as the risk of hacking and unauthorized access is

a significant concern. To address this, banks continually enhance their security measures to protect customers' data and transactions, ensuring a secure banking experience. By prioritizing security and safety, banks can instill confidence in their customers, encouraging them to use the various products and services offered. Robust security protocols not only protect customers but also contribute to their overall satisfaction and trust in the online banking system. This focus on security is essential for the continued growth and adoption of online banking services (Efijemue et al., 2023).

Generation X tends to be very familiar with and particularly concerned about the security of online banking services. This generation often exhibits anxiety when using online banking, showing a preference for traditional banking methods. Historically, Gen X is less interested in adopting new technologies. They are likely to refuse online banking services if the banks provide insufficient or missing information, as they value straightforward and reliable methods to manage their finances. Additionally, due to the numerous reported cases of online banking fraud and security breaches, they often feel paranoid and distrustful of these services (Soni & Remedios, 2023).

Customers consistently express concern about the safety and security of online banking services, as these involve their financial savings and daily transactions. The anxiety surrounding the security of online banking can have a significant negative impact on customer perceptions and expectations. This anxiety often stems from fears of password theft or errors during transactions, which can deter customers from fully trusting and adopting online banking services. Despite these concerns, some customers have positive experiences with the security measures provided by banks, which helps to build their confidence in using online banking. However, if online banking services are perceived as having high risks, customers are likely to develop heightened anxiety. This anxiety can lead to cautious and emotionally charged interactions with the services, affecting overall customer satisfaction (Pham et al., 2022).

Despite these concerns, some customers have positive experiences with the security measures provided by banks, which helps to build their confidence in using online banking. However, if online banking services are perceived as having high risks, customers are likely to develop heightened anxiety. This anxiety can lead to cautious and emotionally charged interactions with the services, affecting overall customer satisfaction.
H3: There is a relationship between safety and security towards customer satisfaction with banking services.

3. Research Methodology

This project will employ quantitative research methodologies to investigate the level of satisfaction with banking services in the Klang Valley. The study will engage people from various backgrounds, including students and workers, ensuring a diverse range of respondents. All individuals from different backgrounds are eligible to participate in this study. A pilot study was conducted with 47 respondents to refine the survey instrument and methodology. The sample size for the main research study is estimated based on a population size of 1000 respondents, with a target of collecting 278 completed responses. The survey will be administered using Google Forms. Data collection from respondents is expected to take two to three months.

4 Results

This section presents a set of results relating to the profile of respondents' experience towards online banking services, the respondent's usage of online banking, and reliability analysis. The statistics represented in this section are analyzed through frequency distribution.

Profile of Respondents: Table 1 displays a summary of the characteristics of the sample of customers who participated in the study. The total number of respondents involved in the pilot study is 47. Most (70.2%) of the respondents are female as compared with the male is 29.8% and most of them are below 25 years old (46.8%). 53.2% of the respondents are employed, followed by students 36.2%. The majority (44.7%) earned an income below RM1500, followed by income more than RM5500 with 21.3%. Selangor recorded the highest (48.9%) of respondents come from, followed by outside Klang Valley with 29.8%.

Table 1: Demographic of the Respondent

No.	DEMOGRAPHIC	ITEM	FREQUENCY	PERCENTAGE (%)
1.	Gender	Male	14	29.8
		Female	33	70.2
2.	Age	Below 25 years	22	46.8
		26 - 35 years	16	34.0
		36 – 45 years	8	17.0
		46 and above	1	2.1
3.	Employment Status	Employed for wages	25	53.2
		Self-employed	0	0.0
		Student	17	36.2
		Not employed	5	10.6
		Other	0	0.0
4.	Income	Below RM 1500	21	44.7
		RM 1500 – RM 2500	4	8.5
		>RM 2500 – RM 3500	6	12.8
		>RM 3500 – RM 4500	3	6.4
		>RM 4500 – RM 5500	3	6.4
		More than RM 5500	10	21.3
5.	Place of Residence	Selangor	23	48.9
		Kuala Lumpur	10	21.3
		Putrajaya	0	0.0
		Outside Klang Valley	14	29.8

Reliability Analysis: The reliability of the present study was measured by the KR-20 Method (Kuder-RichardsonMethod) through the value of Cronbach alpha. The General Guideline for interpreting reliability tests is as in Table 2.

Table 2: General Guideline for Reliability Test Interpretation

CRONBACH'S ALPHA	INDICATION
0.90 and above	Excellent
0.80 – 0.89	Good
0.70 – 0.79	Acceptable
Below 0.70	Not acceptable

Table 3 shows the Cronbach alpha value for the independent and dependent of this study. Independent variables represent easiness of app use, reliability of online banking, and safety and security of online banking services. Meanwhile, the dependent variable is customer satisfaction with online banking services. Easiness of app usage of online banking services, safety and security of online banking services, and customer satisfaction with online banking services show excellent internal consistency. Reliability of online banking services indicates good internal consistency of the item.

Table 3: Cronbach's Alpha Value

VARIABLE	SECTION	CRONBACH'S ALPHA	INDICATION
Independent Variable	Easiness of Apps Usage of Online Banking Services	0.941	Excellent
	Reliability of Online Banking Services	0.882	Good
	Safety And Security of Online Banking Services	0.932	Excellent
Dependent Variable	Customer Satisfaction with Online Banking Services	0.914	Excellent

Frequency Distribution: Frequency distribution is intended to find the most frequent answers answered by the respondents in terms of the agreement of the statement. The mean is the medium used to measure the frequency of the agreement and then the rank of the mean is shown in the table of each variable. This section is measured using the Likert Scale which the indicator is:
1: Very dissatisfied, 2: Dissatisfied, 3: Neutral, 4: Satisfied, 5: Very satisfied.

Easiness of Apps Usage of Online Banking Services
Table 4 shows the mean and ranking of the statement by the respondents. Most of the statement was agreed by the respondents with a range of mean between 3.89 and 4.32. The most agreed statement is the respondents feel easy to use online banking apps, followed by the process of online banking services is easy. However, the least agreement by the respondents is the speed of the app when performing banking transactions.

Table 4: Frequency Distribution of the Easiness of Apps Usage of Online Banking Services

NO.	EASINESS OF APPS USE	MEAN	RANKING
1.	I feel it is easy to use the online banking apps	4.32	1
2.	The process of online banking services is easy	4.26	2
3.	Creating my online account using the apps was useful.	4.23	3
4.	I can use the apps anywhere and anytime	4.17	4
5.	It is easy to log into the online banking apps	4.09	5
6.	The apps are user-friendly	4.04	6
7.	The speed of the app when performing banking transactions is fast	3.89	7

Reliability of Online Banking Services
Table 5 shows the frequency distribution of the reliability of online banking services. The range of agreement is between 3.00 and 3.98. It can be indicated that the respondents mostly rate neutral and agree with the questionnaire. The majority of the respondents agree that logging into the bank account is highly reliable followed by the services provided through online banking as promised. The least agreement from the respondents is the respondents don't experience any technical issues while using online banking services.

Table 5: Frequency Distribution of the Reliability of Online Banking Services

NO.	RELIABILITY OF ONLINE BANKING SERVICES	MEAN	RANKING
1.	Logging into my bank account is highly reliable	3.98	1
2.	The services provided through online banking are as promised.	3.91	2
3.	I trust that the transactions made through my online banking service are completely accurate	3.89	3
4.	The website/app is highly reliable when creating my account.	3.79	4
5.	I am satisfied with the response time when contacting customer support for issues with the online banking service	3.55	5
6.	I don't experience any technical issues while using online banking service	3.00	6

Safety And Security of Online Banking Services
The mean and ranking of the safety and security of online banking services are shown in Table 6. The mean ranged between 3.74 and 4.13 which indicated that the majority of the respondents agreed with the statement highlighted in the questionnaire. The highest ranking is on the statement that the respondent is aware of the security features provided by online banking services such as two-factor authentication and encryption. It was followed by the statement that the effectiveness of the login security measures of online banking services is acceptable. The least agreement statement is that the respondent trusts personal and financial information is kept private and secure by online banking services.

Table 6: Frequency Distribution of the Safety and Security of Online Banking Services

NO.	SAFETY AND SECURITY OF ONLINE BANKING SERVICES	MEAN	RANKING
1.	I'm aware of the security features provided by online banking services (e.g., two-factor authentication, and encryption).	4.13	1
2.	I think that the effectiveness of the login security measures (e.g., passwords, biometric authentication) of online banking services is acceptable	4.11	2
3.	The security requirements to log in to this website are acceptable.	4.00	3
4.	The bank protection against fraud and unauthorized transactions provided by online banking services is acceptable	3.85	4
5.	I could be sure when I created my online account that the website was highly secure	3.81	5
6.	I can perform all transactions using my online account without fear of being subject to any financial risk	3.74	6
7.	I trust that your personal and financial information is kept private and secure by online banking services.	3.74	6

Customer Satisfaction with Online Banking Services

Table 7 shows the mean and ranking of the overall customer satisfaction with online banking services. Overall, respondents agree with the statement given in the questionnaire. The mean ranges between 3.72 and 4.11. The most agreed statement by the respondents is they respondents like to continue using the current online banking services. It was followed by the statement that the respondents like to recommend online banking services to others. The least agreement is the respondents are satisfied with the customer support provided by online banking services.

Table 7: Frequency Distribution of Customer Satisfaction of Online Banking Services

NO.	CUSTOMER SATISFACTION ON ONLINE BANKING SERVICES	MEAN	RANKING
1.	I like to continue using the current online banking service	4.11	1
2.	I would like to recommend online banking services to others	4.04	2
3.	I am satisfied with the quality of customer support provided by the online banking service	3.79	3
4.	It is easy to access customer support for online banking service	3.77	4
5.	I am satisfied with the customer support provided by the online banking service	3.72	5

Discussion

The findings from the preliminary study indicated that the majority of the respondents were satisfied with the online banking services. It is shown through the level of agreement and satisfaction in the statement given by the questionnaire. Overall, the section of Easiness of Apps Usage of Online Banking Services recorded the most agreeable statement by the respondents. Meanwhile, the section on the Reliability of Online Banking Services had the lowest level of satisfaction among other sections. Overall, the questionnaire has good and excellent internal consistency through the indication from the Cronbach alpha. Thus, the study shall be continued for the main survey.

5. Managerial Implications and Recommendations

In tandem with the current technology era, the usage of online banking services has been widely adopted by the user. The study regarding the satisfaction among users shall be conducted to measure the current level of satisfaction and thus provide future recommendations for better use. This study might help the banking industry to serve better in the future by making online banking services more efficient.

From the findings, it is recommended that the banking sector improve the reliability of the online banking services especially related to the technical issue while using the online banking services. Besides that, customer support provided by the banks should be improved for the betterment of the user's experience while using the services.

Conclusion

In conclusion, the objectives of this study are to measure the level of satisfaction of users with online banking services. The variables measured are in terms of easiness of app usage, reliability, and safety and security of the online banking services. The respondents selected for the pilot study have various backgrounds in terms of age, place of residence, and income generated. This study is expected to benefit the banking services and end users through the suggestions made for this study.

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Affecters on Housing Prices: An Initial Review in Malaysia

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Abstract: This research delves into the intricate dynamics of the Malaysian housing market. Due to the issue of constantly high and expensive house prices, the study aims to integrate the possible macroeconomic causes as well as the integrity issue by focusing on three vital independent variables: Gross Domestic Product (GDP), Foreign Direct Investment (FDI), and Corruption Index (CRP). The research uses quantitative methods, the Ordinary Least Squares (OLS), to reveal nuanced correlations between these economic variables and house prices in Malaysia. The intriguing findings show that both FDI and CRP significantly influence house prices positively, aligning with existing literature. However, the unexpectedly insignificant correlation between GDP and house prices suggests a potential gap in understanding, adding a layer of intrigue to the research. These results and significant findings offer valuable insights for decision-makers and emphasize the importance of ongoing research to better grasp the complex factors shaping housing markets in different economic situations.

Keywords: *Housing price, Gross Domestic Product (GDP), Foreign Direct Investment (FDI), Corruption Index*

1. Introduction and Background

The housing market in Malaysia is a significant and dynamic sector in the country's economy. As the country experiences economic growth and urbanization, the housing market becomes increasingly complex, shaping the livelihoods of its citizens. Housing is not just a commodity but a basic human need for social and economic stability. A well-functioning housing market plays a crucial role in the overall economic development of a country. Housing prices, in particular, reflect the affordability, accessibility, and stability of the housing sector. Therefore, a comprehensive understanding of the various factors that affect house prices in Malaysia, given the intricate and multifaceted nature of the housing market, is of utmost importance.

Housing prices are affected by many variables, and among the most important are Gross Domestic Product (GDP), Foreign Direct Investment (FDI), and Corruption (Catte et al., 2004). GDP serves as a macroeconomic indicator that records the overall economic performance of a country. On the other hand, FDI represents the inflow of foreign capital and investment, which can significantly impact the housing market. Furthermore, corruption creates uncertainty, distorts market dynamics, and potentially affects housing prices. Thus, these variables have a significant impact on housing market dynamics. Although the connection between economic indicators and house prices has received much attention, the unique correlations and interactions in the Malaysian context deserve more investigation. Furthermore, due to its potential to produce inefficiencies and distortions in the housing market, the function of corruption as an independent variable is of significant relevance.

This paper is organized into several parts. Section 1 introduces the background analysis, Section 2 highlights the literature review from previous analyses, Section 3 describes the analysis methodology, Section 4 presents the results and discussion, and Section 5 discusses the findings and overall conclusion.

2. Literature Review

Recent data from Malaysia shows that the country's population growth and house construction rates are converging. In recent years, home price discussions have gained much attention. Home prices in Malaysia can range from reasonably priced to expensive, depending on factors such as square footage and neighborhood. Housing costs have been a significant factor influencing Malaysia's GDP since the 1970s (Alpha Kabine, 2023). Residential property rates have been steadily rising since technological advancements caused mortgage rates

to drop significantly in 2000 (Baharuddin et al., 2019).

According to National Property Information Centre (NAPIC) (2023) Data, the number of unsold residential properties has increased since 2011, reaching a notable milestone in 2017. Many elements affect housing prices in Malaysia. A growing House Price Index (HPI) is often used as a dependent variable in academic studies, which shows that many factors affect home costs. There is a consensus in the academic literature that changes in population and the rate of urbanization are the primary drivers of housing demand and, by extension, housing costs.

Malaysia is one of the world's most urbanized nations, and its high-yield, high-impact economy is well-known worldwide. This situation aligns with the nation's growing population (World Bank, 2023). From 10.2 to 15 million people, Malaysia's population surges at a rate of 4% per year, placing it among Southeast Asia's fastest-growing and most urbanized nations. Policymakers and the general public in Malaysia have elevated the issue of housing, a fundamental necessity for shelter, to the forefront of their concerns. The steadily rising cost of housing, making it less affordable, is a major cause for concern. In recent years, home prices have soared by 20% to 80% in both large cities and smaller villages, with the exact percentage changing by area. (Hong, 2012).

A large portion of the increase in the HPI can be attributed to the high demand for housing in urban areas and the low supply. Property prices in Kuala Lumpur, Selangor, Johor Bahru, and Penang, four of Malaysia's main cities, are skyrocketing due to rising demand and a lack of suitable land for new homes, as pointed out by Hassanudin & Chandra (2016). This mismatch reduces the buying power of would-be homeowners, which means Malaysians need to adjust their housing goals based on what they can afford.

Numerous studies have investigated the factors that influence home values using a wide range of criteria, including GDP. Petros (2018), and Li et al (2022), whereas interest rates were used by Sviatlana (2021) and Lu & Bo (2014). Jeffrey (2022) and Sefa et al. (2021) used population size for their research. Research by James M. et al. (1991), Abraham & Hendershott (1992) and Lu et al. (2022), among others, has shown that income levels have a substantial effect on property values. Mortgage rates were also named by Baffoe-Bonnie (1998) as an important economic component impacting home values.

The previous research shows that many financial, demographic, and economic variables impact Malaysia's increasing housing price index (HPI). These investigations highlight the multifaceted nature of the housing market and the impact of macroeconomic conditions and policy choices on it. Policymakers and stakeholders in Malaysia's real estate market would do well to remember the literature's insistence that the country's rising HPI is highly dynamic and subject to change based on a wide range of interrelated economic and demographic factors. This research focuses on GDP, FDI, and corruption, while other studies have used various variables simultaneously.

Gross Domestic Product (GDP)

According to Bayraktar-Sağlam & Yetkiner (2014), GDP is an essential indicator of economic activity and production since it shows how financially healthy a nation is. Investment, consumption, net exports, and government spending are all part of it. There may be both positive and negative links between GDP and house prices, which can make the link complicated and indirect at times.

In most cases, rising home prices directly result from GDP growth, a critical factor in the housing market. The result is based on a plethora of exploratory research that was conducted from 2000 to 2019 by Zulkifli et al. (2022), which used the Autoregressive Distributed Lag (ARDL) model to study the long-term and short-term impacts of these variables on the Housing Price Index (HPI) in Malaysia. Recursively, home prices climb as GDP rises, a measure of economic prosperity. During the pandemic, this pattern became even more apparent, showing how property values are affected by larger economic changes (Azmi et al., 2023). These results show how important it is to consider the situation of the economy as a whole when looking at real estate market patterns.

Real estate market trends can be best gauged by looking at the situation of the macroeconomy, due to the interconnected nature of GDP, housing demand, and property prices. Along with important variables, including

foreign direct investment (FDI), unemployment rates, and inflation, Awan & Latif (2020) acknowledge GDP as a basic component impacting housing prices. During the pandemic, the close relationship between GDP and home prices became increasingly apparent, highlighting how susceptible the housing sector is to larger economic changes (Azmi et al., 2023).

The two-way causation between economic growth and the HPI has been the subject of substantial research covering the period from 2000 to 2020. Evidence from research by Zulkifli et al. (2022) shows that communication between the two goes both ways. According to their research, a rise in property prices is a key component of a healthy economy. On the other hand, falling home prices can be a sign of and a factor in Malaysia's economic progress. A focused investigation confirmed this interactive relationship using the Toda-Yamamoto Granger causality test. According to the results, there is a two-way street: rising property prices in Malaysia are a direct result of economic growth, and rising house prices, in turn, impact economic growth. These findings highlight how the housing sector is a key engine that drives economic growth.

Although GDP does affect home values, it is not necessarily a positive or direct effect. If the housing market were to suddenly collapse, it would have a domino effect on the whole economy, causing GDP to decrease. The government of Malaysia could run out of housing demand if it implemented a large-scale increase in residential credit, which would hurt residential investment.

Moreover, studies show that there is sometimes a negative correlation between GDP and home prices, even though the housing market is a key driver of economic activity. Specifically, Alpha Kabine (2023) and Pillaiyan (2015) highlight that there is no significant relationship between GDP growth and house prices. Also, Trofimov et al. (2018) found that the two factors were negatively correlated with each other. They go on to say that if the economy keeps growing rapidly, it could stimulate too much house building, leading to an overstock and lower property prices.

The entire economy might feel the effects of a sudden collapse in the housing sector, which would lower GDP. For example, this may happen if the government of Malaysia suddenly raised home loans, which would flood the market with homes yet cause investors to pull back on their spending. We need a thorough knowledge of these dynamics because these varied findings and consequences show how GDP and home prices interact in complex ways. Last but not least, Gholipour (2020) pointed out that although foreign real estate investment (FREI) plays a big part in home price appreciation, it doesn't matter in the countries they look at. This shows that the relationship between GDP and housing prices isn't always linear.

Foreign Direct Investment (FDI)

Foreign Direct Investment, or FDI, refers to the injection of capital into domestic corporations by foreign entities, as defined by Graham & Spaulding (2005). FDI offers manifold advantages: It establishes robust markets and avenues for marketing, catalyzes the development of more cost-effective infrastructures, and paves the way for greater access to progressive technologies. Moreover, FDI contributes to augmenting human capital and ensures businesses have the financial wherewithal to pursue sustained growth.

While FDI generates numerous employment prospects, housing affordability remains a pressing concern for Malaysian residents. According to the majority of past studies, housing affordability is the principal challenge faced by citizens in Malaysia. Numerous research efforts have shown that FDI can positively influence economic growth in host countries by facilitating technology transfer, developing human resources, integrating global markets, increasing competition, and promoting business expansion and organizational restructuring (Ong, 2020). This evidence highlights the perception of FDI as a substantial force in steering a host country's economic progress. Nevertheless, there is a persistent need to address Malaysian residents' housing affordability issues despite FDI's effectiveness in boosting the country's economy.

The research posits that FDI, by injecting capital and potentially heightening the demand for housing, may contribute to an increase in house prices. Furthermore, FDI has been found to decrease homeownership rates, which suggests that residents may be priced out of their housing market in regions where foreign investors are particularly active. Consequently, these residents are left with the option to rent rather than own their homes. A separate study, encompassing data from 2010 through the first quarter of 2019, discovered sustained

correlations between the House Price Index (HPI) and specific factors, including GDP and population size (Jehani et al., 2020). The study, however, did not explicitly recognize FDI as an influencing factor. Nevertheless, the research still needs to negate the potential role of FDI in affecting housing prices, particularly considering its bearing on GDP and the broader economy.

In a study by Zull & Masron (2017), the long-term estimations revealed that from 1999 to 2015, FDI inflows hurt house prices in Malaysia. However, the effect reverses when a liberalization policy is accounted for. When such policies are in place, FDI inflows increase house prices in the long run, particularly in economically dynamic states such as Kuala Lumpur and Penang. The positive influence of FDI inflows on housing prices is also evident in slower-progressing states like Pahang and Kedah. It demonstrates that liberalization policies nationwide impact house prices, irrespective of a state's economic standing. Furthermore, these effects are less apparent for more expensive housing but are more noticeable for lower-priced properties, as the supply for these properties tends to be less elastic.

Bonis (2006) Explored whether FDI plays a crucial role in understanding the fluctuations in house prices in major US cities. This relationship was found to be significant but negative. In contrast, Gauder et al. (2014) Observed that an increase in foreign investment in the housing market does not necessarily lead to a net growth in housing demand or a surge in housing prices. Gholipour (2020) Investigated the long-term co-movement between FDI, economic development, and housing prices. Their results indicate that FDI does not contribute to a rise in housing prices or encourage short-term and long-term economic growth in OECD countries.

The available literature points to the connection between FDI and Malaysia's House Price Index, primarily due to FDI's contribution to economic growth and its subsequent influence on housing demand. As foreign property purchases have liberalized in alignment with FDI inflows, house prices have risen, consequently impacting housing affordability for Malaysians (Zull & Masron, 2017). This suggests that FDI fuels economic growth and inflates housing prices due to heightened demand from foreign investors. Such occurrences are not exclusive to Malaysia; similar patterns have been observed in various emerging economies where foreign investments considerably affect local real estate markets. The reviewed literature presents varied perspectives; while some studies support the positive influence of FDI on housing prices, others indicate insignificant or negative impacts. As a result, the effect of FDI on housing prices requires further clarity within the context of the literature.

Corruption Index

Jain (2008) Explains corruption as an act in which the power of public office is used for personal gain in a manner that contravenes the rules of the game. The literature on the relationship between the Malaysia House Price Index and crime, particularly corruption, indicates that crime risk impacts housing prices. The study of corruption's impact on house prices remains an important direction for future research since the effects of corruption on house prices in Malaysia have yet to be a deeply studied topic. However, it can infer potential relationships based on general evidence from other countries and the nature of corruption.

A study that examined this relationship from 1988 to 2016 found that the elasticity of housing prices concerning crime risks ranges from −0.141 to −0.166, suggesting that as crime risk increases, housing prices tend to decrease. (Wong et al., 2020). It aligns with the general literature, which states that higher crime rates can lower property values due to the increased risk perceived by potential homeowners. While this does not establish a direct relationship between corruption and house prices, it does indicate that crime, potentially correlated with corruption, can impact house prices.

It is essential to mention that corruption affects economic growth (Fungáčová et al., 2014). Indirectly, corruption might affect the housing market through its broader impact on economic growth and public trust, influencing investment decisions and property values. For instance, corruption can stifle economic growth by deterring foreign and domestic investment, misallocating resources, and reducing efficiency. Slower economic growth can lead to reduced demand for housing, subsequently impacting house prices. In a thriving economy, housing demand and prices typically increase, but if corruption undermines economic growth, this upward trend in housing demand and prices might be hindered. It also can exacerbate income inequality, affecting overall housing affordability. Suppose corruption leads to wealth being concentrated among a small population

segment. In that case, it can create disparities in housing affordability, with the wealthy driving up prices in specific market segments while the majority may struggle with housing affordability.

On the other hand, direct impacts could include inflated costs due to corrupt practices in property development, influencing housing prices. Corruption in the housing sector can lead to higher development costs. It is often due to the need for bribes or kickbacks to obtain necessary permits or approvals or through inflated contract prices. These increased costs can then be passed on to buyers, raising housing prices. Eventually, corruption can also affect land allocation and zoning decisions, potentially leading to the overvaluation of specific properties. If corrupt practices favor the development of properties in certain areas, they can artificially inflate property values in those locations while potentially neglecting others. Given the complex nature of these relationships, understanding the full spectrum of the impact of corruption on the housing market requires comprehensive analysis considering various economic and social factors.

Corruption practice has proven to have a trickle-down impact on the average Malaysian consumer, according to research conducted by the Institute for Democracy and Economic Affairs (IDEAS, 2019). The "Corruption in the Supply Chain: Forms and Impacts on Consumers" report, which was jointly prepared by the Institute for Democracy and Economic Affairs (IDEAS) and Coalition for Business Integrity (CBI), featured an in-depth study on how corruption in three sectors: construction, healthcare, and education took place, found that corruption not only marked up the prices of goods but also incurred a 14.8% increase in costs in property developments, which was then absorbed by homebuyers (IDEAS, 2019).

Overall, the impact of corruption on economic growth, which in turn can affect housing prices, has been studied using the autoregressive distributed lag (ARDL) method, highlighting the relevance of corruption in macroeconomic performance (Ali, 2023). Although direct literature on corruption's impact on house prices in Malaysia is limited, the overall influence of corruption on the economy can indirectly affect housing markets. (Muhamad & Gani, 2020). It is essential to consider that while the direct relationship between corruption and house prices may not be thoroughly explored, the indirect impact through economic growth is documented, and the same may apply to house prices as economic growth is a known determinant of housing market dynamics (Alpha Kabine, 2023).

3. Research Methodology

The macro data for this study are obtained from the World Development Bank, except for the house price and corruption indexes. The house price index statistics are collected from the Macromicro platform, while the corruption index is obtained from the Malaysia Corruption Index of the Trading Economics website. This study will employ time series data covering 28 years, specifically from 1994 to 2022.

This study will log the model to mitigate the presence of heteroskedasticity in the analysis (Gujarati, 2004). Next, the data will be transformed into variances and analyzed as proportions. Subsequently, the data will undergo a unit root test to determine its stationarity. This test aims to verify the mean and variance consistency. The presence of non-stationarity will lead to an inaccurate regression analysis characterized by a high R-squared value and a limited number of statistically significant correlations between variables. The Augmented Dickey-Fuller (ADF) and Philips-Peron (PP) tests will be performed to assess stationarity (Kwiatkowski et al., 1992; Philips & Perron, 1988; Rehman, 2019).

A further robustness assessment involves the multicollinearity test, which utilizes the variance inflation factor (VIF). This test mitigates the strong correlation among the variables, which could impact their importance in the p-value and t-statistics. Eliminating the variables that strongly correlate with each other resolves the issue of multicollinearity (Skiera et al., 2018).

This study will assess the model for particular characteristics based on the Ordinary Least Squares (OLS) result. The goal is to showcase that the model is the most suitable choice for the analysis. The F-statistics value, which has a p-value of less than 5%, will be examined. Then, the R-squared. The high R-squared value indicates a strong relationship between the variables with a maximal confidence level. Furthermore, the residuals must exhibit no serial correlation or heteroskedasticity and follow a normal distribution. However,

heteroscedasticity can be ignored as this study employs a time series dataset. The optimal model for the analysis possesses all of the aforementioned qualities (Mohamed et al., 2022).

For this analysis, the estimation equation model involved is as follows,

$$HP_t = \beta_0 + \beta_1 GDP_t + \beta_2 FDI_t + \beta_3 CRP_t + \mu_t$$

Where,

HP_t denotes house price, the dependent variable, in the period 't'
GDP_t denotes the gross domestic product in the period 't'
FDI_t denotes the foreign investment in the period 't'
CRP_t denotes the corruption index in the period 't'
β_o denotes intercept
β_1, β_2, β_3 are the respective coefficient terms
μ_t denotes the error term
t denotes the monthly time series data spanning 28 years, from 1995 to 2022

4. Results and Discussion

The analysis of this model begins with the stationarity test. All variables will be transformed into log form to capture their dynamic over time, and the unit root test will be used for this test.

Table 1 shows the results of the ADF and PP stationarity tests of 'with intercept and trend.' Accordingly, the null of having a unit root is rejected for LHP and LGDP based on the ADF and PP tests in the first-order integrated, I (1). However, LFDI and LCRP rejected the null hypothesis in level I (0) for both the ADF and PP test with intercept and trend. The results show that the LHP and LGDP variables are stationary at the first difference, while the LFDI and LCRP are stationary at the level. To synchronize the analysis, the model is transformed to the first difference. Then, the estimation could further OLS analysis.

Table 1: Stationary Test

	ADF		PP	
	Level	**1 Diff.**	**Level**	**1 Diff.**
LHP				
Intercept and Trend	-1.7684	-4.1385***	-1.9086	-4.0994***
LGDP				
Intercept and Trend	-1.9182	-4.9555***	-1.9182	-4.9542***
LFDI				
Intercept and Trend	-5.2616***	-6.0497***	-5.3931***	-23.2125***
LCRP				
Intercept and Trend	-5.5592***	-5.4480***	-3.0778	-5.6687***
Note: *, **, *** imply 10%, 5%, 1% level of significance				

Table 2: Diagnostic test

Test Statistic	**Obs. R-squared**	**p-value**	**Variable**	**VIF**
Serial correlation (lag 2)	5.2411	0.0728		
Heteroscedasticity	1.8454	0.6051		
Normality Test		0.5062		
Multicollinearity			LGDP	1.3168
			LFDI	1.3031
			LCRP	1.0137

Table 3: Results of the OLS model

Variable	Coefficient	S.E	t-statistic	p-value
Intercept	-0.0217	0.0134	-1.6282	
LGDP	0.1413	0.1195	1.1831	0.2489
LFDI	0.0269	0.0092	2.0943	0.0073**
LCRP	0.5154	0.2058	2.5039	0.0198**
R^2	0.5270			
Adj R^2	0.4653			
Prob (F-statistic)	0.000541			

Notes: * indicates a statistically significant p-value ($p < 0.1$);**indicates $p < 0.05$; *** indicates $p < 0.01$.

For the robustness of the model, this study has passed all the requirements needed to justify whether the study is fit to run the analysis. (Mohamed et al., 2022). Table 2 shows the details of the robustness analysis result. It shows that the model has passed the serial correlation test of order 2, where the p-value is larger than 5 percent of the Breusch-Godfrey LM test. For the heteroscedasticity, the model signifies that it is out of the hetero problem, where the p-value is more than 5 percent of the rule of thumb. It also passed the normality test, where the p-value exceeded 5 percent of the analysis, which signifies the model is normal. The last is the multicollinearity test, where analysis shows all the variables are under the variance inflation factor (VIF) rule of thumb, which is less than 5. Thus, it concludes that this study has a niche to be run.

Table 3 shows the model's results. It shows that the model is suited for conducting all the variables. (Gouda & El-Hoshy, 2020). The R-squared shows that the model has a 53% (0.5370) LHP variant, which is explained by all three variables. The F-statistics has a p-value of 0.000541, which means the model rejects the null hypothesis and suggests that the variables involved could influence the HP.

The results also suggested that LFDI and LCRP are significantly associated with LHP. In contrast, the variable LGDP is insignificantly associated with LHP. This analysis proves that LCRP influences LHP, the housing price. A percent increase in the corruption index will initiate a potential increase in the housing price at about 51 percent, which could depress the borrower's ability to buy a house, exploiting the market of the youngsters to buy a house.

Interestingly, in this case, two variables, CRP and FDI, show such a connection, thereby providing valuable insights into factors influencing housing prices.

5. Conclusion & Recommendations

Housing markets are intricately interwoven with various aspects of the economy, making them complex structures shaped by numerous interconnected factors. Stabilizing these markets while ensuring affordability and fairness requires a multifaceted approach. A recent study about the Malaysian context lays down three critical recommendations centered around bolstering anti-corruption initiatives, regulating foreign direct investment (FDI), and diversifying the economy. The necessity to amplify anti-corruption efforts is the first recommendation's crux (Siddiquee, 2005). This need is rooted in the apparent connection between the degree of corruption prevalent in Malaysia and house prices in the country. One example of strengthening these efforts is by launching periodic audits of housing projects to instill a sense of integrity and ensure lawfulness. Such audits, much like a timely health check-up, can preemptively diagnose issues of non-compliance or discrepancies in the process, avoiding the long-term adverse impacts of dishonest practices on housing prices. Moreover, it is critical to protect whistleblowers and encourage them to shed light on corruption. This issue can be comprehended by envisioning a society where individuals fearlessly bring illicit activities to light without worrying about personal safety or backlash. Such an environment discourages corruption and promotes accountability. Creating an independent authority to oversee and prohibit corruption in the housing sector further embellishes anti-corruption efforts. It is analogous to having a dedicated watchdog keeping tabs on any corrupt activities within the housing sector, with the power to take punitive action, thereby concerning potential violators.

The second recommendation addresses the effects of foreign direct investment (FDI) on housing prices. FDI is

a double-edged sword that can spur growth or cause the market to overheat, requiring judicious regulation. A practical method to regulate FDI's impact involves periodically analyzing its effects on the housing market, like constantly tracking the weather to prepare for any sudden changes. This proactive stance allows for the adaptability of rules to maintain economic stability (Wen, 2021).

Furthermore, cultivating sustainable investment practices that value steady, long-term growth over immediate gains can cushion against market volatility resulting from short-lived FDI. This approach mirrors a marathon runner's strategy, focusing on maintaining a consistent pace for the duration of the race instead of sprinting at the very start and then running out of steam. Additionally, nurturing collaborations between the government and the private sector can enable a harmonious blend of FDI and domestic investments focusing on affordable housing (Kim, 2020; Pinjaman & Kogid, 2020). This approach is akin to creating a balanced diet combining different food groups, ensuring holistic growth and development.

While for the GDP, even the research might not have established a direct correlation between GDP and housing prices, steering the economy towards a diverse set of activities is undeniably essential (Pinjaman & Kogid, 2020; Zulkifli et al., 2022). Spreading economic reliance across various sectors, rather than concentrating predominantly on a few, creates a more robust and stable economic climate, akin to not placing all the eggs in one basket. The diversified economic landscape fosters a versatile job market, powering a more secure housing economy. Reflect on an economy that places its bet on a singular industry; a decline in that sector could reverberate dramatically, and it could trigger widespread job losses, diminishing housing demand, which, as a result, pulls down housing prices. In contrast, the sort of economic shock would be lessened considerably in a diversified economy. Other prosperous industries within the economy possess the capacity to compensate for this downturn, effectively keeping unemployment under control and facilitating continuous demand for housing.

In conclusion, a comprehensive strategy articulated with surgical precision, which centers on enhancing anti-corruption initiatives, prudent regulation of foreign direct investment inflows, and stimulating economic diversification, serves as a roadmap for Malaysia to cultivate a balanced, inclusive, and equitable housing market.

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Employer Brand Knowledge (EBK), Sustainability Practices and Employer Attractiveness: A Perspective of Millennial Employees

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Abstract: Employer attractiveness is crucial in talent management as it helps attract, retain, and engage top talent, thereby ensuring a competitive edge and long-term organizational success. This study aims to determine the relationship between Employer Brand Knowledge (EBK) and various dimensions of sustainability practices on employer attractiveness, particularly among Millennial employees. A quantitative research method was employed, with 90 questionnaires collected from Millennial employees in a publicly listed company in Malaysia. The data was analyzed using SPSS version 25.0 to test the hypotheses. The findings reveal that only one dimension of EBK namely employer image has a significant positive relationship with employer attractiveness. Contrary to our expectations, none of the sustainability practices was found to be related to employer attractiveness. This study contributes to a deeper understanding of how EBK influences the perception of employer attractiveness as it not only broadens the theoretical understanding but also provides practical insights for employers seeking to improve their attractiveness to the Millennial workforce. It is also suggested that employers who are more familiar with employees, have a positive reputation, and maintain a strong image are more likely to be attractive to millennials. Implications and recommendations for future research are also discussed in the study.

Keywords: *Employer attractiveness, employer brand knowledge, sustainability practices, millennials, Malaysia*

1. Introduction

Currently, the world of the 21st century is experiencing a revolutionary rate of change (Lim, 2023). Companies with the ability to anticipate and adapt to these changes may have a chance at ongoing success and to remain competitive (Rotatori et al., 2021). It is crucial for companies to fully understand the needs and goals of their employees to work with them accordingly. Such changes include the diverse generational mix in today's workforce where each generation holds different and unique characteristics thus leading to shifts in the way companies are managing their workforce (Becker et al., 2022). One of the generations that still have a huge representative in the workplace is the Millennials generally known as Generation Ys (Chapola, 2016). The age range identifying such generation varies from source to source but the general years range of millennials that will be used throughout this research are those born between 1980 to 2000 (Goldman Sachs, 2016; Schawbel, 2015). These Millennials demand rapid career satisfaction, thus, if their demands are not met by their employers then they would not be reluctant to leave which leads to the difficulty of retaining them (Waikar et al., 2016; Yap & Badri, 2020). Attracting and retaining the workforce is pivotal since it is projected that the current and future labor will face scarcity in several fields especially where special skills are needed (Wagner & Hassel, 2015; Kiel, 2020). Thus, the war for talent has been prevalent where employer attractiveness is becoming more important to attract and retain a highly qualified workforce (Backhaus, Stone, & Heiner, 2002; Schaarschmidt et al., 2021).

Employer attractiveness is referred to as the strength that the employer makes employees feel willing and voluntarily to stay and contribute positivity to the company through employees participating, perceiving, and experiencing life and work in the enterprise (Liu, Tao, & Han, 2016). Kashive and Khanna (2017) believe that EBK influences a company's employer attractiveness. Since the Millennials' EBK affects a company's employer attractiveness, employers must understand how they can influence the Millennials' beliefs (Collins, 2007). Another peculiar attribute of the Millennials is that they tend to show a huge concern for the environment and social responsibility issues (Barber, Taylor & Dodd, 2009; Eastman, Iyer, & Thomas, 2013; Chatzopoulou & de Kiewiet, 2021). Therefore, employers who adopt sustainability practices into their business operations will be deemed attractive by these millennials (Nappi-Choulet & Decamps, 2013; Nadanyiova & Das, 2020).

Sustainability practices accommodated by some companies can be seen from the environmental factors, social factors, and economic factors. Environmental factors can be seen when organizations engage in activities that do not negatively impact the environmental resources for future generations (Goel, 2010; Jerónimo et al., 2020). Social factors can be identified when employers adopt a fair business practice for labor, human capital, and the community that will benefit these people (Elkington, 1997; Janu, 2020). In addition, in terms of economic factors is when organizations contribute some economic value to the surrounding system in a way that enhances it and promotes its capability to support future generations' needs (Spangenberg, 2005; Khan et al., 2021).

Although it is proven in some research that EBK (Kashive & Khanna, 2017) and sustainability practices (Presley et al., 2018) contribute to employee attractiveness. However, these studies have been conducted in the Western regions so there is not much research done based on Asian regions, especially Malaysia. This leaves the context relatively unexplored so there is a need for more research regarding the variables to further explore what the concept entails in the Malaysian context. Thus, this study intends to: (1) identify the relationship between employer brand knowledge (EBK) (employer familiarity, employer reputation, and employer image) and employer attractiveness; (2) identify the relationship between sustainability practices (environmental factors, social factors, and economic factors) and employer attractiveness.

2. Literature Review

Employer Attractiveness

The employer attractiveness concept has been broadly discussed in the areas of management (Bakanauskiené, Bendaravicienė, Krikstolaitis & Lydeka, 2011), applied psychology (Collins & Stevens, 2002), communication (Bergstrom, Blumenthal, & Crothers, 2002) and marketing (Ewing, Pitt, Bussy, & Berthon, 2002). It has also become an increasing focus point in the modern business press (Ritson, 2002). It is believed that employer attractiveness plays a significant role as it influences the recruitment and selection processes and the retention of professionals (Helm, 2013). In other words, an organization that has high employer attractiveness has a higher possibility to increase profits and attract qualified employees (Bakanauskienė et al., 2011). Based on Pingle and Sharma (2013), employer attractiveness can be from an external view and an internal view of an organization. The external perspective concerns the attractiveness seen by prospective employees' while the internal perspective concerns the level of attractiveness seen by an organization's current employees. This study utilized employee attractiveness from an internal perspective.

Employer Branding Knowledge (EBK) and Employer Attractiveness

EBK provides people with a template to group, retain, and recall employer-related information. These related dimensions influence employer attractiveness to induce an organization as a desired workplace (Kashive & Khanna, 2017), The EBK in this study involves dimensions such as employer familiarity, employer reputation, and employer image. Firstly, employer familiarity is deemed as the ease with which an employer brand name comes to mind and the level of awareness of an employer (Cable & Turban, 2001; Collins & Stevens, 2002). On the other hand, Highhouse, Broadfoot, Yugo, and Devendorf (2009) define employer reputation as an internationally recognized and temporarily stable reputation of an organization shared by the general public's evaluative judgment. Employer image is a combination of short-term mental descriptions of specific characteristics of a company as an employer as held by individuals. (Highhouse et al., 2009). Thus, EBK provides a template to categorize, store, and recall employer-related information (Cable & Turban, 2001).

Low and Woo (2009) conducted a study among final-year students of hospitality and tourism courses at four tertiary schools located in the Klang Valley. The findings from 280 students discovered that the relationship between employer image and employer attractiveness is particularly high thus stimulating job seekers' employment decisions at a company. In addition, Collins and Stevens (2002) also proved that there is a relationship between employer image and employer attractiveness where they used the customer-based brand equity theory to predict how positive employer image may affect the employer attractiveness thus stimulating the application decisions of engineering students. Meanwhile, Saini, Rai, and Chaudhary (2014) found that employer familiarity positively impacts employer attractiveness in a study they have done among job applicants of 12 firms in an Indian context.

Furthermore, Turban and Cable (2003) have proven that employers who have better reputations are deemed more attractive to job applicants where the data was obtained from career services offices at business schools at two universities. Collins and Han (2004) have also conducted a study where the data for 99 organizations collected from multiple sources provided evidence that employer reputation influences employer attractiveness. Moreover, Lievens et al. (2005) have received the same result where employer attractiveness is influenced by employer reputation among Belgian armed forces applicants. This is supported by Kashive and Khanna (2017) who have proven that employer reputation is directly related to employer attractiveness in a study conducted among final-year students of computer science courses noting their perception of IT companies. Therefore, it is hypothesized that:

H1: There is a positive relationship between employer brand knowledge and employer attractiveness.
H1a: There is a positive relationship between employer familiarity and employer attractiveness.
H1b: There is a positive relationship between employer reputation and employer attractiveness.
H1c: There is a positive relationship between employer image and employer attractiveness.

Sustainable Practices and Employer Attractiveness

This study defines sustainability practices according to the Brundtland Commission (1987) as the development that meets current needs without compromising the ability of future generations to meet their own needs. In addition, sustainability practices are the organizations' business practices to maintain the qualities that are valued in the physical environment. Sustainability practices are also characterized by environmentally friendly practices initiated by a company to become a more sustainable organization. A sustainable company considers its actions in the economic, social, and environmental dimensions (Elkington, 1997). For example, it seeks profit but reduces the negative impact of its profit-seeking activities on the environment efficiently, through environmental management, and performs social actions for the community, through social responsibility (Azevedo, Carvalho, & Machado, 2011). This study characterized sustainable practices into three dimensions. Firstly, environmental factors where organizations engage in activities that do not negatively impact the environmental resources for future generations (Goel, 2010). Secondly, social factors are referred to as adopting fair business practices for the labor, human capital, and community that will benefit these people (Elkington, 1997). Finally, economic factors which are referred to an organization's contribution to economic value to the surrounding system in a way that enhances it and promotes its capability to support future generations' needs (Spangenberg, 2005).

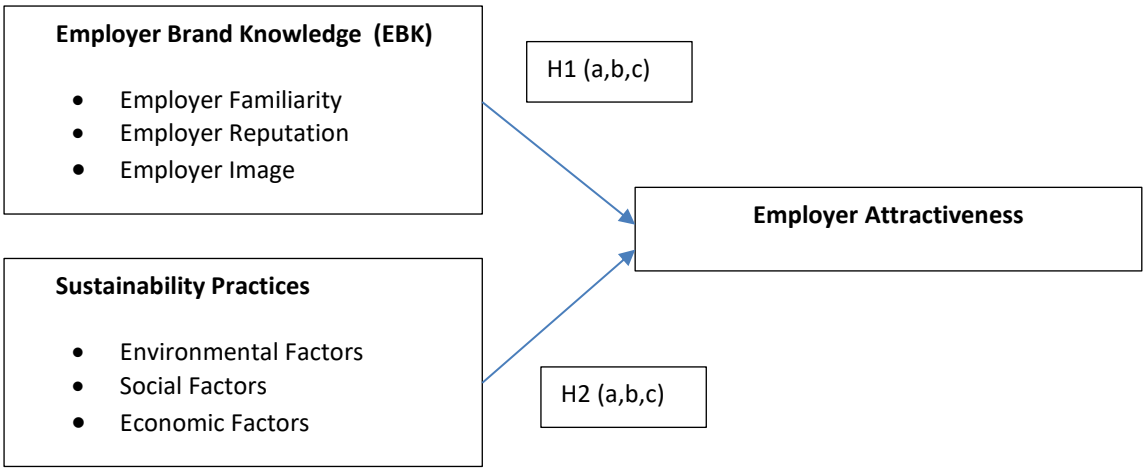
A study done by Aiman-Smith, Bauer, and Cable (2001) used a sample of business students and the results showed ecological rating most strongly affects employer attractiveness. This shows that organizations that are deemed attractive are those that practice sustainability towards the environment. A recent study conducted among job seekers at a career fair tested the environmental dimension of sustainability practices and found that organizations that adopt sustainability practices are deemed more attractive as employers (Jones, Willness & Madey, 2014). Another study also found that sustainability practices in terms of environmental factors do positively impact employer attractiveness among college students entering the job market (Presley et al. 2018). In another study to examine the effects of a pro-environmental corporate message on prospective applicants' attitudes toward a fictitious hiring organization, it was found that the environmental support message positively affected job pursuit intentions. In other words, the applicants are attracted to the company since it adopts sustainability practices in their business operations (Behrend, Baker, & Thompson, 2009).

Moreover, a study has proven that job applicants have higher self-images when working for socially responsible firms thus deducing that socially responsible organizations are perceived as more attractive as an employer (Greening & Turban, 2000). Furthermore, the same study that was tested on job seekers at a career fair found that organizations that have community involvement referring to social factors are deemed more attractive as an employer (Jones et al., 2014). Other researchers have supported previous research results since they found out that soon-to-graduate college students deem organizations more attractive when they conduct sustainability practices socially (Presley et.al, 2018). Therefore, it is hypothesized that:

H2: There is a positive relationship between sustainability practices and employer attractiveness.
H2a: There is a positive relationship between environmental factors and employer attractiveness.
H2b: There is a positive relationship between social factors and employer attractiveness.
H2c: There is a positive relationship between economic factors and employer attractiveness.

Figure 1 displays the research framework.

Figure 1: Research Framework



3. Research Methodology

This study adopts a quantitative approach to test and verify the possibility of a relationship. The type of investigation is correlational study and hypotheses testing where variables were measured through statistics analysis. The time horizon in this study is cross-sectional which means it entails collecting data at and concerning one point in time to make inferences about a population of interest (Hall & Lavrakas, 2008). The respondents of the study were Millennial employees working in a private limited company that provides transportation services in Malaysia. The age range identifying such generation varies from source to source but the general years range of millennials that will be used throughout this research are those born between 1980 to 2000 (Goldman Sachs, 2016; Schawbel, 2015). Millennial employees were chosen as the respondents since they make up almost 70 percent of the total workforce in the company.

Data were collected using survey questionnaires. A purposive sampling technique was chosen to select the respondents as those who fit the definition of Millennial employees were given the survey questionnaire. The survey questionnaire was developed using the English language. Simple English language is used since it is an international language, and respondents are expected to understand all the questions easily. A simple English language will minimize the risk of mistakes during the responding session. The data collection method used in the study was the 'drop off and collect' method where respondents were given the survey questionnaire personally and had 3 days to fill up the survey. Once the survey questionnaires have been completed, the researcher personally collected the survey from the respondents.

To measure employer attractiveness, five items from Highhouse et al. (2003) were adapted for this study. The researcher used a 5-point Likert scale ranging from 1= strongly disagree to strongly agree. Employer Brand Knowledge (EBK) on the other hand was measured using 16 items adapted from Collins (2006). Specifically, employer familiarity and employer reputation were measured by four items respectively, Employer image on the other hand used eight items in measuring the variable. All items were measured using a 5-point Likert scale ranging from 1= strongly disagree to strongly agree. The second independent variable of the study is sustainability practices. Represented by three dimensions namely environmental, social, and economic factors, these dimensions were measured using nine items adapted from Presley et al. (2018). Each dimension was measured using three items respectively. A Likert 5-point scale ranging from 1= unimportant to 5= very important was used to measure sustainability practices. All instruments in this study have been deemed valid and reliable as they were selected from established literature and have acceptable levels of reliability values. Before data collection, a pilot study was conducted among 30 Millennial employees and acceptable reliability values were established ranging from 0.73-0.85.

Data were analyzed using Statistical Package for the Social Sciences (SPSS). This study utilized descriptive statistics, such as percentages, means, frequencies, and standard deviations, to determine the demographic profiles of the respondents. The study also utilized multiple regression analysis to determine the predictive relationships between the variables.

4. Results

This study aims to determine the relationship between Employer Brand Knowledge (EBK) and various dimensions of sustainability practices on employer attractiveness among Millennial employees in a publicly listed company, in Malaysia. Data collected from 90 respondents indicate that the study was responded to by 54.4 percent of female respondents as compared to 45.6 percent of male respondents. Most of the respondents (37.9%) range from 25-29 years old, followed by 30-34 years old (27.7%), 35-38 years old (17.7%) and others (16.7%). The majority of the respondents are Malays (75%) and are permanent employees (78.9%). Most of the respondents had been working with the current organization for 1-4 years (33.3%) followed by 5-9 years (26.7%).

Reliability analysis is done to measure the internal consistency of the items used in the questionnaire. Table 1 displays the results of the reliability analysis for all variables. It was found that Cronbach's alpha values for all variables used in the study ranged from 0.72 to 0.85, indicating that all instruments used are reliable and at an acceptable level.

Table 1: Reliability Analysis

Variable	Original Items	Items Dropped	Cronbach's Alpha
Employer Attractiveness	5	-	0.85
Employer Brand Knowledge (EBK)			
Employer Familiarity	4	-	0.72
Employer Reputation	4	-	0.89
Employer Image	8	-	0.86
Sustainability Practices			
Environmental Factors	3	-	0.82
Social Factors	3	-	0.79
Economic Factors	3	-	0.84

Table 2 shows the descriptive analysis through mean and standard deviation values for all variables. Sustainability practices that consist of environmental, social, and economic factors have the highest mean value ranging from 4.04 to 4.11, followed by employer attractiveness (M = 3.79, SD = 0.64) and EBK dimensions ranging from 3.43 to 3.59.

Table 2: Descriptive Analysis

Variable	Mean	Standard Deviation
Employer Attractiveness	3.79	0.64
Employer Brand Knowledge (EBK)		
Employer Familiarity	3.43	0.66
Employer Reputation	3.47	0.76
Employer Image	3.59	0.62
Sustainability Practices		
Environmental Factors	4.04	0.67
Social Factors	4.06	0.70
Economic Factors	4.11	0.62

Table 3 summarises the result of a multiple regression analysis on the relationship between EBK (employer familiarity, employer reputation, and employer image) and sustainability practices (environmental,

social, and economic factors) on employer attractiveness. The R-squared value of .53 suggests that 53 percent of the variance in the dependent variable is accounted for by these predictors. Based on the findings, only one dimension of EBK namely employer image was found to be positively and significantly related to employer attractiveness ($\beta = 0.65$, $p < 0.01$). The other two dimensions under EBK namely employer familiarity and employer reputation were found to have no significant link with employer attractiveness. Thus, only H1c was supported in the study indicating there's only partial support for H1. Similarly, none of the dimensions under sustainability practices were found to have relationships with employer attractiveness. Thus, H2a, H2b, and H2c were not supported.

5. Discussion and Implications

The study examined the relationship between employer brand knowledge (employer familiarity, employer reputation, and employer image) and sustainable practices (environmental, social, and economic factors) on employer attractiveness. Data were collected from 90 Millennial employees in a publicly listed company in Malaysia and analyzed using SPSS. The hypotheses proposed that each dimension of EBK and sustainable practices would positively influence employer attractiveness. However, the results indicate that only employer image – one of the EBK dimensions was found to be related to employer attractiveness. In other words, companies with a high and positive employer image have a higher employer attractiveness compared to the ones with a lower employer image.

Table 3: Regression Analysis

Independent Variable	**Dependent Variable: Employer Attractiveness β**
Employer Brand Knowledge (EBK)	
Employer Familiarity	0.17
Employer Reputation	0.04
Employer Image	0.65**
Sustainability Practices	
Environmental Factors	-0.03
Social Factors	0.06
Economic Factors	-0.06
F Value	15.55**
R^2	0.53
Adjusted R^2	0.50

Employer image is the employees' beliefs on organizational attributes and associations that portray the company as an employer. This may include size, location, pay, benefits, advancement opportunities, and other objective aspects of an organization (Cable & Turban, 2001). A cognitive employer image will only target specific aspects and might change over time since it is held by individuals rather than the public (Highhouse et al., 2009). A positive employer image is thus important in guiding job seekers' efforts to differentiate an organization from its competitors. Consequently, these employer images help the employees to generate a positive affective attachment to a company thus leading to a lower workforce turnover (Low & Woo, 2009; Syal, 2021). This signifies the significance of employer image as compared to employer familiarity and reputation as part of the employer branding knowledge. The result of the study is consistent with studies conducted by Low and Woo (2009), Collins and Stevens (2002), Kashive and Khanna (2017) and; Myrden and Kelloway (2014).

There are a few possible reasons for this finding. Firstly, the Millennials tend to emphasize extrinsic values such as money, fame, and image (Ng & Johnson, 2015). Based on Smidts, Pruyn and Van Riel (2001), some individuals want to belong to a group for self-categorization and self-enhancement. Therefore, they can feel prideful when they belong to a community that has social prestige. Thus, the relationship between employer image and employer attractiveness may be attributed to the fact that these Millennial employees can base their identity on organizational membership at a well-known company. Some might even go to the extent of fully committing to the company since they want to maintain their association and the benefits of being an employee at the company. Another possible explanation for this is that it relates to person-organization fit. Employees compare

the employer's image to their wants, needs, personalities, values, and beliefs. Thus, the better the match between the employer's company and the employees' value, then the more attractive employees see the organization (Yu, 2014). This is supported by research that indicates employees compare the organization's image with their own needs, personality, and values (Backhaus and Tikoo, 2004). When their needs, personality, and values fit the organization's image, the organization becomes attractive to them (Backhaus & Tikoo, 2004).

Although Millennials show a great concern for the environment and social responsibility issues (Barber et al., 2009; Eastman et al. 2013), however, none of the dimensions of sustainability practices contribute to employer attractiveness. Although the respondents deemed that sustainability practices are important since the variables have most of the highest mean compared to EBK. Nevertheless, this study has proven that sustainability practices are not related to employer attractiveness. These findings were also similar to earlier studies such as Ray (2006). A few reasons in justifying the findings. Firstly, sustainability practices may be perceived by the respondents as the least envisioned benefits that these employees see in organizations (Pingle & Sharma, 2013). Even though the Millennials believe in sustainability practices, however, they do not see it as a variable that leads to employer attractiveness since they believe organizations are normally expected to take up some responsibilities associated with a responsible employer (RER). Renowned economists agree and promote a perspective that some organizations adopt these sustainability practices just for their benefit and not because of their genuine concerns about the surroundings (Jensen, 2002; Newbert, 2018). This seems to imply that sustainability practices are less about giving back to the world and more about saving face for some companies. However, there are still other companies that genuinely believe in giving back to society (Sardana et al., 2020).

As induced before, employer image is never stagnant. There are always emerging trends, advances in technology, and differences of opinion about what works and what does not. Thus, for employers to increase employer attractiveness it is imperative that they continuously exert the utmost efforts in increasing their employer image. Thus, there are some suggestions for organizations to enhance their employer image. Since employer image is only a temporary mental representation of individuals regarding an organization as an employer of choice the organization must put constant efforts into maintaining its positive employer image especially when it comes to Millennial employees. It has been identified that if Millennials are unhappy at a company they will not be reluctant to switch jobs since they know their self-worth (Marston, 2007; Perkasa & Purwanto, 2024).

Firstly, employers might want to practice transparency in leveraging social media platforms. Millennials tend to rely on the internet for information (Tulgan & Martin, 2001; Park et al., 2021). Employment websites such as Jobstreet, LinkedIn and Glassdoor are highly important in this matter. Such websites must present an accurate depiction of what it is like to be working at a company whether it provides a flexible stress-free environment or a nine-to-five kind of company. The current and former employees' positive reviews on such websites regarding an organization can be a powerful marketing tool. Employers can also share true stories and quotes from their top employees about working at the company. Social media is great for sharing such stories because it is a very visual storytelling medium. This will most likely impact the millennials since they are often on social media. An image of employees having a great time at work sends a powerful message to anyone who is considering connecting with an organization. Telling its top employees' stories on the employment website is another powerful way to attract the right applicants for its vacancies. This does not only affect external stakeholders but also internally. This is because publishing a positive employer image may reinforce positive messages about the organizational culture.

Secondly, external stakeholders such as job seekers and customers tend to visit websites like Twitter, Facebook, and Glassdoor to acquire organizational information (Dabirian, Kietzmann, & Diba, 2017; Könsgen, Schaarschmidt, Ivens, & Munzel, 2018; Korzynski et al., 2020). Thus, employees are more aware of how these external stakeholders view their company online which will impact how they evaluate their employees themselves (Helm, 2013). This aligns with the social identity theory where employees relate themselves to their employer due to how others see the employer's achievements (Bouckaert, 2001). Employees develop a sense of collective pride in being organizational members when they see their employer as attractive online compared to competitors and are confident that other external entities also share the same view. Finally, to be

an attractive employer companies might want to step up their game in the business game and become one of the leading employers in Malaysia. Since the studied company is publicly listed, it is an advantage that it already has a brand and is known by the public. One of the initiatives that the company can take is to be at par with or better than other top employers in the country. Millennials demand rapid career satisfaction (Waikar et al. 2016), thus, companies may need to work on their talent management practices such as providing better career development, giving ongoing feedback, and providing attractive compensation and benefits packages. This will lead to improved employer branding and image and subsequently be perceived by the employees and potential employees as attractive.

The significance of this study lies in the fact that it provides a better understanding not only in theory but also practically of how EBK influences employer attractiveness, especially among the Millennial workforce. In the war of talent, employers and their human resource practitioners must creatively develop their employer branding to shape the perception of an organization in the job market, enhancing its ability to attract and retain top talent, while also fostering employee engagement and loyalty, which ultimately drives business success. Thus, employers must fully leverage the employer branding concept not only in retaining and motivating the current workforce but also in attracting potential employees. In addition, the study offers valuable implications for companies aiming to attract and retain millennial talent in a competitive job market.

The recommendations for future research may be able to solve the current study's limitations. First and foremost, future research may want to widen the representation of the sample in various industries using probability sampling techniques. This enables researchers to create a sample that truly represents the population. Secondly, future studies may want to consider using other alternatives to the current statistical software that is more robust such as AMOS, PLS-SEM, and Stata. Such software shall allow greater precision in results. Next, future researchers might also opt for a longitudinal study where researchers will observe the subjects repeatedly throughout the time and the duration may extend over years or even decades. Researchers will be able to detect developments or changes in the characteristics of the subjects at sample and population levels. As longitudinal study extends beyond time, researchers can establish sequences of events. Lastly, future research may want to include moderating or mediating variables to better understand the interrelated relationship between the variables.

Conclusion

In a nutshell, the study is done to determine the relationship between EBK (employer familiarity, employer reputation, and employer image) and sustainability practices (environmental factors, social factors, and economic factors) on employer attractiveness among Millennial employees. Data collected from 90 Millennial employees of a publicly listed company in Malaysia reveals that employer image was the only EBK dimension that emerged as a predictor of employer attractiveness. This study not only fills a gap in existing research but also provides practical insights for organizations aiming to attract and retain millennial talent in today's competitive job market.

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Determinants of Participatory Intention in Autism Volunteer Work for Improving Quality of Life of Persons with Autism (PWA) and their Caregivers

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Abstract: Evidence-based psychosocial interventions can enhance communication and social abilities, leading to a favorable effect on the overall welfare and quality of life for individuals with autism and those who care for them. Despite the importance of volunteers in supporting individuals with autism and their families, there is limited research on the factors influencing individuals' decisions to participate in autism-related volunteer work. This study aims to bridge this gap by investigating the various factors that shape individuals' intentions to participate in volunteer activities related to autism. A cross-sectional study design with a purposive sampling technique was conducted. Data obtained from a survey questionnaire polled ninety-nine university students' attitudes regarding the factors influencing their participatory intention in autism volunteer work. Descriptive statistics show that the participation intention level among university students was high (M=4.47, SD=0.52). There was a statistically significant strong and moderate relationship between attitude, subjective norms, perceived behavioral control, self-efficacy and religiosity toward participation intention. The regression analysis revealed that subjective norms, perceived behavior control and religiosity affected participatory intention. This study provided practical implications for designing and implementing effective interventions and programs to recruit and retain volunteers, as well as to promote positive social change and inclusion for people with autism.

Keywords*: Person with Autism, Volunteer Work, Quality of Life, Community Support System, Participatory intention.*

1. Introduction and Background

Volunteerism is essential in fostering community well-being and facilitating development across various sectors. It is deeply embedded in societal frameworks, evidenced by its robust connection with communities and its adaptability in response to crises. The COVID-19 pandemic has underscored the dynamic nature of volunteerism, with a significant shift toward virtual engagement (Lachance, 2020). This adaptability has been crucial in managing crises, as highlighted by Chow et al. (2021), who examined the importance of volunteerism among frontline workers during the pandemic. Moreover, volunteer involvement is essential in public affairs management, contributing to the progress of civil society and local communities (Pevnaya et al., 2020).

Volunteering offers numerous benefits, both at the community and individual levels. Research by Eberl and Krug (2020) indicates that volunteer work can positively impact individuals' earnings, providing economic advantages. Additionally, studies have revealed that volunteering enhances general well-being and physical health, while also strengthening social connections and reducing the need for government welfare spending (Grönlund et al., 2023). These findings emphasize the multifaceted significance of volunteerism in fostering social resilience and well-being.

Given the global prevalence of autism spectrum disorder (ASD), which affects approximately 1 in 100 children worldwide (World Health Organization, 2023), the role of volunteerism becomes even more critical. In Malaysia, the Ministry of Health has reported a steady increase in ASD diagnoses among children, with 589 new cases in 2021, up from 562 in 2020 (Codeblue, 2022). This rise is attributed to better recognition and understanding of the condition by the public and healthcare professionals. Autism, a complex

neurodevelopmental disorder, presents unique challenges that necessitate community support and intervention.

Volunteers play an essential role in supporting autism-related initiatives, particularly in countries like Malaysia, where non-governmental organizations (NGOs) have been instrumental in establishing early intervention programs (Sidique et al., 2022). These programs support children with ASD and their families, who benefit significantly from community engagement and volunteer efforts (Jominol et al., 2022). However, there is a notable gap in research concerning the factors that influence individuals' decisions to participate in autism-related volunteer work.

The prevalence of autism in Malaysia is about 1.6 in 1000, highlighting the importance of community support and volunteer efforts (Codeblue, 2022). Engaging the community, including individuals on the autism spectrum, their families, educators, and allied health professionals, is crucial in setting research priorities and ensuring the relevance of research outcomes (Clark & Adams, 2020). This evidence highlights the need for volunteers to actively engage with the autism community and contribute to research initiatives. It underscores the importance of volunteer work in supporting parents and individuals with autism in navigating service systems and advocating for their needs. In Malaysia, there is a need to increase knowledge and understanding of autism among the public, as many individuals may have heard about autism but do not fully comprehend the nature of children with autism (Azmi et al., 2022). Despite the importance of volunteers in supporting individuals with autism and their families, there is limited research on the factors influencing individuals' decisions to participate in autism-related volunteer work.

Understanding these factors is vital for effectively recruiting and engaging volunteers, thereby enhancing support for the autism community. This study aims to address this gap by investigating the determinants of participatory intention in autism volunteer work among the student cohort. By exploring these factors, the research seeks to contribute to the development of strategies that can better mobilize volunteer efforts, ultimately benefiting individuals with autism and their families.

Utilizing the Theory of Planned Behavior (TPB), the research examined how attitudes, subjective norms, and perceived behavioral control, along with sociodemographic characteristics, self-efficacy, and religiosity, impact volunteer participatory intentions. The research findings highlighted critical psychological and social motivators and barriers, contributing to the literature by extending TPB with additional factors relevant to the Malaysian context. The insights gained have practical implications for promoting and enhancing autism volunteer work among youth, addressing a significant gap in the existing research.

2. Literature Review

Community Support System Through Volunteering

Community support systems play a vital role in enhancing the quality of life for families with autism, and volunteering serves as a powerful mechanism for fostering this support. Engaging in volunteer activities allows families to connect with others facing similar challenges, creating a network of understanding and shared experiences. This social interaction is crucial, as it can significantly reduce feelings of isolation and stress often experienced by caregivers of individuals with autism (Ault et al., 2021).

Volunteering also promotes skill development and empowerment (Rubel et al., 2024). Families can participate in programs that not only benefit the community but also provide valuable resources and training tailored to their needs. Through these activities, parents and caregivers can gain insights into effective strategies for supporting their children, thereby enhancing their confidence and competence in managing autism-related challenges.

Moreover, the act of giving back can instill a sense of purpose and fulfillment, which is beneficial for mental health. Research indicates that volunteering is associated with increased happiness and reduced depression, making it a dual benefit for both volunteers and the communities they serve. Correale et al., (2022) highlight that by participating in community service, one can help families with autism improve their quality of life while contributing positively to society, thus reinforcing the interconnectedness of community support and

individual well-being.

Quality of Life of Caregivers of PWA

Quality of life is influenced by mental health, environment, and social relationships (Rojas, 2024). In Malaysia, support for caregivers of children with autism remains insufficient (Isa et al.,2021). Caregivers face increased stress, anxiety, and poor family functioning, which lowers their quality of life compared to families without autistic children (Liu et al., 2021). Good mental health, family relationships, and coping strategies are crucial for families with an autistic member. The Malaysian National Health System Study emphasizes the need to consider caregivers' input to improve services for children with special needs (Jawahir et al., 2021).

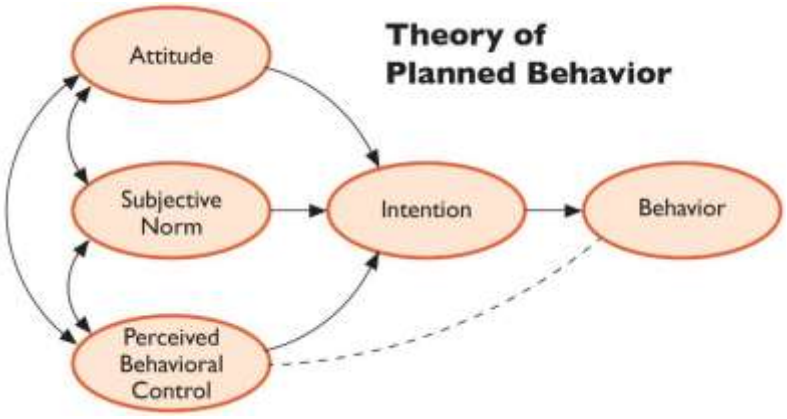
Participatory intention in autism volunteer work

To understand the factors influencing participation in autism volunteer work, it's important to examine motivational and organizational aspects. Studies show a strong link between volunteer motivation and the intention to continue volunteering. For example, Fruchtman et al. (2022) found that participation efficacy predicts the intention to stay with an organization, while Nov et al. (2021) emphasized that collective motives significantly influence contribution intentions. Zhang et al. (2020) demonstrated that motivation and job satisfaction predict ongoing service intentions among volunteer parents. Additionally, satisfaction from previous experiences and factors like skill enrichment and social benefits (Agustin, 2021) drive future engagement. Inclusive opportunities are vital, as Annabi & Locke (2019) highlight the importance of integrating individuals with autism into volunteer work. Addressing these factors is crucial for sustaining participation.

Theory of Planned Behaviour (TPB)

An underlying theory helps to answer the research questions or test the study's hypotheses. It also helps to connect the study to the existing knowledge and literature in the relevant field. The theory of planned behavior (TPB) was applied in the study. The Theory of Planned Behaviour (TPB) is a psychological theory that links beliefs to behavior. The theory maintains that three core components, namely, attitude, subjective norms, and perceived behavioral control, shape an individual's behavioral intentions. In turn, a tenet of TPB is that behavioral intention is the most proximal determinant of human social behavior (Ajzen, 1991).

Figure 1: Theory of Planned Behavior



Attitudinal: Attitudinal factors, which include cognitive, affective, and behavioral qualities, significantly shape an individual's attitudes and beliefs, influencing decision-making, social interactions, and responses to stimuli. These factors encompass value-relevant, impression-relevant, and outcome-relevant dimensions that affect attitude formation and expression (Zunick et al., 2017). Understanding attitudinal factors is essential for addressing behaviors in various domains, including health, politics, and education.

Studies reveal a complex relationship between attitudinal factors and volunteer intentions. Nov et al. (2021) found that active volunteers are more motivated by collective goals, while passive volunteers are driven by community identification. Beckman et al. (2021) highlighted the indirect link between volunteering motivations and continued participation, mediated by attitudes toward volunteering. Cho et al. (2020)

emphasized the role of management in shaping volunteer intentions, while Agustin (2021) noted engagement's influence on future volunteering. Aseanty et al. (2022) underscored the impact of volunteer training on commitment, and Kim et al. (2020) explored the role of psychological contract fulfillment in volunteer satisfaction and intention. These findings illustrate the importance of understanding the diverse attitudinal and psychological drivers of volunteer participation.
H_1: A significant relationship exists between attitudinal and volunteer participatory intentions.

Subjective Norms: Subjective norms in psychology refer to perceived social pressures that influence one's intention to perform a specific behavior (Trafimow & Finlay, 1996). This study examines the subjective norms of students involved in an autism volunteer program, a complex phenomenon influenced by various factors. Research highlights a positive relationship between volunteer satisfaction and the intention to continue volunteering (Cho et al., 2020). Structured training programs also strengthen community ties and commitment, impacting continued participation (Aseanty et al., 2022). Additionally, values and beliefs, particularly regarding environmental conservation, significantly affect sustained volunteer involvement (Rahman, 2022). The interplay of psychological resilience, personal norms, and self-interested values further shapes volunteer tourism intentions (Han et al., 2020). Collectively, these studies underscore the influence of satisfaction, skills, social factors, and values on volunteer participatory intentions. These factors shape individuals' commitment and intention to sustain their involvement in volunteer activities.
H_2: A significant relationship exists between subjective norms and volunteer participatory intention.

Perceived Behavior: The relationship between perceived behavior control and volunteer participatory intention is complex and varies across contexts. Studies indicate that perceived behavior control, self-efficacy, and moral norms significantly predict intentions, particularly in volunteer and professional settings (Lee & Kim, 2017; Mouloudj & Bouarar, 2023). External factors, such as perceived structural support, can further influence this relationship (Otchengco & Akiate, 2021). However, conflicting findings suggest that perceived behavioral control's impact on intention may differ based on specific situations (Ilmiyah et al., 2022). Moreover, moral obligations can moderate this relationship, particularly in re-intentions to volunteer (Liang & Wu, 2023). These findings underscore the need for a nuanced understanding of how various factors shape individuals' intentions to participate in volunteer activities.
H_3: A significant relationship exists between perceived behavior and volunteer participatory intention.

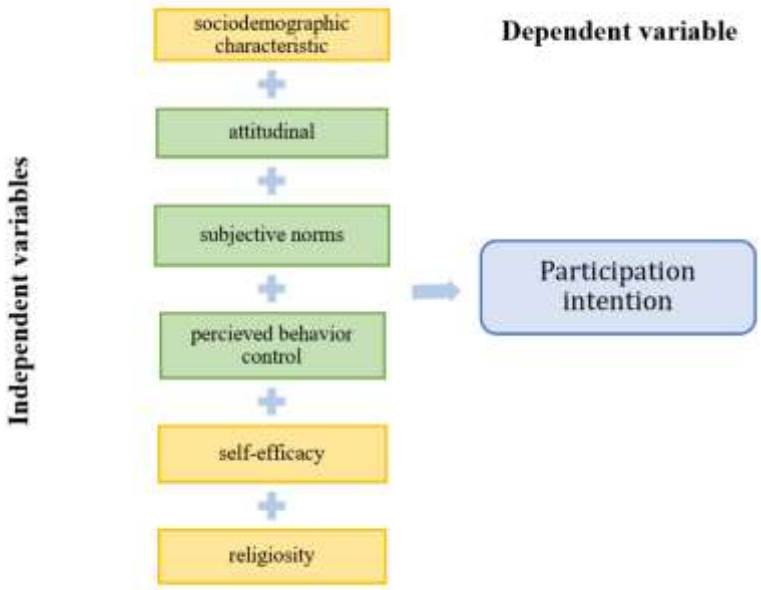
Social Cognitive Theory (SCT)
Social Cognitive Theory (SCT) posits that learning occurs in a social context and that individuals learn from observing others' behaviors, attitudes, and outcomes. Bandura (1986) emphasizes the importance of self-efficacy, a core concept in SCT, in determining how people behave. In the context of volunteering, SCT can help explain how observational learning, social modelling, and reinforcement shape volunteer intentions and actions.
Observational Learning: Individuals often develop intentions to volunteer after observing others who model volunteer behaviors, especially in socially supportive environments.
Self-Efficacy: SCT underscores the importance of self-efficacy in driving behavioral intentions. As noted in TPB, higher self-efficacy leads to stronger intentions to volunteer.

Self-efficacy: Self-efficacy, or the belief in one's ability to accomplish tasks, is crucial in motivation and personal achievement. It is influenced by mastery experiences, vicarious experiences, social persuasion, and emotional states, and varies across situations. In this study, self-efficacy specifically refers to students' confidence in participating in an autism volunteer program. Research shows that self-efficacy significantly impacts volunteer participatory intention and satisfaction. Studies have found that it moderates the relationship between role clarity and volunteer satisfaction, making it a stronger predictor of future volunteer behavior than perceived behavioral control (Lee & Kim, 2017; Bang et al., 2022). Furthermore, self-efficacy influences engagement in various volunteer activities, such as health volunteering and community service, underscoring its broad relevance (Kang & Kahar, 2022). The literature consistently demonstrates the critical role of self-efficacy in shaping volunteer intentions and experiences, making it an essential factor in understanding volunteer behavior across diverse contexts.
H_4: A significant relationship exists between self-efficacy and volunteer participation intention.

Religiosity: Religiosity, defined as a person's involvement in religious practices, significantly impacts psychological well-being and behavior, including moral judgments and volunteer participation. Various studies have examined this relationship. Sallam et al. (2018) found that higher religiosity positively correlates with volunteering intentions among Malaysian Muslim students, while Yeung (2018) noted that public religiosity more strongly predicts participation in voluntary services than private religiosity. Grönlund et al., (2023) explored the role of religious affiliation and spiritual fulfillment in volunteering, highlighting the importance of religion in daily life. Jang et al. (2023) emphasized the bi-directional relationship between religiosity and volunteering, suggesting that volunteering may also increase religiosity. Polson (2018) found that sect-like religiosity affects congregational and non-congregational volunteering differently. These insights underline the complex, bi-directional relationship between religiosity and volunteering, suggesting that religiosity not only influences volunteering but may also be shaped by it. Understanding these dynamics is crucial for grasping the broader implications of religiosity on social behavior.
H_5: A significant relationship exists between religiosity and volunteer participatory intention.

Integrating Theories
By combining TPB with SCT, this study aims to create a robust framework for understanding volunteer participatory intentions. TPB provides the foundation for linking beliefs to behavior, while SCT offers additional perspectives on how social learning influences volunteering. This integrated approach offers a comprehensive view of the complex factors driving volunteer participation, particularly in an autism volunteer program.

Figure 2: Conceptual framework of the study



A conceptual framework clearly explains the variables, relationships, and assumptions underpinning this study (Fig.2). The factors that affect participatory intention using the theory of planned behavior (TPB) as the underlying framework is portrayed. TPB is a psychological theory that links beliefs to behavior and posits that three core components, namely, attitude, subjective norms, and perceived behavioral control, shape an individual's behavioral intentions and actions. This study develops an integrated theoretical framework combining the Theory of Planned Behaviour (TPB), and Social Cognitive Theory (SCT) to examine volunteer participatory intentions in an autism volunteer program. This approach provides a more holistic understanding of the factors influencing volunteer behavior, addressing the limitations of using a single theory.

3. Research Methodology

This study used a quantitative research design and a cross-sectional approach to investigate the factors influencing the intention to participate in autism volunteer work. Data were collected through a structured questionnaire distributed to students at universities. A purposive sampling technique ensured that participants with relevant experience were included. The questionnaire comprised various sections to gather demographic information and assess factors such as attitudinal and subjective norms, perceived behavioral control, self-efficacy, and religiosity. A five-point Likert scale was employed to measure respondents' agreement with various statements, while a five-point Semantic Differential scale was used to evaluate attitudes towards autism volunteer work. Both primary and secondary data were collected, with primary data obtained through self-administered questionnaires and secondary data through a desktop study. Before completing the survey, the study's participants signed an informed consent form detailing all aspects of the investigation and were assigned a unique identifier. These procedures were implemented to safeguard personal information and ensure the protection of participants' rights. A total of 120 questionnaires were distributed, with 97 valid responses obtained, resulting in a response rate of 81%. Data analysis was conducted using SPSS Version 23, enabling a comprehensive examination of the relationships between the independent variables and participatory intentions.

Reliability is associated with the accuracy of a measure. To ensure this, each survey question is designed to yield similar or closely related outcomes. This technique allows researchers to assess the consistency and stability of the data. In this study, SPSS was utilized to conduct the reliability test by evaluating Cronbach's alpha score, where a score of 1 represents the optimal result. All variables have Cronbach's alpha values higher than the threshold value of 0.7 as suggested by Kaur and Paruthi (2019), indicating the items are reliable for measuring the intended variables. The Cronbach alpha value ranges between .848 to .925.

Table 1: Reliability analysis

Variables	Cronbach Alpha	Skewness	Kurtosis	No. of Item
Attitude	0.85	-0.34	-0.39	6
Subjective Norms	0.87	-1.22	1.41	4
Perceived Behaviour Control	0.89	-0.26	-0.23	6
Self-efficacy	0.92	-0.16	-0.08	8
Religiosity	0.89	-0.58	-1.09	11
Intended participation	0.85	-0.55	-0.68	4

The study findings showed that skewness values between -0.157 and -1.224 and kurtosis values between -0.230 and 1.414. The skewness for all variables was found to be between -3 and +3, indicating that the distribution was left-skewed. The kurtosis for all variables was found to be between -10 and +10, indicating that the distribution was heavier-tailed compared to the normal distribution (Brown & Greene, 2006).

4. Results and Discussion

This section summarizes the characteristics of the sociodemographic profiles. According to Table 2, the majority of respondents were under 25 years old (n=67, 67.8%), while only one respondent (1%) was aged 41 years or older. Regarding gender, 75 respondents (77.8%) were male, and 23 respondents (23.2%) were female. Most respondents were Malays, with 96 individuals, and most were single, totalling 88 respondents (88.7%). Given that the university is situated in urban areas, most respondents currently reside in urban settings (n=55, 53.5%), followed by those in sub-urban areas (n=34, 34.3%), and a smaller group in rural areas (n=12, 12.1%).

Table 2: Sociodemographic Information of Volunteer (N=97)

Variables		Frequency	Percentage
Age	< 25 years old	65	67
	26 – 30 years old	17	17.5
	31 – 35 years old	10	10.3
	36 – 40 years old	4	4
	41 years old and above	1	1
Gender	Female	23	23.7
	Male	74	76.3
Marital Status	Married	11	11.3
	Single	86	88.7
Race	Malay	94	96.9
	Others	3	3
Place of Stay	Urban	53	54.6
	Sub-urban	34	35.1
	Rural	10	10.3

Table 3 reports the participation level in volunteering work. The study found that the mean scores ranged from 4.38 to 4.53 and SD scores between 0.595 to 0.695 were obtained from participatory intention (PI). These results indicate a high level of concordance among respondents with the items related to participatory intention (PI).

Table 3: The level of participatory intention (N=97)

Variable	Item(s)	M	SD
Participatory Intention (PI)	PI1 Like to volunteer.	4.47	0.59
	PI2 Plan to participate as a volunteer.	4.49	0.61
	PI3 Like to recommend family/friends to participate in volunteering.	4.39	0.70
	PI4 Like to participate in autism volunteering.	4.52	0.61

Cohen (1988) classifies the strength of relationships between variables using Pearson's correlation coefficient (r) as follows: strong (±0.5), moderate (±0.3), and weak (±0.1). According to Table 4, all five independent variables—attitude (r=0.538), subjective norms (r=0.472), perceived behavior control (r=0.545), self-efficacy (r=0.456), and religiosity (r=0.548)—show a positive and significant relationship with the dependent variable, participatory intention in autism volunteer work ($p<0.01$).

Table 4: Correlation analysis (N=97)

Variables	M	SD	p-value	Coefficient (r)
Attitude	4.29	0.56	0.000	0.54 (High)
Subjective norms	4.54	0.54	0.000	0.65 (Moderate)
Perceived behavioral control	3.88	0.72	0.000	0.59 (High)
Self-efficacy	4.18	0.56	0.000	0.46 (Moderate)
Religiosity	4.55	0.45	0.000	0.55 (High)

This indicates that higher values in these variables correlate with increased intention to participate in volunteer work. Specifically, attitude and religiosity show a strong positive correlation, while subjective norms and perceived behavior control also show strong correlations. Self-efficacy has a moderate positive correlation with participation intention. Overall, as these independent variables increase, so does the intention to participate in autism volunteer work.

Multiple linear regression was conducted to evaluate the extent to which, attitudes, subjective norms, perceived behavioral control, self-efficacy, and religiosity significantly could predict the level of intention to participate in autism volunteer work. The regression analysis revealed that the overall regression was statistically significant ($R^2 = 0.614$, $F(5, 91) = 28.964$, $p < 0.01$). This result indicates that the intention to participate in autism volunteer work explained approximately 61% of the variance in subjective norms, perceived behavior control and religiosity.

Based on Table 5, it was found that subjective norms ($\beta = .0.38$, $p < 0.00$), perceived behavioral control ($\beta = 0.25$, $p < 0.00$) and religiosity ($\beta = 0.24$, $p < 0.01$) had positive effects on participation intention level. Meanwhile, attitude ($\beta = .0.08$, $p = 0.29$) and self-efficacy ($\beta = -0.01$, $p = 0.88$) did not affect participation level in autism volunteer work.

Table 5: Regression analysis (N=97)

Variable	β	SE	Beta	t	p	%CI
Attitude	0.08	0.08	0.09	1.06	0.29	[-0.07,0.24]
Subjective norm	0.38	0.08	0.39	4.88	0.00	[0.22,0.53]
Perceived behavior control	0.25	0.07	0.35	3.68	0.00	[0.12,0.39]
Self-efficacy	-0.01	0.09	-0.01	-0.15	0.88	[-0.18,0.16]
Religiosity	0.24	0.09	0.20	2.58	0.01	[0.05,0.42]

This means that, for every one-point increase in subjective norms, the predicted participatory intention level increased by approximately 0.379, for every one-point increase in perceived behavioral control, the predicted participatory intention level increased by 0.251; and for every one-point increase in religiosity, the predicted participatory intention level increased by 0.237.

Table 6: Hypothesis Testing Result

Hypothesis	Statement(s)	Results
H_1	There is a significant relationship between attitudinal and volunteer participation intention.	**Reject**
H_2	There is a significant relationship between subjective norms and volunteer participation intention.	**Accept**
H_3	There is a significant relationship between perceived behavioral control and volunteer participation intention.	**Accept**
H_4	There is a significant relationship between self-efficacy and volunteer participation intention.	**Reject**
H_5	There is a significant relationship between religiosity and volunteer participation intention.	**Accept**

Discussion

As reported, most of the respondents have a high level of participatory intention level in volunteering work related to autism. Regarding the relationship between variables, correlation Pearson Analysis was applied. Variables of attitudinal, subjective norms, perceived behavior control, self-efficacy and religiosity had strong and moderate significant relationships on participation intention in autism volunteers. Meanwhile, for the factor impacting participatory intention level, multiple regression analysis was applied. As reported, variables such as place of stay (sociodemographic characteristics), attitude, perceived behavior control and religiosity were good predictors of participatory intention in autism volunteer work.

University students exhibit a high level of intention to participate in autism volunteer work, a finding consistent

with recent. Research (Halverson & Lowmaster, 2024). Zhang et al. (2020) emphasized that volunteer motivation and a sense of community positively impact the intention for continued service. Nov et al. (2021) found that collective motives are strongly linked to volunteering intentions across various groups. Cho et al. (2020) observed that satisfaction from past experiences motivates future volunteer engagement. Hsieh (2022) demonstrated that perceptions of corporate social responsibility (CSR) enhance volunteer intentions. Additionally, Jominol et al. (2022) reported that knowledge of autism spectrum disorder (ASD) predicts a stronger motivation to volunteer, particularly for supporting children with ASD.

Correlational analysis reveals that attitudes, subjective norms, perceived behavioral control, self-efficacy, and religiosity have a significant impact on participatory intention in autism volunteer work. Attitudes have a strong, positive relationship with participatory intention. Studies by Kuźmiński et al. (2019) indicate that a better understanding of autism correlates with more positive attitudes and acceptance. Cage et al. (2018) emphasize that addressing dehumanization and stigma toward autism can improve attitudes and enhance volunteer engagement.

Subjective norms show a moderate positive correlation with participatory intention. Cho et al. (2020) suggest that volunteer satisfaction is crucial for sustaining participation. Aseanty et al. (2022) highlight the role of training in building community and commitment, which influences volunteers' intention to continue. Perceived behavioral control (PBC) is strongly correlated with participation intention. The Theory of Planned Behaviour (TPB) often uses PBC to predict volunteer behavior. Mouloudj & Bouarar (2023) found that PBC significantly predicts volunteer willingness. However, Wu et al. (2022) noted that attitude and subjective norms may be stronger predictors than PBC in health-related volunteer contexts. Lee & Kim (2017) argue that self-efficacy might be a more robust predictor than PBC for future volunteer intentions.

Self-efficacy has a moderate, positive impact on participation intention. Research shows that self-efficacy affects volunteer satisfaction and future intentions. Studies by Gulliver et al. (2022) and Bang et al. (2022) confirm that self-efficacy positively influences volunteer engagement. Self-efficacy often surpasses PBC in predicting volunteer behavior (Lee & Kim, 2017), and it is linked with higher motivation and satisfaction in volunteering. Religiosity has a strong positive correlation with participatory intention. Xie et al. (2020) found that religious beliefs enhance students' inclination toward volunteerism. Gazley et al. (2022) highlight that religious affiliation drives civic engagement, while Kim and Dew (2019) associate religious practices with improved social behaviors and volunteering. This indicates that religiosity significantly influences individuals' willingness to volunteer.

Multiple regression analysis reveals that perceived behavioral control, subjective norms and religiosity significantly impact participatory intention in autism volunteer work. In analyzing the relationship between attitude, self-efficacy, and intention to volunteer, the regression results indicate that neither attitude nor self-efficacy significantly predicts participation intention. Specifically, a one-point increase in attitude raises participation intention by .0279, but this increase is not statistically significant. Similarly, self-efficacy, often considered a strong predictor of behavior, does not significantly influence the intention to volunteer in this analysis.

The lack of significance for both attitude and self-efficacy suggests that other factors may play a more critical role in shaping an individual's intention to volunteer. While self-efficacy is typically associated with an individual's belief in their ability to successfully engage in a behavior, this belief alone may not be sufficient to drive the decision to volunteer. External motivations, social influences, and situational factors could have a more substantial impact on volunteering intentions. Moreover, these findings indicate that improving attitudes or enhancing self-efficacy alone may not be enough to increase volunteer participation. It highlights the complexity of volunteer behavior and the need to consider a broader range of factors when developing strategies to boost volunteer engagement.

An increase in perceived behavioral control raises participatory intention by .266. Higher perceived control enhances confidence, self-efficacy, and the ability to act on volunteer intentions (Son & Wilson, 2021). This highlights the importance of perceived control in fostering volunteer participation. For every one-point increase in religiosity, participatory intention rises by .260. Higher religiosity strengthens motivation, trust,

and access to volunteer opportunities (Valente & Okulicz-Kozaryn, 2021). This indicates that religious commitment significantly influences volunteer intentions.

In summary, the findings reveal that urban residency, positive attitudes, perceived behavioral control, and religiosity are key factors influencing participatory intention in autism volunteer work. These insights underscore the multifaceted nature of volunteer engagement and the importance of addressing these factors to enhance participation levels, hence, contribute to the betterment of caregivers and families of PWA's quality of life.

5. Managerial Implications and Recommendations

The study's implications extend to volunteerism theory, student behavior, and education. It could enhance volunteer programs for autism by identifying key factors influencing university students' participation, allowing for targeted interventions to boost motivation and retention. Insights into students' attitudes and beliefs about autism can foster positive social change and reduce stigma, particularly if religiosity is a significant factor. Additionally, the study may highlight how volunteering impacts students' skills, career prospects, and personal growth, revealing how living conditions affect their willingness to volunteer. Understanding these factors can help in designing effective support systems and incentives for student volunteers. An important implication of this study is its potential to improve the quality of life for caregivers of individuals with autism. Increased volunteer participation in autism-related programs could provide much-needed support and respite for caregivers, alleviating some of the burdens they face. By enhancing the quality and availability of volunteer services, the study could contribute to better outcomes for both caregivers and those they care for.

The study's limitations include restricted generalizability, validity, and causality. Generalizability is limited due to the focus on university students, who may differ from other populations, and potential selection bias among volunteers. Validity issues arise from reliance on self-reported data, which may be affected by social desirability and recall bias. Causality is constrained by the cross-sectional design, which cannot determine the direction or strength of causal relationships and potential confounding factors like personality and past experiences. Acknowledging these limitations is essential for transparency and guiding future research improvements.

Future research on autism volunteer work should focus on increasing participation intention by targeting factors like location, attitude, perceived control, and religiosity through education, incentives, and collaborations with religious groups. To enhance study validity and reliability, incorporating diverse methods such as interviews or observations and using validated scales like the Participatory Behaviours Scale is recommended. Additionally, extending the research to explore other influencing factors, such as personality or values, and comparing actual behavior with intentions through longitudinal studies can provide deeper insights. Replicating the study across different populations or settings can also broaden its applicability.

Conclusion

This study examined factors affecting university students' intention to volunteer for autism-related programs using a quantitative approach. It revealed that high participatory intention is associated with factors such as proximity to urban areas, positive attitudes towards autism, confidence in volunteering abilities, and religiosity. The findings contribute to the literature on volunteerism by highlighting these key determinants, which can help in designing strategies to recruit and retain volunteers effectively. Importantly, the study underscores the potential of volunteerism to improve the quality of life for caregivers and families of persons with autism by fostering social inclusion and support. By understanding and leveraging these factors, efforts can be better directed to enhance both volunteer engagement and the well-being of those affected by autism, promoting meaningful social change.

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The Impact of Transformational and Transactional Leadership on Organisational Commitment in Small and Medium Enterprises (SMEs)

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Abstract: This study was conducted to explore the relationship between leadership styles and organizational commitment in the manufacturing sector in Small and Medium Enterprises (SMEs) in Malaysia. This study utilizes survey methods via questionnaires that involve 452 respondents. Findings from regression analysis show that both transformational and transactional leadership styles have a significant impact on organizational commitment in the manufacturing sector in Malaysian SME firms, especially transformational leadership. Hence, SME management teams are advised not to neglect the aspect of leadership styles in efforts to increase their organization's performance.

Keywords: *Transformational, Transactional Leadership Styles, Organisational Commitment, SMEs.*

1. Introduction and Background

The Malaysian Government has introduced various policies to spur the growth of SMEs such as launching a series of transformational programs to assist the growth of SME firms in facing fierce competition in the global market. Among the aspects that are the focus include innovation, human capital, market access and financing. These efforts have raised SMEs' contribution to the nation's economy to 38.4% in 2022 compared to 37.4% in 2021. The biggest contribution of SMEs is the generation of employment opportunities for the locals. SME firms provide job opportunities to more than 7 million people in 2022 (Department of Statistics Malaysia, 2022). The capability of the SME sector to absorb substantial employment shows that SME is one of the important sectors in boosting the Nation's economic development (Adan & Hussain, 2021; Surya et al., 2021).

A review of past studies found that the organization's performance depends on the extent of the employee's commitment to the organization. According to Bucăţa et al. (2022), organisational commitment is an important predictor in determining an organization's effectiveness and is needed by each firm to remain productive. Organizational commitment is needed more than ever, especially in a volatile market. (Nijhof et al.,1998). Researchers such as Lo et al. (2024); and Salleh et al. (2008) assert that a committed employee contributes to a competitive advantage and reduces the firm's operating cost as they are likely to execute tasks exceeding their task description, provide the best service to clients, and are more motivated in performing tasks. Furthermore, they continuously try to raise their work performance (Manshor et al., 2020). Hence as stated by Allen, & Meyer (1990) study findings by Al Balushi et al. (2022); and Guzeller & Celiker (2020), organizations that possess committed employees are expected to experience lower employee turnover and turnover intention rates.

Realizing how important organizational commitment is to the continuity of SME firms, studies on this need to be given attention, especially in determining predictors of organizational commitment in SME firms. Highlights from the literature indicate that many researchers attempt to identify factors that contribute to organizational commitment. Among these are motivational factors (Bytyqi, 2020; Pongpeng & Pongpeng, 2022; Siregar, 2022), work satisfaction (Bashir & Gani, 2020; Gopinath, 2020; Hiola & Hanurawan, 2022), empowerment (AlKahtani et al., 2021; Fragkos et al., 2020; Kyei-Frimpon et al., 2024), emotional intelligence (Al-Oweidat et al., 2023; Chigeda et al., 2022, ethics (Alam et al., 2021; Grabowski, et al. 2019, job characteristics (Ahmad, 2018; Okonkwo et al., 2019; Ramli et al., 2020), personnel characteristics (Aldiabt, 2023; Korankye et al., 2021), human resource management (Gaung, 2022; Noor et al., 2023; Oliveira & Honorio, 2020), organisational justice

(Jang et al., 2021; Manshor et al., 2016; Unaam & Benjamin, 2021) and leadership (Adekoya & Guobiazor, 2023; Kim, & Oh, 2023; Zainuddin & Asaari, 2020).

Wang (2023) Asserts that leadership styles are a main contributing factor in the attitude and behavior of employees towards the organization. This view is supported by studies conducted by Uriah & Amadi (2019) and Razak et al. (2018) found that leadership styles contributed to the increase in motivation, commitment, performance as well as employee productivity. Because individual and organizational performance can be influenced by transformational and transactional leadership styles, the question is, are both leadership styles equal in terms of impact on organizational commitment? Researchers such as Avolio et al. (2009) explain that development and current progress in leadership research are still attempting to understand how and when transformational and transactional leadership styles are more effective in a given firm. Not many empirical studies focus on which leadership style is more effective on employee organizational commitment in a firm (Keskes, 2014; Kungwola, 2023; Tianyang, et al., 2023).

Past study results related to transformational and transactional leadership on employees' attitudes and behavior are still unclear and inconsistent and show that the matter is still under debate. In addition, most researchers stress the transformational leadership style in the SME sector (Jabeen, 2022; Yunus & Ibrahim, 2015; Wu, 2022). This study utilizes the social exchange theory to explain the influence of leadership styles on the attitudes and behavior of employees in the organization. The social exchange theory explains that organizational commitment depends on how firms take care of and pay attention to their employees (Arshad & Zawawi, 2010). In the exchange process, employees will increase their obligations towards their duties due to feelings of gratitude towards the organization (Blau, 1964). Studies have been conducted to obtain new evidence about the roles of both leadership styles on employee organizational commitment. Hence, the first objective of this study is to investigate the impact of transformational and transactional leadership styles on organizational commitment among SME employees. The second objective is to answer the question of which leadership style is more dominant in influencing organizational commitment.

Even though SME firms are the main contributor to the nation's economic development, the performance of SME firms has not reached the targeted levels. SMEs still face low employee productivity which is relatively lower as compared to big companies (Department of Statistics Malaysia, 2020). This low employee productivity impacts the development of SMEs in Malaysia (Salleh & Ndubisi, 2006). It is estimated that in 2011 the average productivity was about RM50,498 per worker versus the average productivity of big companies which is RM140,691 per worker (National SME Development Council, 2012). With regards to this, the National Master Plan targets the increase of productivity for each worker to RM91,000 by 2020 (National SME Development Council, 2012). SMEs continue to encounter significant challenges in terms of ensuring high-quality jobs that result in the intended organizational output (Department of Statistics Malaysia, 2020). Asri (2023) Asserts that productivity is the main issue that is frequently faced in a firm. Hence various efforts have been implemented in the recruitment, selection, placement and training of employees by SME management (Abraham, 2020; Baharum et al., 2006).

Various factors influence productivity in SME firms, including the attitude and behavior of employees such as motivation level, commitment and low work satisfaction Krishna et al., 2023; Yusof & Imm, 2020). According to Rahman et al. (2014) when the level of motivation and commitment is low, SME employees are prone to counterproductive behaviors such as disciplinary, dishonesty and absenteeism problems. According to Lo et al. (2009), an uncommitted employee is more likely to leave the organization. Because organizational commitment is one of the main factors in driving productivity in SME firms, the factors that influence organizational commitment in SME firms need to be researched. There are several studies on leadership styles and organizational commitment. For example, Lo et al. (2009) assert that leadership style is an important factor that contributes to the employees' attitudes and behavior toward the organization. This view is supported by studies by Ibrahim (2023), Kashefi et al. (2013), Lo et al. (2010) and Roy et al. (2021). They found that leadership style contributes to the increase in employees' motivation, commitment, performance and productivity. According to Mwakajila & Nyello, (2021) and Yunus & Ibrahim (2015), the leadership style at SME firms determines the success of achieving the firm's goals by bringing about positive change in the employees' behavior.

Price (1997) further outlines that employees will be more committed if they have confidence in the leader. This means the stronger the trust of the employees towards the employer, the higher the level of loyalty towards the organization (Garg & Ramjee, 2013). However, there is a lack of research relating to leadership and organizational commitment in Malaysia (Yunus & Ibrahim, 2015), especially in SME firms. Past research that studied the relationship between leadership and organizational commitment was conducted in other sectors, for instance, studies by Hasbullah (2008) were conducted among employees of the Malaysian Co-operative Societies Commission in Peninsular Malaysia. Also, studies by Aghashahi et al. (2013), and Lo, Ramayah, Min, and Songan (2010) were conducted in the Kuala Lumpur services sector and multinational companies in East Malaysia. The findings of their studies show that there is a significant relationship between leadership and organizational commitment. Lo (2010) proposed that leadership in the manufacturing sector should seriously give more attention to the factor of leadership style, as effective leadership plays an important role in increasing the motivation, inspiration and performance of an organization. Although the latest studies emphasize transformational leadership and organizational commitment, the importance of transactional leadership cannot be neglected.

Researchers such as Aziz (2010) assert that both transformational and transactional leadership are the best leadership in influencing business performance. He proposed that employers should improve leadership skills to ensure the firm's objective is achieved. This view is supported by Alrowwad et al. (2020) and Klein (2023) that found transformational and transactional leadership have a positive relationship between individuals and organizational performance. Based on these issues, this study aims to close the gap from previous studies by giving attention to the leadership styles and employees' organizational commitment in the manufacturing sector of SME firms.

2. Literature Review

Organizational Commitment

Organizational commitment is a variable that is frequently studied in attitude studies. (Mathieu & Zajac, 1990; Meyer & Allen, 1984; Tarigan & Ariani, 2015). Mowday et al. (1979) characterized organizational commitment into three key characteristics which are a strong belief and acceptance of the organization's goals and values, a willingness to fulfill responsibilities for the sake of the organization, and a determination to maintain membership in the organization (Mowday, 1998). This model is also known as affective commitment (Allen & Meyer, 1990) or attitudes (Mathieu & Zajac, 1990).

Allen & Meyer (1990) divides commitment into three main components, which are affective commitment, continuance commitment, and normative commitment. The main characteristic of a high affective commitment is illustrated by the attitudes of an individual who tries to identify, engage himself/herself and be happy with his/her membership in an organization. Continuance commitment is linked with the consideration of the profitability if one remains with the organization, and the cost that is incurred if one leaves the organization. The normative commitment component emphasizes more on the moral aspects which is the responsibility to remain with the organization as it is considered as an action that is correct, moral and worthwhile.

This study only focuses on affective commitment as it is the most widely researched construct and is considered an effective measure in explaining employees' commitment to a firm compared to other constructs (Almohtasb et al., 2021; Lavelle et al., 2009; Nguyen et al., 2020). Also, affective commitment is an important determinant of employees' dedication and loyalty to the firm (Alnıaçık et al., 2012; Kaur & Mittal, 2020). Why are organizational commitment studies still relevant in the era of globalization? In the world of globalization, each organization faces new challenges to sustain productivity and create a committed workforce (Dixit & Bhati, 2012). Even though studies on organizational commitment have spanned four decades, it remains a key area that continues to attract the interest of researchers and practitioners (Somers, 2009). Organizational commitment is seen as the most challenging concept in the area of organizational management and behavior (Dixit & Bhati, 2012). In that regard, as highlighted by Nehmeh (2009) and Eliyana (2019), organizations with a committed workforce are seen as the main factor in achieving a more competitive performance because committed employees of the organization will contribute greater efforts in carrying out their duties.

Leadership Styles Model

The full-range leadership model proposed by Burns (1978) is known as the transformational-transactional leadership theory. Bodla & Nawaz (2010) explain that the transformational and transactional leadership styles have been continuously put to the test by various researchers. Bass (1985) describes transformational leadership as consisting of four different factors: charisma, inspiration, individualized consideration and intellectual stimulation. Charisma is an agent of change or becomes a role model by creating understanding through vision sharing and developing a sense of pride and trust in followers to overcome obstacles. This theory was expanded in 1990 by Bass and Avolio with the proposal of a nine-factor model (charisma, inspirational leadership, individualized consideration, intellectual stimulation, contingent rewards and management-by-exception) as the features inherent in transformational and transactional leadership.

Bass & Avolio (1990) revised the theory of leadership and proposed a new leadership theory known as full-range leadership theory (FLRT). This FRLT construct consists of three types of leadership behavior namely transformational, transactional, and laissez-faire represented by nine different factors. The FRLT theory comprises five transformational leadership factors (intellectual stimulation, inspirational motivation, individualized consideration and idealized influence of attribute and idealized influence of behavior), three transactional leadership factors (contingent reward, passive management-by-exception and management-by-exception) and lastly, laissez-faire.

In 1993, Bass and Avolio modified the concept of leadership into seven leadership factors (idealized influences, inspirational motivation, intellectual stimulation, individualized consideration, contingent reward, passive management-by-exception, active management-by-exception and laissez-faire). Nevertheless, Bass & Avolio (1994) once again revamped the form of active and passive leadership from seven leadership factors to eight leadership factors. In 1995, Bass & Avolio added the Laissez-faire leadership style factor and separated the idealized influence factor into the idealized influence of attributes and idealized influence of behavior. Due to various leadership factors, many researchers use different leadership scales in their studies (Bass & Avolio 2004). Hence, Bass & Avolio (2004) revised the leadership style dimensions and produced the up-to-date version of a leadership style consisting of the nine factors or the full range leadership model. This model consists of five transformational leadership style factors: the idealized influence of attributes, the idealized influence of behavior, inspirational motivation, intellectual stimulation, and individualized consideration, the two factors of the transactional leadership style are contingent reward and management-by-exception (active) and two factors of the passive-avoidant leadership style are management-by-exception (passive) and laissez-faire leadership style.

This leadership model focuses on the various types of leadership from transformational leadership to passive/avoidant leadership (Bodla & Nawaz, 2010). The full-range leadership theory is a leadership model that is widely studied and endorsed by many researchers around the world (Deng et al., 2023) and is one of the contemporary leadership theories (Bodla & Nawaz, 2010). However, it is found that most researchers only investigate the full-range leadership model in different cultures and occupations (Bodla & Nawaz, 2010). Therefore, this study uses a leadership model consisting of two types of leadership styles namely transformational and transactional leadership. In addition, the study by Mwakajila & Nyello (2021), and Aziz (2010) revealed that transformational and transactional leadership is a superior leadership style as shown by the owners of SME firms.

According to Bass & Avolio (2004) and Batista-Foguet et al. (2021), the Multifactor Leadership Questionnaire (MLQ) is an instrument that is widely used to measure employers' behavior. Based on the findings of previous studies, the consistency value of the MLQ model for transformational and transactional items is high and consistent, for example, the reliability value of several studies is above the minimum value of reliability, alpha = 0.70. For instance, research on SMEs by Arham (2014), Aziz (2010), and Zin (2012), shows a high reliability (alpha) value for transformational leadership, as much as 0.89 to 0.90.

Transformational Leadership

Transformational leadership is defined as an interactive interaction between the employer and employee, where each of them has a moral level beyond personal interest to achieve the firm's goals (Bass, 1998). Transformational leadership encourages its followers to carry out their duties over their self-interest for the

good of the group and firm (Bass, 1990; Burn, 1978), to act as a trainer or mentor to each follower by giving particular attention to the needs, achievements and growth of followers (Bass & Riggio, 2006) as well as to act as an innovative problem solver and playing a role in the development of employee capabilities through guidance, challenges and support (Bass & Riggio, 2006). Flexible systems are used by employers to adapt to the development and change in the firm's environment (Kawatra & Krishnan, 2004; Shafie et al., 2013).

Transactional Leadership

Bass (1985) defines transactional leadership as an exchange-based oriented leadership. According to Bass & Avolio (2006), transactional leadership involves transactions or exchanges that occur among employees, working groups, and employers. This exchange is based on discussions between employers employees and others through the setting of conditions and rewards. In the same sense, transactional leadership is an exchange between employer and employees through the provision of a reward to obtain something in return through the exchange of benefits with their employees (Gardiner, 2006). In that respect, the rewards will be received by the workers and the parties involved if they meet the criteria set out in the exchange process (Bass & Riggio, 2006). An employee's positive performance will be rewarded with a good reward while workers displaying a lower work performance will be given appropriate action (Manzoor et al., 2021; Noorazem et al., 2021).

Transformational and Transactional Leadership on Organisational Commitment

Although many recent studies focus on transformational leadership and organizational commitment, the importance of transactional leadership cannot be neglected. Researchers such as Aziz (2010) claim that both transformational and transactional leadership are superior leadership styles in influencing business performance. He suggested that employers need to improve their leadership skills to ensure the firm's goals are achieved. This view is supported by Alrowwad et al. (2020) and Klein (2023), who found that transformational and transactional leadership have a positive relationship with individual and organizational performance. Since the performance of individuals and organizations can be influenced by transformative and transactional leadership styles, the question is, do both styles of leadership have the same effect on organizational commitment?

The study by Ahmad & Gelaidan (2011) uses both qualitative and quantitative approaches in analyzing organizational culture, leadership style and commitment to change. Their study was conducted among 371 public sector employees in Yemen. The findings show that both transformational and transactional leadership have a significant relationship to the commitment towards change but the findings are rather surprising where transactional leadership is the strongest predictor of commitment to change as opposed to transformational leadership. This finding is supported by Fasola, Adeyemi & Olowe (2013), from results of a study conducted among bank workers in Nigeria that indicate transformational leadership has no significant relationship to organizational commitment. Conversely, their study shows that transactional leadership has more impact on organizational commitment. However, a study by Lo (2010) in a manufacturing company in East Malaysia found that the dimensions of transactional leadership style had no significant impact on organizational commitment components. Their findings have also proven that only transformational leadership has a significant and stronger relationship to organizational commitment.

There is other evidence that several Western studies also focus more on transformational leadership than transactional leadership. Among them is the study by Mesu et al. (2015) which outlines the impact of transformational leadership on organizational commitment among 588 employees in the manufacturing and services sector of SME firms in the Netherlands. Their findings show that transformational leadership that refers to visionary leadership dimensions and development stimuli only has a positive relationship with organizational commitment in the SME services sector. Another study was conducted by Herold et al. (2008) consisting of 343 employees from various industries encompassing 30 organizations in the United States. In this study, they examined the relationship between transformational leadership, leadership change and follower commitment. Their findings show that transformational leadership has a stronger relationship with the followers' change in commitment as opposed to the change of specific leadership practices. A study in Malaysia by Yunus & Ibrahim (2015) among employees of SME firms in Shah Alam proves that only one dimension of transformational leadership, which is individualized consideration, has a significant relationship to affective commitment. While studies by Khalil, et al. (2022) examined transformational leadership among

small-scale enterprises in Malaysia. They explain that leaders need to form an appropriate leadership style to apply in the organization to ensure followers can align with the goals of the firm.

Transformational leadership forms the long-term relationship between leaders and followers and creates strategic and organization-oriented interaction (Herold et al., 2008; Klein, 2023). Transformational and transactional leadership, organizational support and environmental competition intensity as antecedents of intrapreneurial behaviors. While there are studies that examine the relationship between leadership styles and organizational commitment, these studies are not comprehensive because they focus only on transformational leadership factors by sidelining the role of transactional leadership. For example, a study conducted in Turkey by Tuna et al. (2011) focused only on employee perceptions of the impact of transformational leadership on organizational commitment by ignoring other leadership factors such as transactional leadership. Their findings show that transformational leadership characteristics can increase loyalty and reduce employee turnover rates. In addition, researchers in China and Korea also focus on transformational leadership rather than transactional leadership factors on organizational commitment, including studies by Huang & Hsin (2023), Kim & Shin (2019) and Shim et al. (2015). Based on the results of previous studies on transformational and transactional leadership on employees' attitudes and behaviors the findings are still unclear and inconsistent, thus this indicates that the subject still needs to be researched.

The hypothesis for this study is as follows:
H1: Leadership style has a direct significant impact on organizational commitment.
H2: Transformational leadership style has a direct significant impact on organizational commitment.
H3: Transactional leadership style has a direct significant impact on organizational commitment.

3. Research Methodology

The population for this study is estimated at 157,000 full-time employees working in Small and Medium Enterprises (SMEs) firms. A total of 452 employees in the manufacturing sector were involved in this study. The questionnaires were distributed to the participants and filled in at a meeting in the presence of the researcher. This gave the participants to raise questions related to the content of the survey (Krogstie & Andersson, 2012).

Both leadership style variables will be measured using the Multifactor Leadership Questionnaire (MLQ) by Bass & Avolio (2004). The MLQ contains 28 items related to transformational leadership and transaction leadership. The MLQ consists of two sets of measurements, i.e., the followers set, and the leaders set. This study uses a set of measurements for followers where respondents will assess and measure the behavior of leaders within the organization by using the 7-point Likert scale technique (Never to Always). In general, the transformational leadership style is measured using 20 items. While the transactional leadership style contains eight items.

Organizational commitment is measured in terms of affective commitment by using the scale developed by Allen and Meyer (1990). The Allen and Meyer measurement scale is the best measurement tool and has been empirically certified by many studies around the world (Khajuria & Khan, 2022). The measurement contains 8 items using a Likert scale of 1 to 7 points (Strongly Disagree to Strongly Agree). A study by Efthymiopoulos & Goula (2024) reported a relatively high-reliability coefficient of 0.95. Likewise, the study conducted in Malaysia by Karim & Noor (2017) also produced a high-reliability coefficient of 0.81 for the affective commitment scale.

4. Results and Discussion

Comparison of Transformational and Transactional Leadership Dimension Mean Score

Table 1 shows the mean score and standard deviation for the transformational leadership dimension factors and the two transactional leadership factors. The mean score of the transformational leadership dimensions in order is intellectual stimulation (M = 4.132), inspirational motivation (M = 4.326), individual consideration (4.188) and idealized influence of attitude and behavior (M = 4.219) which are all at a moderate mean score level. The mean scores for transactional leadership dimensions are: contingent reward (M = 4.1394), and passive management-by-exception (M = 4.2317) are also at a moderate mean score level.

Table 1: Mean and Standard Deviation table for transformational and transactional leadership dimensions

Leadership Styles Dimensions	N	Minimum	Maximum	Mean	Std. Deviation	Level
Transformational Leadership Dimension						
Intellectual Dimension	452	1.50	6.50	4.1372	1.02179	Moderate
Inspirational Motivation	452	1.50	7.00	4.3269	1.02195	Moderate
Individualized Consideration	452	1.50	6.75	4.1886	1.00067	Moderate
Idealized Influence (Behaviour)	452	1.63	6.13	4.2196	.93972	Moderate
Transactional Leadership Dimensions						
Contingent Reward	452	1.00	7.00	4.1394	1.04602	Moderate
Passive Management-by-Exception	452	1.00	7.00	4.2317	.98721	Moderate
Valid N (listwise)	452					

Relationship Between Leadership Styles and Organisational Commitment

Multiple regression analysis was conducted to identify the relationship between transformational leadership and transactional leadership on organizational commitment. Table 2 shows how leadership styles directly affect organizational commitment ($\beta = 0.712$; $p < 0.001$). Further analysis confirms that both dimensions of transformational leadership and transactional leadership have a significant relationship with organizational commitment ($\beta = 0.545$p < 0.001) and ($\beta = 0.201$, $p < 0.001$). Based on this finding, hypothesis statements H1, H2 and H3 are accepted.

The findings are also in line with the findings of Chih & Lin (2009) in Taiwan's High Technology Industries. The difference is that this study showed that leadership styles had a greater impact on organizational commitment among employees in SMEs with β values of 0.712 ($p < 0.001$), compared to the study by Chih & Lin (2009) with β values of 0.338 ($p < 0.001$). The findings also show that transformational leadership has a significant impact on organizational commitment with β value of 0.545 ($p < 0.001$). This is consistent with the findings of Saeed et al. (2013) in the Yamen education sector and Bučiūnienė, & Škudienė (2008) in Lithuania manufacturing firms, each with β values of 0.204 ($p < 0.01$) and 0.527 ($p < 0.01$) respectively.

The results additionally indicate a significant correlation between transactional leadership and organizational commitment, with a β value of 0.201 ($p < 0.001$). These results support the findings of Saeed et al. (2013) and Bučiūnienė & Škudienė (2008), which demonstrated that there is a strong association between transactional leadership and organizational commitment. The β value for this relationship is 0.429 ($p < 0.01$) and 0.408 ($p < 0.01$), respectively.

The disclosure summary for each independent variable (transformational leadership and transactional leadership) towards the dependent variable (organizational commitment) is significant and hypotheses are accepted by referring to the β-value and the p-value. To interpret the β-value, the positive beta coefficient means that there is an increase in the independent variable, which is associated with an increase in the dependent variable. As for the p-value, this study showed $p<0.01$, which indicated strong evidence of the relationship between independent and dependent variables.

Table 2: The effect of Leadership Style on Organisational Commitment

Independent Variable	Dependent Variable	R^2	F Value	Standardized Coefficients Beta	t	Sig.
Leadership Style	Organizational Commitment	0.507	463.225	0.712	21.523	.000
Transformational Leadership	Organizational Commitment	0.507	231.225	0.545	10.473	.000
Transactional Leadership				0.201	3.870	

5. Conclusion and Recommendations

In the context of the manufacturing sector in SME firms, transformational leadership and transactional leadership also play a role in influencing employee commitment. This means employers need to emphasize leadership that is oriented to an exchange-based system between employers and employees, to motivate employees through reward and punishment to help increase employee commitment at SME firms. The important matter that can be put forward through this study is that transformational leadership style has more impact compared to transactional leadership. SMEs are advised to prioritize transformational leadership as opposed to transactional leadership in managing human resources through the involvement of employees in developing the organization and thus assisting in achieving the organization's goals. Employers of SMEs can boost their workforce's commitment by sharing the organization's vision, setting clear goals, encouraging workers to do better at work, and implementing innovative management techniques.

To that end, the government is advised, through its agencies such as SME Corporation and SME Development Council, to extend training programs on human resource development and leadership skills to employers at SME firms. Often, elements that are given attention in the SME development programs are only relevant to the provision of infrastructure facilities, product marketing, and product research and development (R&D) activities. To increase SMEs' contribution to the nation's economic development, the Malaysian government and its agencies need to realize that the provision of training to employers about leadership, especially transformational leadership can influence the performance of SMEs in Malaysia. In addition, governments should actively support and facilitate SMEs in their efforts to implement workplace innovation and process optimization. An effective strategy is to provide financial support in the form of subsidies to companies that employ consultants or experts who specialize in methods designed to improve the organization's efficiency. This strategy not only fosters continuous improvement but also cultivates a culture of excellence and innovation inside the SME sector.

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The Impact of Digital Economy and Net Export of Goods and Services Towards Employment in the Selected Southeast Asia Countries

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Abstract: The digital economy is rapidly growing and transforming the way people work and do business globally. This growth has a significant impact on employment in the Association of Southeast Asian Nations (ASEAN) countries. This study aimed to examine the impact of the digital economy and net export on employment in selected ASEAN members, Malaysia, Indonesia, Singapore, and Thailand. Sample years were extracted from 1991 to 2021 and the panel data regression method was applied in this study. The result of this study showed that the digital economy; fixed broadband subscription (LBROAD), internet users (LUSER), and net export (LEXP01) had a significant influence on employment (LTEMP).

Keywords: *Digital economy, ASEAN, export, employment*

1. Introduction and Background

The digital economy has significantly impacted employment in ASEAN countries, particularly in Indonesia, Malaysia, Singapore, and Thailand. It has created new job opportunities in areas like e-commerce, digital marketing, data analysis, and software development, such as delivery drivers, customer service representatives, and data analysts (Xia & Pei, 2021). However, it has also led to job displacement and wage stagnation for low-skilled workers in industries disrupted by automation and digital technologies (Comin et al., 2008). The gig economy, where workers work as independent contractors, may lead to increased precarity and reduced social protections for workers (Muhyi et al., 2023). The rapid expansion of the Internet has led to job losses and increased unemployment rates. The digital economy requires workers with the necessary skills, particularly in IT, which can lead to a wage-price rise due to a gap between supply and demand (European Commission, 2010). In addition, the digital economy has become an important element in the rapid development of the global economy and the promotion of export trade. Hence digital transformation and export products in an enterprise are interrelated (Qian, 2023). This is further argued by Zhang et al. (2022) and Wang et al. (2023), who verified that the digital economy could promote export trade, and they found the relationship between e-commerce, technological progress and urban export trade.

ASEAN countries need to adopt proactive policies and invest in up-skilling and reskilling programs to help workers transition to new job opportunities (Kwan, 1994). This may include initiatives to promote digital literacy, encourage entrepreneurship, and support workers in acquiring new skills and finding new job opportunities in growing industries. Governments must address the challenges posed by the gig economy and ensure workers are adequately protected by labor laws and social protections (Yusof et al., 2022). In conclusion, the digital economy has enabled employment and the global network of commercial, economic, and professional exchanges.

The digital economy, a fourth revolution, significantly impacts job availability in the market due to the expansion of ICT and new digital technologies, such as data analytics, artificial intelligence, 3D printing, cloud computing, IoT, and robots. This can either change or eliminate existing jobs, creating new activities, businesses, and job scopes, especially for youngsters who can adapt easily to technology (Strange et al., 2022). Economic advances, globalization, and shifting consumer preferences also affect the supply and demand of the labor force. E-Bay, a globally famous marketplace, is an example of how the digital economy can reduce unemployment rates (Bello & Perez, 2019). However, the digital economy also automates tasks, such as translation, handwriting recognition, and automotive navigation, putting jobs in logistics, transportation, and office and administrative support at risk (Frey & Osborne, 2013). Some cognitively erratic processes can be

automated, such as the diagnosis of chronic diseases and the treatment of cancer in hospitals (Cohn, 2013). Although, tasks that are difficult to automate, such as creativity, social skills, and talents, are still crucial in various activities, such as administration, business, arts, media, education, and healthcare.

The Association of Southeast Asian Nations (ASEAN) is a region with ten member states that has experienced significant trade growth, with both goods and services playing pivotal roles. The services sector, which contributes between 38% and 69% of each member state's GDP, is the primary recipient of Foreign Direct Investments (FDI) into the region (Gavurova et al., 2020). Travel services lead ASEAN's service exports, while financial services play a crucial role in its export portfolio. Transport services dominate ASEAN's service imports, and intellectual property charges contribute significantly to ASEAN's import of services (ASEAN, 2020).

To facilitate trade in goods, ASEAN is virtually tariff-free, with tariffs eliminated on 98.6% of products under the ASEAN Trade in Goods Agreement (ATIGA) (ASEAN, 2020). This reflects the region's growing interconnectedness, with approximately 25% of ASEAN's goods exports going to other member states (Handoyo et al., 2021). However, there are challenges, such as addressing non-tariff barriers, enhancing trade facilitation, and leveraging ASEAN's digital transformation (Sandkamp et al., 2019). Strengthening regional supply chains and collaborating in manufacturing and logistics can enhance competitiveness among Southeast Asia countries (Nguyen, 2023). By leveraging its strengths, addressing challenges, and embracing opportunities, ASEAN can continue its trajectory toward a competitive, integrated, and prosperous economic community.

This study is conducted to examine how the digital economy and net exports play an essential role employment in in Southeast Asia Countries. As the digital economy and exports are the keys to a successful world economy, employers are now dealing with the most recent pressures from the digital economy in increasing their productivity.

2. Literature Review

Keynesian Theory on Employment

The Keynesian theory, developed by British economist John Maynard Keynes during the Great Depression, explains the relationship between employment and economic activity. It suggests that employment is not determined by market forces but by aggregate demand, which includes goods and services demanded by consumers, businesses, and the government (Pettinger, 2018). Keynes argued that changes in aggregate demand can significantly impact employment, and government intervention may be necessary to stimulate demand and maintain full employment (Heise, 2009).

The digital economy affects employment in various ways, such as increased demand for skilled workers in software development, data analysis, and digital marketing (Heise, 2009). However, digital technologies can also automate certain tasks, potentially displacing jobs and increasing unemployment rates. The gig economy, where individuals work on short-term contracts or freelance, has also been facilitated by digital platforms (Li, 2023).

Keynes proposed that total employment equals total output, which is equal to total income. He also emphasized the multiplier effect, which states that changes in spending have a magnified impact on economic activity. When aggregate demand is insufficient to maintain full employment, the government can stimulate demand through policies, such as increasing government spending, reducing taxes, and lowering interest rates (Pettinger, 2018).

Policymakers should consider the impact of digitalization on employment when designing economic policies, and investing in digital infrastructure, education, and skills development (Li, 2023). Balancing technological progress with social welfare remains a challenge, and Keynesian principles can guide policy decisions.

Export Based Theory

The export base theory, also known as economic base theory, is a framework for analyzing local economies and understanding how changes in economic activity affect employment and development within a region. It posits

that trades act as an engine of growth, providing externalities and productivity benefits to regional economies (Conway, 2022). The Heckscher-Ohlin model suggests that export growth is driven by regional labor and capital supplies, with regions specializing in producing goods that align with their abundant factors of production (Thomas, 1964).

This model can lead to direct employment, indirect employment, and multiplier effects, with increased income from exports creating a positive feedback loop (Conway, 2022). The theory emphasizes the pivotal role of exports in regional development, enabling policymakers and businesses to make informed decisions to foster resilient and thriving economies. In summary, the export base theory is not just about trade but also about shaping employment, prosperity, and the future of the region, particularly in Southeast Asia (Thomas, 1964).

Employment

An empirical review of employment can examine the distribution of employment across countries and regions, macroeconomic factors like recessions and monetary policy, labor market policies like minimum wage laws and unemployment benefits, and demographic factors like population growth and aging (Wu & Yang, 2022). The current decade has seen higher levels of unemployment, temporary jobs, and job insecurity due to global economic crises, wars, immigration, and pandemics (Nourafkan & Tanova, 2023).

Multispectral dynamic models have been used to examine how technological advancements affect the compensating framework, showing that compensation mechanisms might more than makeup for early job losses caused by innovation (Filippi et al., 2023). The nature of employment will change, and millions of people will need new skills due to the applications of twelve technologies.

The impact of technological change and automation on employment will be considered, including job displacement and the creation of new types of jobs (Wu & Yang, 2022; Berman et al., 1998). The role of various stakeholders, such as employers, workers, and governments, in shaping the employment landscape will be evaluated (Bertani et al., 2020).

Broadband Subscription and Employment

Broadband subscription is a crucial aspect of the digital economy, with its relationship with employment being a subject of much research and debate (Zuo, 2021). Some argue that increased broadband adoption leads to increased employment, as it provides job opportunities and business tools that promote productivity (Kolko, 2012). However, others argue that the relationship between broadband subscription and employment is more complex and may be influenced by factors, such as education, income, technological change, competition, innovation, and availability of infrastructure and services supporting economic growth (Koutroumpis, 2019).

The impact of broadband on employment is significant, particularly in developing countries where access to the internet and digital tools may be limited. A study by Kolko (2012) examined the causal relationship between broadband subscription and employment and identified industries likely to be impacted by faster networks. The empirical review could also examine the relationship between broadband access and social and economic outcomes, such as economic growth, innovation, and employment, and consider the impact of broadband on various segments of the population, including rural communities, low-income households, and elderly individuals (Geraci et al., 2022).

Digital economics can help evaluate the effects of broadband adoption, considering factors, such as infrastructure, technology use, and organizational operations (Röller & Waverman, 2001). Broadband can also affect the way an organization runs, as better penetration of the internet can have a greater effect on production (Koutroumpis, 2019). The effectiveness of different broadband technologies, such as fiber, cable, and wireless, in meeting the needs of different users and communities should be evaluated.

Internet User and Employment

An empirical review should examine internet adoption across different countries and regions, considering factors like education, income, and age (Wahab et al., 2020) Government policies, such as investment in infrastructure and digital literacy, can promote internet adoption and usage. Cultural and social factors, such as gender and language, also impact internet usage (Edrak et al., 2022). The relationship between internet users

and employment is crucial, with the number of people with access to and using the internet correlated with employment levels (Wahab et al., 2020; Hsieh & Goel, 2019).

The review should also examine the relationship between internet usage and other economic and social variables, such as economic growth, employment, and political engagement (Wahab et al., 2020). The rise in computer adaptation has been influenced by government encouragement and affordable access (Sharon, 2020). The use of computers includes browsing the internet, locating documents, performing chores, discovering resources, and using them for leisure activities (Coovert & Thompson, 2014). In addition, psychological communication theories emphasize internet usage, with internet users seeking to fulfill their needs and desires (Nagam, 2023).

Net Export and Employment

The impact of net exports on employment is a contentious issue amongst economists. Some argue that net exports can create jobs in the exporting country, while others argue that they can lead to job losses in the importing country (Tejvan, 2017). One study by Mohler et al. (2018) has shown that rising imports do not necessarily increase unemployment rates. High-quality development of foreign trade in China's border regions has a positive impact on residents' employment (Liu et al., 2022). However, the International Labour Organisation (ILO) (2015) found that while exports can create jobs in certain sectors, they can also lead to job losses in other sectors. For example, an increase in exports of manufactured goods can create jobs in the manufacturing sector, but it can also lead to job losses in other sectors like agriculture.

The impact of net export on employment is complex and depends on factors, such as the type of goods being exported, domestic market competition, and investment in the exporting country (Sasahara, 2019). The quality of employment created by exports can also vary depending on the type of industry and the level of education of workers (OECD,2017). In conclusion, the relationship between net exports and employment is complex and can vary depending on various factors.

3. Research Methodology

This section focuses on the regression model, specifically the influence of the digital economy and net export factors on the total employment amongst selected ASEAN countries. The relationship between the independent variables which are broadband subscription, internet users and net export of goods and services with the dependent variable which is employment is examined by using a static panel data analysis.

Sample of Study

The initial sample data collected are related to all ASEAN countries with a time frame of 30 years. Due to the limited of complete and accessible data for the study period and certain countries, the research study has been using selected ASEAN countries, such as Indonesia, Malaysia, Singapore and Thailand. The variables used in this study were fixed broadband subscription (LBROAD), internet user (LUSER), net export of goods and services (LEXP01) and the dependent variable the total employment (LTEMP) were all collected from the World Bank Database with a period from 1991 to 2021.

Theoretical Model

The static panel data regression is used to investigate the effect of digitalization, as well as macroeconomic factors, such as broadband subscription, internet users and total export of goods and services towards the total employment in these four ASEAN countries.

$$L\,TEMPit = \beta 0 - \beta 1\,LBROADit + \beta 2\,LUSERit + \beta 3\,LEXP01it + \varepsilon$$

Where, $TEMP_{it,}$ is the Total of Employment for the ASEAN countries *I* in year *t*. $LBROAD_{it}$ is a Fixed Broadband Subscription which will measured by broadband subscription per 100 people and *LUSERit* is internet users which will measured by individuals using the internet (% of the total population). $LEXP01_{it}$ is the net export of goods and services which is measured by trade % GDP.

This study attempted to seek the relationship between the digital economy and the net export of goods and

services towards the total employment of four ASEAN countries and examine whether this study aligned with the Endogenous Growth theory and findings from other past researchers.

4. Results & Discussion

Data Analysis

A static panel data analysis was used in this study to investigate and measure the effect of digital economy development towards employment amongst four ASEAN countries which is a cross-sectional unit, N=4 and for the period, T=31 of the year 1991 to 2021 which will be a total of 124 observation. The utilization of static panel data regression is suggested in this research study to obtain more accurate results according to the number of cross-sectional units and periods used.

Therefore, the following tests were conducted. Descriptive statistics and the Jarque-Bera normality test will reveal insights about the data. To test whether the data are stationary or non-stationary, the unit root test (URT) is used in this study (Mahadeva & Robinson, 2004). Next, panel specification tests will determine the appropriate panel data analysis method of either the pooled ordinary least squares (POLS) model, Fixed-effect (FE) model or random-effect (RE) model. To develop a better and more robust panel regression model, diagnostic tests are required to detect any serious problems in the model, such as multicollinearity, heteroscedasticity and serial correlation.

Descriptive Statistical Analysis

Table 1 presents the results of the descriptive statistics of the data.

Table 1: Descriptive statistics

	LTEMP	LBROAD	LUSER	LEXP01
Mean	4.069639	-0.204241	1.893124	4.265301
Median	4.170063	0.480969	3.101476	4.230822
Maximum	4.316154	3.327541	4.573934	5.433695
Minimum	3.478779	-6.882751	-9.860428	2.852507
Std. Dev.	0.253275	2.819135	3.077264	0.729023
Skewness	-1.233058	-0.548535	-1.587270	-0.105198
Kurtosis	3.130494	2.111075	5.002834	1.930347
Jarque-Bera	31.51024	10.30104	72.79344	6.140188
Probability	0.000000	0.005796	0.000000	0.046417
Sum	504.6352	-25.32593	234.7473	528.8973
Sum Sq. Dev.	7.890231	977.5454	1164.755	65.37132
Observations	124	124	124	124

The total observation of all the variables included in the analysis which is 31 years period is 124 observations. In the analysis of LTEMP, the highest value in the range of the variable is 4.316154 where the lowest value is 3.47779 and the medium value is 4.170063. The range of LBROAD where the maximum value is 3.327541, medium value is 0.480969 and the minimum value is -6.882751. Whereas, LUSER has the highest value of 4.573934 and the lowest value of -9.860428 with a medium value of 3.101476. Lastly, the highest value for variable LEXP01 is 5.433695 while the smallest value is 2.852507 with a medium value of 4.230822.

Panel Specification Tests

In this section, a discussion of the results from three statistical tests was performed to decide which model is the most suitable for the empirical methodology of this research study which are the POLS model, FE model or RE model. Firstly, the F-test was used to choose either the POLS model or the FE model. Secondly, the Breusch

and Pagan Lagrangian Multiplier (BP-LM) test was used to decide either the POLS model or the RE model and lastly, Hausman test was utilized to select the best model between the FE model and the RE model.

Table 2: Panel Specification Test Results

Test	P-value	Null Hypothesis
F-test	0.0000	Reject
BP-LM test	0.0000	Reject
Hausman test	0.0000	Reject

Based on Table 2, the F-test result revealed that the p-value is 0.0000 < 0.05, indicating that the null hypothesis needs to be rejected. Thus, the FE model can be used to pool the panel data from the test. Nevertheless, a BP-LM test that suggested to use of the RE model instead of the null hypothesis is the outcome of rejecting the null hypothesis because the p-value is 0.000 < 0.05. As a result, the Hausman test must be performed. The results indicated that the p-value is 0.000 < 0.05, thereby the FE model is the most suitable approach, and the null hypothesis is rejected.

The results of the panel specification test demonstrated that the FE model was the most reliable panel data analysis method. Consequently, to be used in this study involves factors like economic growth, technology, and macroeconomic variables (Park, 2011). From this specification result, it addressed the third research question, which determines the suitable model for this research which is the panel data analysis.

Diagnostic Tests

To detect any serious problems regarding the dataset used in this research study, such as multicollinearity, homoscedasticity and serial correlation, the researcher has conducted diagnostics tests to identify these problems.

Table 3: Multicollinearity Test - Variance Inflation Factor (VIF)

Variables	LBROAD	LUSER	LEXP01
VIF	5.187058	5.389537	1.323368
Mean VIF = 3.96			

Table 4: Homoscedasticity and Serial Correlation Test Results

Test	P-value	Result
Heteroscedasticity	0.0000	Significant
Serial Correlation	0.0001	Significant

Based on the multicollinearity test listed in Table 3, VIFs less than 10 for each of the independent variables indicated that there is not a serious multicollinearity issue in the data (O'Brien, 2007). The tests for heteroscedasticity and serial correlation are based on Table 4. The results of both tests showed p-values which are equal to 0.0000 and 0.0001, respectively. These values were less than 0.01 proving that the results were significant and required the researcher to reject the null hypothesis of these tests. Hence, this proved that the model in this study has serious heteroscedasticity and serial correlation problems. The problems of heteroscedasticity and serial correlation can be resolved by application of fixed-effects regression with cross-section SUR and white diagonal as applied by Arellano (1987), Beck and Katz (1995), Wooldridge (2002) and Kok and Ersoy (2009) to ensure that the model will be more robust.

Findings of Panel Data

In identifying the effects of the digital economy and macroeconomic factors, such as broadband subscription, internet users and net export of goods and services on total employment of four ASEAN countries, a static panel data regression has been estimated.

Table 5: Regression Results of the Fixed-Effects Model

	Pooled Regression Model	Fixed Effect Model	Random Effect Model	Fixed Effect Model (Cross section SUR and White Diagonal
Constant	3.453506	5.139804	3.453506	4.928997
	(0.0000)	0.0000	0.0000	(0.0000)
LBROAD	0.053788	0.002802	0.053788	0.00651
	(0.0001)	0.5494	0.0000	(0.0027)
LUSER	-0.029811	0.013494	-0.029811	0.010403
	(0.0091)	0.0008	0.0000	(0.0000)
LEXP01	0.160259	-0.256755	0.160259	-0.205782
	(0.0000)	0.0000	0.0000	(0.0000)
R^2	0.472911	0.956320	0.472911	0.977099
Adj. R^2	0.459734	0.954080	0.459734	0.975925
F-statistic	35.88855	426.9271	35.88855	832.0031
Prob (F-statistics)	0.000000	0.000000	0.000000	0.000000
Total Observation	124	124	124	124

( ) probability value of t-statistics.

Table 5 shows the value of adjusted R^2 in this study is 0.977099 where the independent variables in this study explained 97.71% of the variation in the independent variables that impacted the dependent variable. Meanwhile, the other 2.29% is not explained in this study which might be the other variables of digitalization or any other macroeconomic factors. In the fifth column, FE model (cross-section SUR and white diagonal), the regression result showed the variable that represents the digital economy, LBROAD which is a broadband subscription has proved to have a positive significance towards the dependent variable, total employment in four ASEAN countries with the probability of p-value of 0.0027 and 0.00651. The parameters estimated that with the increase of one unit of LBROAD, the total employment (LTEMP) will improve by 0.00651 units. This significant result between variable LBROAD and LTEMP has been acknowledged by Raquel et al. (2016), Nurul (2018) and Jonas and Jonas (2019). Hence, this proved that broadband subscription has a relationship with the total employment rate in these four ASEAN countries.

Moreover, the internet user (LUSER) has a positive and statistically significant probability of p-value (0.0000) towards the total employment (LTEMP) with a coefficient of 0.010403. It explained that with an increase in LUSER by one unit, the LTEMP will increase by 0.010403 units. Therefore, there is a positively significant effect of internet users on the total employment rate in these four ASEAN countries, which is in line with previous research by Wahab et al. (2020).

Another independent variable is net export (LEXP01) is the only variable that has a negative significance towards the LTEMP as LEXP01 has a coefficient of -0.205782 with a probability p-value of 0.0000. This showed that the rise of the variable LEXP01 one unit will decrease the LTEMP by 0.205782 units. Net export of goods and services in four ASEAN countries has a negative significant effect on total employment. This result is consistent with (OECD, 2012; Kozo, 2016; Artuc et al., 2019).

5. Conclusion and Recommendations

The digital economy has significantly impacted employment in Southeast Asian countries like Indonesia, Malaysia, Singapore, and Thailand. It has created new job roles in technology, e-commerce, and digital services, such as software development, data analytics, cybersecurity, and digital marketing.

This study's results indicated that the digital economy (broadband subscription and internet users) and net exports of goods and services play a significant role in shaping the employment landscape in Indonesia, Malaysia, Singapore, and Thailand. While these factors have contributed to job creation and economic growth,

they have posed challenges, such as increased working hours, work overload, and income inequality. Therefore, efforts to ensure inclusive digital growth and equal opportunities in the digital economy are crucial. These efforts include bridging the digital divide, supporting startups, and implementing policies to ensure equal distribution of profits in the digital sector. By doing so, these countries can leverage the digital economy and net exports of goods and services to create more job opportunities and drive economic growth.

Investing in broadband infrastructure and expanding its coverage and affordability, especially in rural and remote areas, will enable more people and businesses to participate in and benefit from the digital economy. Governments can collaborate with private sector companies to build and maintain the digital infrastructure and provide incentives and subsidies to encourage investment and innovation.

Policymakers should adopt a holistic approach to trade policies that not only focuses on increasing net exports but also considers their implications for employment. Strategies aimed at promoting trade should be complemented with measures to support labor market flexibility, encourage entrepreneurship, and facilitate the transition of workers to new digital-intensive sectors. Cross-border collaboration and regional integration efforts should be intensified to leverage synergies and promote inclusive growth across Southeast Asia.

The study sheds light on the profound impact of the digital economy on employment in ASEAN countries, emphasizing the necessity for targeted policy interventions. Governments should prioritize the implementation of reskilling and upskilling initiatives to facilitate the transition of workers into newly created positions emerging from digital advancements. Investments in digital literacy and technical education are crucial in adequately equipping the future workforce for the dynamic job market. Furthermore, policies should address the precarious nature of gig economy work by enhancing labor laws and social protections, guaranteeing that gig workers receive essential benefits such as health insurance and retirement savings. Expanding broadband infrastructure, particularly in underserved areas, can further amplify job creation and economic opportunities by enabling broader participation in the digital economy.

For businesses, adapting to the digital economy entails substantial investments in technology and innovation. Companies should concentrate on digital transformation and embrace novel technologies, such as data analytics and artificial intelligence, to maintain competitiveness and foster growth. Embracing e-commerce and digital marketing strategies will enable businesses to access new markets and enhance global competitiveness. Moreover, firms must prioritize continuous employee training and development to keep pace with technological advancements and consider flexible work arrangements to attract and retain skilled personnel, particularly in a burgeoning gig economy.

From an economic perspective, while the digital economy offers prospects for job creation, it also presents challenges such as sectoral disparities and potential increases in economic inequality. Policymakers should strive to balance the benefits of digital growth across diverse sectors and address disparities by supporting industries adversely affected by trade imbalances. Strengthening regional trade agreements and reducing non-tariff barriers within ASEAN can enhance economic integration and resilience. Future research endeavors should concentrate on examining the long-term impacts of emerging technologies and sector-specific effects to refine policy approaches and support mechanisms, ensuring that the advantages of digital advancements are widely distributed.

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A Novel Techniques Tool in Cutting and Peeling Coconut: SWOT Analysis

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Abstract: Innovation is essential for small and medium-sized agricultural enterprises (SMEs) in Malaysia, as it improves productivity and competitiveness in the agricultural industry. It is essential to incorporate cutting-edge techniques and tools for processing coconuts, given the agriculture sector's objective of increasing productivity and sustainability. Since Malaysia aims to upgrade its agricultural methods, these advancements are relevant in Malaysia. The present study provides a thorough SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis of CoCoCut's cutting and peeling procedures and tools for coconuts. The analysis is based on a single-case study. Furthermore, it evaluates the inherent advantages and disadvantages of these innovative approaches, together with the potential advantages and risks in the market. This study offers a thorough analysis of the innovative tool, i.e., CoCoCut's areas of expertise, which can help in identifying the numerous possibilities for expanding its business. Moreover, it offers a comprehensive comprehension of CoCoCut's vulnerabilities and discerns prospective hazards that pertinent stakeholders may encounter in the future. Having this comprehension is crucial for effectively navigating the intricacies of the market and taking advantage of advancements. To conclude, this study emphasizes the need for adopting creative methods in coconut processing and advancing a more competitive and sustainable coconut sector. The invention and utilization of this groundbreaking instrument have several substantial economic ramifications. This cutting-edge gadget enhances the efficiency of coconut peeling, resulting in a boost in output. It is advisable to utilize this instrument to enhance the distribution network by forming strategic alliances with industry and trade firms, thereby expanding its reach in the worldwide market.

Keywords: *Product Innovation*; *SWOT analysis; innovative tool, coconut processing*

1. Introduction and Background

In Malaysia's emerging market, small and medium-sized enterprises (SMEs) encounter many challenges in sustaining their operations amidst market volatility (Jalil, Ali & Kamarulzaman, 2022). Innovation is regarded as a catalyst for the growth and development of the economy, particularly for SMEs. The ability to innovate is a critical determinant of success for SMEs in developing countries (Afriyie et al., 2019; Dabic et al., 2019; Donkor et al., 2018). Therefore, implementing innovative strategies is essential for the growth and development of these enterprises (Korau et al., 2020). Within the SME landscape, innovative performance is closely related to creating innovative products or services, which are vital for adapting to evolving market conditions, competitive pressures, and technological advancements (Si et al., 2020). Consequently, the capability of SMEs to embrace innovation is a significant competitive advantage in the marketplace.

Innovation related to products involves the introduction of a new or significantly improved good or service, with enhancements in technical specifications, components and materials, incorporated software, user-friendliness, or other functional characteristics (Economico, 1997; OECD, 2005). Innovation is crucial for agricultural SMEs in Malaysia, as it enhances productivity and competitiveness in the agricultural sector. As consumer preferences evolve and environmental considerations become more pressing, fostering innovation capabilities can improve performance and resilience. The nature of agricultural innovation can be both technological, such as agricultural inputs, machinery, or crop management techniques, as well as institutional, for example, markets, policies, and new forms of social organization, or a combination of these (Schut et al., 2018; Fieldsend, Varga, Biró, Von Münchhausen & Häring, 2022). However, this sector's innovation level needs to be higher, highlighting the need for strategic initiatives to foster a culture of innovation and collaboration

among these enterprises (Kamalrulzaman, Ahmad., Ariff & Muda, 2021). Innovation in the agricultural sector is a continuous process of developing and enhancing products, processes, and technologies to improve efficiency, sustainability, and profitability. This approach seeks to create innovative solutions to enhance societal well-being, foster community engagement, and promote sustainable practices (Prihadyanti et al., 2023; Cattivelli & Hoffmann, 2020).

Incorporating product innovations in agriculture is essential for revitalizing rural economies and ensuring equitable access to resources and technologies. This multifaceted approach emphasizes the importance of collaborative efforts among stakeholders, including farmers, policymakers, and community organizations, to create sustainable solutions that benefit individuals and the broader community. The agricultural sector can play a pivotal role in achieving long-term social and environmental goals by fostering an environment conducive to social innovation.

On a global scale, the coconut industry is an essential crop, as many smallholders depend on it for their livelihoods (International Coconut Community, 2024). Traditional methods for cutting and peeling coconuts are labor-intensive and time-consuming, leading to significant product loss. Given the agriculture sector's goal of improving production and sustainability, it is crucial to introduce innovative methods and equipment for processing coconuts. These innovations are particularly relevant in Malaysia, as it seeks to modernize its agricultural practices. Innovative techniques and tools are needed to improve production and sustainability. However, small-scale Malaysian farmers need help obtaining these technologies due to financial limitations and technical proficiency. This inequality in access can hinder the use of novel processing techniques that can improve productivity and sustainability. Additionally, new processing techniques must meet market demands and consumer preferences. However, there is often a disparity between inventive methodologies and market demands, posing obstacles in bringing these innovations to the commercial market. Understanding market dynamics and collaborating with stakeholders can improve the relevance and acceptance of innovative coconut processing products and tools.

In Malaysia, various coconut-cutting tools are available, catering to different needs from home use to commercial processing ranging from manual to electric and semi-automatic machines. These tools vary in price and functionality, making it easier for consumers to choose based on their specific needs, whether for casual home use or commercial coconut processing. However, existing tools are typically single-function and require separate devices for different tasks. To address this limitation, a novel 3-in-1 multifunctional coconut cutter tool, CoCoCut, was developed. This innovative device simplifies the process of opening, cutting, and dismantling coconuts within 10 seconds. Through the analysis of a single case study, this study presents a comprehensive SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis of CoCoCut, innovative techniques and tools for cutting and peeling coconuts, and examines the internal strengths and weaknesses of these novel methods and the external opportunities and threats in the market. In conclusion, this study highlights the significance of embracing innovative approaches in coconut processing, promoting a more competitive and sustainable coconut industry.

2. Literature Review

This section presents literature evaluations on the significance of production innovation for economic growth and government initiatives toward encouraging research on innovations.

The importance of product innovations in economic growth

Product innovation can foster the development of businesses and create competitive advantages. As markets become increasingly dynamic and competitive, companies are compelled to continuously seek out new ways to innovate and meet evolving consumer demands (Štreimikienė & Kačerauskas, 2020). Product innovations, i.e., the development and introduction of new or significantly improved goods and services, have long been considered a key driver of economic growth and prosperity. Successful product innovations can bring several benefits to companies, including longer growth trajectories, stronger financial performance, and greater shareholder attractiveness (Kozludzhova, 2023). In addition, innovation activities can have a positive impact on investment activity and promote general economic development. Innovation is often seen as one of the most important factors in economic progress, production, and management decision-making (Kogabayev &

Maziliauskas, 2017).

Sustainability has also emerged as a key consideration in innovation, as businesses strive to develop products and services that balance economic, environmental, and social factors. Technology innovation, in turn, is a critical enabler of sustainable development, as it can influence manufacturing processes, product performance, and waste reduction. The importance of innovation to economic growth cannot be overstated. Product, service, and business model innovations that introduce novel solutions can empower companies to gain a competitive edge in global markets, attract greater investment, and ultimately drive long-term economic prosperity. (Kogabayev & Maziliauskas, 2017). Furthermore, the interplay between technological innovation and governance institution quality has been shown to have a positive long-term impact on Malaysia's economic growth. Well-planned and relevant policies that boost technological progress can be instrumental in driving sustainable economic development in the Malaysian context. While Malaysia has made substantial strides in fostering a culture of innovation, ongoing efforts are needed to strengthen the country's innovation ecosystem further and ensure that the benefits of product innovations are widely distributed across the economy (Ngisau & Ibrahim, 2020).

Agriculture has long been a cornerstone of many economies, particularly in developing regions where it contributes significantly to employment, income, and food security. Among the numerous agricultural products, coconuts hold a special place due to their versatility and economic importance (Mahfud, & Purabaya, 2021). Coconuts are used to produce a wide range of products, including copra (dried coconut meat), coconut oil, coconut water, and various by-products such as coconut husk and shell. However, traditional methods of processing coconuts, especially cutting and peeling, are often labor-intensive and inefficient, leading to significant losses in productivity (Jusoh et al., 2020).

Government Initiatives to Promote Innovation Efforts

Governments worldwide have acknowledged the vital role of innovation in driving economic growth, enhancing standards of living, and addressing pressing challenges in society. One key aspect of government efforts to encourage innovation is the creation of an enabling regulatory framework. Policymakers must carefully navigate the balance between necessary oversight and control and allow for the flexibility and risk-taking that often characterize innovative activities (Bradley, et. al., 2021). As noted, the same regulations that may hinder innovation in one industry could potentially serve as a stimulus in another (Barr, 2017). Governments must therefore adopt a tailored approach, continuously evaluating the impact of their policies and adjusting accordingly.

In the context of Malaysia, product innovation continues to play a pivotal role in driving both economic and social development. The Twelfth Malaysia Plan (12MP), covering the period from 2021 to 2025, emphasizes the importance of innovation as a critical enabler of the country's aspirations to become a high-income nation. A key strategy outlined in the 12MP is to foster an innovation-driven economy by strengthening the innovation ecosystem, enhancing the role of research and development (R&D), and encouraging the adoption of advanced technologies across industries. The plan also highlights the need for increased collaboration between the public and private sectors to promote the commercialization of innovative products. These measures are designed to accelerate economic growth and ensure that innovation contributes significantly to Malaysia’s sustainable development goals.

In response to this awareness, the Malaysian Innovation Foundation (YIM), established in 2008 under the Ministry of Science, Technology, and Innovation (MOSTI), aims to promote a culture of creativity and technology-based innovation in Malaysian society. YIM targets technology use at the grassroots level, encompassing school students, youth, women, rural residents, people with disabilities, and non-governmental organizations (NGOs) (Yayasan Inovasi Malaysia, 2024). To realize these objectives, YIM has provided grants in the form of financial and technical assistance to fund and support innovative technology-based projects (known as beneficiaries) until they successfully reach commercialization. In addition, YIM has established strategic collaborations with government research institutes (GRIs) and higher education institutions (HEIs) (referred to as collaborators) to obtain technical advice, ensuring that the technology transfer process runs smoothly using the latest technologies in line with current needs.

Recently, the Madani Economy framework, introduced in 2023, represents a comprehensive approach to

building a resilient and sustainable economy. It integrates economic prosperity with social justice and environmental sustainability, with innovation playing a central role. Under the Madani framework, the focus on transforming Malaysia into a knowledge-based, high-income economy is clear. The framework encourages the widespread adoption of digital technologies and supports the growth of high-tech industries (Narayanan, & Yew-Wah, 2018). Public-private partnerships are highlighted as essential mechanisms for driving innovation, enabling the commercialization of new technologies, and fostering entrepreneurship. The framework also prioritizes social innovation to tackle inequality and poverty. By promoting social enterprises and community-driven initiatives, the framework aims to ensure that economic growth is inclusive and benefits all segments of society (Narayanan, & Yew-Wah, 2018).

3. Research Methodology

Case study: A single qualitative case study CoCoCut. The research utilized a single case study approach to better understand the phenomenon (Yin, 2003). This method was chosen for its ability to provide detailed insights and a comprehensive view of the specific case being studied. By focusing on a single case study, the researchers could thoroughly explore the intricacies and unique aspects of the CoCoCut innovation. This approach allowed for an in-depth analysis of Mr. X's strategies, challenges, and successes, offering valuable lessons and implications. Additionally, the single case study facilitated a closer examination of the interactions and dynamics within the development team, shedding light on the collaborative processes and mentorship roles. Overall, this method provided a rich, contextual understanding of the factors contributing to the product's development and potential impact.

Participant Selection and Profile. Mr. X, an instructor at a college on the east coast of Peninsular Malaysia, was selected as the sole participant for this case study due to his significant contributions to developing the 3-in-1 Coconut Peeler innovation. To maintain confidentiality, a pseudonym, "Mr. X," has been used throughout the study to identify the innovator. Mr. X is in his mid-40s and holds a diploma in engineering, specializing in product design and development. With over 15 years of experience in academia and industry, he teaches engineering and product innovation courses at the college. Mr. X is known for his collaborative approach, working closely with students under his supervision to develop practical solutions to real-world problems.

Interview Procedure. The interview with Mr. X, the innovator was held at his house, which also served as his workshop, and lasted approximately two hours. The participant was informed about the study's objectives and provided informed consent before the interview. The semi-structured interview allowed for flexibility in exploring Mr. X's experiences and insights into the invention process. During the session, Mr X shared detailed accounts of his creative journey, including the challenges he faced and the strategies he employed. The conversation also delved into his collaborative efforts with students and how these interactions influenced the development of the innovative tool. This approach facilitated an in-depth understanding of the technical aspects and personal experiences that contributed to the invention's success.

Ethical Considerations. To ensure the ethical conduct of this research, the participant's confidentiality and anonymity were maintained throughout the study. The interview data was securely stored, and any identifying information was removed from the transcripts. The participant was informed of their right to withdraw from the study at any time without consequence.

Data Analysis. The interview data was analyzed using narrative analysis to uncover the secrets of successful innovation and experience related to Mr. X's creative process, collaboration with students, and the development of the innovative tool. This study focuses on interpreting the personal stories shared by participants, allowing researchers to uncover underlying themes and meanings related to their experiences. Narrative analysis is a qualitative research method that emphasizes the importance of personal narratives in understanding human experiences. It involves collecting data through interviews, where participants recount their stories in a way that reflects their thoughts, feelings, and motivations.

Additionally, the Strength, Weaknesses, Opportunity and Threat (SWOT) analysis technique was employed to evaluate the strengths, weaknesses, opportunities, and threats of this novel coconut-cutting and peeling tool designed for individual use. Developed initially in business administration and organizations Pickton & Wright

1998), SWOT analysis was selected for its practicality and effectiveness in identifying key factors relevant to the tool's performance. This approach provided a structured method for gathering information on both internal and external factors, making it well-suited for assessing the tool's viability and potential market impact in this exploratory research.

4. Results

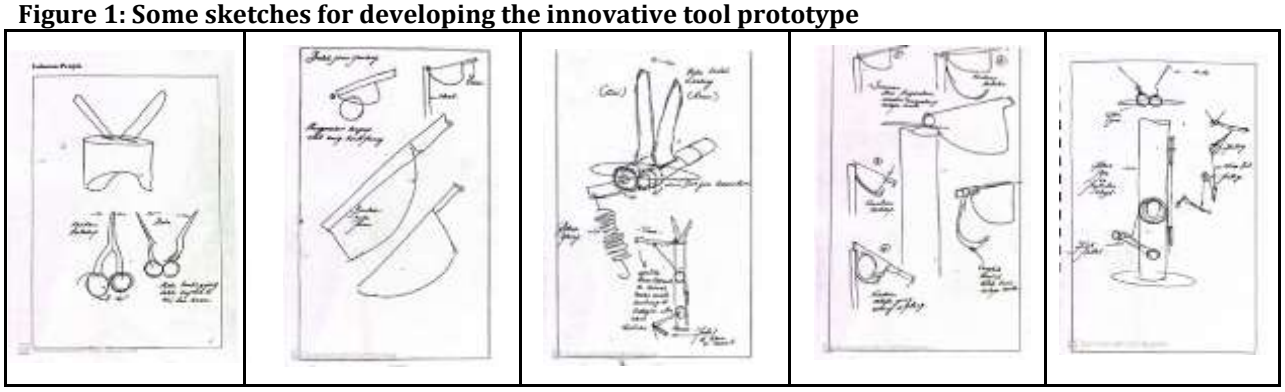
This section explains the development of the innovative product, CoCoCut, also referred to as Pengupas Kelapa. Following that, the SWOT analysis will be discussed.

Development of the Innovative Product. The innovator is an instructor at the TVET Education Institute, widely known as GIATMARA. He played a pivotal role in creating an innovative tool mainly used to process both mature and young coconuts, which can be referred to as the 3-in-1 coconut peeler project. This project has received funding from the MyIS Akar Umbi (MaGRIs) program by the Malaysian Innovation Foundation (YIM).

Under his supervision, a group of students collaborated to develop this innovative product, utilizing recycled materials such as metal pipes, hollow steel, and springs. Specifically, the materials utilized in constructing the tool include a 2-inch black pipe, ½-inch black pipe, 1-inch x 1-inch hollow steel, axle springs, tensional bearings, wire rods, stainless steel plates, 1-inch x ½-inch flat bars, and 7mm thick plates. Figure 1 shows a snapshot of the innovative tool prototype development sketches.

Based on observations of the difficulties involved in peeling coconuts, the innovator has been driven to develop an innovative product that addresses the challenges faced by traders and entrepreneurs in the coconut industry, such as young coconut vendors. The tool offers solutions to several problems, including (1) the ability to peel young coconuts quickly, taking approximately 8 to 10 seconds per coconut; (2) a safer, more ergonomic peeling process that requires minimal human effort; (3) ease of use, particularly for women; and (4) the flexibility to perform the peeling process using either hands or feet. For mature coconuts, the process requires no more than 40 seconds. This innovative tool is also designed to enhance user safety, with ergonomic features that reduce the physical exertion required, making the peeling process more manageable. It is portable and operates without the need for electricity. Weighing seven kilograms, this tool is durable, easy to transport, and designed with safety features in mind. This innovative tool allows the peeling process to be performed using feet or hands, providing a practical, efficient, and suitable solution for everyday needs.

Figure 1: Some sketches for developing the innovative tool prototype



In conclusion, the innovative CoCoCut tool is a classic instance of how innovation can promote sustainable practices by using recycled materials to increase production and efficiency in the agriculture industry dramatically. This novel innovation demonstrates creativity and acts as a basis for fostering local economic growth. CoCoCut has the potential to significantly improve Malaysia's agricultural sector globally and help the community in the long run with a clear strategy and ongoing support.

SWOT Analysis. Guided by the SWOT framework and informed by the available literature, this study provides

a comprehensive overview of Cococut's strengths, which can help identify its various opportunities for business growth. It also provides a clear understanding of the weaknesses of Cococut to highlight potential threats that relevant stakeholders (consumers, suppliers, competitors and investors) may face in the future. This understanding is essential for navigating the industry's complexities and capitalizing on innovation. Figure 1 presents the SWOT analysis of CoCoCut. The analysis consists of internal and external factors.

Internal factors. Internal factors focus on the strengths and weaknesses of the innovative tool, i.e., CoCoCut. This section highlights the strengths identified in the interview with Mr. X, focusing on the key advantages of the CoCoCut innovation. These strengths demonstrate the product's unique qualities and the positive impact it can have on users and the environment. Recognizing these strengths can help position CoCoCut favorably in the competitive market.

Figure 2: SWOT analysis of CoCoCut

	Helpful to achieve goals	Harmful to achieve goals
Internal factors	**Strength:** Innovative product Collaboration Safety features Social impact Creative and Active Innovator Environmental impact Efficiency	**Weakness:** Cost increase Limited production capacity and Limited Distribution Dependency on manual labour
External factors	**Opportunity:** Growing Demand and Market expansion Partnership Customer Demand for Customisation and Diversification	**Threat:** Intense Competition Economic downturn Rapid technological advancements

The first strength is the product's innovation. CoCoCut is a unique 3-in-1 coconut peeler, specifically designed to peel efficiently, slice, and split coconuts. This innovative approach speeds up the processing procedure and enhances safety, making it easier and safer for users to handle coconuts. CoCoCut simplifies the coconut processing experience for users by combining multiple functions into one tool. Another strength lies in Mr. X's collaborative efforts. Mr. X leads a group of supervised students in a cooperative endeavor to create the CoCoCut, showcasing his mentorship and teamwork. This collaboration maximizes their combined abilities and inventiveness, fostering a learning environment that promotes creativity and practical problem-solving. Through this teamwork, the project benefits from diverse perspectives and skills, enhancing the overall quality of the innovation. The third strength is the product's safety features. CoCoCut prioritizes user safety through its durable design and foldable structure. These features give users confidence and peace of mind, knowing they use a well-designed and safe tool for coconut processing. The emphasis on safety protects users and encourages more comprehensive adoption of the product in various settings. The fourth strength is the product's positive environmental impact. The prototype of CoCoCut is made from recycled materials and does not require electricity, thus minimizing its environmental footprint. This eco-friendly approach aligns with sustainable practices and appeals to environmentally conscious consumers. By promoting sustainability, CoCoCut positions itself as a responsible choice in the market. Lastly, the innovation's efficiency is a significant strength for Mr X. CoCoCut enables quick and safe coconut peeling, significantly reducing the time and effort required. This efficiency makes the product highly practical for users, allowing them to complete the task swiftly and with minimal effort. As a result, CoCoCut enhances productivity and improves the overall user experience.

The following section highlights the weaknesses identified during interviews with Mr. X, emphasizing the challenges that CoCoCut faces at its current stage. Addressing these weaknesses is crucial for the product's growth and sustainability. By recognizing these issues, the company can develop strategies to overcome them and thrive in the market.

One significant weakness is the rising cost of production and materials. Although the CoCoCut prototype utilized recycled materials, transitioning to commercial production has increased expenses due to more costly materials and manufacturing processes. This escalation in costs could render the product less accessible to consumers. Potential customers may seek more affordable alternatives if the price remains high, impacting sales. Another critical weakness, as noted by Mr. X, is the limited production capacity and distribution network.

Mr. X has partnered with a small local manufacturing company, which restricts production to just 30 units. As demand for CoCoCut increases, additional resources will be needed to enhance manufacturing capabilities and expand distribution channels beyond local markets. Without addressing these limitations, the company risks losing market opportunities and customer interest.

The final weakness is the reliance on manual labor. While CoCoCut minimizes the need for manual intervention in coconut processing, it still depends on human operation. This reliance could pose challenges in environments that prioritize full automation, potentially limiting the product's scalability. To remain competitive, CoCoCut may need to explore automation options that can reduce labor dependency and improve efficiency.

External factors. This section focuses on external factors, which focus on identifying and evaluating trends and events beyond the control of the social innovator, Mr X. The external assessment aims to develop a finite list of opportunities that could benefit the product and the threat that should be avoided or mitigated (David et al., 2023). Figure 2 illustrates how the external environment fits into the strategic management process. Key opportunities and threats of CoCoCut are described as follows.

The first opportunities are growing demand and market expansion. The product's increasing popularity on social media has attracted orders from regions beyond Bachok Kelantan. The innovator, Mr. X, reported receiving orders from across Malaysia and international interest, particularly from neighboring Brunei. This surge in demand signifies a significant opportunity for market expansion, with the potential to tap into global sales and establish a broader market reach. The second opportunity related to CoCoCut is access to resources and expertise through partnerships. Strategic alliances with distributors or retailers can enhance market penetration and sales while cooperating with businesses can effectively meet increasing demand and expand production capacity. Mr. X's insights provide valuable insights into how partnerships can efficiently tackle growing demand and increase production capacity. Finally, the opportunity for CoCoCut is customer demand for customization and diversification. Offering personalized options and adaptations for CoCoCut is a strategic approach to expanding the customer base. By catering to diverse applications, user preferences, and changing market needs, the innovator can create a versatile and customizable product that appeals to a wide range of customers. Besides that, Mr X could explore diversifying the product line or improving existing features to cater to a broader range of needs within the coconut industry. The innovator's experience and insights are crucial in understanding how product customization can be leveraged to expand the customer base for the 3-in-1 coconut processing tool, CoCoCut.

The first threat of CoCoCut is intense competition. The presence of existing or potential competitors poses a threat to CoCoCut. This competition, whether from similar products or traditional methods, can influence market dynamics and the positioning of coconut processing tools within the agricultural industry. Additionally, interviews indicate that CoCoCut still needs to secure a patent, creating a risk that others could easily replicate the product. The second threat of CoCoCut is the economic downturn. Economic downturns or fluctuations in raw material prices could impact production costs and profitability. According to the innovator, the rising cost of raw materials has put significant pressure on production costs. During the interview, the innovator described the difficulties they have faced due to the significant increase in the price of raw materials such as plastics and metals. Finally, the last threat of CoCoCut is rapid technological advancements. According to the interview, rapid technological advancement could seriously risk CoCoCut's position in the market. More advanced,

effective methods of processing coconuts will eventually make the CoCoCut product outdated. Innovators must closely monitor technology advancements and industry trends to keep CoCoCut competitive and flexible enough to meet shifting market demands.

Discussion

This discussion chapter explores the critical strengths and weaknesses identified during interviews with Mr. X regarding CoCoCut's current stage. By addressing these challenges namely rising production costs, limited production capacity, and dependency on manual labor strategies can be developed to ensure CoCoCut's growth and sustainability.

The development of CoCoCut, a multifunctional coconut processing tool, represents a significant advancement in coconut processing technology. The integration of peeling, slicing, and splitting functions into a single device is a novel approach that enhances operational efficiency and addresses common issues associated with traditional methods (Alehosseini et al., 2021; Wang et al., 2021). This innovation aligns with recent trends in the coconut agroindustry supply chain, where there is a growing need for innovative products that can streamline processing and add value to coconut-derived products (Jayasekhar, S., Thomas, 2024). The collaborative effort between Mr X and his students in developing CoCoCut is evidence of the power of teamwork in fostering creativity and innovation. Similar studies have highlighted the importance of collaboration in product development, as it combines diverse expertise and perspectives to overcome complex challenges (Ayodeji et al., 2024). The mentorship aspect of this collaboration is particularly valuable, as it contributes to the professional development of the students involved and promotes a culture of shared learning (Putnam et al., 2024).

One of the critical strengths of CoCoCut is its emphasis on safety through a durable and foldable design (Kusunoki et al., 2024). This feature addresses a critical concern for users and aligns with best practices in product design and user well-being (Sheth et al., 2024; Stray et al., 2024). Recent studies have emphasized the importance of prioritizing safety in product development, as it enhances consumer confidence and reduces the risk of injuries (Awaysheh et al., 2024; Qian et al., 2024). Using recycled materials and eliminating electricity requirements in CoCoCut's design reflects a commitment to environmental sustainability (Elfahmi et al., 2024; Michael et al., 2024). This focus on sustainability is becoming increasingly important in the coconut agroindustry as consumers and regulatory bodies demand more eco-friendly solutions (Elfahmi et al., 2024). By minimizing its ecological footprint, CoCoCut differentiates itself from competitors and appeals to a growing market of eco-conscious consumers.

Finally, the efficiency of CoCoCut in streamlining the coconut peeling process is a significant strength that supports its adoption and long-term success. Recent studies have highlighted the importance of operational efficiency in product development, as it enhances productivity and overall user experience (Ayodeji et al., 2024). By reducing the time and effort required for processing, CoCoCut offers tangible benefits to users, making it an attractive option in the market. CoCoCut's transition from using recycled materials in the prototype to more costly commercial production materials has increased expenses. This issue is common in product scaling, as discussed by (Bohan et al. (2024), who emphasize the need for strategic cost management to maintain affordability and competitiveness. CoCoCut must adopt similar strategies to ensure its price point remains attractive while covering production costs.

Due to CoCoCut's partnership with a small local manufacturer, the limited production capacity and distribution network restricts production to just 30 units. (Tochukwu et al., 2024) Note that limited production capabilities can significantly hinder market penetration and growth. CoCoCut must focus on securing additional resources and partnerships to enhance manufacturing capabilities and reach broader markets. Despite reducing manual intervention in coconut processing, CoCoCut still relies on human operation (Whittle et al., 2024) highlighted that such reliance can limit scalability and efficiency, proposing semi-automation as a transitional strategy. For CoCoCut, exploring automation options to reduce labor dependency and improve operational efficiency will be crucial for maintaining competitiveness and scalability.

CoCoCut's innovative design and collaborative development align with research by Liczmańska-Kopcewicz (2020) and Wagner (2024). However, CoCoCut faces unique challenges related to rising production costs,

limited production capacity, and reliance on manual labor. Liczmańska-Kopcewicz (2020) and Oloruntosin and Vincent (2024) emphasized that addressing practical limitations and operational challenges is essential for sustained growth. CoCoCut must adopt a strategic approach to overcome these challenges while leveraging its innovative strengths.

As previously stated, external factors refer to identifying and evaluating trends and events beyond the innovator's control. The objective of the external assessment is to develop a list of opportunities that could benefit the product and identify threats that should be avoided or minimized. This section discusses future strategies and directions for the innovator to capture the opportunities and mitigate threats for CoCoCut.

Based on the findings, several potential opportunities could benefit CoCoCut's business prospects. As the product has been receiving local and international orders, the growing demand for CoCoCut creates opportunities for market expansion. The innovator should take these opportunities to market and showcase the unique features and benefits of CoCoCut to reach diverse audiences by utilizing social media platforms for marketing. Findings from previous studies reported the effective use of social media to promote agricultural-related products enhances the product's overall success in diverse markets (Al-Shaikh, Al-Gharagher & Alshohaib, 2023; Saikia, Kumari & Choudhary, 2021; Karle & Mishra, 2022). With the right strategies, innovators can leverage social media to achieve sustainable growth, enhance their market presence and achieve long-term product success by selecting the right social media channel.

Moreover, since Mr. X is actively involved in local and international innovation and invention competitions, he should capitalize on this opportunity to promote and find strategic alliances to improve the production of CoCoCut. These competitions often attract industry leaders, investors, and potential collaborators who can contribute to the product's development and market reach. To maximize these opportunities, Mr. X should join the International Coconut Community (ICC), which operates under the United Nations Economic and Social Commission for Asia and the Pacific (UN-ESCAP) based in Jakarta, Indonesia. The ICC provides a robust platform for promoting products, allowing Mr X to present CoCoCut to a broader audience and establish links with key industry participants. Interacting with the ICC can help access valuable resources and collaborations crucial for promoting innovation and expanding the market presence of his product. Research has shown that networking and forming strategic alliances can increase market penetration and expand production capacity (Fieldsend, Varga, Biró, Von Münchhausen & Häring, 2022).

The paper also highlights the opportunity for CoCoCut related to customer demand for customization and diversification. For example, CoCoCut can capitalize on the growing customer demand for specialized and diverse products by diversifying its offerings to appeal to a wider customer base. By catering to diverse applications, user preferences, and changing market needs, the innovator can create a versatile and customizable product that appeals to a wide range of customers. This finding is supported by Rismanto and Latif, (2024) that customization will likely lead to increased customer retention and market share. The opportunity to offer customization and diversification is critical for CoCoCut's growth strategy and to differentiate itself from competitors. Mr. X's background and experience will help him to create versatile products that appeal to customers by focusing on personalized options and flexible product design. Moreover, Mr X can implement a modular design approach, enabling customers to select features or components that suit their specific needs and requirements. This unique selling proposition can attract and retain new customers, as consumers will likely choose brands that acknowledge and cater to their specific needs.

Based on the findings, the innovator needs to address several threats to maintain a competitive edge in the market. The primary threat facing CoCoCut is the presence of existing and potential competitors. To mitigate this risk, it is highly recommended that the innovator pursue patent registration. Prior research has demonstrated that obtaining a patent is an essential and crucial stage in the innovation process (Argente, Baslandze, Hanley & Moreira, 2020). This legal protection will safeguard the product from being replicated by competitors, preserving its unique market position.

The next threat of CoCoCut is the economic downturn, which has put significant pressure on production costs and profitability. Rising raw materials costs present significant challenges for the CoCoCut. Several strategies can be adopted by the innovator to mitigate this issue such as diversification of suppliers, incorporating

sustainable practices and embracing new technologies that can improve production efficiency and reduce waste (Wilson, 2024) to overcome the threats and maintain competitiveness in an increasingly volatile environment. It cannot only withstand the pressures of cost increases but can thrive in a competitive marketplace.

Rapid technological advancement could seriously risk this product's position in the market. Due to rapid technological development and more diversified customer needs, the innovator may no longer dominate the market with their innovation. To adapt to the technological advancement and rapid changes in the market, the innovator has to capitalize not only on internal expertise but also from outside through technological exploration, which refers to a practice that enables firms to acquire new knowledge and technologies from outside through customer involvement, external networking, external participation and through R&D (Varadarajan, 2009; Lee, Cha & Park, 2016).

Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis is essential matching tools that help the innovator develop four types of strategies: ST (strengths-opportunities) strategies, WO (weaknesses-threats) strategies, ST (strengths-threats) strategies and WT (weaknesses-threats) strategies (David et al., 2023). By considering these factors, the innovator can better understand the strengths and weaknesses of CoCoCut, identify growth opportunities, and mitigate potential threats to the product's success.

5. Managerial Implications and Recommendations

The development and use of this innovative tool present several significant economic impacts. This innovative tool contributes to increased productivity by enabling the coconut peeling process to be carried out more quickly and efficiently, reducing the time required to peel each coconut to just eight to ten seconds. This enhancement in productivity allows small traders and entrepreneurs in the coconut industry to process more coconuts in a shorter period, ultimately boosting their output. By reducing the time and effort needed for coconut peeling, this tool helps traders lower operational costs, including labor expenses. Subsequently, the tool offers substantial cost savings. Moreover, the tool operates without the need for an electrical power supply, further decreasing energy costs. Consequently, this can lead to significant savings in both operational and labor costs.

The effectiveness of the tool also has the potential to create new business opportunities. Its production can generate employment in the manufacturing, marketing, and distribution sectors. Traders can also offer coconut peeling as an additional service using this tool, further expanding their business offerings. Overall, the adoption of this innovative tool, i.e., CoCoCut, can positively impact the economy by driving efficiency, reducing costs, and improving product quality. The tool has progressed from the conceptual stage to the testing stage, undergone rigorous testing, and received positive feedback from users and local stakeholders. It is recommended that this tool for expanding the distribution network through strategic partnerships with industry and trade entities be crucial for broadening global market penetration.

Conclusion

In conclusion, the development of this innovative tool, i.e., CoCoCut, significantly aids and simplifies the operations of farmers, entrepreneurs, and coconut processors in the peeling of both mature and young coconuts, making the process more effective and efficient while reducing the need for manual labor. With the introduction of CoConut, stakeholders can optimize productivity and improve outcomes without spending excessive time or resources. Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis is essential matching tools that help the innovator develop four types of strategies: ST (strengths-opportunities) strategies, WO (weaknesses-threats) strategies, ST (strengths-threats) strategies and WT (weaknesses-threats) strategies (David et al., 2023). By considering these factors, the innovator can better understand the strengths and weaknesses of CoCoCut, identify growth opportunities, and mitigate potential threats to the product's success. It also demonstrates the substantial potential for market success.

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Push, Pull and Mooring Factors on Offline-Online Learning Switching Behavior

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Abstract: During the pandemic, many sectors, including education, were affected. The shift from traditional to online learning is an opening for students and educators to explore online learning. Students may connect from anywhere at any time through this learning mode. This sudden shift has impacted the learning behavior of students to a large extent. People can access information anytime and anywhere that is typically available only through a traditional classroom. This study adopts the Push-Pull-Mooring (PPM) theory as the theoretical framework to understand how push, pull, and mooring factors affect students' shift from offline to online learning. A survey was used as the main instrument in this study. A quantitative approach was utilized to achieve the stated research objectives. The questionnaires were distributed among undergraduate students in public and private schools in Malaysia through convenience sampling techniques. The minimal 77 sample size has been determined by utilizing G*Power software. 117 responses were collected from the questionnaires that met the minimum required sample size for this study. The findings emphasize that push and pull factors are essential to student learning. However, the mooring factor does not affect the student's switching behavior. The study sheds light on capturing more essential measures in the theoretical development of switching behavior.

Keywords: *Push Factor, Pull Factor, Mooring Factor, Push-Pull-Mooring (PPM) Theory, Switching Behavior*

1. Introduction and Background

The shift from offline to online learning has emerged as a critical research topic, especially given the global transition prompted by the COVID-19 pandemic. In reaction to the pandemic's new norm, academic institutions are attempting to implement e-learning techniques called Open and Distance Learning (ODL) practices. Universities today face significant challenges in resisting the transition from traditional teaching methods to online instruction since failing to adapt could compromise their viability in this industry (Maheshwari, 2021). In addressing this challenge, the National Fiberisation and Connectivity Plan (NFCP) 2019-2023 was launched by the Malaysian Communication and Multimedia Commission (MCMC) in September 2019. This plan targets giving an average internet speed of 30 Mbps to 98% of population regions in 2023, and fiber network passes to 70% of schools, hospitals, libraries, police stations, and post offices by 2022 (Malaysian Investment Development Authority, 2021).

Rathinam et al. (2023) reported that due to the COVID-19 outbreak in 2020, Malaysian academic institutions have been forced to embrace online learning strategies that use learning management systems to enhance students' performance. The sudden transition to online learning presented challenges in policy, pedagogy, logistics, socioeconomic factors, technology, and psychosocial (Barrot et al., 2021). Although it is impossible to ignore the challenges of online education, it is vital to acknowledge the benefits of online learning (Mozie, Jailani & Kassim, 2023). These learning methods and environments provide students with the ability to communicate with their lecturers at any location and learn at their own pace (Singh and Thurman, 2019 and offer greater flexibility, enabling students to connect from anywhere, at any time (Chen, Liu, Chang, Gui, & Na, 2020). This change has significantly impacted student learning behaviors as they can now access information previously only available through traditional classroom settings (Li, Nishimura, Yagami, & Park, 2021). Moreover, students can easily find and switch between alternative learning platforms that they prefer, and this will leverage innovative technologies, such as smart devices and online platforms, to facilitate sustainable educational practices (Mozie, Jailani & Kassim, 2023).

Online learning can be categorized into synchronous and asynchronous (Algahtani, 2011). Using tools such as

videoconferences or chatrooms, synchronous online learning facilitates direct interaction between lecturers and students during class. Next, asynchronous online learning allows lecturers and students to engage in thread discussions and correspondence before or after the online class.

This online learning provides benefits in developing new skills and fostering independent learning, ultimately leading to lifelong learning (Dhawan, 2020). This is aligned with the Malaysian Ministry of Education's initiatives to incorporate online learning as a fundamental component of higher education and lifelong learning under the Malaysian Education Blueprint 2015–2025 (Higher Education). Therefore, this study is conducted to obtain a comprehensive understanding of how push (e.g., learning convenience and service quality), pull (e.g., enthusiasm, facilitating conditions, perceived ease of use, perceived usefulness/functional value, and perceived behavioral control), and mooring factors (e.g., switching cost, variety seeking, and involuntary choice) affect students to shift from offline to online learning.

2. Literature Review

Push Pull Mooring Theory

The Push Pull Mooring Theory (PPM) is a commonly used model for examining consumer switching behavior. The factors that influence people to migrate or switch can be explained by categorizing the factors into three categories: pulled (a positive factor that attracts people to the new destination), and the next is push. This negative factor encourages people to move from their origin, and lastly, are mooring, social, or interpersonal factors that might facilitate or inhibit people from switching or migrating (Lai, Debbarma, & Ulhas, 2012; Zhang et al., 2014). This theory originated from the context of human migration and is widely accepted by scholars from a variety of fields, including research that focuses on the understanding of consumer switching behavior patterns (Chang, Wong, & Li, 2017; Wang, Luo, Yang, Qiao, & Management, 2019). Chen and Keng (2019) emphasize that the transition of learners to online education service providers is a phenomenon like the "push-pull-mooring" theory, which refers to a change in behavior. This theory can be a framework for interpreting migration patterns (Chen & Keng, 2019). Therefore, the theory posits those elements from all three categories influence the offline-online learning transition among university students: push, pull, and mooring factors. This theory analyses the factors that affect student behavior by dividing them into 'push' factors, which discourage students from traditional learning environments, 'pull' factors, which attract them to online platforms, and mooring factors, which influence the decision to switch between these learning modes. It provides valuable insights into university students' behavior transitioning between offline and online learning.

Switching Behavior

Switching behavior refers to the consumer selecting an alternate seller instead of their current one (Xu et al., 2021). Switching intention relates to consumers' migration from one provider to another (Ranganathan, Seo, & Babad, 2006), which is typically related to users' discontent with the current product or service as well as evaluation of the relative benefit of a substitute (Wu, Vassileva, & Zhao, 2017). Consumers ' evaluation of switching intention is determined by their use of a product or service (Chen & Keng, 2019). The factors driving this transition may vary from individual preferences, curriculum adaptation, resource accessibility, or unexpected global transformations (Bawa, 2016). The phenomenon of university students moving from conventional offline learning to online learning has gained attention and has been the research focus in recent years. The transition from offline to online learning poses concerns and can impact the behavior of university students, affecting their readiness to transition (Lin et al., 2021). The switching intention among university students can be analyzed through the lens of push-pull migration theory, which elucidates the factors influencing students' preference for or resistance to online learning platforms (Abumalloh et al., 2021; Lin et al., 2021; Nayak, Bhattacharyya, Goswami, & Thakre, 2022; Xu et al., 2021). This theory posits that students' prior experiences, routines, and attachments to offline learning can be barriers or facilitators in their propensity to transition to online learning (Zeng et al., 2021). Consequently, it is imperative for universities and education providers to comprehend and resolve the mooring effect, in addition to the push and pull factors, to effectively support and encourage students during their transition to online learning.

The Push Factors

Hsieh et al. (2012) described this as the push effect, which happens when the consumer is not happy with the services they get from their current provider and, therefore, decides to switch to another one. This finding is

supported by Jung and Oh (2017), who argue that the push effect results from consumer dissatisfaction with existing service providers, so they desire other options in life. According to Chang, Wong & Li (2017), the push effect favors the intention to switch, leading consumers to migrate from their current service provider to a new one. Consumer switching refers to the willingness of consumers to withdraw from their current service provider and start using a different one. Astuti & Eliana (2019) asserted that the push effect influences switching intention. This demonstrates that the push effect has a pronounced inclination to impact the desire to switch. This study considers the students' switching intentions from traditional to online learning. The dimensions of push effect variables in this study include learning convenience and service quality, which will be used to analyze the influence of the push effect on switching intention. The following hypothesis is developed:

H_1: Push factors have a positive influence on the students' switching behavior.

The Pull Factors

A pull factor is a favorable aspect of alternative services that attracts consumers to switch to those services (Nurlinda & Anam, 2024). The push-pull factor theory is derived from the study of human migration (Lee, 1966), which posits that migration is the outcome of the push and pull forces that influence an individual's transition from one location to another (Chang et al., 2014). In marketing and information systems, pull primarily relies on alternative attraction to clarify the user's preference to transition from offline to online consumer behavior (Lin & Huang, 2014). The Pull Effect, as described by Sun et al. (2017), refers to the favorable aspects that pull consumers towards alternative products or services. These benefits, present in the alternative service, can bring in clients and encourage them to use the service (Guo et al., 2021). In this study, the term "pull factor" refers to the factors that inspire university students to switch between offline and online learning, including enthusiasm, facilitating conditions, perceived ease of use, perceived usefulness/functional value, and perceived behavioral control. Leong's (2022) research shows a positive correlation between customers' interest in other services and their desire to move to new services. In other words, the more interested consumers are in alternative services, the more likely they are to consider switching. A similar finding was made by Jung and Han (2017), indicating that the pull effect favors the intention to switch. This demonstrates that a service with a strong attraction will offer a superior deal, resulting in increased consumer satisfaction and influencing consumers to switch. Therefore, the following hypothesis was formulated:

H_2: Push factors have a positive influence on the students' switching behavior.

Mooring Factors

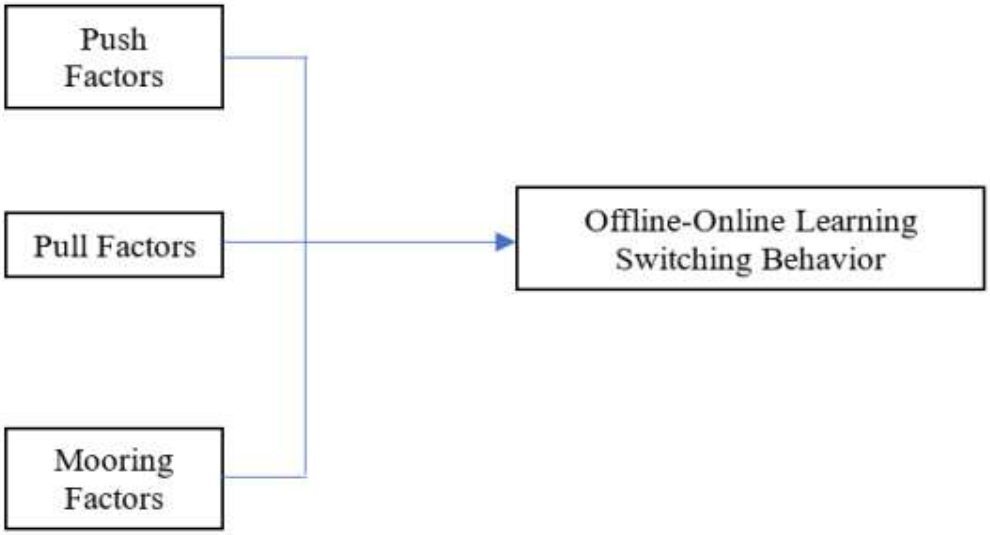
The mooring factor refers to the individual and societal influences that might encourage a potential resident to either remain or relocate from their current area of residence (Moon, 1995). The elements are linked to the switching behavior and can either restrain or assist in decision-making. In this paper, the mooring factor refers to the influence of online learning factors that motivate students to leave or remain in the physical classroom. Switching costs are a component of the anchoring factor that influences platform-switching behavior (Cheng, Lee, & Choi, 2019) and play a crucial role in determining and regulating consumer happiness (Burnham, Frels, & Mahajan, 2003). The study conducted by Chen and Keng (2019) and Liao et al. (2019) asserts that switching costs influence the mooring of learning platforms. The need for change is another mooring factor considered an involuntary choice when the users face a situation where they have no choice. As for Menon & Kahn (1995), the mooring factor refers to the tendency to select products and services that differ from one another. A past study conducted by Chen and Keng (2019) found a connection between the desire to switch from offline to online real-person English learning platforms among individuals in Taiwan. Therefore, this paper looks into the factors influencing switching behavior, such as switching cost, variety seeking, and involuntary choice. The following hypothesis was formulated:

H_3: Mooring factors have a positive influence on the students' switching behavior.

Theoretical Framework

Based on the preceding discussion, a theoretical framework was established in which push factors, pull factors, and mooring factors are posited as the key drivers prompting the transition from offline to online learning, as illustrated in Figure 1.

Figure 1: Theoretical Framework of Push, Pull, and Mooring Factors on Offline-Online Learning Switching Behavior



3. Research Methodology

A quantitative approach is utilized to achieve the stated research objectives. The research design for this study is a correlational study. The researcher tried to investigate the factors influencing students' switching behavior using the push-pull-mooring theory for this study. The population of this study is undergraduate students in a private and public university in Peninsular Malaysia. All respondents participating in this study should have experience studying online and offline.

Meanwhile, the sampling technique that is applied in this study is convenience sampling. Convenience sampling can be defined as a type of non-probability sampling, which involves the subjects being drawn from the part of the population close to hand. In determining the minimum sample size for this study, G*Power software is employed. The researcher calculates the sample size by using the G*Power 3.1.9.4. Thus, the setting measured in this study is as follows: Effect size f^2: 0.15, α=0.05, and the number of predictors=3 (push factors, pull factors, and mooring factors). The power was set at 95%. Thus, the sample size required for this study is 77. A total of 117 respondents were received from the data collection.

This research study has received ethical approval from the Faculty Research Ethics Committee under the Faculty of Business and Management. Four constructs were measured in this study: push factors, pull factors, mooring factors, and offline and online switching behavior. The constructs were measured using a five-point Likert scale ranging from 1 strongly disagree to 5 strongly agree. Appropriate item modification was performed to fit the study context and validated by experts in the study area. A reliability test was conducted before the data collection to ensure the consistency of the measure. Based on the pilot test of 30 respondents, the internal consistency value for all constructs met the minimum requirement of 0.700. Meanwhile, to collect the data, an online survey was designed using Google Forms, and the invitation to participate in the study was sent through emails and WhatsApp.

4. Results

Data were analyzed using SPSS version 28.0 and Smart PLS 4.0. Table 1 summarises the demographic profile of the respondents. Most respondents were female, between 21 and 25 years old, and had a bachelor's degree from a public university in Malaysia.

Table 1: Demographic Profile

Demographic	Frequency	Percentage
Gender		
Male	22	18.8
Female	95	81.2
Age		
< 20 years	6	5.13
21-25 years	96	82.05
25- 30 years	8	6.84
30 years	7	5.98
Education Level		
Diploma	15	12.82
Bachelor Degree	102	87.17
University		
Public	107	91.45
Private	10	8.54

The research model for this study is tested using the PLS Algorithm in SmartPLS 4.0. Table 2 shows the result summary of the measurement model. The results provide evidence for the measurement model for composite reliability, which meets the minimum requirement of 0.7 and above to achieve internal consistency reliability (Ramayah et al.,2018). Moreover, all indicator loadings reached the minimum requirement of 0.4, with the average variance extracted (AVE) establishing more than 0.5 to accomplish the convergence validity requirement. Next, a discriminant validity procedure was conducted to observe how a particular construct differed from the other construct in the study (Lowry & Gaskin,2014).

Table 2: Measurement Model

Constructs	**Items**	**Indicator Reliability Outer Loadings > 0.6**	**Convergent Validity AVE > 0.5**	**Internal Consistency Reliability Composite Reliability > 0.7**	**Cronbach's Alpha > 0.7**
Push Factor	C1	0.879	0.798	0.956	0.949
	C2	0.920			
	C3	0.913			
	C4	0.888			
	C5	0.913			
	C6	0.846			

Constructs	Items	Indicator Reliability Outer Loadings > 0.6	Convergent Validity AVE > 0.5	Internal Consistency Reliability Composite Reliability > 0.7	Cronbach's Alpha > 0.7
Pull Factor	ENT11	0.722			
	ENT2	0.705			
	ENT3	0.758			
	ENT4	0.807			
	FC1	0.728			
	FC2	0.739			
	FC3	0.808			
	FC4	0.875			
	PBC1	0.792			
	PBC2	0.745			
	PBC3	0.839	0.634	0.974	0.971
	PEOU1	0.778			
	PEOU2	0.839			
	PEOU3	0.864			
	PEOU4	0.739			
	PEOU5	0.824			
	PEOU6	0.742			
	PU1	0.866			
	PU2	0.799			
	PU3	0.854			
	PU4	0.859			
Mooring Factor	IC1	0.940	0.784	0.918	0.901
	IC2	0.941			
	IC3	0.952			
Switching Behavior	SB2	0.787			
	SB3	0.927			
	SB4	0.901	0.763	0.874	0.845

Using the heterotrait-monotrait ratio (HTMT) techniques, the results shown in Table 3 indicate that all values fulfilled the criterion of HTMT 0.85, as suggested by Kline (2015), which established discriminant validity. Furthermore, the result of HTMT inference also revealed that the confidence interval did not show a one on any of the constructs, which further confirmed discriminant validity (Henseler et al.,2015; Ramayah et al.,2018). In addition, based on the Confidence Interval Bias value, the columns labelled 2.5% and 97.5% showed that the lower and upper bounds of the 95% (bias-corrected and accelerated) confidence interval did not include the value of 1. In conclusion, the measurement model has established its discriminant validity. Before the structural model development, a procedure to address the issue of collinearity was conducted, as the existence of multicollinearity does not contribute to a good regression model.

Table 3: HTMT 0.85

	Mooring Factor	**Pull Factor**	**Push Factor**	**Switching Behavior**
Mooring Factor				
Pull Factor	0.291			
Push Factor	0.305	0.213		
Switching Behaviour	0.357	0.713	0.342	

Finally, the structural model analysis was performed through several steps. As illustrated in Table 4, values for all constructs met the requirement of VIF below 5.00 (Hair, Hult, Ringle, & Sarstedt, 2016; Wong,2013), thus confirming the absence of multicollinearity. This was preceded by the structural model and followed by the PLS algorithm to test the hypotheses. A bootstrapping technique with 5000 subsamples was performed to ensure

the accuracy of PLS estimates, and the results are presented in Table 5. The relationship was found to have a t value ≥ 1.645, thus significant at 0.01 for the pull factor (β= 0.617, t value = 9.599) and push factor (β= 0.150, t value = 2.095).

The r^2 value of 0.491 suggests that pull and push factors explained 49.1% of the variation in switching behavior among undergraduate students. Next, the blindfolding procedure was conducted to obtain the model's predictive capability using Q^2 (Hair et al., 2016). According to Hair et al. (2016) and Ramayah, Cheah, Chuah, Ting, and Memon (2016), if the Q^2 value is more than 0, the model has predictive relevance for a specific endogenous construct. Based on predictive analytics, the predictive relevance for Q2 values for mooring, pull and push factor are 0.201, 0.343 and 0.456, respectively, indicating that the model has a predictive relevance because the Q^2 values are considerably above zero, as Hair et al. (2016) outlined. The f^2 values represent the effect size of a specific exogenous construct on the endogenous construct (Hair et al.,2016). The effect size of the mooring factor → switching behavior was 0.016 (small), the pull factor → switching behavior was 0.683 (medium), and the push factor → switching behavior was 0.040 (small) based on the guidelines provided by Cohen (1988).

Table 4: Structural Model

	Path Coefficient (β)	Std. Error	T statistics	P values	f^2	Effect Size	VIF	Q^2
Mooring Factor -> Switching Behavior	0.097	0.101	1.251	0.211	0.016	Small	1.136	0.201
Pull factor -> Switching Behavior	0.617	0.622	9.599	0.000	0.683	Medium	1.094	0.343
Push factor -> Switching Behavior	0.150	0.155	2.095	0.036	0.040	Small	1.109	0.456

Table 5: Summary of Hypotheses Result

No	Hypotheses	Result
H_1	Push factors have a positive influence on the students' switching behavior.	Supported
H_2	Pull factors have a positive influence on the students' switching behavior.	Supported
H_3	Mooring factors have a positive influence on the students' switching behavior.	Not Supported

Discussion

This study examined the relationship between offline-online learning switching behavior (dependent variable) and push, pull and mooring factors (independent variables). Online learning platforms are essential for giving students all the resources they need to gain information and skills and the opportunity to continue studying throughout their lives. Encouraging lifelong learning is critical for improving people's skill sets and the economy's overall well-being. The research findings provide fresh perspectives and valuable ramifications for the long-term growth of online learning environments. It is clear from Table 5 that two of the three hypotheses (the push and pull factors) are supported. Concurrently, the hypothesis between the mooring factor and switching behavior needs to be supported. According to Hsu (2014), Push factors will influence users to stay away from current technology. Meanwhile, pull factors will attract users to newer technologies. Furthermore, the mooring factor is a variable that facilitates or limits the intention to switch users towards technology adoption (Cheng et al., 2019).

The hypothesis clearly shows that the push factor significantly influences the students to switch behavior. With the p-value smaller than the significant level value, the results support H1's assertion that there is a meaningful relationship between push factors and switching behavior. This study aligns with earlier research by Lisana (2023), which emphasizes that push factors significantly influence young people's intention to change their behavior as H_1 is accepted. Moreover, a study by Handarkho (2020) and Chao et al. (2020) stated that push factors are a potential factor that triggers people to switch behaviors in fulfilling their social needs. Due to the push factor during the COVID-19 pandemic, many young people developed depressive emotional states as they

were forced to spend most of their time at home, limiting their ability to interact physically with friends. As a result, information and communication technology tools like the Internet of Things and smart devices play a crucial role in analyzing the real-time environment, which allows people to respond effectively if any problems arise (Handarkho, Khaerunnisa, & Michelle, 2023). The other study by Lisana (2023) mentions that the discomfort of attending physical classes had become a significant reason for students to switch to mobile learning. This type of learning offers a more convenient platform that isn't restricted by time or place, making it more likely that students will switch. Furthermore, push factors directly relate to why individuals seek better education, such as building connections (Brandt & Hagge, 2020) and better job opportunities (Alexander, 2021). On the other hand, push factors also can lead people to choose an alternative way, as stated in a study by Monoarfa, Sumarwan, Suroso, and Wulandari (2023) that the pandemic is a push factor for customers to shop from alternative places and media. However, this does not mean that customers will quickly accept the consequences of switching from the old habit of shopping for groceries in physical markets to e-grocery services. In future investigations, it might be possible to use a different motive variable, which can be done differently to help shed more light on this topic.

A strong correlation has also been found between the pull factor and switching behavior. The result of p-values smaller than significant value indicates that H_2 also has been supported for this study. Moreover, these findings are consistent with the outcomes of prior research by Abbas et al. (2021), Do and Le (2020), and Pratama, Aditya, Putra, and Hendriana (2024), which found that the positive influence of pull factors on decisions that made by students when to study abroad. Meanwhile, the attractiveness of e-grocery shopping as the pull factor has a binding effect on the switching cost and intention to switch to e-grocery shopping (Monoarfa, Sumarwan, Suroso, & Wulandari, 2023). In addition, it has been found to have a pull effect on the intention to switch from traditional methods to distance learning methods (Lin, Chien, Hung, Chen, & Ruangkanjanases, 2021). Pull factors also affect the intention to switch to digital application services (Zhang, Oh, & Lee, 2021), as reflected in the consistency and quality of Peer-to-Peer accommodation services.

Lastly, the result indicates the analysis between mooring factors and switching behavior. The findings of this analysis, which provide different perspectives in this study H_3, are not supported. The mooring factor that has been used for this study is Involuntary Choice. This study indicates that students did not connect emotionally to their type of study in determining their switching behavior. This result is consistent with Lisana (2023), who indicates that students did not connect emotionally to their network when developing their switching intention to use mobile learning. This result is consistent with the investigation study of mobile payment adoption by Lisana (2021). Moreover, a study by Zhou (2016) also determines that mooring factors, which are switching costs, hurt switch intention.

5. Managerial Implications and Recommendations

There are various ways to look at the implications. The educational institution should list the drawbacks of traditional learning environments, such as strict timetables, and a restricted selection of courses. By considering these drawbacks in consideration, educators may create more adaptable and easily accessible online learning. Furthermore, institutions should invest in technological innovations, such as interactive content, adaptive learning technologies, and immersive virtual environments, to create a compelling and differentiated online learning experience. These enhancements can significantly increase the appeal of online learning and encourage switching behavior. To increase the legitimacy of online education and reduce institutional resistance, institutions should collaborate closely with accreditation and regulatory bodies to include online learning in the broader educational system. It is anticipated that the findings of this study shall provide a deep insight into students' perspectives on how they feel about online and offline learning. This study may also contribute to a better alliance of formal and informal support systems in the education field. Moreover, the research output will contribute significantly not only to the corpus of knowledge but also to understanding the importance of comprehensive context towards determining the best factor in online and offline study.

The recommendations to be developed at the end of the research will be a list of factors the government can consider in developing comprehensive strategies for applying the best practices for Malaysian education. This will also allow for policy advice and reform suggestions to strengthen Malaysian education further. Originality/value: The research on university students' offline-to-online learning switching behavior utilizing

the push-pull-mooring theory holds significant originality and value in education and behavioral psychology. The research offers a unique cultural perspective by focusing on Malaysian Public University students, potentially uncovering nuances in switching behavior that may differ from other regions. Overall, this research adds valuable knowledge to the ongoing discourse on educational adaptability and enhances learning environments in the digital age.

Conclusion

The offline-online learning switch among university students has dramatically altered the educational landscape. Grasping the dynamics behind this transition is fundamental to optimizing students' experiences and outcomes in the new learning frontier. Push factors are factors that encourage learners to switch to online learning environments, including the constraints and challenges encountered with traditional offline learning platforms. On the other hand, learners who are searching for flexibility, accessibility, and a wider variety of educational options are primarily motivated by pull factors, which are defined as the intrinsic benefits and alluring features of online learning. Mooring factors, which include both individual and contextual elements, can help or interfere with learners in this transition by addressing the challenges they may encounter from their personal, technological, and institutional environments. With a deeper understanding of the factors fueling offline-online learning switching behavior among university students, educators can tailor their teaching methods to meet the learners' evolving needs. The Push-Pull-Mooring theory acts as a solid framework for analyzing these factors. The results demonstrate that push and pull variables influence students' decision to switch behaviors. In contrast, the mooring elements do not play a significant role in influencing students' decisions.

Meanwhile, policymakers can make informed decisions to build a flexible, inclusive education system that embraces the digital age. Based on the Push Pull Mooring Theory, this paper has provided a comprehensive overview of the factors determining offline-online learning switching behavior among university students. Through deeper understanding, educational institutions and policymakers can gear up to effectively provide a blended learning environment that meets the evolving needs of their students. To better understand the factors influencing students' switching behavior. University students of this digital age stand at the forefront of this radical shift in learning models, presenting a new wave in education.

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Examining the Psychosocial Factors of Mental Health Well-being Among Medical University Students: Gender-based Analyses

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Abstract: The mental health of university students is a major concern due to the various stressors they face, including academic pressures, social dynamics, and personal development challenges. Previous studies have shown that gender differences significantly impact how students perceive and express psychological distress. This study aimed to identify these differences in the context of academic stress, social support, self-esteem, academic motivation, and family functioning, and their association with psychological distress. The study involved 2206 medical students in a cross-sectional study at a medical university in Ningxia, western China. The data analysis revealed significant gender differences in scores for academic stress, social support, and academic motivation. Academic stress, social support, and family functioning were found to be significantly associated with psychological distress for both genders. However, academic motivation was found to significantly influence psychological distress only among male students, while self-esteem had an impact on female students. These findings highlight the need for tailored mental health services in universities to address gender-specific needs, such as providing counseling services that focus on coping with academic stress and strengthening social and familial support networks to improve student well-being.

Keywords: *Mental health, psychological, well-being, university, students, medical, stress, depression, anxiety, family, social support, China*

1. Introduction and Background

The mental health of university students has become a critical area of concern, particularly in light of the multifaceted stressors they face, including academic pressures, social dynamics, and personal development challenges. Academic stress is a predominant factor influencing psychological distress among students, often exacerbated by high expectations, workload, and fear of failure (Hussain et al., 2023; Jiang, 2024).

Medicine is considered one of the most stressful academic disciplines due to the intense academic demands, high expectations, and personal challenges faced by students. Studies conducted in multiple countries have reported that a significant number of medical students experience psychological distress (Wang et al. 2023; Liao et al., 2022; Rtbey et al., 2022; Raduan et al. 2022; Gebremedhin et al., 2020; Sahu et al., 2020). If not addressed, this issue could negatively impact their academic performance and overall well-being.

Research indicates that high levels of perceived stress correlate with increased symptoms of depression, anxiety, and hopelessness, underscoring the need for effective stress management interventions (Padmanabhanunni et al., 2023; Li et al., 2003). Social support emerges as a crucial protective factor, significantly mitigating the adverse effects of stress and enhancing overall well-being. Studies have shown that social support directly reduces psychological distress and positively influences life satisfaction and academic well-being (Zayed et al., 2024; Dadandi & Citak, 2023).

Furthermore, self-esteem plays a vital role in buffering against stress, with higher self-esteem linked to lower levels of psychological distress (Terry & Abdullah, 2023). Academic motivation and self-efficacy are also

pivotal, as they foster resilience and a positive academic experience, thereby reducing stress and enhancing academic performance (Hussin et al., 2023). Family functioning, including the quality of family relationships and support, significantly impacts students' mental health, with strong family support correlating with lower levels of depression, anxiety, and stress (Newhart, 2023).

The interplay between these variables—academic stress, social support, self-esteem, academic motivation, and family functioning—creates a complex dynamic that influences psychological distress among university students. For instance, social competence and family functioning have been identified as significant predictors of mental well-being, with social competence being the largest predictor, followed by perceived social support and family functioning (Newhart, 2023). Additionally, digital resilience and social support have been found to predict academic well-being, highlighting the importance of these factors in managing digital stress and promoting academic success (Zayed, 2024). The COVID-19 pandemic has further amplified these issues, with containment measures leading to increased social isolation and perceived stress, thereby heightening psychological distress among students (Padmanabhanunni et al., 2023; Ntoiti et al., 2024). Negative coping strategies, such as substance use, have also been linked to poor academic performance and increased mental distress, emphasizing the need for positive coping mechanisms and support systems (Ntoiti et al., 2024).

Gender differences significantly influence the perception and expression of psychological distress among students, as evidenced by various studies. Female students report higher levels of emotional distress compared to their male counterparts, with findings indicating that 11.7% of females experienced emotional distress versus 3.8% of males, influenced by factors such as stigma and isolation (Tzeng et al., 2024). Additionally, while both genders experience stress, females reported significantly higher stress levels in emotional and social domains (Dheerendra et al 2023). Interestingly, a study on self-perceived gender typicality found that gender did not directly influence psychological distress, suggesting that self-esteem mediates this relationship (Chuku, 2017). Furthermore, research on medical students revealed that males exhibited better resilience and lower psychological distress compared to females (Suresh & Nair, 2023). Lastly, while no overall gender differences in psychological distress were found among treatment-seeking university students, interactions between gender and ethnic identity highlighted the complexity of these experiences (Sorkhou et al., 2022). These findings underscore the necessity for gender-sensitive approaches in mental health interventions for students.

Overall, the existing literature underscores the multifaceted nature of psychological distress among university students and the critical role of social support, self-esteem, academic motivation, and family functioning in mitigating these challenges. This research aims to explore these interrelationships further, providing insights into effective gender-based interventions and support mechanisms to enhance university students' mental health and academic success.

2. Research Methodology

Study design

This quantitative study was designed as a cross-sectional study, aiming to examine the influence of Academic stress (AS), Social Support (SS), Self-esteem (SE), Academic Motivation (AM), and Family Functioning (FF) on the psychological well-being (psychological distress) of a public university's medical students in Ningxia, Western China.

Population and sample size determination

The study's population refers to 10,760 medical-related students aged ≥ 18 at one public medical university in Ningxia, Western China. These students consist of those who were studying in allied health programs (e.g., nursing, pharmacy), bachelor's degree medical programs, or postgraduate degree programs. The sample size was determined using the following formula:

$$\frac{Z_{1-\alpha/2} * pq}{\delta^2}$$

Where p = the expected present-day rate, q = 1 - p, and $z_{1-\alpha/2}$ were the significant test statistics and the allowable error. Sample size calculation was performed using PASS software with the parameters set at α =.05, for p of 10-30%, tolerance error δ=2%. Considering the possibility of non-response (20%), the minimum sample size

was determined to be 1143. In this study, convenience sampling was used. The selection is justified due to its practicality and efficiency, particularly in contexts where time and resources are limited. This method allows researchers to gather data quickly and at a lower cost, making it particularly useful in fields like social and psychological sciences. A total of 2206 questionnaires were purposely distributed, which far exceeded the minimum sample size required, giving the researchers more confidence in sampling power.

Definition of Study Variables and Instrument Development

Academic stress (AS) refers to the student's psychological state resulting from continuous social and self-imposed pressure in a school environment that depletes the student's psychological reserves (Misra et al., 2000). In this study, academic stress is measured using the Perceived Academic Stress Scale (PASS) developed by Bedewey & Gabriel, (2015). This *18*-item scale was later translated into Chinese language. The alpha coefficient suggests that the instrument used in this study is highly reliable (α = 0.89)

Social support (SS) has been described as the provision of assistance or comfort to others, typically to help them cope with biological, psychological, and social stressors. The level of social support received by the students was measured using the Social Support Rating Scale (SSRS), which consists of 10 items measuring subjective support, objective support, and support-seeking behavior (Xiao, 1994). The internal consistency of the SSRS scale in this study was high (α = 0.98)

Self-esteem (SE) refers to one's positive or negative attitude toward oneself and one's evaluation of one's thoughts and feelings overall about oneself. This psychological aspect is measured using the self-esteem scale (SES) that was originally developed by Rosenberg in 1965 (Rosenberg, 1965). The Chinese-translated version of SES was used in this study that maintains all 10 items as originally proposed (Yang & Wang, 2007). Scale reliability analysis showed this instrument is highly reliable (α = 0.93)

Academic Motivation (AM) is defined as an internal process that stimulates and maintains individual learning activities and makes learning behaviors toward certain goals. This process is measured using a 16-item academic motivation scale that Wan-W (2006) developed. Preliminary findings indicate that this instrument has a high reliability (α = 0.94).

Family functioning (FF) refers to the state where the family environment allows for clear communication, affective regulation, defined roles, and cohesion. The degree of compliance with APGAR basic parameters, which include adaptation, participation, gain or growth, affection and resources, will be used to identify the state of family functioning (Smilkstein, 1978). The 5-item family APGAR questionnaire, which was previously translated by Lu et al. (1999), was used in the current study. The scale is considered highly reliable, as suggested by the alpha coefficient (α = 0.90).

Psychological distress (PD) encompasses painful mental and physical symptoms associated with normal mood fluctuations in most individuals. Many self-reported measures of depression and anxiety are believed to assess this condition. In the context of the current study, psychological distress, as the outcome variable, is measured using The Depression, Anxiety, Stress Scale (DASS). The translated version of the DASS scale containing 21 items was used in this study (Gong et al., 2010). Alpha coefficients are reported as follows: Depression (α = 0.90), Anxiety (α = 0.86), and Stress (α = 0.88). According to the DASS manual, scores> 9 for depression, > 7 for anxiety, and > 14 for stress indicate the presence of symptoms associated with psychological distress (Lovibond & Lovibond, 1995). A complete guideline for scoring and its interpretation can be found at https://www2.psy.unsw.edu.au/dass/

Data collection process

Before data collection was initiated, a request for permission to collect the data was forwarded to the university's authority by submitting the research protocol, questionnaires, and informed consent form. Upon ethics approval, the counselling center issued online and offline notices notifying participant recruitment. Interested students who met the study inclusion criteria and responded to the recruitment notices were contacted by telephone and email.

A set of questionnaires was provided to the participants, and sufficient time was allocated to complete the questionnaire and return it to the researchers. A total of 2205 students completed the questionnaire and

returned it to the researchers, translating to a 100% response rate.

Data Analysis

The descriptive statistics for categorical variables were expressed in numerical values and percentages. Scores based on instruments measuring AS, SS, SE, AM, FF, and PD (i.e., Depression, Anxiety, and Stress) were computed, and the statistics were presented using means and standard deviations. The normality distribution was statistically checked by examining skewness and kurtosis values, as well as the results of the Anderson-Darling test (Anderson & Darling, 1954). In this study, all scores were found to be distributed normally. Independent sample *t*-tests were conducted to determine if the scores varied statistically between gender groups. The homogeneity of variance was checked, and if the assumption was violated, estimates based on Welch's *t* and *d* were calculated to determine the significant differences and the equivalent effect sizes. The influence of AS, SS, SE, AM, and FF on PD was analyzed using structural equation modeling (SEM), where a latent variable for PD was created to contain three measurement dimensions, namely Depression, Anxiety, and Stress. Standardized regression estimates were obtained by simultaneously regressing AS, SS, SE, AM, and FF with the outcome variable (PD). Sub-group analyses were also performed to compare the estimates between male and female students. To address issues with model convergence, we allowed the error terms of the measurement model to correlate between Depression and Anxiety and between Anxiety and Stress. Models' fitness was assessed using a chi-squared test (model vs saturated), Root mean squared error of approximation (RMSEA), Comparative fit index (CFI), Tucker-Lewis Index (TLI), Standardize root mean squared residual (SRMR) and coefficient of determination (CD). All reported *p*-values were 2-tailed, and the significance level was set at $p < 0.05$. Stata statistical software: Release 17 (StataCorp LP, College Station, TX), R Statistical Software (v4.3.3; R Core Team 2021), and Lavaan—an R package for structural equation modeling, were used to analyze the data.

3. Results

Profile of Respondents: The total number of respondents is 2206, of which 645 are males (29.20%) and 1561 are females (70.80%). Sixty percent of college students are from rural areas (n = 1327), and the remaining 40% are from urban areas (n = 879). Regarding academic program enrolment, the most frequently reported was bachelor's degree programs (n = 1,486, 67.36%), followed by college diploma programs (n = 565, 25.61%) and postgraduate programs (n = 155, 7.03%).

Descriptive Statistics: The raw scores were summarized using mean and standard deviation and subsequently compared between male and female students. A statistically significant difference in student's responses regarding perceived academic stress (t = 2.98, p = 0.002, d =.14), social support (t = -4.72, p <.001, d =-.23), and academic motivation (t = -2.70, p = 0.006, d = -.13) was observed with small to medium effect sizes. In particular, female students had a higher social support and academic motivation score than male students. Whereas, male students had a higher academic stress score when compared to female students. Interpreting the scores based on relevant manuals and research works for the use of DASS, Family APGAR, PASS, SES, and SSRS, the students were mostly characterized as having a highly functional family, receiving a high level of social support, and having a normal range of self-esteem level. Likewise, the students did not show any signs of depression or significant levels of stress (either caused by academic or psychological). However, the mean score for anxiety indicated that the respondents, on average, showed a mild level of anxiety. Table 1 summarizes the data showing the mean and standard deviations for scores of studied variables.

Table 1: Summary of mean analyses performed on studied variables

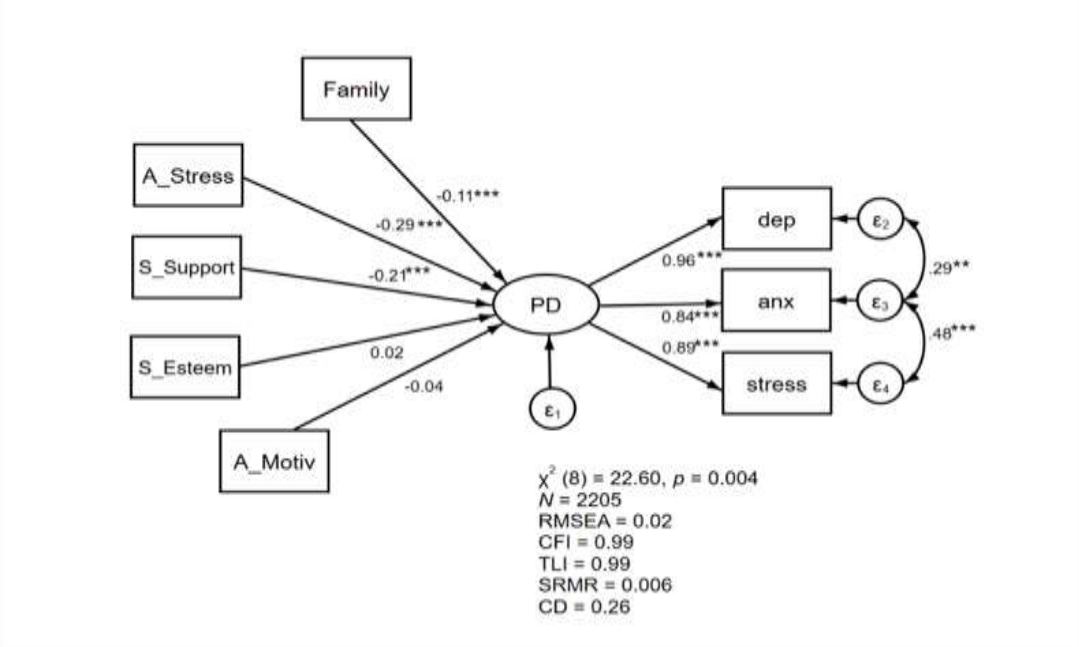
	All (N = 2205)		Male (n = 646)		Female (n = 1559)		*t*-test	
Variable	***M***	***SD***	***M***	***SD***	***M***	***SD***	***t***	***p***
Academic stress	60.80	11.33	61.95	11.86	60.33	11.08	2.98*	0.002
Social Support	65.81	14.19	63.55	14.80	66.75	13.83	-4.72*	<.001
Self-esteem	29.36	7.17	29.26	7.54	29.40	7.03	-0.41	0.679
Academic motivation	62.64	11.73	61.58	12.06	63.09	11.57	-2.70*	0.006
Family Apgar	7.47	2.56	7.40	2.61	7.50	2.55	-0.79	0.428
Depression	6.66	7.81	6.98	8.03	6.52	7.72	1.26	0.207

Anxiety	7.10	7.52	7.16	7.67	7.08	7.46	0.22	0.824
Stress	8.34	8.24	8.70	8.56	8.19	8.11	1.30	0.194

**Estimates were obtained from the parametric Welch t-test*

Inferential Statistics: Based on the analysis of all data, the statistics indicate academic stress (β = -.29, 95% CI =-.33 to -.25, *p* <.001), social support (β = -.21, 95%CI = -.26 to -.16, *p* <.001), and family functioning (β = -.11, 95% CI = -.15 to -.06, *p* <.001) significantly associated with psychological distress which was measured by depression, anxiety, and stress scores. Figure 1 shows the diagrammatic presentation of the study findings.

Figure 1: Diagrammatic Presentation of regression analysis containing all responses of the study sample (N= 2205).



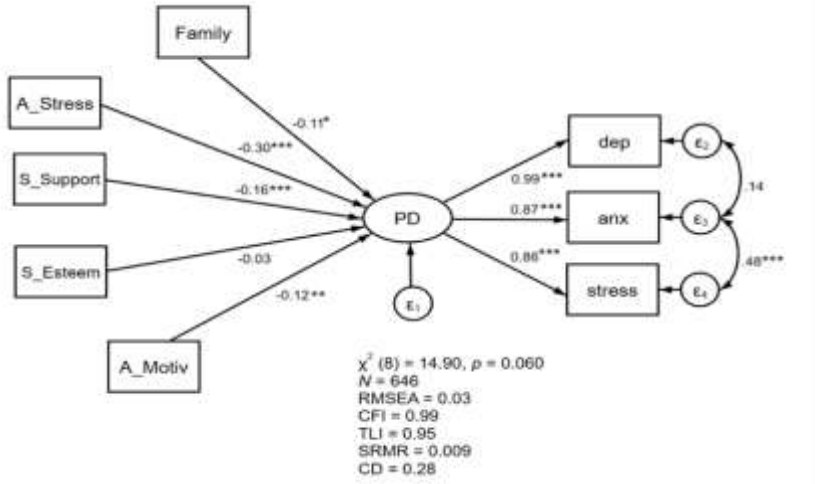
The diagram shows the standardized path coefficients and their statistical significance.

The results of sub-group analyses identified academic motivation score (β =-.12, 95% CI = -.19 to -.04, *p* = .002), along with academic stress(β = -.30, 95% CI = -.37 to -.22, *p* <.001), social support (β = -.16, 95% CI = -.25 to -.07, *p* =.001), and family functioning (β = -.11, 95% CI = -.19 to -.02, *p* =.010), significantly associated with psychological distress among male students. Such a significant effect of academic motivation, however was not seen among female student, but self-esteem score (β =-.05, 95% CI = -.00 - .09, *p* = .047), along with academic stress (β = -.29, 95% CI = -.34 to -.25, *p* <.001), social support (β = -.23, 95% CI = -.29 to -.17, *p* <.001), and family functioning (β = -.10, 95% CI = -.16 to -.04, *p* =.001), had emerged as significant predictors for psychological distress.

Judging from the standardized coefficients, academic stress and social support contribute most to the prediction. The influence of academic stress on psychological distress is, however, comparatively stronger in male than female students. On the contrary, the perceived social support score had a greater influence on female students than on male students.

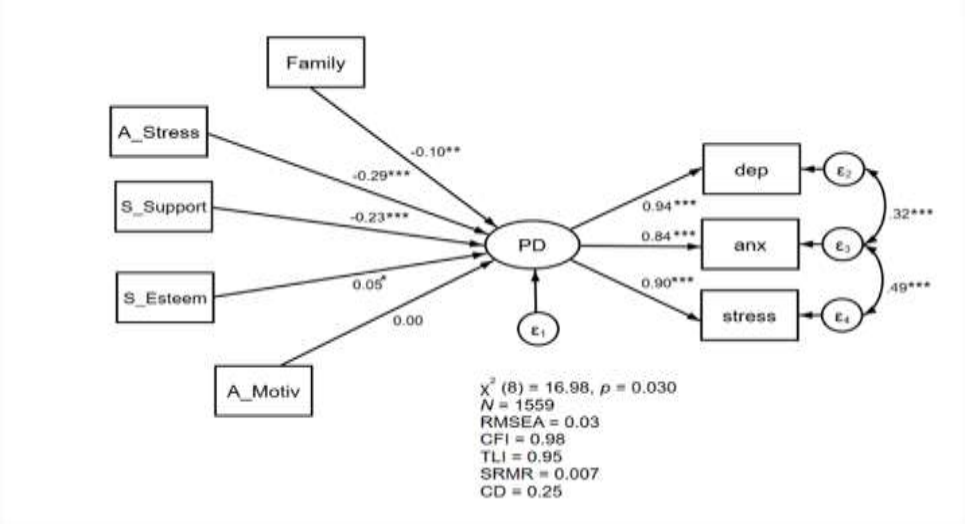
Negative coefficients signify an inverse relationship between variables. Simply put, the higher the score of predictor variables, the lower the score of psychological distress as measured by depression, anxiety, and stress, is predicted. Figure 2 and Figure 3 illustrate the relationship of variables.

Figure 6: Diagrammatic presentation of regression analysis containing responses of male respondents (n = 646).



The diagram shows the standardized path coefficients and their statistical significance.

Figure 3: Diagrammatic presentation of regression analysis containing responses of female respondents (n = 1559).



The diagram shows the standardized path coefficient and their statistical significance.

The models developed in this study showed an acceptable goodness of fit. Although the chi-square statistics for model 1, which included responses of all study participants, and model 3, which included responses of female participants, were statistically significant, signifying a discordance between the model and population estimates, several researchers pointed out that the chi-squared test provides the least useful metric for model fit because of its sensitivity to sample size (Hu & Bentler, 1999; Schumacker & Lomax, 2010). In a study with a large sample size, it is typical to see such a chi-squared test to be significant. Therefore, other indicators such as RMSEA, CFI, and TLI should be used for model fitness. In the current study, those indicators showed acceptable values compared to established cutoffs or benchmarks. Table 2 summarizes the results of analyses along with the models' fit statistics.

Table 2

Results of structural equation modelling on factors associated with psychological distress among medical students

	All students (N = 2205)				Male students (*n* = 646)				Female Students (*n* = 1559)			
	Coef.	SE	95% CI	*p*	Coef.	SE	95% CI	*p*	Coef.	SE	95% CI	*p*
Structural												
Psychological Distress												
Academic stress	-.29	.021	[-.33, -.25]	<.001	-.30	.039	[-.37, -.22]	<.0001	-.29	.024	[-.34, -.25]	<.001
Social Support	-.21	.026	[-.26, -.16]	<.001	-16	.047	[-.25, -.07]	0.001	-.23	.030	[-.29, -.17]	<.001
Self-esteem	.02	.019	[-.02, .06]	0.24	-.03	.034	[-.09, .03]	0.410	.05	.023	[.00, .09]	0.047
Academic motivation	-.04	.022	[-.07, .01]	0.11	-.12	.038	[-.19, -.04]	0.002	.00	.027	[-.04, .06]	0.884
Family	-.11	.025	[-.15, -.06]	<.001	-.11	.043	[-.19, -.02]	0.010	-.10	.029	[-.16, -.04]	0.001
Measurement												
Depression	.95	.010	[.93, .97]	<.001	.99	.019	[.95, 1.02]	<.001	.94	.013	[.92, .97]	<.001
Anxiety	.84	.017	[.81, .88]	<.001	.87	.029	[.81, .92]	<.001	.84	.021	[.79, .88]	<.001
Stress	.88	.010	[.86, .91]	<.001	.86	.019	[.82, .89]	<.001	.90	.013	[.87, .92]	<.001
Var (e. Depression)	.08	.021	[.04, .13]		.019	.038	[.00, 1.06]		.11	.025	[.07, .17]	
Var (e. Anxiety	.29	.029	[.23, .35]		.249	.052	[.17, .37]		.30	.036	[.24, .38]	
Var (e. Stress)	.21	.019	[.18, .26]		.260	.033	[.20, .34]		.19	.024	[.15, .25]	
Var (e. Psych. Distress)	.74	.016	[.71, .77]		.721	.029	[.66, .78]		.75	.018	[.71, .79]	
Cov (e. Dep, e. Anx)	.28	.092	[.11, .47]	0.002	.13	.413	[-.67, .95]	0.738	.32	.090	[.14, .50]	<.001
Cov (e. Anx, e. Stress)	.48	.041	[.40. .56]	<.001	.48	.062	[.36 - .61]	<.001	.49	.053	[.39, .60]	<.001
Fit Indices												
Chi2 (df.)	22.60	(8)		0.004	14.90	(8)		0.060	16.98	(8)		0.030
RMSEA	.029		[.02, .04]		.030		[.01, .05]		.030		[.01, .05]	
CFI/TLI	.998	.995			.998	.995			.998	.995		
SRMR	.006				.009				.007			
CD	.256				.279				.250			

Abbreviation: Coef. = (standardized) coefficient, SE = Standard Error, CI = Confidence Interval, Var = Variance, Cov. = Covariance, Dep = Depression, Anx = anxiety, df. = degree of freedom, RMSEA =Root Mean squared error approximation, CFI/TLI = Comparative Fit Index/Tucker-Lewis Index, SRMR = Standardized Mean Squared Residual, CD = Coefficient of Determination.

4. Discussion

Our findings highlight the significant association between academic stress, social support, family functioning and psychological distress. Such significant findings were consistent with the findings of recent studies. Numerous studies have established a significant association between academic stress and mental health issues among university students. For instance, a systematic review highlighted that stressful academic environments can lead to mental health problems, emphasizing the need for educational institutions to foster holistic well-being (Garces Garces et al., 2024). Another study found a negative correlation between mental health issues, such as anxiety and depression, and academic performance, underscoring the importance of socio-emotional skills in mitigating these effects (Saidi et al., 2024). Furthermore, research specifically focused on undergraduate students revealed that academic stress is a significant predictor of mental health issues, indicating a direct impact on students' psychological well-being (Kashif et al., 2024).

Research consistently highlights the significant association between social support and mental health among university students. A study in Malaysia found that higher levels of social support were linked to lower levels of psychological distress, including anxiety, stress, and depression, indicating a protective effect against suicidal ideation (Tarmizi et al., 2024). Similarly, research conducted in Pakistan demonstrated that social support positively influenced students' mental well-being, with a strong mediation effect from parent-child relationships (Jameel et al., 2024). Furthermore, a study on Chinese university students revealed that perceived social support significantly enhanced psychological resilience, with positive coping styles mediating this relationship (Hou et al., 2024). Collectively, these findings underscore the importance of fostering social support systems within university environments to enhance students' mental health and resilience, while also suggesting the need for targeted mental health education initiatives.

Also, research indicates a significant association between family functioning and mental health among university students. A study by del Carmen et al. (2024) found that positive family relationships were linked to better mental health outcomes, with stronger associations observed during the COVID-19 pandemic, highlighting the protective role of family dynamics in stressful times. Similarly, Shon & Lee (2004) demonstrated that family dysfunction negatively impacted perceived mental health, with family communication serving as a mediating factor. Furthermore, Osman et al (2024) reported that dysfunctional family environments correlated with increased mental health risks, emphasizing the importance of effective coping strategies. Qi et al. (2024) also noted that better family functioning predicted lower depressive symptoms and social media addiction, suggesting that family dynamics influence various aspects of mental health. Collectively, these studies underscore the critical role of family functioning in shaping mental health outcomes among university students, advocating for interventions that enhance family relationships and communication skills.

Our study observed a significant association between self-esteem and psychological distress in male students, and between academic motivation and psychological distress in female students. These significant associations were however absent when all data were analyzed together. This phenomenon, perhaps, could be explained by the inherent differences in perceptions that were documented across the literature. Research indicates notable gender differences in academic motivation and self-esteem among university students. Female students generally exhibit higher self-esteem compared to their male counterparts, as evidenced by findings from a study in South Punjab, which reported that female participants had significantly higher self-esteem levels despite no significant differences in academic performance between genders (Perveen et al., 2022). Conversely, another study highlighted that self-esteem positively influenced academic performance for females but not for males, suggesting that female students' perceptions significantly impact their academic outcomes (Subair, 2022). Additionally, self-efficacy, a related construct, was found to be lower in female students compared to males, although females demonstrated a greater motivation for learning compliance (Xiao & Song, 2022). This suggests that while females may possess higher self-esteem, their self-efficacy could be a barrier to academic motivation. Overall, these findings underscore the complexity of gender dynamics in academic settings, indicating that interventions aimed at enhancing self-esteem and self-efficacy could be beneficial, particularly for female students.

The findings in this study might be further complicated by gender differences in self-reported mental health

among university students. Women generally report poorer mental health outcomes compared to men, as evidenced by studies showing that female students experience higher levels of anxiety, depression, and self-harm behaviors (Faradiba & Rahmatullah, 2023). In contrast, men tend to perceive their overall health more positively and report fewer limitations in daily activities (Garcia-Campanario et al., 2024). However, men are less likely to recognize or seek help for mental health issues, often due to stigma and societal expectations surrounding masculinity (Wolstenholme, 2024). These findings, therefore, emphasize the need for tailored, gender-based mental health intervention.

This study is limited due to its cross-sectional design. While cross-sectional studies are useful for generating hypotheses and initial insights, their limitations require careful interpretation and often warrant follow-up studies to confirm findings. Researchers interested in similar studies should consider using a longitudinal design. Longitudinal designs offer several advantages over cross-sectional designs, primarily because they can track changes over time and establish causal relationships. This dynamic approach allows researchers to observe the evolution and interactions of variables, providing deeper insights into phenomena.

5. Managerial Implications and Recommendations

Understanding the mental health needs of students can significantly inform the practices of university counselling service centers. The findings presented in the study highlight the necessity for university counselling service centers to develop specialized, inclusive services that cater to diverse student populations. University counselling service centers should consider barriers to access and explore innovative staffing solutions to meet the growing demand for mental health services. Additionally, the findings underscore the importance of integrating mental health support into academic frameworks, as mental health disorders can adversely affect students' academic performance (Putra & Mudjiran, 2023). Overall, these insights can guide university counselling service centers in enhancing service delivery and addressing the evolving mental health landscape in higher education.

Conclusion

The research concludes that there is a significant relationship between academic stress, social support, family functioning, and psychological distress among university students. High levels of academic stress are closely associated with increased psychological distress, while strong social support and healthy family functioning play protective roles in mitigating these effects. As predictor variables, academic motivation is only statistically significant among male students, whereas the significant effect of self-esteem is only significant among female students. These findings suggest the importance of tailored mental health services in universities that consider gender-specific needs. By addressing these gender differences, institutions can develop more effective support systems, such as counselling services that focus on building coping mechanisms for academic stress and strengthening social and familial support networks, thereby improving overall student well-being.

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A Preliminary Methodological Framework of the Potential Hydrogen Economy for a Sustainable Transport in Malaysia

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Abstract: The transition to a hydrogen economy is vital for achieving sustainable transport in Malaysia, particularly in mitigating the environmental impact of heavy-duty mobility. This paper proposes a preliminary methodological framework to evaluate hydrogen's potential as a transformative solution for decarbonizing the transportation sector, focusing on key areas such as hydrogen production, storage, distribution, and vehicle integration, with an emphasis on green hydrogen from renewable sources. Our assessment reveals the significant potential of hydrogen to reduce greenhouse gas emissions and air pollutants, positioning it as a viable alternative to fossil fuels and battery-electric vehicles, especially in heavy-duty applications. The study assesses the technological feasibility, economic viability, and environmental benefits of adopting hydrogen in Malaysia, considering current infrastructure, production capabilities, and regulatory frameworks. Key challenges identified include the high costs of hydrogen production and infrastructure, technological barriers in storage and vehicle integration, and gaps in policy and market readiness. To address these, we propose strategic recommendations for stakeholders, highlighting the need for government support, public-private partnerships, and international collaborations. This framework aims to guide Malaysia's transition to a hydrogen-powered transport sector, aligning with the nation's sustainability and energy security goals while positioning Malaysia as a leader in hydrogen technology in Southeast Asia.

Keywords: *Hydrogen economy, sustainable transport, green hydrogen, Malaysia, decarbonization, heavy-duty vehicles, technological feasibility, economic viability*

1. Introduction and Background

The global transportation sector is a significant contributor to greenhouse gas emissions, accounting for approximately 24% of global CO_2 emissions from energy consumption, with heavy-duty vehicles (HDVs) such as trucks, buses, and trains being major contributors within this sector (International Energy Agency [IEA], 2023). As the world seeks to transition towards more sustainable energy systems, the hydrogen economy has emerged as a promising solution for decarbonizing transportation, particularly heavy-duty mobility. In Malaysia's context, its National Energy Policy 2022-2040 the transition to a hydrogen-based economy is not merely strategic but essential. Malaysia's pledge to cut carbon emissions level by 15 percent in 2050, with the launching of the Hydrogen Economy and Technology Roadmap (HETR) has strengthened its commitment.

The concept of a hydrogen economy envisions a future where hydrogen plays a central role in energy storage, distribution, and utilization across various sectors, including transportation, industry, and power generation (International Renewable Energy Agency [IRENA], 2019). This transition is driven by advancements in hydrogen production technologies, such as electrolysis powered by renewable energy (producing "green hydrogen") and steam methane reforming coupled with carbon capture and storage (producing "blue hydrogen") (European Hydrogen Backbone, 2023) which are expected for its potential to be more economically competitive and environmentally beneficial over time.

The use of hydrogen in the transportation sector, particularly for heavy-duty vehicles, is one of the most promising aspects of the hydrogen economy. Fuel cell electric vehicles (FCEVs) use hydrogen to generate

electricity on-board through a chemical reaction in a fuel cell, offering a clean and efficient alternative to diesel engines (U.S. Department of Energy, 2021). Heavy-duty vehicles (HDVs), which include trucks, buses, and trains, are particularly well-suited for hydrogen fuel cells because of the high energy density of hydrogen, which provides longer driving ranges and quick refueling times compared to battery-electric alternatives (National Renewable Energy Laboratory [NREL], 2021). These vehicles are essential for the movement of goods and people over long distances, often serving as the backbone of economic activities, particularly in logistics and public transportation. Despite their importance, HDVs are also significant contributors to greenhouse gas (GHG) emissions and air pollution, which has made their decarbonization a priority in pushing towards sustainable transport.

As far as Malaysia is concerned, the state of Sarawak has taken the lead in the hydrogen economy to begin large-scale commercial production to be the exporter of hydrogen by 2027. The launching of its H2biscus project in Tanjong Kidurong, Bintulu is forecasted to produce 220,000 tons of green hydrogen, 630,000 tons of green ammonia and 600,000 tons of blue ammonia when it starts operation. On the other hand, the Sarawak Economic Development Corporation (SEDC) will promote extending the use of hydrogen-powered public vehicles to the people of Sarawak. Its Chairman Tan Sri Datuk Amar Abdul Aziz Hussain stated that the use of Autonomous Rapid Transit (ART) vehicles and buses will start its commercial operations by the end of 2025 (The Borneo Post Online, March 22, 2023). He further added that SEDC Energy needs to produce hydrogen to power the state's ART system and hence it is best to produce their electrolyzers to cut the cost.

Additionally, the shift towards a hydrogen economy has significant implications for energy security and economic development. By diversifying the energy mix and reducing reliance on imported fossil fuels, hydrogen can enhance energy resilience and provide new economic opportunities, particularly in regions with abundant renewable energy resources (European Hydrogen Backbone, 2023). Furthermore, as technologies advance and economies of scale are realized, the costs associated with hydrogen production and infrastructure are expected to decrease, making hydrogen a more competitive and viable option for widespread adoption.

Nevertheless, issues or challenges in a developing country like Malaysia are that the transition to a hydrogen economy would involve the need for extensive infrastructure development, high costs of hydrogen production and the lack of a cohesive regulatory framework present significant barriers to widespread adoption (IRENA, 2019). Addressing these challenges requires coordinated efforts from governments, industries, and research institutions to invest in technology development, infrastructure, and supportive policies. Thus, the primary objective of this paper is to propose a preliminary methodological framework for a hydrogen economy in Malaysia's transport sector, and the specific goals are to explore hydrogen's role, assess feasibility, identify impacts, and analyze challenges.

2. Literature Review

Hydrogen as a Clean Energy Carrier: One of hydrogen's most notable properties is that it is the most abundant element in the universe, making it a potentially limitless energy resource. As the lightest element, hydrogen boasts a high energy content per unit mass, making it highly efficient for energy storage and utilization (U.S. Department of Energy, 2021). Hydrogen's high energy density is particularly advantageous in applications requiring long driving ranges and heavy payload capacities, such as in heavy-duty transportation, where it is approximately three times that of gasoline (International Renewable Energy Agency [IRENA], 2020). Additionally, hydrogen is non-toxic and non-polluting, and when used in fuel cells, it combines with oxygen to produce electricity, with water vapor as the only by-product. This makes hydrogen an environmentally friendly alternative to traditional fossil fuels (Hydrogen Council, 2021).

The benefits of hydrogen extend beyond its clean emission profile. Hydrogen fuel cells, for instance, emit only water vapor, which significantly reduces greenhouse gas emissions and air pollutants compared to internal combustion engines powered by fossil fuels (International Energy Agency [IEA], 2021). Moreover, hydrogen can be produced from a variety of resources, including water, natural gas, biomass, and even industrial waste. This versatility allows hydrogen to be integrated into various energy systems, thereby enhancing energy security by diversifying the energy mix (IRENA, 2019). Another significant advantage is hydrogen's capacity for long-term energy storage, which makes it an ideal solution for balancing supply and demand in renewable

energy systems, where the production of electricity from sources like wind and solar can be intermittent (U.S. Department of Energy, 2021).

Hydrogen's applications are broad and impactful, particularly in transportation, industry, and power generation. In the transportation sector, hydrogen is increasingly seen as a promising solution for heavy-duty vehicles such as buses, trucks, and trains. The high energy density of hydrogen, combined with rapid refueling capabilities, offers significant advantages over battery-electric vehicles, particularly in applications requiring long ranges and heavy loads (Hydrogen Council, 2022). In the industrial sector, hydrogen is already widely used as a feedstock in processes such as ammonia production, oil refining, and steel manufacturing, and its role is expected to expand as industries seek to reduce carbon emissions (IEA, 2021). Furthermore, hydrogen can be utilized in power generation, either through direct combustion in gas turbines or in fuel cells, providing a clean and flexible option for electricity production (IRENA, 2019).

In recent years, there has been a significant increase in global interest and investment in hydrogen as a clean energy solution, especially in the transportation sector. Governments and industries worldwide are increasingly recognizing hydrogen's potential to decarbonize heavy-duty transport and are actively integrating it into their energy and transport strategies.

The European Union (EU) has made hydrogen a central component of its climate neutrality goals, with the EU Hydrogen Strategy outlining plans for the large-scale deployment of hydrogen technologies across the continent. This strategy includes ambitious targets, such as the installation of 6 GW of renewable hydrogen electrolyzers by 2024 and 40 GW by 2030, highlighting the EU's commitment to integrating hydrogen into its energy and transportation systems (European Commission, 2020). Similarly, Japan has been a pioneer in hydrogen technology, with its Hydrogen Roadmap setting out plans to establish a hydrogen-based society. Japan aims to deploy 320 hydrogen refueling stations and 200,000 hydrogen vehicles by 2025, focusing on reducing the cost of hydrogen and expanding its use in transportation (Ministry of Economy, Trade and Industry [METI], 2017). In the United States, the Department of Energy (DOE) has launched several initiatives, including the Hydrogen Energy Earth Shot, which seeks to reduce the cost of clean hydrogen to $1 per kilogram by 2030. The U.S. is also investing heavily in hydrogen infrastructure to support the adoption of hydrogen-powered heavy-duty vehicles (U.S. Department of Energy, 2021).

In the transportation sector, hydrogen fuel cells are being increasingly adopted in vehicles, particularly in regions such as Japan, South Korea, and California. These vehicles offer longer driving ranges and quicker refueling times compared to battery-electric vehicles, making them particularly suitable for heavy-duty applications (Hydrogen Council, 2022). In Europe, hydrogen-powered trains like the Alstom Coradia iLint have been successfully deployed, demonstrating hydrogen's viability as a clean energy solution for rail transport (Alstom, 2022). Additionally, companies such as Hyundai and Nikola are developing hydrogen fuel cell trucks for long-haul transportation, which are expected to play a crucial role in reducing emissions from the freight sector (Hyundai, 2021; Nikola Corporation, 2022).

Hydrogen in Heavy-Duty Mobility: Alstom's Coradia iLint, the world’s first hydrogen-powered train, was introduced in Germany in 2018. It operates on non-electrified tracks and has a range of approximately 1,000 kilometers on a single tank of hydrogen. This train has been celebrated for its low environmental impact, emitting only water vapor and offering a sustainable alternative to diesel trains on routes that are not yet electrified. The success of the Coradia iLint has prompted further interest in hydrogen trains across Europe and beyond (Alstom, 2022).

In 2020, Hyundai began deploying its XCIENT Fuel Cell trucks in Switzerland as part of a broader initiative to establish a green hydrogen ecosystem. These trucks, designed for long-haul freight operations, offer a range of around 400 kilometers per refueling, with plans to increase the fleet size in the coming years. This project has highlighted the operational feasibility of hydrogen trucks and the importance of developing supporting infrastructure such as refueling stations (Hyundai, 2021).

South Korea has been a leader in the adoption of hydrogen buses. Hyundai has developed and deployed hydrogen fuel cell buses in several cities across the country, with the buses being integrated into regular public

transit services. These buses are part of South Korea's broader strategy to reduce urban air pollution and greenhouse gas emissions, with the government providing substantial support for hydrogen infrastructure development (Hydrogen Council, 2022).

In Malaysia, the state of Sarawak has taken significant steps towards adopting hydrogen in public transportation. The Sarawak government launched Southeast Asia's first hydrogen-powered buses in Kuching in 2019. This pilot project is part of a larger initiative to explore hydrogen as a clean energy source for the region. The hydrogen used is produced locally, highlighting the potential for integrating hydrogen production and usage within the local economy. The success of this project could pave the way for the broader adoption of hydrogen technology in Malaysia's transport sector (Sarawak Energy, 2020).

Framework Development Key Component: The foundation of any hydrogen economy framework is the production and supply chain of hydrogen. According to the International Renewable Energy Agency (2019), green hydrogen, produced through electrolysis using renewable energy, is essential for reducing the carbon footprint of hydrogen production. Additionally, hydrogen production methods such as Steam Methane Reforming (SMR) with Carbon Capture and Storage (CCS) are currently more prevalent but face challenges related to carbon emissions and scalability (International Energy Agency, 2023). A robust hydrogen economy framework must prioritize green hydrogen while acknowledging the role of transitional technologies like SMR with CCS.

Storage and distribution are critical components of the hydrogen supply chain. The U.S. Department of Energy (2022) highlights that advancements in storage technologies, such as compressed gas, liquid hydrogen, and chemical carriers, are necessary to ensure a stable hydrogen supply. Efficient distribution networks, including pipelines and refueling infrastructure, are also crucial for the successful integration of hydrogen into the transportation sector. The framework must address the technological and logistical challenges associated with hydrogen storage and distribution to create a resilient supply chain.

The success of the hydrogen economy depends heavily on supportive policy and regulatory frameworks. The Hydrogen Council (2022) and the International Energy Agency (2023) emphasize the importance of government policies that incentivize hydrogen production and use, such as subsidies, tax credits, and carbon pricing. These policies must be designed to stimulate investment in hydrogen infrastructure and research while ensuring alignment with international standards and certifications. A methodological framework must incorporate policy recommendations that foster innovation, investment, and international collaboration.

The integration of hydrogen into transportation systems, particularly for heavy-duty vehicles, is a key focus of the hydrogen economy. Hydrogen fuel cell vehicles (FCVs) offer a zero-emission alternative to diesel engines, and their adoption is critical for decarbonizing the transportation sector (Hydrogen Council, 2022). The literature suggests that a successful framework must include strategies for scaling up FCV production, developing refueling infrastructure, and ensuring the economic viability of hydrogen as a fuel.

Finally, the framework must address the socio-economic and environmental impacts of transitioning to a hydrogen economy. This includes assessing the economic feasibility of hydrogen technologies, their potential to create jobs, and their environmental benefits compared to existing energy sources (National Renewable Energy Laboratory, 2021). The framework should also consider public acceptance and the social implications of widespread hydrogen adoption.

3. Research Methodology

Methodological Framework Development: Developing a preliminary methodological framework for establishing a hydrogen economy in Malaysia involves several critical steps, each designed to address the unique challenges and opportunities within the Malaysian context. The following outlines the key steps in this process:

Step1: Literature Review and Benchmarking
The first step is to conduct a comprehensive literature review and benchmarking of global hydrogen

economies. This involves analyzing existing hydrogen strategies and frameworks from leading countries such as Japan, Germany, and South Korea, as well as reviewing academic research and case studies on hydrogen technologies and their applications in transportation. This step will provide a solid foundation of knowledge on the current state of hydrogen economies globally, identifying best practices, key success factors, and potential pitfalls that could be relevant to Malaysia's context.

Step2: Stakeholder Analysis
Identifying and engaging with key stakeholders in the hydrogen economy, including government agencies, industry players, research institutions, and non-governmental organizations (NGOs). This step involves mapping out the roles and interests of these stakeholders and assessing their influence and contribution to the development of a hydrogen economy in Malaysia. A stakeholder map that highlights the roles, responsibilities, and potential collaboration opportunities among different entities, ensuring a coordinated approach to hydrogen development.

Step3: Assessment of Malaysia's Current Energy Landscape
Analyzing Malaysia's current energy mix, infrastructure, and policies to assess the readiness for integrating hydrogen as a significant energy carrier. This includes evaluating the availability of renewable energy sources for green hydrogen production, existing hydrogen production capacities, and the state of transportation infrastructure. A detailed report on Malaysia's energy landscape identifies existing assets, gaps, and areas requiring development to support a hydrogen economy.

Step4: Feasibility Studies
Conducting technical, economic, and environmental feasibility studies specific to the Malaysian context. These studies will assess the potential for hydrogen production (both green and blue hydrogen), the cost-effectiveness of hydrogen technologies, and the environmental benefits and risks associated with hydrogen adoption. A series of feasibility reports that provide data-driven insights into the viability of hydrogen as a key component of Malaysia's energy and transportation sectors.

Step 5: Framework Design and Development
Using insights from the previous steps, design a preliminary framework that outlines the structure, policies, and strategies required to develop a hydrogen economy in Malaysia. This framework should include technological pathways, infrastructure development plans, and policy recommendations tailored to Malaysia's specific needs. A draft framework document that serves as a roadmap for establishing a hydrogen economy in Malaysia, with clearly defined phases, milestones, and action plans.

Step 6: Pilot Projects and Case Studies
Designing and implementing pilot projects in key areas such as transportation and industrial applications. These pilots will serve as practical case studies to test the viability of the hydrogen framework and provide real-world data for further refinement. Detailed case studies from pilot projects that offer insights into the practical challenges and successes of hydrogen adoption in Malaysia, inform the final framework.

Step 7: Feedback and Iteration
Engaging stakeholders once more to gather feedback on the preliminary framework, followed by iterative refinement. This step ensures that the framework is robust, practical, and aligned with the needs and expectations of all stakeholders. A final, well-vetted framework ready for implementation, along with an action plan for its rollout across different sectors in Malaysia.

Step 8: Implementation Planning
Developing a comprehensive implementation plan that includes timelines, resource allocation, and risk management strategies. This plan should outline the specific steps needed to transition from the framework to actionable projects and initiatives. A detailed implementation plan that guides the deployment of the hydrogen economy framework, ensuring the smooth execution and continuous monitoring and evaluation.

Step 9: Monitoring and Evaluation
Establishing monitoring and evaluation mechanisms to track progress, measure impacts, and ensure the

framework's objectives are being met. This includes setting up key performance indicators (KPIs) and conducting regular assessments. A robust monitoring and evaluation system that provides continuous feedback and enables the framework to adapt to changing conditions or new information.

Hydrogen Production Technologies: When analyzing different hydrogen production methods for potential application within Malaysia's hydrogen economy, it is essential to adopt a systematic approach that considers both the technical and economic aspects of each method, along with its environmental impacts. The primary hydrogen production methods that need to be analyzed include green hydrogen, produced via electrolysis powered by renewable energy; blue hydrogen, produced from natural gas with carbon capture and storage (CCS); and grey hydrogen, produced from natural gas without CCS. Table 1 summarizes the technical feasibility, economic viability, and environmental impact of green, blue, and grey hydrogen production methods, with a focus on their application within Malaysia's hydrogen economy.

Table 1: Hydrogen Technical Feasibility, Economic Viability, and Environmental Impact

Aspect	Green Hydrogen	Blue Hydrogen	Grey Hydrogen
Technical Feasibility	Evaluate availability and potential for scaling up renewable energy sources (e.g., solar, wind) for electrolysis. Consider the efficiency of current electrolyzer technologies. Examine the adaptability of these technologies to Malaysia's energy landscape.	Assess infrastructure and technology for natural gas reforming combined with CCS. Evaluate the availability of natural gas resources and proximity of CCS sites. Assess technology readiness for large-scale deployment.	Analyze current infrastructure for natural gas production. Consider the potential for transitioning to cleaner methods. Serve as a transitional method while green hydrogen infrastructure is developed.
Economic Viability	Examine the cost of producing green hydrogen, focusing on the cost of renewable energy, electrolyzers, and infrastructure. Factor in potential economies of scale and impact of government incentives or subsidies.	Analyze the costs associated with natural gas extraction, reforming technologies, and CCS. Evaluate the economic feasibility relative to other low-carbon options. Consider market demand and regulatory frameworks influencing costs.	Consider the current cost structure of grey hydrogen production. Assess potential economic shifts as Malaysia transitions to cleaner alternatives. Include an analysis of potential carbon pricing or taxes affecting long-term viability.
Environmental Impact	Evaluate lifecycle emissions, considering the carbon footprint of renewable energy sources. Assess the potential for near-zero emissions from green hydrogen production. Assess the environmental benefits of green hydrogen in reducing Malaysia's overall greenhouse gas emissions.	Analyze carbon capture efficiency and effectiveness in reducing emissions. Consider potential risks and environmental impacts associated with CCS technologies. Assess the role of blue hydrogen in achieving short-to-medium-term emissions reduction targets while green hydrogen infrastructure and technology continue to mature.	Assess environmental impact focusing on greenhouse gas emissions. Consider implications for Malaysia's climate goals and commitments under international agreements. Evaluate the environmental trade-offs of continued grey hydrogen production while transitioning towards more sustainable hydrogen production methods.

Hydrogen Storage and Distribution: When developing a methodological framework for assessing the

challenges and solutions associated with hydrogen storage and distribution in Malaysia, the following steps are critical:

Step1: Identification of Storage Methods
Investigate the use of high-pressure tanks for storing hydrogen as a gas. Assess the technical feasibility, safety standards, and capacity limitations associated with compressed gas storage. Evaluate the viability of storing hydrogen in liquid form at cryogenic temperatures. Consider the energy requirements for liquefaction and the associated infrastructure needed for maintaining extremely low temperatures. Explore the potential for storing hydrogen in solid materials, such as metal hydrides, which can absorb and release hydrogen under certain conditions. Analyze the efficiency, scalability, and safety of these technologies in the context of Malaysia's energy landscape.

Step 2: Technical and Economic Feasibility Assessment
Conduct a technical assessment of the various storage methods, focusing on factors such as energy density, storage efficiency, material durability, and life cycle. Evaluate the adaptability of these methods to Malaysia's climate and existing infrastructure. Perform a cost analysis to determine the economic feasibility of each storage method. This includes calculating the initial capital costs, operating and maintenance expenses, and potential economies of scale. Consider the impact of government incentives and market demand on reducing these costs over time.

Step 3: Safety and Regulatory Considerations
Review existing safety standards and regulations for hydrogen storage in Malaysia and globally. Assess the risks associated with each storage method, including potential hazards such as leaks, explosions, and contamination. Analyze the current regulatory framework governing hydrogen storage in Malaysia. Identify gaps and propose necessary updates or new regulations to ensure safe and efficient hydrogen storage.

Step 4: Infrastructure Assessment
Assess the current state of infrastructure related to hydrogen storage and distribution in Malaysia. This includes existing storage facilities, pipelines, and transportation networks. Identify the infrastructure needed to support the large-scale deployment of hydrogen technologies. This involves planning for new storage facilities, distribution networks, and integration with existing energy systems.

Step 5: Stakeholder Engagement
Engage with key stakeholders, including government agencies, industry players, and research institutions, to gather input and support for developing and implementing storage solutions. Conduct workshops and consultations to ensure alignment and address concerns. Develop strategies to educate the public and relevant stakeholders about the importance of hydrogen storage and the safety measures in place. Public acceptance is crucial for the successful implementation of hydrogen storage infrastructure.

Step 6: Pilot Projects and Case Studies
Design and implement pilot projects to test various hydrogen storage methods in real-world scenarios. These projects will provide valuable data on the performance, costs, and challenges associated with each method. Conduct case studies on successful hydrogen storage projects in other countries, analyzing their strategies, challenges, and outcomes. Use these insights to refine the framework for Malaysia.

Evaluation of Infrastructure Needs, Including Hydrogen Refueling Stations, and Logistics: To support the widespread adoption of hydrogen as a sustainable fuel, Malaysia must develop an extensive infrastructure network. The evaluation of infrastructure needs involves the following key components:

Hydrogen Refueling Stations
Assess the current number and distribution of hydrogen refueling stations in Malaysia, if any. Identify areas where refueling infrastructure is most needed, such as urban centers, industrial zones, and major transportation corridors. Develop a strategic plan for the rollout of hydrogen refueling stations. This plan should consider the optimal locations for stations based on factors such as traffic density, proximity to hydrogen production sites, and existing energy infrastructure. Evaluate the costs associated with building and

operating hydrogen refueling stations, including land acquisition, construction, equipment, and maintenance. Identify potential funding sources, such as government subsidies, private investments, and public-private partnerships. Ensure that all hydrogen refueling stations comply with international safety standards and local regulations. This includes setting guidelines for station design, operation, and emergency response procedures.

Hydrogen Logistics and Distribution Networks
Assess the feasibility of developing hydrogen pipelines for efficient transportation of hydrogen from production sites to storage facilities and refueling stations. Consider the costs, technical challenges, and regulatory requirements associated with pipeline construction. Evaluate the use of trucks and ships for transporting hydrogen, especially to regions not served by pipelines. Consider the safety and efficiency of different transport modes, as well as the need for specialized vehicles and containers designed for hydrogen transport. Analyze how hydrogen storage and distribution infrastructure can be integrated with Malaysia's existing energy systems, such as natural gas networks and electrical grids.

Long-term Infrastructure Planning
Develop a scalable infrastructure plan that allows for gradual expansion as hydrogen demand grows. This plan should include provisions for upgrading and expanding storage facilities, refueling stations, and distribution networks as needed. Implement a monitoring system to track the performance of hydrogen infrastructure. Use this data to make informed decisions about future investments and adaptations to the infrastructure network.

International Collaboration
Collaborate with countries that have advanced hydrogen infrastructure, such as Japan, Germany, and South Korea. Learn from their experiences and adapt their best practices to the Malaysian context. Explore the potential for cross-border hydrogen infrastructure projects with neighboring countries, which could enhance regional energy security and create new economic opportunities.

Cost-Benefit Analysis of Hydrogen Use in Heavy-Duty Vehicles: Conducting a cost-benefit analysis (CBA) of hydrogen use in heavy-duty vehicles requires a systematic approach to evaluate the financial viability and broader economic impacts of adopting hydrogen as a primary fuel source. The following steps outline the approach:

Step 1: Define the Scope and Objectives
Establish the scope of the analysis, including the types of heavy-duty vehicles (HDVs) to be considered. State the objectives, such as reducing greenhouse gas emissions, enhancing energy security, or achieving cost savings over the vehicle's lifecycle.

Step 2: Identify and Quantify Costs
Include the initial costs of purchasing hydrogen-powered vehicles, which may be higher than traditional vehicles due to the technology's current state. Account for the costs associated with developing the necessary hydrogen production, storage, and refueling infrastructure. This includes the construction of refueling stations and the modification of existing facilities to handle hydrogen. Assess the costs of hydrogen fuel, which depend on production methods. Include maintenance costs, which may differ from those of traditional vehicles due to the different technology used. Consider the potential costs associated with environmental impacts, such as the cost of carbon emissions if traditional fuels are used versus the near-zero emissions of hydrogen. These can be translated into financial terms through carbon pricing or emissions trading schemes.

Step 3: Identify and Quantify Benefits
Evaluate potential savings in fuel costs over the vehicle’s operational life, particularly in regions where hydrogen may become cheaper than diesel or gasoline as production scales up. Quantify the reduction in greenhouse gas emissions and other pollutants, translating these into monetary terms where applicable. Assess the benefits of reduced reliance on imported fossil fuels, which may include enhanced energy independence and stability of fuel prices. Consider the broader economic impacts, such as job creation in the hydrogen sector and the potential for technological leadership and export opportunities.

Step 4: Perform a Sensitivity Analysis

Conduct sensitivity analyses to understand how changes in key variables impact the overall cost-benefit outcome. This helps in assessing the robustness of the conclusions under different scenarios.

Step 5: Compare Net Present Value (NPV)
Calculate the NPV of the costs and benefits over the vehicle's expected lifetime, using an appropriate discount rate. This will provide a clear picture of the economic feasibility of hydrogen-powered HDVs compared to traditional and alternative fuels.

Step 6: Assess Non-Monetary Factors
Consider qualitative factors such as the societal acceptance of hydrogen technology, the readiness of supporting infrastructure, and potential regulatory changes that could affect economic feasibility.

Comparison of the Total Cost of Ownership: The total cost of ownership (TCO) is a critical metric in comparing hydrogen-powered vehicles with traditional diesel or gasoline vehicles and alternative fuel vehicles such as battery-electric vehicles (BEVs). Table 2 provides a clear and concise comparison of the TCO for hydrogen-powered vehicles, traditional vehicles, and BEVs, highlighting the economic and environmental factors that influence the viability of each option in the context of the Malaysian transport sector.

Table 2: TCO for Hydrogen-powered Vehicles, Traditional Vehicles, and BEVs

Aspect	Hydrogen-Powered Vehicles	Traditional Vehicles (Diesel/Gasoline)	Battery-Electric Vehicles (BEVs)
Vehicle Acquisition Costs	Higher upfront costs due to fuel cell technology and lower production volumes.	Lower upfront costs due to economies of scale and established manufacturing processes.	Higher upfront costs due to battery technology, but costs are decreasing over time.
Fuel Costs	Higher fuel costs, especially for green hydrogen, but expected to decrease with advancements in renewable energy.	Lower fuel costs but subject to market fluctuations and geopolitical factors; higher emissions costs.	Lower fuel costs, particularly when charged during off-peak hours; are limited by long charging times.
Maintenance Costs	Potentially lower due to fewer moving parts in fuel cells; specialized maintenance skills required.	Predictable costs due to established services, though higher due to frequent parts replacement and emissions maintenance.	Lower due to fewer moving parts and no oil changes; significant battery replacement costs.
Lifespan and Residual Value	Long fuel cell lifespan; residual value depends on hydrogen adoption and secondary market development.	An established market for used vehicles helps maintain residual value.	Residual value linked to battery life and rapid tech advancements; potential for depreciation.
Environmental and Regulatory Costs	Benefit from low or zero emissions; lower environmental costs, especially with increasing carbon taxes.	Increasing costs due to stricter emissions regulations and potential carbon pricing.	Zero tailpipe emissions; environmental impact tied to electricity mix; benefits of incentives.
Incentives and Subsidies	Government incentives/subsidies can significantly reduce TCO, making hydrogen more competitive.	Fewer incentives; are subject to increasing regulations and carbon pricing.	Often eligible for significant incentives, subsidies, and tax benefits.

4. Comprehensive Assessment of Hydrogen's Environmental, Technological, and Economic Feasibility

for Sustainable Transport in Malaysia

Environmental Impact Analysis: The transition towards a hydrogen economy in Malaysia, particularly within the transportation sector, holds significant promise for reducing greenhouse gas (GHG) emissions and enhancing environmental sustainability. However, to ensure that the adoption of hydrogen technologies contributes positively to Malaysia's environmental goals, a comprehensive Environmental Impact Assessment (EIA) is essential. This section introduces the role of EIA in evaluating the environmental implications of developing a hydrogen economy, specifically focusing on the sustainable transport sector. Table 3 shows the comparative assessment of the greenhouse Gas Emissions and Environmental Impact of FCVs, Gasoline vehicles, BEVs and biofuels.

Table 3: Comparative Assessment of The Greenhouse Gas Emissions And Environmental Impact

Aspect	Hydrogen Fuel Cell Vehicles (FCVs)	Diesel and Gasoline Vehicles	Battery-Electric Vehicles (BEVs)	Biofuels
Tailpipe Emissions	Zero tailpipe emissions; no CO_2, NO_x, or PM. Only water vapor as a by-product.	Significant tailpipe emissions: CO_2, NO_x, and PM. Diesel: approx. 94 g CO_2e/MJ	Zero tailpipe emissions; similar to hydrogen FCVs.	Produces CO_2 when burned, though generally less than fossil fuels.
Lifecycle Emissions	1-4 g CO_2e/MJ for green hydrogen produced via renewable energy.	High lifecycle emissions due to extraction, refining, and combustion of fossil fuels.	Lifecycle emissions depend on the electricity mix; 50-100 g CO_2e/MJ in fossil-fuel-heavy grids.	Varies widely; generally lower than fossil fuels but still significant.
Air Pollutants	No NO_x or PM emissions; significant reduction in air pollutants.	High emissions of NO_x and PM, contribute to air quality degradation.	No NO_x or PM emissions; dependent on the electricity grid for overall impact.	Emits pollutants when burned; production can impact land and water resources.
Environmental Impact of Production	Minimal if produced from renewable energy; higher if from fossil fuels.	High environmental impact due to extraction and refining processes.	Significant due to raw material extraction (lithium, cobalt) and electricity generation.	Can impact land use and water resources; and potential competition with food production.

Technological Feasibility: The development of a hydrogen economy for sustainable transport in Malaysia hinges on the technological feasibility of hydrogen production, storage, distribution, and utilization in the transportation sector. Technological feasibility refers to the practical capability of deploying hydrogen technologies on a large scale, considering the current state of technology, infrastructure, and the readiness of these systems to meet the demands of a hydrogen-based transport network. This section introduces the key aspects of technological feasibility that need to be addressed to realize the potential of hydrogen as a sustainable energy solution for Malaysia's transportation sector. Table 4 shows the hydrogen production, storage, and vehicle integration in Malaysia.

Table 4: Hydrogen Production, Storage, and Vehicle Integration in Malaysia

Aspect	Current Status	Statistics	Potential for Improvement
Hydrogen Production	Focused on grey hydrogen, primarily for industrial use. Green hydrogen production is in the early stages of pilot projects.	Annual Production: 60,000 tonnes of hydrogen, mostly grey (Petronas, 2022). Renewable Energy Contribution: 23% of electricity in 2023,	Capitalize on solar and hydropower resources. Improve electrolyzer efficiency and scale renewable energy. Implement CCS for grey hydrogen to transition to blue hydrogen.

		targeted to increase to 31% by 2025 (Ministry of Energy, 2023). Green Hydrogen Costs: $4-6/kg (IRENA, 2020).	
Hydrogen Storage	Mainly through compressed gas storage. Research is ongoing into liquid hydrogen and solid-state storage but not commercially deployed.	Storage Infrastructure: Limited to a few industrial sites with no large-scale storage facilities (Petronas, 2022). Energy Efficiency: Compression can consume up to 15% of hydrogen's energy content (U.S. Department of Energy, 2021).	Develop advanced storage technologies such as solid-state and liquid hydrogen. Build a standardized regulatory framework for safe storage and scaling up infrastructure.
Vehicle Integration	Early-stage integration with pilot projects like the Sarawak Hydrogen Bus Project. Limited refueling infrastructure and high costs.	Hydrogen Refueling Stations: Only two operational stations, both in Sarawak (Sarawak Energy, 2023). Hydrogen Vehicles: Fewer than 100 in operation, mainly buses (Sarawak Metro, 2023). Vehicle Costs: $750,000 per bus (Hydrogen Council, 2022).	Invest in expanding refueling infrastructure in urban areas and major routes. Reduce vehicle costs through economies of scale and technological advancements. Government incentives and subsidies are needed.

Economic Assessment: The economic assessment of the potential hydrogen economy for sustainable transport in Malaysia is a critical component of the overall feasibility study. This section aims to assess the financial viability and economic impact of adopting hydrogen as a key energy source for the transportation sector. By assessing costs, benefits, market dynamics, and potential economic outcomes, the economic assessment provides a comprehensive understanding of the financial implications of transitioning to hydrogen-powered transportation. Table 5 shows the cost factors associated with hydrogen production, storage, and distribution while Table 6 shows the economic considerations for hydrogen-powered heavy vehicles.

Table 5: Cost Factors Associated with Hydrogen Production, Storage, and Distribution

Category	Type	Cost	Description
Hydrogen Production Costs	Green Hydrogen	$4-6 per kilogram	Produced through electrolysis powered by renewable energy sources such as solar or wind. Costs are high due to renewable energy and electrolyzer technology (International Renewable Energy Agency [IRENA], 2020)
	Blue Hydrogen	$2-3 per kilogram	Produced from natural gas through SMR combined with carbon capture and storage (CCS). Lower cost than green hydrogen but includes CCS technology expenses (Petronas, 2022)
	Grey Hydrogen	$1-2 per kilogram	The most common and cheapest form is produced from natural gas without carbon capture. Environmentally unfriendly due to high CO_2 emissions (U.S. Department of Energy, 2021)

Hydrogen Storage Costs	Compressed Gas Storage	$15-20 per kilogram	Stored as a compressed gas at high pressures (350-700 bar). Costs include compression energy and high-pressure storage tanks (International Energy Agency [IEA], 2021)
	Liquid Hydrogen Storage	$30-50 per kilogram	Stored as a liquid at cryogenic temperatures (-253°C). More expensive due to the energy-intensive liquefaction process but allows higher energy density (U.S. Department of Energy, 2021)
	Solid-state Storage	Higher and varies depending on the materials	Involves storing hydrogen in metal hydrides or other solid materials. Technology is still in development with potential safety and efficiency benefits (International Renewable Energy Agency [IRENA], 2020)
Hydrogen Distribution Costs	Pipeline Distribution	$1-2 per kilogram per 100 kilometers	Cost depends on distance and pipeline material. Higher costs due to limited infrastructure in Malaysia, requiring new pipelines or retrofitting existing ones. (Petronas, 2022)
	Transport by Road	$2-4 per kilogram	Transported by road using high-pressure tube trailers or cryogenic liquid tankers. Costs are higher than pipeline transport, depending on distance and mode (U.S. Department of Energy, 2021)
	Shipping	$3-6 per kilogram	Shipped as a liquid or in chemical carriers like ammonia. Significant costs due to the need for specialized ships and additional conversion processes (International Energy Agency [IEA], 2021)

Table 6: Economic Considerations For Hydrogen-Powered Heavy Vehicles

Aspect	Hydrogen-Powered Vehicles (FCVs)	Diesel Vehicles	Battery-Electric Vehicles (BEVs)
Vehicle Acquisition	$300,000-$500,000 per vehicle (High due to fuel cell tech)	$200,000-$300,000 per vehicle (Lower due to mature technology)	Higher costs due to battery technology, but decreasing over time (BloombergNEF, 2021)
Fuel Costs	$10-15 per kilogram of hydrogen (High)	$0.60 per liter of diesel (Lower fuel costs in the short term)	Lower electricity costs, but dependent on charging infrastructure availability
Maintenance Costs	Lower due to fewer moving parts; specialized skills required	Higher due to more frequent wear and tear	Lower maintenance costs, but battery replacement is significant
Short-term Economic Viability	High costs; less economically viable currently	Most economically viable in the short term due to lower costs	Economically viable for short-range applications, but less so for long-haul due to battery constraints
Long-term Economic Viability	Expected to improve with decreasing hydrogen production costs	Increasing costs due to carbon taxes and emissions regulations	Expected to improve as battery technology advances and costs decrease

Suitability for Heavy-Duty and Long-Haul Applications	High stability due to long-range and quick refueling	High suitability currently, but facing future regulatory pressures	Less suitable due to battery constraints (range and charging time)

Discussion

Environment, Technology and Economic Impacts: The adoption of hydrogen as a fuel source for heavy transport in Malaysia presents significant environmental benefits, particularly in reducing greenhouse gas (GHG) emissions and improving air quality. Hydrogen fuel cell vehicles (FCVs), when powered by green hydrogen, produce zero tailpipe emissions, emitting only water vapor as a by-product. This stands in stark contrast to traditional diesel vehicles, which are major contributors to CO_2, NO_x, and particulate matter (PM) emissions. The potential for reducing lifecycle emissions to as low as 1-4 grams of CO_2-equivalent per megajoule (g CO_2e/MJ) with green hydrogen underscores the transformative impact hydrogen can have on Malaysia's carbon footprint, especially in the transportation sector, which is one of the largest sources of GHG emissions in the country.

The environmental significance is further emphasized when considering Malaysia's commitments under international agreements, such as the Paris Agreement, and its national goals for reducing carbon emissions. By transitioning to hydrogen, Malaysia can make substantial progress toward its climate targets while simultaneously addressing the pressing issue of urban air pollution, which has direct health implications for its population. Moreover, the use of green hydrogen aligns with Malaysia's renewable energy ambitions. As the country increases its capacity for solar and hydropower, there is a growing opportunity to produce hydrogen sustainably, thus reinforcing the environmental credentials of hydrogen technology. This transition not only supports global climate objectives but also enhances local air quality, contributing to the overall health and well-being of Malaysian citizens.

The economic assessment of hydrogen adoption in Malaysia reveals both challenges and opportunities. Currently, the costs associated with hydrogen production, storage, and distribution are relatively high compared to traditional fossil fuels and even some renewable alternatives like battery-electric vehicles (BEVs). For example, the production cost of green hydrogen in Malaysia ranges from $4-6 per kilogram, which is significantly higher than the cost of producing grey hydrogen or conventional fuels like diesel. Additionally, the infrastructure required for hydrogen storage and distribution, including pipelines and refueling stations, demands substantial upfront investment.

However, the long-term economic viability of hydrogen looks promising, especially as technology matures and economies of scale are realized. As Malaysia continues to invest in renewable energy infrastructure, the cost of green hydrogen is expected to decrease, making it more competitive with traditional fuels. Furthermore, hydrogen's potential to serve as a "future-proof" fuel—capable of powering heavy-duty vehicles with longer ranges and quick refueling times—positions it as a strategic investment in the country's transport sector.

The broader economic implications include the potential for hydrogen to catalyze new industries and job creation within Malaysia. By becoming an early adopter and leader in hydrogen technology, Malaysia could develop a competitive edge in the global clean energy market, attracting international investment and fostering innovation. Additionally, the reduction in dependency on imported fossil fuels could enhance Malaysia's energy security, providing greater price stability and resilience against global energy market fluctuations.

The integration of hydrogen into Malaysia's transport sector has far-reaching implications for the country's sustainability and energy security. Environmentally, the shift to hydrogen supports Malaysia's efforts to decarbonize its economy, reducing reliance on fossil fuels and mitigating the adverse effects of climate change. Economically, the transition could drive growth in new sectors, from hydrogen production and distribution to fuel cell manufacturing and related technologies. From an energy security perspective, hydrogen offers a pathway to diversify Malaysia's energy mix, reducing vulnerability to global oil price fluctuations and supply disruptions. By producing hydrogen domestically, particularly through green methods, Malaysia can leverage its abundant renewable resources, thus decreasing the need for energy imports and enhancing self-sufficiency.

Challenges and Barriers: The adoption of hydrogen in heavy-duty mobility in Malaysia faces several key challenges, particularly in technology, infrastructure, regulation, and economics. One of the primary technological hurdles is the high cost and efficiency of green hydrogen production, driven by expensive renewable energy and electrolyzer technology. Current production methods, like steam methane reforming (SMR) and electrolysis, are either carbon-intensive or costly, making large-scale adoption difficult. Hydrogen fuel cells, while offering longer ranges and faster refueling than battery-electric vehicles (BEVs), are less efficient in energy conversion and require significant advancements to improve durability and reduce costs for mass-market adoption.

Infrastructure challenges are also significant, with Malaysia currently lacking sufficient hydrogen refueling stations and the necessary production, storage, and distribution facilities. Building this infrastructure demands substantial investment in new pipelines, storage facilities, and refueling stations, as well as the integration of hydrogen into the existing energy grid, which poses technical and safety challenges due to hydrogen's highly flammable nature.

Regulatory barriers further complicate hydrogen adoption. Malaysia's regulatory framework is underdeveloped, with gaps in safety standards, certification processes, and regulatory oversight. Without clear regulations and supportive policies, industry investment in hydrogen technologies and infrastructure remains limited. Existing energy policies do not sufficiently incentivize the transition to hydrogen, particularly when compared to other clean energy technologies like BEVs.

Economically, hydrogen for heavy-duty vehicles is challenged by high production and infrastructure costs. Green hydrogen remains significantly more expensive than conventional fuels, making it less competitive without substantial subsidies. The total cost of ownership for hydrogen vehicles is also higher than for diesel or BEV alternatives, due to higher initial costs and fuel prices. Additionally, the immature market for hydrogen technologies limits economies of scale, further keeping prices high and deterring private investment.

Finally, the market for hydrogen-powered heavy vehicles in Malaysia is still in its early stages, with limited consumer awareness and acceptance. The underdeveloped supply chain for hydrogen production and distribution exacerbates these challenges, limiting the availability and affordability of hydrogen fuel and slowing adoption.

Proposed Preliminary Framework: The proposed preliminary framework for a hydrogen economy in Malaysia outlines a comprehensive strategy for transitioning to a sustainable energy future through the adoption of hydrogen technologies. This framework focuses on key components such as hydrogen production, storage, distribution, and vehicle integration, supported by a robust regulatory and policy environment.

Hydrogen production is a central element of the framework, emphasizing the development of green hydrogen through renewable energy sources like solar and wind. Malaysia's abundant solar potential makes it an ideal candidate for large-scale photovoltaic systems integrated with electrolysis units, which are critical for reducing carbon emissions and aligning with global decarbonization trends. While green hydrogen is the ultimate goal, the framework also acknowledges the role of blue hydrogen as a transitional solution. This involves producing hydrogen from natural gas combined with carbon capture and storage (CCS) technology, serving as a bridge while green hydrogen infrastructure matures. Additionally, the establishment of regional hydrogen production hubs is proposed, particularly in areas with high renewable energy potential and proximity to industrial centers. These hubs would centralize hydrogen production, storage, and distribution, thereby reducing transportation costs and enhancing supply chain efficiency.

In terms of hydrogen storage and distribution, the framework calls for significant investment in advanced storage technologies, including compressed gas, liquid hydrogen, and solid-state storage. Each storage method offers distinct advantages, and a diversified approach would address the specific needs of different sectors. Developing a dedicated hydrogen pipeline network, initially connecting production hubs with major industrial and transportation corridors, is also identified as a key infrastructural goal. In regions where pipeline construction is impractical, the use of cryogenic tankers and tube trailers for hydrogen transport is recommended.

For Vehicle Integration and Infrastructure, the framework proposes the phased deployment of hydrogen refueling stations across key transportation routes and urban centers. This infrastructure is essential to support the adoption of hydrogen-powered heavy-duty vehicles in Malaysia. The framework also encourages the development of hydrogen fuel cell vehicles (FCVs) tailored to Malaysia's heavy-duty transport needs, such as buses, trucks, and rail. Collaborations with international manufacturers and local technology firms will be crucial to reduce costs and enhance vehicle performance.

Regulations and Policy Support is a crucial pillar of the framework. The framework includes various financial incentives to stimulate hydrogen adoption, such as subsidies for hydrogen production and infrastructure development, tax rebates for hydrogen vehicles, and grants for research and development. Establishing clear safety standards and regulations for hydrogen production, storage, and transport is emphasized, along with advocating for the integration of hydrogen into Malaysia's broader energy and environmental policies to ensure alignment with national decarbonization goals.

The implementation strategy is phased over short, medium, and long terms. In the short term (1-3 years), the focus will be on launching pilot projects in hydrogen production, storage, and vehicle integration, establishing a regulatory framework, and engaging stakeholders across government, industry, and academia. In the medium term (3-7 years), the strategy shifts to scaling up infrastructure, fostering market development through targeted investments, and increasing research and innovation to improve hydrogen production efficiency, storage solutions, and vehicle technology. The long-term strategy (7+ years) aims for the mass adoption of hydrogen across multiple sectors, including heavy-duty transport, industry, and power generation. This phase also includes ensuring that hydrogen is fully integrated into Malaysia's long-term energy strategy and strengthening international partnerships for technology transfer, joint ventures, and access to global markets. The role of stakeholders in supporting this transition is critical.

The Malaysian government plays a pivotal role in setting strategic direction, establishing regulatory frameworks, and providing financial incentives. Government agencies are responsible for coordinating infrastructure development and ensuring that hydrogen policies align with national energy and environmental goals. The private sector is essential for deploying hydrogen technologies and infrastructure, with companies in the energy, transportation, and manufacturing sectors expected to invest in hydrogen production, storage, and distribution. Industry players will also be key in scaling up hydrogen vehicle production and establishing supply chains, with collaboration with international companies bringing in the necessary technology and expertise. Academia contributes by advancing hydrogen technology through research and the development and training of the workforce required to support the hydrogen economy. Academic institutions also provide the data and analysis necessary to inform policy decisions and guide technological innovation.

5. Managerial Implications and Recommendations

Strategic Recommendations for Stakeholders: As Malaysia strives to establish a hydrogen economy to support sustainable transport, coordinated actions by the government, industry, and research institutions are critical to driving the adoption of hydrogen technologies. These recommendations aim to align the efforts of all parties toward a low-carbon, hydrogen-powered future, ensuring Malaysia's competitiveness in the global energy transition. The government plays a central role in creating a supportive environment for hydrogen adoption. This includes developing and implementing a comprehensive national hydrogen strategy that sets clear goals for hydrogen production, infrastructure development, and vehicle integration. Policies should incentivize hydrogen adoption through subsidies, tax breaks, and carbon pricing mechanisms, creating financial incentives for industries to transition from fossil fuels to hydrogen.

Infrastructure development is another key area where government action is necessary. Prioritizing funding for hydrogen refueling stations and storage facilities, particularly in strategic locations like industrial zones and transportation corridors, is essential. Supporting the expansion of renewable energy infrastructure, crucial for green hydrogen production, will further drive sustainability.

Public awareness and education are also vital. The government should launch campaigns to increase public

understanding and acceptance of hydrogen as a clean fuel alternative. Additionally, collaborating with educational institutions to develop specialized training programs will ensure a skilled workforce is ready to support the growing hydrogen economy.

For the industry, investment in research and development (R&D) is paramount. Companies should focus on reducing the costs of hydrogen production, especially green hydrogen, and improving the efficiency of storage and fuel cell technologies. Developing hydrogen-powered vehicles, particularly for heavy-duty transport, is another critical area where industry collaboration can accelerate commercialization.

Public-private partnerships (PPPs) offer a strategic avenue for co-financing and building hydrogen infrastructure, such as refueling stations and production facilities. These partnerships can mitigate financial risks and ensure efficient infrastructure development. Furthermore, engaging in international collaborations will allow companies to access advanced hydrogen technologies, expand into global markets, and position Malaysia as a regional leader in hydrogen.

Research institutions have a crucial role in advancing hydrogen technology through focused research initiatives. Prioritizing studies to improve the efficiency and cost-effectiveness of green hydrogen production and exploring advanced storage solutions is essential. Collaborating with industry to test and refine these technologies in real-world settings will bridge the gap between research and commercialization. Additionally, research institutions should support policy development by providing data-driven insights and recommendations to guide government strategies. Developing specialized educational programs to train professionals in hydrogen technologies will also be critical to sustaining the growth of the hydrogen sector.

Public-Private Partnerships and International Collaborations: Public-private partnerships are vital for leveraging government support with private-sector innovation and investment. These partnerships can accelerate the development of hydrogen infrastructure, reduce costs, and ensure projects are completed efficiently. In the context of hydrogen adoption, PPPs are particularly effective in developing refueling infrastructure, establishing hydrogen production hubs, and launching large-scale demonstration projects.

International collaborations are equally important. Forming alliances with countries and companies that lead in hydrogen innovation will facilitate technology transfer, joint research initiatives, and shared knowledge. These partnerships can also open new markets for Malaysian hydrogen products and services, contributing to the country's economic growth.

Policy and Regulatory Recommendations: Developing supportive policies and regulations is crucial for facilitating hydrogen adoption in Malaysia's transport sector. The government should establish a comprehensive national hydrogen strategy that outlines long-term goals and a roadmap for hydrogen integration. This strategy should align with broader climate and energy policies to ensure hydrogen contributes effectively to national decarbonization efforts.

Integrating hydrogen into existing energy and transport policies is essential, with mandates for hydrogen blending, support for hydrogen in public transport, and the development of hydrogen corridors. A clear regulatory framework addressing safety, quality, and operational standards will reduce investment risks and promote confidence in the hydrogen sector. Financial incentives, such as grants, subsidies, and tax breaks, are necessary to reduce the costs of hydrogen production, storage, and infrastructure development. These incentives will lower entry barriers for private investors and encourage greater participation in the hydrogen economy.

Investment and Funding Strategies: Substantial investment and strategic funding are required to develop Malaysia's hydrogen economy, particularly in the transport sector. Government-backed initiatives, including national budgets, dedicated grants, and green financing programs, will be primary funding sources for hydrogen projects. Public-private partnerships offer a robust mechanism for financing large-scale hydrogen projects by combining public and private resources. Malaysia can also tap into multilateral development banks and international climate funds for additional financing.

Innovative funding mechanisms, such as green bonds and sustainability-linked loans, can raise capital for hydrogen infrastructure projects. Attracting venture capital and private equity is crucial for fostering innovation and scaling hydrogen technologies, with the government providing a conducive environment through tax incentives and reduced regulatory barriers. A stable regulatory framework is essential to attract private and international investment. By offering financial incentives and establishing international partnerships, Malaysia can position itself as a regional hub for hydrogen technology and innovation.

This paper has presented a comprehensive framework for establishing a hydrogen economy in Malaysia's transport sector. The key findings emphasize the significant potential of hydrogen as a clean energy carrier, capable of driving Malaysia's decarbonization efforts while positioning the country as a regional leader in hydrogen technology. However, achieving this potential requires overcoming challenges related to cost, infrastructure, and technology. By aligning the efforts of government, industry, and research institutions, and fostering strong public-private partnerships and international collaborations, Malaysia can successfully transition to a hydrogen-powered future. Continued research, strategic policy development, and stakeholder collaboration are crucial to navigating the opportunities and challenges ahead, ensuring that hydrogen plays a central role in Malaysia's sustainable energy future.

Conclusion

This paper has proposed a preliminary methodological framework for establishing a hydrogen economy to support sustainable transport in Malaysia, highlighting both the potential and challenges associated with adopting hydrogen technologies, particularly for heavy-duty mobility.

Hydrogen, especially when produced from renewable sources (green hydrogen), offers significant potential as a clean energy carrier that can decarbonize Malaysia's transport sector. It provides a viable pathway to achieving near-zero emissions in heavy-duty vehicles such as trucks, buses, and trains. Higher energy density, rapid refueling capabilities, and suitability for long-range applications make hydrogen a competitive alternative to fossil fuels and battery-electric vehicles in specific transport segments. However, the adoption of hydrogen technologies faces substantial challenges, including high production costs, lack of infrastructure, and technological barriers related to storage and vehicle integration. The current cost of green hydrogen production is particularly high, and the necessary infrastructure—such as refueling stations and distribution networks—is still underdeveloped. Additionally, the regulatory framework needed to ensure the safety and standardization of hydrogen technologies requires significant attention.

Hydrogen is crucial for achieving Malaysia's decarbonization goals. The integration of hydrogen into the country's energy and transport systems aligns with broader sustainability objectives, contributing to reduced greenhouse gas emissions and improved air quality. Malaysia's abundant renewable energy resources, particularly solar and hydropower, position the country well to scale up green hydrogen production, not only to meet domestic energy needs but also to become a regional leader in hydrogen technology. Beyond environmental benefits, hydrogen presents an economic opportunity for Malaysia to establish itself as a hub for hydrogen innovation and deployment in Southeast Asia. By investing in hydrogen production, storage, and distribution infrastructure, Malaysia can attract international investment, create new jobs, and foster economic growth. This leadership could also enhance Malaysia's geopolitical influence by providing an alternative energy source to neighboring countries.

While the path to a hydrogen-powered future presents formidable challenges, the rewards are significant. Overcoming these challenges requires a coordinated effort from all stakeholders, including government, industry, and academia. Continued research, innovation, and strategic policy development are essential to reduce costs, improve technology, and build the necessary infrastructure. Public-private partnerships and international collaborations will be vital in accelerating hydrogen adoption and ensuring Malaysia's leadership in the global transition to clean energy.

In conclusion, embracing hydrogen as a central component of Malaysia's sustainable transport strategy offers substantial environmental, economic, and social benefits. Success depends on unified efforts, ongoing research, and strong stakeholder collaboration. The framework and the recommendations outlined in this paper provide a roadmap for guiding Malaysia towards a sustainable and prosperous hydrogen economy.

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Retaining Talent in Digital, Technology and Innovation Department: Key Factors Influencing Retention at a GLC in Malaysia

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Abstract: Employee retention is crucial for organizational success, especially in dynamic fields like Digital, Technology, and Innovation. This correlational study investigated factors influencing employee retention within the DTI department of a Malaysian GLC, guided by Herzberg's Two-Factor Theory. The study examined the relationship between employee retention (dependent variable) and compensation & benefits, work-life balance, career growth opportunities, and training & development (independent variables). Data was collected from a diverse sample of DTI employees using a comprehensive survey and analyzed using Statistical Package for Social Sciences (SPSS) version 29. The findings revealed no significant relationship between compensation & benefits, work-life balance, or career growth opportunities and employee retention. However, a significant positive relationship was found between training & development and employee retention. This study provides insights into the unique factors affecting retention in DTI departments and offers practical recommendations for creating a supportive work environment that enhances employee retention. Specifically, the study highlights the importance of robust training and development programs in fostering employee satisfaction, skills development, and ultimately, higher retention rates.

Keywords: *Compensation and Benefits, Work-Life Balance, Career Growth Opportunities, Training and Development, Employee Retention*

1. Introduction and Background

Employee retention is widely recognized as a critical factor in the long-term success of organizations [Hanai, 2021; Nagalakshmi et al., 2023]. It reflects the level of commitment employees feel towards their company, encompassing its values and beliefs [Krishnamoorthy & Aisha, 2022]. Recognizing the value of high-performing individuals, organizations often prioritize strategies to identify and retain such talent [Aman-Ullah et al., 2021]. This emphasis on retention stems from the understanding that skilled and engaged employees are valuable assets that contribute significantly to organizational success.

Beginning in early 2021, developed countries like the United States experienced a surge in voluntary employee departures, a phenomenon that peaked in September 2021, widely known as the "Great Resignation" [U.S. Bureau of Labor Statistics, 2021]. This period saw a record 4.4 million (3%) American workers leaving their jobs. While the number of resignations decreased to 3.4 million (2.2%) by December 2023, the trend remains a significant concern [U.S. Bureau of Labor Statistics, 2023]. This sustained pattern of employee turnover, even amidst pandemic-related challenges, highlights a pressing issue requiring further investigation. Psychologist Anthony Klotz, who coined the term "Great Resignation," suggests that events like the pandemic prompt individuals to re-evaluate their life choices [Kaplan, 2021]. This perspective is echoed by Agovino (2021), who posits that the pandemic's impact on the workforce in 2021, particularly during the recovery phase, empowered employees to seek new opportunities.

In a similar scenario, the 'Great Resignation' has also occurred in Asia. As noted by Alistair Cox, the Chief Executive Officer of Hays, the shortage arises as employees leave their current company in pursuit of more appealing work environments offering better wages and increased flexibility (Kamei, 2022). Kamei also mentioned that while the pandemic markedly hastened digitalization, indirectly led to a significant increase in technology-related roles. This surge in demand is driven by the rapid adoption of digital technologies across industries, compelling IT talent to actively seek new opportunities in more digitally driven work environments. Besides that, the employee retention issue has also been reflected in a Robert Walters survey conducted in June 2022 among 2,638 professionals from 1,131 companies, covering six Southeast Asian countries: Singapore, Malaysia, the Philippines, Thailand, Indonesia, and Vietnam. Among the professionals surveyed across

Southeast Asia, 79% expressed the intention to resign in 2021.

When an employee leaves the organization, it significantly impacts the dynamics and performance of the organization. This is supported by Pallathadka et al. (2021) highlighted that increased employee turnover poses a serious challenge, as employees are integral to every business losing key personnel can significantly impact organizational and financial growth, as well as overall stability. Moreover, employee turnover undermines an organization's ability to maintain productivity, sustain operations, compete effectively in the market, and achieve profitability (Al-Suraihi et al., 2021). It disrupts team cohesion, necessitates frequent recruitment and training, and can lead to loss of institutional knowledge, all of which increase operational costs and hinder long-term growth prospects. Hence retaining employees is essential for maintaining stability, reducing costs associated with turnover, and developing sustainable growth within the organization.

Statement of the Problem

In Malaysia, the attrition rate rose to 16.2% in 2023, up from 14.9% in 2022, reflecting evolving talent strategies and the persistent mismatch between talent supply and demand (Times, 2024). A digital talent survey by the Strategic Change Management Office (SCMO) and the Social Economic Research Initiatives (SERI) revealed that key tech roles, including Big Data Analytics, Data Science, Cybersecurity, Artificial Intelligence, and Cloud Computing, often remain unfilled for over three months. This underscores the high demand and the challenges in recruiting for these specialized skills. The inability to retain talent in these critical areas poses significant risks and potential losses for companies (Birruntha, 2021).

A GLC in Malaysia faces significant challenges in retaining employees within its Digital, Technology, and Innovation (DTI) department, where talent is highly sought after in the competitive job market. This reflects the broader industry trend emphasizing the importance of digital and technological skills in the modern business landscape. Over the past three years, encompassing both the pandemic and recovery periods, the DTI department experienced notable attrition rates of 21% in 2021, 27% in 2022, and 17% in 2023. These rates are considerably higher than those in other departments within the Corporate Support Division. Experts suggest that a healthy organization typically maintains an attrition rate of 10% or less, depending on the industry (Ercanbrack, 2023).

In the face of rapid advancements in automation and digital transformation, including the integration of technologies such as artificial intelligence, data analytics, and blockchain, private enterprises are not only compelled to adopt these innovations but also to retain employees with the specialized skills necessary to effectively utilize them. Exit interviews with employees from the Digital, Technology, and Innovation (DTI) department have highlighted key reasons for departure, including concerns about salary, limited career growth opportunities, inadequate training, personal issues, and high-stress workloads. While numerous studies have explored various factors influencing employee retention, this research specifically focuses on the relationships between compensation and benefits, work-life balance, career growth opportunities, training and development, and employee retention among DTI department employees at GLC. The findings will contribute to the existing body of knowledge on employee retention and offer practical recommendations for enhancing retention strategies.

Research Objectives

This study aims to examine the following relationships among employees in the Digital, Technology, and Innovation departments at GLC:
The relationship between compensation and benefits and employee retention.
The relationship between work-life balance and employee retention.
The relationship between career growth opportunities and employee retention.
The relationship between training and development and employee retention.

2. Literature Review

Understanding the factors that contribute to employee retention is crucial for mitigating the adverse effects of employee turnover. The Malaysia Employers Federation Salary Survey (2020) highlights the importance of

retention strategies, including offering competitive salaries and benefits, providing training and growth opportunities, and implementing flexible work arrangements (Murad, 2021).

Employee Retention

Employee retention refers to the strategic process of ensuring that employees remain with the organization for the long term (Aman-Ullah et al., 2021). It is widely recognized as one of the most significant challenges facing organizations today, as most businesses find it difficult to retain employees particularly talented employees (Haddad et al., 2023). Understanding that the retention of employees serves as a linchpin for business success, organizations are compelled to formulate and implement effective strategies to cultivate a workplace environment conducive to sustained employee commitment. Effective management of employee retention is essential for maintaining a turnover rate that is lower than industry standards (Kamselem et al., 2022). Extensive research on this topic has reached a consensus that retention is a critical strategy for preserving talent within an organization (Khan et al., 2020; Islam et al., 2022). Consequently, businesses that aim to retain their employees must develop comprehensive strategies that address various factors, including financial incentives, motivation, work environment, and health considerations (Aman-Ullah et al., 2021).

Compensation and Benefits

Employee benefits are a crucial component of overall compensation, distinct from salary, provided to employees either in full or incrementally over time. These supplementary rewards extend beyond monetary compensation and include insurance (such as group, health, family, and accident), post-retirement benefits, sick leave, vacation, and educational funds (Siyal & Garavan, 2020). Compensation and benefits are also classified as extrinsic rewards and they play a crucial role in retaining employees. It becomes a magic bullet for management to boost employee engagement, and job happiness, and ultimately lead towards retention even if they may increase operating costs (Hassan & Govindhasamy 2020). Plus, Watkins and Fusch (2022) emphasized that employers can leverage compensation and incentives to attract and retain experienced and high-performing employees.

Understanding the influence of compensation and benefits on employee retention has been a focal point for both organizations and researchers. For instance, Islam et al. (2022) found that compensation played a significant role in employee retention within the hospitality and tourism industry in Bangladesh. Similarly, Sorn et al. (2023) underscored the importance of compensation in retaining employees, noting that those who receive higher pay are more likely to remain committed to their organizations. These researches indicate that employees receiving higher pay are more inclined to remain committed to their organizations. Commenting further on this, it means an employee who feels valued both in their work and by the management are more likely to stay with the company, especially when their needs are met through various benefits.
These findings lead to the formulation of the first hypothesis (H1) of this study:
H1: There is a relationship between compensation and benefits and employee retention among employees in the Digital, Technology, and Innovation departments at GLC.

Work-Life Balance

Work-life balance refers to the degree to which employees are satisfied with both their job and family roles (Bellmann & Hübler, 2020). It involves the interaction between various aspects of an employee's life, where the balance or imbalance can have significant implications for both personal well-being and society (Roopavathi & Kishore, 2020). Recognizing the importance of work-life balance, organizations increasingly view it as a crucial factor in retaining talent (Chawla & Singla, 2021). Post-pandemic, this has become more profound and this impacts employee's work duties, and social, personal, and family commitments (Chawla & Singla, 2021; Sharma & Gupta, 2020).

To address the diverse needs of employees, there are five types of work-life balance arrangements: remote work, flextime, job sharing, and schedules of fewer than 40 hours (Half, 2023). These arrangements empower employees by providing them with control over their work schedules and workspaces. This not only facilitates the management of non-job-related responsibilities but also indirectly contributes to creating a positive work environment that fosters employee retention and loyalty to the organization (Half, 2023). Hence, to practice a harmonious work-life balance, organizations can adopt diverse policies and practices. This includes refraining from mandating overtime, discouraging the expectation of after-hours communication, introducing flexible

work schedules, and promoting the uptake of reasonable vacation time. By implementing these measures, employees gain ample time beyond their regular work hours to unwind, pursue personal interests, partake in outdoor activities, and engage in enjoyable pursuits. This approach empowers employees to manage their professional and personal lives effectively, thereby improving their work-life balance and bolstering their commitment to remain with the company (Weng et al., 2023).

Research supports this view; for example, Sindhuja and Subramaniam (2020) found a significant relationship between work-life balance and employee retention among bank employees in Sivakasi, India. Similarly, Aman-Ullah et al. (2022) demonstrated that work-life balance positively influences employee retention and reduces turnover intentions among doctors in public hospitals in Pakistan. This emphasizes the significance of promoting work-life balance strategies in the organization to enhance employee retention and overall workforce stability. This leads to the second hypothesis (H2) of this study:
H2: There is a relationship between work-life balance and employee retention among employees in the Digital, Technology, and Innovation departments at GLC.

Career Growth Opportunities
The terms "career growth" and "career development" are often used interchangeably (Houssein et al., 2020). Career growth refers to the continuous progress, experience, and skill acquisition in a specific field (Cabaya, 2023). While career growth generally refers to the cumulative progression of jobs throughout one's life, it also encompasses broader aspects of professional advancement. Career development, on the other hand, involves preparing employees for future responsibilities (Brown & Brooks, 1990). Similarly, career growth has been described as subjective evaluations of a person's career during their job with several companies (Ng et al 2005).

For companies perspective, career growth holds significance, as a deficiency in advancement opportunities ranks among the primary reasons employees resign from their positions. If retaining and engaging employees is a priority for an organization, emphasizing and prioritizing career growth serves as an excellent starting point (Wooll,2022). Concerning career growth opportunities, managers or organizations must engage in one-on-one discussions to understand their employees' career growth aspirations. Many employees express that discussions about career growth are rare in the workplace, and some lack career goals due to their intense focus on tasks, often driven by heavy workloads (Cabaya, 2023).

Further empirical research indicates that career growth opportunities significantly enhance employee retention. Tetteh and Asumeng (2022) found that career development programs substantially improved retention in Ghanaian companies, while Hussein et al. (2020) observed a positive impact on retention in Djibouti's financial sector. These findings suggest that offering career growth opportunities is crucial for reducing turnover. Therefore, the third hypothesis (H3) is as follows:
H3: There is a relationship between career growth opportunities and employee retention among employees in the Digital, Technology, and Innovation departments at GLC.

Training and Development
Training and development refer to the process of acquiring or transferring the skills, abilities, and knowledge necessary for performing a specific task (Sepahvand & Khodashahri, 2020). Cultivating new skills and knowledge in the workplace becomes paramount as organizations strive to adapt to evolving technologies, market trends, and global challenges (Al Kassem, 2021). This necessity arises so that the organization's goal can be aligned with the constant changes in the environment and technology. Companies that invest in training and development often experience higher employee retention, as these initiatives enhance employee capabilities and creativity, benefiting both the individual and the organization (Nguyen & Duong, 2020).

The importance of training in retaining employees is well-documented. For instance, Elsafty and Oraby (2022) found that training and development directly and positively influence employee retention in Egypt's private sector. This finding is supported by Aleem and Bowra (2020), who conducted a study on employee retention across various sectors, including public, private, foreign, and Islamic banks. The study revealed a significant impact of training and development on both employee retention and commitment. However, it is worth noting that a separate study conducted in Pakistan with 130 participants across different banks indicated either no or very minimal relationship between training and development and the retention of employees (Aleem and

Bowra, 2020). These diverse findings highlight the need for a nuanced understanding of the relationship between training and development initiatives and their impact on employee retention in different contexts (Khan et al., 2020). This leads to the fourth hypothesis (H4) of this study:
H4: There is a relationship between training and development and employee retention among employees in the Digital, Technology, and Innovation departments at GLC.

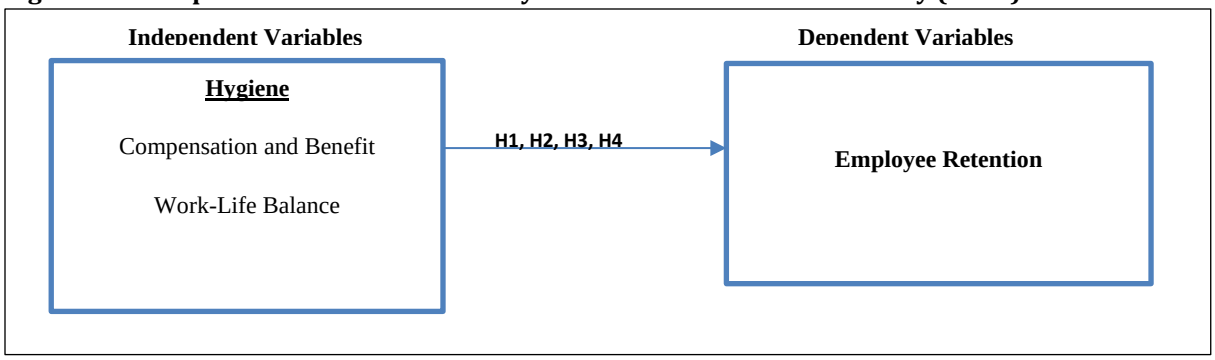
Underpinning Theory: Herzberg's Two-Factor Theory
Herzberg's Two-Factor Theory, also known as the Motivation-Hygiene Theory, provides a framework for understanding employee retention. The theory divides factors into two categories: motivators (intrinsic factors such as recognition, responsibility, and personal growth) that lead to job satisfaction, and hygiene factors (extrinsic factors like salary, company policies, and working conditions) that, when inadequate, cause dissatisfaction. For effective employee retention, organizations must enhance both motivators and hygiene factors. While motivators increase job satisfaction and commitment, addressing hygiene factors is crucial to prevent dissatisfaction and reduce turnover.

This dual approach is supported by research, such as studies by Islam et al. (2022) and Miligi et al. (2020), which emphasize the importance of recognizing both motivators and potential areas of dissatisfaction to foster organizational commitment. By focusing on both sets of factors, organizations can create a work environment that not only retains employees but also promotes their engagement and loyalty, making Herzberg's theory a valuable tool for guiding retention strategies.

In this study, particular attention is given to specific hygiene and motivator factors identified as crucial to employee retention. For hygiene factors, the focus is on compensation and benefits, as well as work-life balance, as these elements have been highlighted in the literature as significant contributors to retention. The Adecco Group's Global Workforce of the Future report (Styr, 2022) underscores that while salary is a primary consideration for employees contemplating a job change, work-life balance also plays a critical role in their decision to stay with a company. Regarding motivators, career growth opportunities and training and development are central. Providing opportunities for skill development and career advancement not only aligns with Herzberg's theory but also meets the increasing demand among employees for continuous learning and professional growth (Kang, 2021). By focusing on these factors, organizations can enhance job satisfaction and employee retention, creating a more committed and engaged workforce.

Conceptual Framework
Figure 1 presents a conceptual framework that outlines the key elements and their relationships examined in this study. Herzberg's Two-Factor Theory underpins the conceptual framework of this study, categorizing compensation and benefits and work-life balance as hygiene factors, while career growth opportunities and training and development are considered motivator factors. Employee retention is the dependent variable, and the study investigates how these independent variables influence retention outcomes. By addressing both motivators and hygiene factors, the study aims to offer a comprehensive understanding of strategies that can effectively enhance employee retention and organizational commitment, aligning with previous research (Rahman et al., 2020; Abdulkhamidova, 2021). The conceptual framework developed for this study is illustrated in the following figure.

Figure 1: Conceptual Framework Guided by the Model of Two Factor Theory (1959)



This study aims to investigate the nature and strength of these relationships through empirical analysis. Based on the conceptual framework, four hypotheses have been formulated:
H1: There is a relationship between compensation and benefits and employee retention among employees in the Digital, Technology, and Innovation departments at GLC in Malaysia.
H2: There is a relationship between work-life balance and employee retention among employees in the Digital, Technology, and Innovation departments at GLC in Malaysia.
H3: There is a relationship between career growth opportunities and employee retention among employees in the Digital, Technology, and Innovation departments at GLC in Malaysia.
H4: There is a relationship between training and development and employee retention among employees in the Digital, Technology, and Innovation departments at GLC in Malaysia.

This conceptual framework provides a comprehensive overview of the key constructs and the hypothesized linkages that will be tested in the current investigation. The findings from this study are expected to contribute to the existing literature and offer insights into the complex interactions among the variables of interest.

3. Research Methodology

This study employs a quantitative approach to identify factors influencing employee retention in the Digital, Technology, and Innovation (DTI) department at GLC, Malaysia. The sample consists of all 80 employees within the DTI department, selected through a census sampling method to ensure a comprehensive representation of digital talent.

Data were collected using questionnaires, which provide direct insights into the variables of interest. The analysis is conducted at the individual level, focusing on each employee's responses. Quantitative statistical analyses are performed to derive findings and conclusions. Data analysis is conducted using the Statistical Package for the Social Sciences (SPSS) Version 29, selected for its robust capabilities in handling quantitative research data (Rowley, 2014). Hypotheses are tested using Multiple Regression Analysis. A summary of the data analysis for each research question is presented in Table 1.

Table 1: **Summary of Data Analysis**

Research Question	Part From Questionnaire	Data Analysis
RQ1: Is there any relationship between compensation and benefits and employee retention among employees in the Digital, Technology, and Innovation departments at GLC in Malaysia?	Part B: Compensation and benefit Part C: Employee retention	Descriptive Analysis Multiple Regression Analysis
RQ2: Is there any relationship between work-life balance and employees' retention among employees in the Digital, Technology, and Innovation departments at GLC in Malaysia?	Part B: Work-life balance Part C: Employee retention	Descriptive Analysis Multiple Regression Analysis
RQ3: Is there any relationship between career growth opportunities and employees' retention among employees in the Digital, Technology, and Innovation departments at GLC in Malaysia?	Part B: Career Growth Opportunities Part C: Employee retention	Descriptive Analysis Multiple Regression Analysis
RQ4: Is there any relationship between training and development and employee retention among employees in the Digital, Technology, and Innovation departments at GLC in Malaysia?	Part B: Training and development Part C: Employee retention	Descriptive Analysis Multiple Regression Analysis

Pilot Study
To ensure the validity and reliability of the constructs in the questionnaire, a pilot study was conducted before the distribution of the final version. A pilot study is defined as a preliminary test to evaluate the research protocol, data collection instruments, sample recruitment strategy, and other research techniques, thereby preparing for a larger-scale study (Hassan, Schattner, & Mazza, 2006). It allows researchers to refine research

questions, identify optimal methods, and estimate the time and resources required for the full study (Ismail, Kinchin, & Edwards, 2018).

For this pilot study, 40 questionnaires were distributed to employees in the Human Resources department at GLC. Convenience sampling was employed to select respondents due to its ease of access and practicality (Etikan, 2016). Respondents from this pilot study were not included in the final research sample. A total of 30 completed questionnaires were returned. The reliability analysis revealed acceptable Cronbach's alpha coefficient values exceeded the minimum threshold of 0.7, indicating a satisfactory level of internal consistency (as shown in Table 2).

Table 2: Reliability Analysis of the variables (n=80)

No	Variables	Number of Items	Cronbach's Alpha from actual study (n=80)
	Independent Variable		
1	Compensation and Benefit	7	.810
2	Work-Life Balance	6	.789
3	Career Growth Opportunities	4	.852
4	Training and Development	4	.805
	Dependent Variable		
	Employee Retention	8	.821

In Table 2, all variables, including the dependent variable, demonstrated Cronbach's Alpha values of at least 0.789, indicating reliable measurements. "Career Growth Opportunities" achieved the highest Cronbach's Alpha of 0.852, reflecting excellent reliability. These findings are consistent with Lessa et al. (2020), who note that a Cronbach's Alpha value above 0.70 is considered reliable and internally consistent in research.

4. Results and Discussion

In the main study, 80 questionnaires were distributed, achieving a response rate of 100%, with all 80 respondents providing feedback. This excellent response rate suggests that the results are highly reliable and consistent.

Profile of Respondents: Table 3 displays a summary of the characteristics of the total sample of employees in the Digital, Technology, and Innovation department at GLC in Malaysia who participated in the study.

Table 3: Demographic Profile of the Respondents (n=80)

Demographic Variable	Category	Frequency (N)	Percent (%)
Gender	Female	18	22.5
	Male	62	77.5
Age	21-30 years old	24	30.0
	31-40 years old	41	51.2
	41-50 years old	12	15.0
	51 years old and above	3	3.8
Marital Status	Married	60	75.0
	Single	20	25.0
Working Experience	3 years and below	14	17.5
	4 -8 years	24	30.0
	9-11 years	10	12.5
	12 years and above	32	40.0
Level of Education	Diploma	12	15.0

	Degree	61	76.3
	Master	6	7.5
	PHD	1	1.3

The sample is predominantly male and married, with a majority aged between 31 and 40 years old. Most respondents possess a blend of extensive and moderate work experience and hold a degree. This demographic analysis provides a comprehensive overview of the sample, highlighting the key characteristics that define this group. This demographic analysis provides valuable insights into the respondents' profiles, ensuring that the study's findings are grounded in a well-understood context of the sampled population.

Descriptive Statistics

Table 4 presents the means and standard deviations for both independent and dependent variables after factor analysis. The independent variables include compensation and benefits, work-life balance, career growth opportunities, and training and development, while employee retention serves as the dependent variable.

Table 4: Descriptive Statistics

No	Variables	N	Mean	Standard Deviation
	Independent Variable			
1	Compensation and Benefit	**80**	**3.7839**	**.70390**
2	Work-Life Balance	**80**	**3.7188**	**.78872**
3	Career Growth Opportunities	**80**	**4.1031**	**.82456**
4	Training and Development	**80**	**3.8563**	**.77006**
	Dependent Variable			
	Employee Retention	**80**	**3.7688**	**.74101**

As shown in Table 4, "Career Growth Opportunities" recorded the highest mean (M = 4.1031) and standard deviation (SD = 0.82456), indicating strong perceptions in this area even after factor analysis. Conversely, "Work-Life Balance" had the lowest mean (M = 3.7188) and standard deviation (SD = 0.78872) among the independent variables, yet it remains a significant factor. For the dependent variable, "Employee Retention" had a mean of 3.7688 and a standard deviation of 0.74101, reflecting effective scores and indicating a robust relationship with the independent variables.

Normality Analysis

Table 5 presents the normality scores for each variable following factor analysis. All variables exhibited normal distribution characteristics, with skewness values ranging from -2.366 to -1.531 and kurtosis values from 2.119 to 6.906. These values fall within the acceptable ranges of skewness (-3 to +3) and kurtosis (-7 to +7), indicating that the data for all variables adhere to the assumption of normality.

Table 5: Normality score for all variables after Factor Analysis

No	Variables	N	Skewness	Kurtosis
	Independent Variable			
1	Compensation and Benefit	**80**	**-2.366**	**6.906**
2	Work-Life Balance	**80**	**-1.744**	**2.939**
3	Career Growth Opportunities	**80**	**-1.780**	**3.520**
4	Training and Development	**80**	**-2.353**	**5.490**
	Dependent Variable			
	Employee Retention	**80**	**-1.531**	**2.119**

Pearson Correlation Analysis

Table 6 presents the results of the Pearson correlation analysis, which examines the relationships between the independent variables—Compensation and Benefit, Work-Life Balance, Career Growth Opportunities, and Training and Development—and the dependent variable, Employee Retention.

Table 6: Correlation Analysis

Variables	1	2	3	4	5
Dependent Variable					
Employee Retention	1				
Independent Variable					
Compensation and Benefit	0.043	1			
Work-Life Balance	0.034	.227*	1		
Career Growth Opportunities	-0.025	-0.1	.287**	1	
Training and Development	.283*	-0.114	-0.153	0.107	1

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

The analysis reveals that compensation and benefits have no significant impact on employee retention ($r = 0.043$, $p > 0.05$), suggesting that variations in compensation do not affect retention in this context. This finding contrasts with Hassan (2022), who observed a positive relationship between reward and compensation practices and employee retention in the retail industry in the Maldives, indicating that industry-specific factors may influence these dynamics.

Work-life balance also shows no significant correlation with employee retention ($r = 0.034$, $p > 0.05$). This suggests that increases in work-life balance for respondents did not influence employee retention. This lack of significance may be influenced by the gender imbalance in the sample, where 77.5% of respondents were male. Research by Franklin (2023) suggests that work-life balance is valued differently by gender, which may affect the results. This discrepancy highlights the need to consider gender diversity in studies on work-life balance and employee retention.

Similarly, career growth opportunities do not significantly affect employee retention ($r = -0.025$, $p > 0.05$). This suggests that increases in career growth opportunities for respondents did not influence employee retention. This finding is consistent with Frimayasa (2022), who reported that career development opportunities did not significantly impact employee retention in the telecommunications sector in South Tangerang. It underscores the importance of contextual factors in understanding the impact of career development on retention.

In contrast, training and development demonstrate a weak but significant positive relationship with employee retention ($r = 0.283$, $p < 0.05$). This indicates that training and development are important factors influencing retention. This result aligns with Kumari et al. (2022), who found a positive impact of training and development on employee retention, and Aleem and Bowra (2020), who confirmed that training and development significantly affect employee retention and commitment across various sectors. These findings collectively highlight that while compensation, work-life balance, and career growth opportunities may not significantly influence employee retention in this context, training and development play a crucial role in enhancing retention rates.

Multiple Regression Analysis

Table 7 presents the results of the multiple regression analysis assessing the impact of compensation and benefits, work-life balance, career growth opportunities, and training and development on employee retention.

Table 7: Multiple Regression Analysis

Independent Variable	Standardized Coefficients	t	Sig.
	Beta		
Compensation and Benefit	.049	.428	.670
Work-Life Balance	.094	.776	.440
Career Growth Opportunities	-.081	-.685	.496
Training and Development	.312	2.768	.007
R Square	.096		
Adjusted R Square	.048		
F	1.986		
Sig. of F Value	.105[b]		

Dependent Variable = Employee Retention *p value < 0.05, **p value <0.01

The results indicate that training and development have the highest standardized coefficient (β = 0.312, p < 0.05), suggesting it makes the most substantial unique contribution to Employee Retention when controlling for other variables. Conversely, work-life balance** (β = 0.094, p > 0.05), compensation and benefits** (β = 0.049, p > 0.05), and career growth opportunities** (β = -0.081, p > 0.05) show less significant contributions. The model explains 9.6% of the variance in Employee Retention (R^2 = 0.096), indicating that 90.4% of the variance is attributable to factors not included in this study. The F-test result (Sig. = 0.105) suggests that the overall model is not statistically significant.

Discussion

The results from employees in the Digital, Technology, and Innovation department at GLC in Malaysia concur only with H_4 which looks at whether there is a relationship between training and development and employee retention (see Table 8). Therefore, training and development affect employee retention and this could be influenced by the background of the sample in this study. A substantial proportion (40.0%) of employees have 12 years or more of work experience hence they may seek advanced training opportunities that align with their career progression, given the necessity for digital talent to adapt to industry changes and maintain agility. Additionally, the majority (76.3%) of the sample hold a bachelor's degree, which means they are educated employees and consistently seek continuous training. Therefore, training programs offering specialized skills or advanced degrees could be particularly appealing for them to remain in the organization. This finding is compatible with studies conducted by Elsafty and Oraby (2022) and Xuecheng et al. (2022) that highlight the significant role of training and development in enhancing employee retention. Effective training initiatives appear to lead to longer employee tenure, benefiting both the individuals and the organization.

It can be assumed that these employees prioritize continuous training and development, reflecting their commitment to self-improvement in response to the rapidly evolving digital and technological skills demanded in the market. This highlights an opportunity for the organization to address retention challenges by enhancing and supporting employees' professional growth initiatives through training and development.

Conversely, work-life balance, compensation and benefits, as well as career growth opportunities show less significant contributions which lead to rejection of H_1, H_2, and H_3 (see Table 8). This suggests that employees may already be satisfied with their current compensation, work hours, and career progression, or these factors may not sufficiently influence their retention decisions. The finding on work-life balance contradicts the findings in Sindhuja and Subramaniam (2020) which investigates work-life balance among bank employees and how its influence on employee retention within selected banks in a small district in India. The findings reveal a significant relationship between work-life balance and employee retention. Upon closer examination of the sample of this study, it becomes evident that the majority of respondents (77.5%) were male, comprising 62 male participants and 18 (22.5%) female participants. This gender distribution highlights a significant imbalance, with male respondents outnumbering their female counterparts. This disparity suggests that

perspectives and priorities regarding work-life balance may differ between male and female respondents, potentially influencing the overall correlation results.

On that note, a study by Durham University Business School supports this notion, indicating that women place a higher value on work-life balance compared to men, particularly at junior levels, but less so at managerial levels (Franklin, 2023). Therefore, the predominance of male respondents in the sample may have contributed to the finding that improvements in work-life balance did not impact employee retention, as the perspectives of male participants may not fully reflect the preferences and considerations of female employees. This contextual insight emphasizes the importance of considering gender dynamics when interpreting and applying findings related to organizational policies and employee retention strategies.

The rejection of H_1 which looks at whether there is a relationship between compensation and benefits and employee retention also contradicts a study by Maru & Omodu (2020) where it was found that non-monetary benefits had a moderate link with employee retention however monetary perks were found to have a strong positive correlation. The authors advise management to focus on both kinds of benefit plans to successfully encourage highly skilled employees to stay with the company. This means that, despite the population in this study setting receiving a digital scheme premium as an additional allowance on top of their regular salary, digital talent was still leaving the organization. This trend was observed even when compared to other employees who did not receive this additional benefit. The digital scheme premium was intended to provide extra financial incentives to retain valuable digital talent, recognizing their critical role in the organization. However, the fact that these employees continued to leave indicates that monetary incentives alone are not sufficient to ensure retention.

Table 8: Summary of Hypotheses

No	Hypotheses	Result
H1	There is a relationship between compensation and benefits and employee retention among employees in the Digital, Technology, and Innovation departments at UEM Edgenta.	**Rejected**
H2	There is a relationship between work-life balance and employee retention among employees in the Digital, Technology, and Innovation departments at UEM Edgenta.	**Rejected**
H3	There is a relationship between career growth opportunities and employee retention among employees in the Digital, Technology, and Innovation departments at UEM Edgenta.	**Rejected**
H4	There is a relationship between training and development and employee retention among employees in the Digital, Technology, and Innovation departments at UEM Edgenta.	**Accepted**

5. Managerial Implications and Recommendations

Employee retention is paramount to the growth and success of any organization. Since the findings of this study suggest that training and development have been identified as factors influencing employee retention, the management of any company needs to develop a comprehensive training needs analysis. This analysis should focus on identifying the specific training and comprehensive development needs of employees. Plus, a long-term plan for employee development needs to be established to reduce performance gaps.

Training need not be in a formal setting like attending training classes or seminars, but employees could also participate in job shadowing, coaching, mentoring, and project participation to enhance their skills as well as gain new knowledge. Through training, organizations can ensure that employees receive the necessary support to enhance their soft skills, technical skills, and functional skills. Additionally, furthering employees' training is crucial as it provides them with valuable opportunities to expand their knowledge base and enhance their job skills, thereby improving their effectiveness in the workplace (Herrity, 2024).

It can be assumed that when employers place high priority over continuous training and development, reflecting their commitment to encourage self-improvement among employees. This is crucial in response to

the rapidly evolving digital and technological skills demanded in the market. This highlights an opportunity for the organization to address retention challenges by enhancing and supporting employees' professional growth initiatives through training and development.

Conclusion

The objective of this paper was to establish the key factors influencing retention among Digital, Technology, and Innovation departments in a GLC in Malaysia. It was found that training and development is the most influential factor affecting Employee Retention. In contrast, compensation and benefits, work-life balance, and career growth opportunities did not significantly impact Employee Retention in this study. Future research could explore additional factors influencing employee retention, such as workload dynamics, organizational culture, and leadership styles. Investigating these elements could provide a more comprehensive understanding of employee retention strategies. Singh (2023) emphasizes the importance of considering a holistic work experience, including job satisfaction and organizational culture, to retain talent effectively.

Expanding the sample to include digital talent from various organizations within the industry could offer comparative insights and reveal industry-specific retention trends. This broader perspective would help identify common challenges and effective practices across different digital talent environments, leading to more robust retention strategies.

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Modelling the Predictors of Social Media Marketing on Consumer Buying Behavior in Malaysia

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Abstract: Despite the rapid increase in internet and mobile users in Malaysia, the growth of online purchases through social media platforms has not kept pace with this broader digital trend. This study investigates the key predictors that influence consumer buying behavior through social media marketing, with a specific focus on the roles of Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) of these platforms. Employing a quantitative cross-sectional research design, data were collected from 115 respondents in Malaysia who have experience making online purchases via mobile applications. The study also examines variations in consumer experiences based on demographic factors, including age, gender, education level, and geographic region. The findings indicate that both PEOU and PU are significant predictors that shape consumer buying behavior on social media platforms. This research provides valuable insights for marketers seeking to enhance the effectiveness of their social media marketing strategies. By better understanding the factors driving consumer behavior in the Malaysian market, businesses can design more targeted and personalized campaigns for specific consumer segments, ultimately improving their competitive advantage in this digital landscape.

Keywords: *Perceived Ease of Use, Perceived Usefulness, Social Media Marketing, Consumer Buying Behavior, Digital Accessibility, Technology Acceptance Model (TAM)*

1. Introduction and Background

The rapid digitalization of the global marketplace has significantly transformed consumer behavior, particularly in how individuals engage with products and services online (Choi & Song, 2024). In Malaysia, this digital revolution is marked by a substantial increase in internet and mobile usage, presenting businesses with unprecedented opportunities to leverage social media platforms for marketing (Nawi & Sulaiman, 2021). However, despite these advancements, the expected growth in online purchases through social media platforms has not materialized, suggesting the presence of barriers to consumer adoption (Schultz & Block, 2023). These barriers may include concerns over data privacy, difficulties navigating e-commerce platforms, a preference for traditional in-person shopping experiences, or a lack of trust in the security and reliability of online transactions.

To address these challenges, this study seeks to understand the key factors influencing consumer buying behavior on social media platforms in Malaysia. Specifically, it applies Davis's Technology Acceptance Model (TAM) to explore the roles of Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) in shaping consumer decisions on these platforms (Davis, 1993). According to TAM, these constructs are critical determinants of an individual's acceptance and adoption of new technologies (Balakrishnan & Shuib, 2021). By extending TAM to the context of social media marketing in Malaysia, this study aims to provide valuable insights into how these factors influence consumer responses to marketing campaigns.

The objectives of this research are twofold: first, to identify the key factors that predict the effectiveness of social media marketing in influencing consumer buying behavior in Malaysia, and second, to develop a conceptual model that explains the relationships between these predictive factors and their impact on consumer purchasing decisions within the Malaysian social media environment. This research contributes to the existing literature by offering actionable insights for marketers seeking to optimize their social media

strategies. Furthermore, it equips businesses to navigate the evolving digital landscape, enabling them to develop more effective and engaging social media campaigns that resonate with Malaysian consumers.

Research Objectives

To identify the key factors that predict the effectiveness of social media marketing in influencing consumer buying behavior in Malaysia.

To develop a conceptual model that explains the relationships between these predictive factors and their impact on consumer purchasing decisions within the Malaysian social media environment.

2. Literature Review

The unprecedented digitalization of global markets has profoundly transformed consumer behavior, particularly in how individuals engage with products and services through online channels (Lim et al., 2022). In the Malaysian context, this digital revolution is exemplified by the substantial rise in internet and mobile usage (Pragash et al., 2021), which has presented businesses with unprecedented opportunities to leverage social media platforms for marketing purposes. Nevertheless, comprehending the key factors that motivate consumer engagement with these platforms remains vital for organizations seeking to capitalize on these burgeoning digital avenues.

The Technology Acceptance Model, developed by Davis, offers a well-established theoretical foundation for examining the factors that influence technology adoption. This model postulates that perceived usefulness and perceived ease of use are the primary determinants of an individual's acceptance and adoption of new technologies. TAM has been extensively applied across diverse technological contexts, including social media marketing, rendering it a suitable framework for the present study (Rauniar et al., 2014). The TAM model has been extensively validated and recognized as a robust predictor of technology usage (Garcia et al., 2023), making it a valuable tool for understanding consumer behavior in the social media domain.

Consumer Buying Behavior

Consumer buying behavior refers to the complex decision-making processes and actions undertaken by individuals or groups when purchasing goods or services (Harizi et al., 2022). In the context of social media marketing, consumer buying behavior is influenced by a multitude of factors, including psychological (e.g., attitudes, motivations, perceptions), environmental (e.g., social influence, cultural norms), and technological (e.g., platform features, user experience) aspects (Benson et al., 2019). Understanding the nuances of consumer buying behavior is vital for businesses seeking to design effective marketing strategies that resonate with their target audience and drive meaningful engagement and conversions on social media platforms.

Consumer Buying Behavior in the Digital Age

The advent of digital platforms, particularly social media, has significantly transformed traditional consumer behavior (Verhoef et al., 2021). Consumers now have unprecedented access to a wealth of information, including user reviews and social interactions, all of which collectively influence their purchasing decisions. The rise of digital influencers, user-generated content, and personalized marketing campaigns on social media platforms has become increasingly influential in shaping consumer buying behavior in the modern digital landscape (Jansom & Pongsakornrungsilp, 2021; Leparoux et al., 2019).

The convenience and immediacy offered by social media platforms have enhanced consumer engagement, making the purchasing process more streamlined and immediate (Harizi et al., 2022). Consumers can easily access product information, read real-time reviews, and complete transactions seamlessly, which draws them to the efficiency and accessibility of social media-enabled shopping experiences. These factors have collectively played a key role in driving consumer buying behavior on social media platforms.

Importance of Understanding Consumer Buying Behavior in Malaysia

Malaysia, with its rapidly growing digital economy, presents a unique and compelling market for studying consumer buying behavior in the context of social media. The country has experienced a significant surge in online purchases, driven by the increased adoption of e-commerce and the widespread use of mobile devices among consumers (Anisha et al., 2022). The rising popularity of social media platforms, such as Facebook,

Instagram, and WhatsApp, has further facilitated the growth of online shopping in Malaysia, as consumers leverage these platforms to discover, research, and purchase products and services (Hng et al., 2020).

This dynamic digital landscape offers businesses valuable opportunities to understand and capitalize on the evolving purchasing behaviors of Malaysian consumers through effective social media marketing strategies, driven by the increasing penetration of internet access and widespread adoption of mobile devices. However, the specific factors that influence consumer decision-making in this dynamic digital space require further in-depth exploration. Understanding these nuanced drivers of consumer behavior is crucial for businesses seeking to tailor their marketing strategies effectively, ensuring their approaches resonate with the preferences and behaviors of the Malaysian consumer base (Aris et al., 2021). By gaining a deeper understanding of the factors shaping consumer buying decisions within the Malaysian social media landscape, organizations can develop more targeted and impactful marketing campaigns that capitalize on the burgeoning opportunities presented by the country's rapidly evolving digital landscape.

Perceived Ease of Use (PEOU)

Perceived Ease of Use refers to the degree to which a user believes that using a particular system or technology will be free of effort (Al-Adwan et al., 2023). In the context of social media platforms, ease of use is a critical determinant of user satisfaction and engagement. If users find a platform easy to navigate, with intuitive interfaces and accessible features, they are more likely to engage with it and, consequently, participate in online purchases (Mensah et al., 2020). This is because users value the convenience and efficiency of a platform that is straightforward to use, allowing them to focus on the content and features that are important to them without being hindered by complex or unintuitive design. When a social media platform is perceived as easy to use, it can foster a positive user experience, leading to increased user loyalty, repeated interactions, and ultimately, enhanced purchasing behavior (Santini et al., 2020).

Elements contributing to perceived ease of use in the context of social media platforms include intuitive interface design, clear and concise display of information, seamless navigation between features and functions, and the availability of user support resources(Williams, 2021). Research has consistently shown that perceived ease of use significantly impacts the adoption and continued usage of technology (Jalil, 2022, Malik et al., 2021, Gebert-Persson et al., 2019). For instance, social media applications that are perceived as easy to navigate, with straightforward and user-friendly interfaces, are more likely to foster positive user experiences, leading to increased adoption rates, higher user satisfaction, and more frequent engagement. In the realm of social media marketing, the perceived ease of use of the platform can enhance consumer trust, encourage repeat interactions, and ultimately influence their purchasing behavior, as users are drawn to the convenience and efficiency of a well-designed social media experience (Setyawati & Anindita, 2022).

Perceived Usefulness (PU)

Perceived Usefulness is defined as the degree to which a user believes that using a particular system or technology will enhance their performance, productivity, or overall experience(Khafit et al., 2021). In the context of social media marketing, perceived usefulness is closely linked to the tangible and intangible benefits that consumers perceive from engaging with a platform (Dang, 2018). This can include finding better deals, saving time, discovering new products, accessing personalized recommendations, or simply enjoying a more seamless and enriching shopping experience. When consumers recognize the usefulness of a social media platform in meeting their needs and goals, they are more likely to engage with the platform and incorporate it into their purchasing decisions (Yang et al., 2020).

The usefulness of a social media platform can be determined by how well it meets a variety of consumer needs, such as providing relevant product information, offering personalized recommendations based on user preferences and past behaviors, and facilitating seamless transactions that enable effortless purchasing (Ismail et al., 2017). Studies have consistently demonstrated that perceived usefulness is a strong predictor of technology adoption and continued usage (Dang, 2018). Consumers are more likely to use and engage with social media platforms that they perceive as highly beneficial in meeting their diverse needs and goals, which in turn directly impacts their buying behavior and purchase decisions. The perceived usefulness of a platform's features and capabilities plays a crucial role in shaping consumer engagement and ultimately influencing their purchasing habits within the social media landscape.

Application of the Technology Acceptance Model (TAM) in Social Media Marketing

The Technology Acceptance Model (TAM), originally developed by Davis (1989), is a widely recognized framework for understanding how users come to accept and use a technology. TAM suggests that two key factors—Perceived Ease of Use (PEOU) and Perceived Usefulness (PU)—determine an individual's intention to use a technology, which in turn predicts actual usage behavior. This model has been extensively validated across various technological contexts, making it a robust predictor of technology adoption (Rauniar et al., 2014; Garcia et al., 2023).

Relevance of TAM to Social Media Marketing

In the realm of social media marketing, TAM provides a valuable lens through which to examine consumer engagement and buying behavior. Social media platforms, being a relatively new and rapidly evolving technology, fit well within the TAM framework as they require users to navigate and interact with technology in ways that can significantly influence their purchasing decisions. The constructs of PEOU and PU are particularly relevant in this context because they directly affect how users perceive the value and functionality of these platforms in facilitating their shopping experiences.

By applying TAM to social media marketing, researchers can gain insights into the factors that drive consumer behavior on these platforms. Specifically, understanding how ease of use and perceived usefulness influence consumer intentions and actions can help marketers design more effective campaigns that enhance user satisfaction and encourage purchasing behavior.

Perceived Ease of Use (PEOU)

Perceived Ease of Use (PEOU) refers to the degree to which a user believes that using a particular system or technology will be free of effort (Davis, 1989). In the context of social media platforms, ease of use is a critical determinant of user satisfaction and engagement. If users find a platform easy to navigate, with intuitive interfaces and accessible features, they are more likely to engage with it and, consequently, participate in online purchases. Elements contributing to perceived ease of use include interface design, clarity of information, and the availability of user support (Williams, 2021).

Research has consistently shown that perceived ease of use significantly impacts technology adoption and continued usage. For instance, social media applications that are perceived as easy to navigate, with straightforward and user-friendly interfaces, are more likely to foster positive user experiences, leading to increased adoption rates and higher user satisfaction (Jalil, 2022; Malik et al., 2021; Gebert-Persson et al., 2019).

Perceived Usefulness (PU)

Perceived Usefulness (PU) is defined as the degree to which a user believes that using a particular system or technology will enhance their performance or overall experience (Davis, 1989). In the context of social media marketing, perceived usefulness is closely linked to the benefits that consumers perceive from engaging with a platform, such as finding better deals, saving time, or accessing personalized recommendations (Dang, 2018). Studies have consistently demonstrated that perceived usefulness is a strong predictor of technology adoption and continued usage. Consumers are more likely to use and engage with social media platforms that they perceive as highly beneficial in meeting their diverse needs and goals, which in turn directly impacts their buying behavior and purchase decisions (Yang et al., 2020; Ismail et al., 2017).

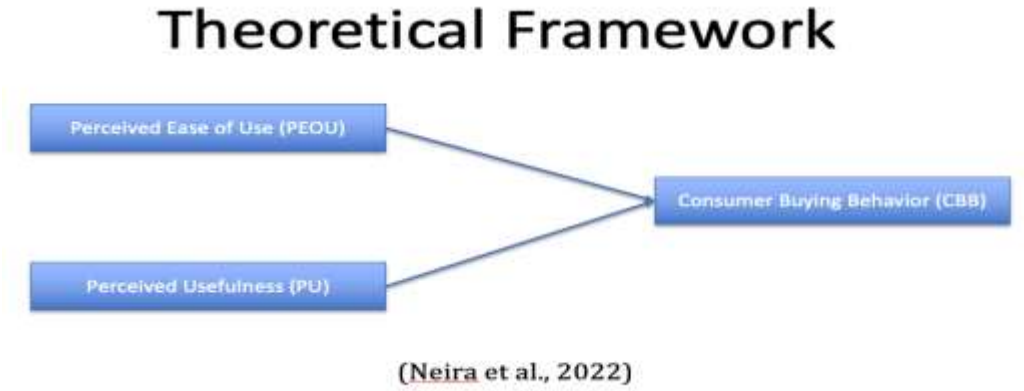
Hypotheses Development

Based on the literature review, the following hypotheses are proposed:

H1: Perceived Ease of Use positively affects consumer buying behavior on social media platforms.

H2: Perceived Usefulness positively affects consumer buying behavior on social media platforms.

Figure 1: Theoretical Framework



Summary of Key Points

The literature review has underscored the critical significance of Perceived Ease of Use and Perceived Usefulness as key determinants of consumer purchasing behavior on social media platforms. The application of the well-established Technology Acceptance Model provides a robust and well-validated framework for comprehending these key relationships and for accurately forecasting consumer engagement and purchasing behavior within the dynamic social media marketing landscape. The core constructs of TAM, perceived ease of use and perceived usefulness have demonstrated strong empirical support in explaining and predicting user adoption and continued usage of various digital technologies, including social media platforms. By applying this reliable theoretical model, researchers and marketers can gain valuable insights into the key drivers that shape consumer perceptions and ultimately influence their buying decisions in the social media environment.

Justification for Focus on TAM

Focusing solely on the Technology Acceptance Model is justified by its strong empirical support and demonstrated relevance in the context of digital marketing. TAM's clear and well-established constructs, such as Perceived Ease of Use and Perceived Usefulness, provide a straightforward yet powerful framework for studying the key factors that influence consumer behavior and purchasing decisions in the dynamic digital age. This well-validated model offers a comprehensive and reliable lens through which to examine the drivers of user adoption and engagement with various digital technologies, including social media platforms. By applying the TAM framework, researchers and marketers can gain valuable, evidence-based insights into the perceptions and preferences that shape consumer behavior within the evolving social media landscape.

Transition to the Research Methodology

The Literature Review laid the groundwork for the upcoming Research Methodology section, where the proposed conceptual model and hypotheses were empirically tested. The emphasis on TAM shaped the research design, data collection, and analysis, ensuring a cohesive and focused study that provided valuable insights into the field of social media marketing.

3. Methodology

Research Design

This study adopted a quantitative cross-sectional research design to investigate the relationship between Perceived Ease of Use (PEOU), Perceived Usefulness (PU) of social media platforms, and consumer buying behavior in Malaysia. The cross-sectional approach was selected to capture data at a specific point in time, enabling the analysis of relationships between these variables within the context of social media marketing.

Sampling Method

A convenience sampling technique was employed, targeting business students from public and private higher learning institutions in Malaysia. This demographic was chosen due to their high level of familiarity with social media platforms and frequent engagement in online purchasing behaviors. Business students were

considered particularly suitable for this study as they are often early adopters of digital technologies and social media tools, which makes them an ideal group for examining the factors that influence consumer buying behavior in the digital landscape. Additionally, their academic background in business likely provides them with a deeper understanding of marketing concepts, further enhancing the relevance of their responses to the study's focus.

Data Collection

Data were collected using an online questionnaire distributed via the Google Forms platform. The survey resulted in 115 valid responses. The questionnaire items were adapted from established studies to ensure relevance and reliability in measuring the constructs of interest(Neira et al., 2022). Each item was measured using a five-point Likert scale, ranging from "strongly disagree" to "strongly agree," to capture the respondents' perceptions of ease of use, usefulness, and their buying behavior on social media platforms.

Data Analysis

The collected data were analyzed using SPSS software. The analysis process included several key steps:

Descriptive Analysis: Descriptive statistics were used to summarize the demographic characteristics of the respondents and the central tendencies of the main variables (PEOU, PU, and consumer buying behavior).

Reliability Tests: The reliability of the scales was assessed using Cronbach's Alpha to ensure internal consistency. A Cronbach's Alpha value of 0.7 or higher was considered acceptable for the constructs.

Correlation Analysis: Pearson's correlation analysis was conducted to examine the relationships between PEOU, PU, and consumer buying behavior. This step provided insights into the strength and direction of these relationships.

Regression Analysis: Multiple regression analysis was performed to test the hypotheses and determine the predictive power of PEOU and PU on consumer buying behavior. The regression model assessed the extent to which PEOU and PU influenced buying behavior while controlling for demographic variables.

Ethical Considerations

Ethical approval for the study was obtained from the relevant institutional review board. All participants were informed of the purpose of the study and were assured of the confidentiality and anonymity of their responses. Participation was voluntary, and respondents were given the option to withdraw from the study at any time without penalty. Informed consent was obtained from all participants before the commencement of the survey.

4. Results and Analysis

Demographic Analysis

The demographic analysis revealed that the majority of respondents were female (73.90%) and primarily fell within the 18-24 age range (90.40%). Most respondents were pursuing a Bachelor's degree (76.50%), with a substantial portion studying Business Administration (40.90%) or Marketing (28.70%). The majority were enrolled in public institutions (88.70%) in Malaysia (93.00%). This demographic profile indicates a young, predominantly female student body with a strong preference for practical, visual, and theoretical learning approaches.

Reliability Analysis

The reliability analysis indicated strong internal consistency across all measured items. Specifically, the scales for Perceived Ease of Use (PEOU) ($\alpha = 0.877$), Perceived Usefulness (PU) ($\alpha = 0.836$), and Consumer Buying Behavior ($\alpha = 0.816$) all demonstrated good reliability. These high Cronbach's Alpha values suggest that the survey items consistently measured their respective constructs, providing confidence in the reliability of the data collected.

Hypothesis Testing

Hypothesis 1 (H1): Perceived Ease of Use positively affects consumer buying behavior on social media platforms.

Finding: The correlation analysis revealed a significant positive relationship between Ease of Use (EU) and Consumer Buying Behavior (CBB) ($r = 0.626$, $p < 0.001$). This finding supports Hypothesis 1, indicating that as

consumers perceive social media platforms to be easier to use, their likelihood of engaging in buying behavior on these platforms increases.

Hypothesis 2 (H2): Perceived Usefulness positively affects consumer buying behavior on social media platforms.

Finding: Similarly, the regression analysis demonstrated that Perceived Usefulness (PU) significantly predicts Consumer Buying Behavior (CBB) ($p < 0.001$). This result supports Hypothesis 2, confirming that the perceived benefits of using a social media platform enhance consumers' propensity to make purchases through that platform.

ANOVA Analysis

The ANOVA results indicated a significant effect of the predictors on consumer satisfaction, with the regression model showing $F(4, 110) = 52.202$, $p < 0.001$. The predictors (Perceived Ease of Use and Perceived Usefulness) explained a substantial portion of the variance in Consumer Behavior. This finding reinforces the importance of both perceived ease of use and accessibility in shaping consumer satisfaction and buying behavior on social media platforms.

Correlation Analysis

The correlation analysis revealed significant positive relationships between all the studied variables. Perceived Ease of Use (PEOU) strongly correlated with Perceived Usefulness (PU) ($r = 0.603$, $p < 0.001$) and Consumer Buying Behavior (CBB) ($r = 0.626$, $p < 0.001$). Similarly, Perceived Usefulness (PU) was positively correlated with CBB ($r = 0.621$, $p < 0.001$). These significant correlations indicate that higher ease of use, greater accessibility, and increased extent of social media usage are all associated with higher satisfaction in consumer buying behavior.

Linking Findings to Hypotheses

Each of the findings presented in the results section has been directly linked back to the hypotheses tested in this study. The strong positive relationships observed between PEOU, PU, and consumer buying behavior provide empirical support for the study's hypotheses, confirming the central role of these factors in influencing consumer engagement on social media platforms.

Table 1: Reliability Analysis

Variables	No of Items	Cronbach Alpha	Strength of Association
Perceived Ease of Use (PEOU)	5	0.877	Good
Perceived Usefulness (PU)	5	0.836	Good
Consumer Buying Behaviour, CBB	5	0.816	Good

The reliability analysis of the variables indicates strong internal consistency across all measured items. Specifically, Perceived Ease of Use (PEOU) (5 items, Cronbach's Alpha = 0.877), Perceived Usefulness (PU) (5 items, Cronbach's Alpha = 0.836), and Consumer Buying Behaviour (5 items, Cronbach's Alpha = 0.816) all demonstrate good reliability. These high Cronbach's Alpha values suggest that the survey items consistently measure their respective constructs, providing confidence in the reliability of the data collected.

Table 2: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	25.355	4	6.339	52.202	<.001b
	Residual	13.357	110	0.121		
	Total	38.712	114			

a Dependent Variable: Satisfaction

b Predictors: (Constant), PEOU, PU, CBB

The ANOVA analysis indicates that the regression model significantly predicts satisfaction ($F(4, 110) = 52.202$, $p < 0.001$), with the predictors (Perceived Ease of Use and Perceived Usefulness) explaining a substantial portion of the variance in Consumer behavior (Regression Sum of Squares = 25.355, Residual Sum of Squares = 13.357, Total Sum of Squares = 38.712). The high F-value and low p-value suggest that the combined effect of these predictors on satisfaction is statistically significant, demonstrating that these factors collectively contribute to consumer satisfaction in using social media platforms as marketing activities tools.

Table 3: Correlations

	EU	Ao	CBB
Perceived Ease of Use (PEOU)	1		
Perceived Usefulness (PU)	.603**		
	p<.001		
Consumer Buying Behaviour	.626**	.621**	1
	p<.001	p<.001	

** Correlation is significant at the 0.01 level (2-tailed).

The correlation analysis shows significant positive relationships between all the studied variables. Perceived Ease of Use (PEOU) has a strong correlation with Perceived Usefulness (PU) ($r = .603$, $p < .001$). Ao is also positively correlated with CBB ($r = .586$, $p < .001$). Importantly, CBB is significantly correlated with PEOU ($r = .626$, $p < .001$) and PU ($r = .621$, $p < .001$). These significant correlations at the 0.01 level indicate that higher ease of use, greater accessibility, and increased extent of social media usage are all associated with higher satisfaction in consumer buying behavior. Perceived Usefulness (PU) correlates positively with the responses of Satisfaction of consumer buying behavior is strongly correlated with all measured factors: PEOU ($r = .626$) and PU ($r = .621$). These findings underscore that enhancing the ease of use optimizing the facilitating easier access to support and promoting greater app usage collectively contribute to higher satisfaction in using social media platforms. In summary, these insights highlight actionable strategies for improving user experience and educational outcomes in digital marketing education and practice, emphasizing the interconnectedness of user ease of use, usefulness, and overall satisfaction.

5. Conclusion

This study provides critical insights into the factors driving consumer buying behavior on social media platforms in Malaysia, emphasizing the roles of Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) as central determinants. By applying the Technology Acceptance Model (TAM), this research confirms that both ease of use and perceived usefulness significantly influence consumer engagement and purchasing decisions on social media. These findings have profound implications for marketers and businesses aiming to leverage social media platforms more effectively.

Implications for Practice

The practical implications of this study are far-reaching. For marketers, the findings underscore the importance of designing social media platforms that are not only user-friendly but also perceived as highly beneficial by consumers. To maximize engagement and conversion rates, businesses should focus on enhancing the intuitive design of their platforms, ensuring seamless navigation, and providing clear, accessible information. Moreover, marketers should emphasize the tangible benefits of their platforms, such as time-saving features, personalized recommendations, and exclusive deals, to enhance perceived usefulness. By doing so, they can create more compelling and persuasive marketing campaigns that resonate with their target audiences, ultimately driving higher consumer engagement and sales.

Furthermore, the strong correlation between accessibility and consumer behavior highlights the need for businesses to ensure that their platforms are easily accessible across various devices and user environments. This means optimizing for mobile usage, providing robust customer support, and ensuring that the platform is

accessible to users with varying levels of digital literacy. These strategies will not only enhance user satisfaction but also build long-term customer loyalty.

Summary of Contributions

This study makes significant contributions to both theory and practice. Theoretically, it extends the application of the Technology Acceptance Model (TAM) to the context of social media marketing in Malaysia, offering empirical evidence that reinforces the model's relevance in this domain. By confirming the roles of PEOU and PU as key predictors of consumer behavior, the research enriches the existing body of knowledge on technology adoption and consumer psychology, providing a solid foundation for future studies in this area.

Practically, the research offers actionable insights for marketers seeking to optimize their social media strategies. The findings provide a clear roadmap for enhancing user engagement and conversion on social media platforms, highlighting the critical elements that influence consumer behavior. This knowledge empowers businesses to design more effective and personalized marketing campaigns, tailored to the specific needs and preferences of Malaysian consumers.

Directions for Future Research

While this study provides valuable insights, it also opens avenues for future research. Future studies could explore additional factors that may influence consumer behavior on social media platforms, such as cultural influences, trust in online transactions, and the impact of emerging technologies like AI-driven recommendations. Additionally, expanding the scope to include cross-cultural comparisons could provide a deeper understanding of how different consumer segments interact with social media platforms. By exploring these areas, researchers can continue to build on the foundations laid by this study, further enhancing the effectiveness of social media marketing strategies in diverse contexts.

Final Thoughts

In conclusion, this study not only reaffirms the critical importance of Perceived Ease of Use and Perceived Usefulness in shaping consumer behavior but also provides practical guidelines for businesses aiming to thrive in the competitive digital landscape. By leveraging the insights gained from this research, marketers can create more engaging, user-friendly, and beneficial social media platforms that drive consumer satisfaction and business success.

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Gender-Based Analysis of Online Shopping Patterns on Shopee in Malaysia: A J48 Decision Tree Approach

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Abstract: The purpose of this study is to investigate the gender differences of the Shopee platform for online shopping behavior by using the J48 decision tree algorithm to classify and predict shopping frequency among male and female consumers in the Malaysian context. WEKA software was used in this study to analyze the datasets. From the experiments, the majority of Shopee users were female consumers. The findings show that female consumer behavior is more complicated and more varied regarding purchasing behavior. The study's findings demonstrate the potential of gender-specific insights to enhance e-commerce strategies, particularly in product recommendations and targeted marketing. Although the J48 model performed well in predicting male shopping patterns, it was less effective for females, indicating the need for more advanced modeling techniques to better capture the complexities of female consumer behavior. This research also emphasizes the significance of using machine learning tools like the J48 decision tree to analyze consumer data, providing valuable insights for improving customer satisfaction and business performance. However, limitations such as sample size and the focus on a single platform suggest that further research is needed, including the exploration of alternative algorithms and broader demographic factors.

Keywords: *Gender, Shopping Patterns, E-Commerce, Decision Tree, J48, Shopee*

1. Introduction

Starting in 2004, Malaysia's government took the first step towards e-commerce with local websites and attempts to introduce people with the help of promotional activity. Major retailers such as Lazada then helped rapid increases in the e-commerce industry. Among the many other available e-commerce websites, Shopee has become the most widely used in Southeast Asia, including Malaysia. Wong et al. (2023) Express that in their study, though Lazada was created in 2012, Shopee has grown to become the go-to platform for Malaysian consumers who intend to shop online. This is because this platform wants products to be shopped online easily, and effortlessly for buyers and sellers.

Nowadays, understanding consumer behavior in e-commerce is important for business. This is because most e-commerce platforms provide a unique environment where consumers can access numerous products and services simply and immediately without leaving the comfort of their homes. Align with the statement by Arif et al (2021) The trend of online shopping is growing with time as digital technology and the internet take over our lives. Along with the growth of the digital market, the amount of data created through online purchases, customer interactions, and other e-commerce activities has also increased dramatically. In this case, businesses must understand consumer preferences, emerging purchasing trends, and factors influencing purchasing decisions. By knowing these purchasing trends, businesses can improve their marketing strategy, consumer experiences, and overall performance. However, the amount of data generated by the e-commerce platform, especially Shopee, is enormous and complex. It consists of a variety of information such as purchase history, demographics, consumer preferences, and others. Moreover, it provides opportunities for companies to collect, analyze, and use data to gain valuable insight. This is attributed to the fact that growth in e-commerce has been rapid, hence making it important for businesses to keep themselves updated for them to maintain some level of competitiveness. Hence, in analyzing the data, especially the complex purchasing patterns, innovative technologies such as machine learning or any other predictive algorithm can be employed by businesses.

With innovative technologies today, machine learning approaches can effectively predict the characteristic customer purchasing behavior. Machine learning is aimed at developing algorithms that could be learned and

improved over time and applied to a prediction context. Liu et al. (2020) say that machine learning is a method that is quick, accurate, and very advanced. Furthermore, Choudhury & Nur (2019) also applied machine learning in their study for the classification of probable customers based on their past buying habits. In addition, understanding consumer purchasing trends is important so that one can align offerings to meet the needs of the consumers at a better level. By finding trends and preferences within users' consumption, businesses can work toward better inventory management, personalization of marketing campaigns, and enhancement of user experiences. Also, the insights into purchasing behavior on gender help predict future trends to proactively strategize business. This analysis not only creates value for businesses through increasing sales and consumers but also increases consumer satisfaction by offering products and services that cater to the preferences of female and male consumers.

This paper identifies the frequency of online shopping on the Shopee platform and the gender factors that determine the frequency of shopping among consumers in Malaysia. Research has continually shown that, regarding the frequency of buying goods online, there is a difference between genders, with different factors influencing the behavior, such as loyalty, discount, and general shopping patterns. Filipas et al. (2023). Females and males present different preferences when shopping online. It also shows that, while purchasing something, males consider fewer factors than females. Rianto et al. (2017). Furthermore, Malaysian findings report that, in terms of frequency of usage of mobile platforms for online shopping, education, and traveling, females use them more than males, while males are interested in downloading, gaming, and other online leisure activities. (Kovacevic & Kascelan, 2020). This also agrees with the local consumer behavior whereby Shopee has gained wider support because its mobile-compatible platform is user-friendly and easy to use by both genders. On the other hand, it is equally important to find out about the gender-based differences in online shopping experiences within Malaysia's emergent e-commerce market and diverse consumer base. In this regard, the local players will profit from how to design their marketing strategy according to the gender preferred to increase the satisfaction of consumers and thereby increase the sales record in the direction required. Whereas various research works have been done to investigate the differences between genders in online shopping behavior, few of them have utilized the J48 decision tree algorithm in analyzing or predicting the said behavior. By applying this machine learning technique, this present study fills a very important gap by enabling a localized understanding of gender-based online shopping behavior on the Shopee platform in Malaysia.

2. Literature Review

Consumer Behavior Models in E-Commerce

Employing various theoretical frameworks to analyze and predict purchasing patterns to understand consumer behavior in online purchasing, has been a significant area of research nowadays. (Arora & Sahney, 2018) Deploy an integrated technology acceptance model (TAM) and theory of planned behavior (TPB) framework to examine showrooming behavior. In this study, they found two factors significantly influence consumer decisions which are the perceived ease of online purchasing and the usefulness of showrooming. Similarly, the study by Ha et al. (2019) Used an integrated TAM and TPB models to examine online purchase intention. This study reveals that perceived usefulness, attitude, ease of use, subjective norm, and trust positively influence shopping intention.

To understand consumer behavior in specific situations, an extended TAM model has been applied. Study by (Sun et al. (2009) Two elements have been added to the extended TAM model which are trust and resources in mobile commerce adoption. From this study, the finding shows that perceived credibility and self-confidence are the main factors that influence. It can be concluded that using an extended TAM model is very relevant in understanding the adoption of mobile commerce. Different study by Mou & Benyoucef (2021), they employed different theoretical frameworks such as TAM, TPB, and the Theory of Acceptance and Use of Technology (UTAUT). In this study, they identified that UTAUT and TAM models have a strong correlation with each other. It shows that mutually of this theory is very beneficial in recognizing how people perform in social commerce.

Gender Differences in Consumer Behavior

Study by Hasan (2010) Identified there is a difference between females and males especially in shopping perspective such as in terms of thinking, feeling, and shopping attitude. In this study, the data were collected from 80 students from Midwestern University who enrolled in an e-commerce course. The experiments reveal

that thinking attitude is the most important factors that give differences between females and males, and it shows that females think online shopping is less useful compared to males. A different study done by Akhlaq & Ahmed (2016) Which focuses on Pakistan to find the relationship between gender and online shopping factors. This study was distributed through an online survey via email to students, alumni, and local university in Karachi, Pakistan. The study found that a big gap had arisen between females and males through perceived enjoyment (PE) and legal framework (LF) online shopping factors. The results show that Eastern females are more enjoyable during online shopping because they can have fun shopping in a secure virtual environment.

In addition, a study from Indonesian by Pradhana & Sastiono (2019) Focusing on finding out how different genders affect consumer choice during they shop online. From their experiments, they found out that females are more towards online shopping compared to males, but in terms of total spending, males are more than females, this study also reveals that trust is the main factors that influence males when they decide how much money they spend and how frequently they shop online. It can be concluded that different genders can be influenced by online shopping factors.

Moreover, a study by An et al. (2022) Emphasize predicting gender for the system that can make predictions based on online shopping behavior specifically for Vietnam FPT groups. The system testing, reveals that the system can predict gender with almost a 78% success rate, it demonstrates that based on online shopping behavior data can be used to figure out gender. However, this study has a hole because it is only based on prediction accuracy rather than gender-specific shopping patterns or preferences. Therefore, this study provides valuable insight into the differences between females and males in online shopping behavior, and it can help to tailor their marketing strategies more effectively to each gender, especially in the Shopee platform.

Data Mining in E-Commerce

In e-commerce, it involves a massive volume of data which this data is collected from various sources. Utilization of data mining or big data is the best way to handle the data. Data mining is the procedure of determining patterns and knowledge from large amounts of data. To enhance an e-commerce strategy on consumer behavior and help optimize business operations utilizing data mining is very important. A study by Arif et al., (2021) Investigates the challenges and advantages of utilization mining on e-commerce data. The study highlights the need to design e-commerce sites for better data collection and analysis. While data mining can reveal useful customer trends and preferences, it also comes with challenges that need to be addressed to fully benefit from it.

Each of the businesses can use data mining to increase their market to consumers and improve their prediction capabilities. Both of the studies by Asniar and Surendro (2019) and Alghanam et al. (2022), agreed that using data mining techniques in business can help make the prediction more reliable and accurate. Similarly study by Li et al. (2019), shows that using decision trees and cluster analysis, both of these categories under machine learning methods, would help businesses better understand consumer behavior and preferences. Additionally, Moon et al. (2021) Apply four types of machine learning methods such as Apriori, Decision Tree, Random Forest Tree, and Naïve Bayes to find an effective algorithm to analyze consumer satisfaction in e-commerce. In this study, it used a large dataset that included 40,000 records. After the experiments have been done, the results show that the Apriori algorithm is the best among the other machine learning methods, with an accuracy of 88%. From the several experiments and findings from this study, it can be concluded that selecting the right data mining techniques will help companies easily understand consumer trends to make a proper marketing plan and product recommendation. Similarly study by Chaubey et al. (2022) Conducted a comparison of numerous machine learning algorithms to predict consumer purchase behavior. The study examined methods such as decision trees, KNN, SGD, AdaBoost, and hybrid algorithms. The findings show that using advanced and hybrid data mining techniques can improve predicting consumer behavior, especially in an e-commerce context. This will guide the companies leading to more effective marketing strategies.

J48 Decision Tree Algorithm

The J48 decision tree algorithm is commonly used in data mining, especially in predicting consumer behavior. It uses accuracy, and efficiency are examined in the literature below from different contexts. Study by Alghanam et al. (2022) In the context of e-commerce recommended J48 algorithm is a data mining model to predict

consumer purchase behavior. They used the Northwind data set, and the finding reveals that 95.2% accuracy was achieved in this study. It shows that using the J48 algorithm also can predict consumer behavior.

Additionally, different contexts of study by Afolabi et al. (2019), for predicting consumer behavior, in this study, they apply integration between structured and unstructured data. They found that prediction based on structured data is more accurate than unstructured data. It shows that the J48 algorithm can work with different types of data and can be used as a tool for predicting consumer behavior. At the same time Kolahkaj & Madjid Khalilian (2015) The Study uses hybrid methods which are J48 and frequent pattern mining. The goal is to improve the recommendation system. From the experiment, the result shows that the J48 algorithm has the highest accuracy and recall. After frequent pattern mining is added into J48, it not only makes the system recommendation better but also contributes to the easy-to-handle big dataset. Meanwhile, the study by Brunello et al. (2019) Employed the new version of the J48 algorithm, known as the J48 security system. Both the sequential and temporal series of data are things that this new version is intended to handle. It is not only advantageous to use J48SS to categorize the data, but it also makes the process of compiling the data much easier. The result is thus an indication that this new version of the J48 method would be acceptable and appropriate for use in industry.

3. Methodology

This study used questionnaires to understand the purchase behavior of the client. Customers who have purchased Shopee are randomly selected for the survey. A total of 156 respondents were recorded, and each was allowed to answer questions that shadowed their buying habits through an online poll. The survey was administered using an online format backed by a Google form. For your convenience, a description of the data is provided in detail below.

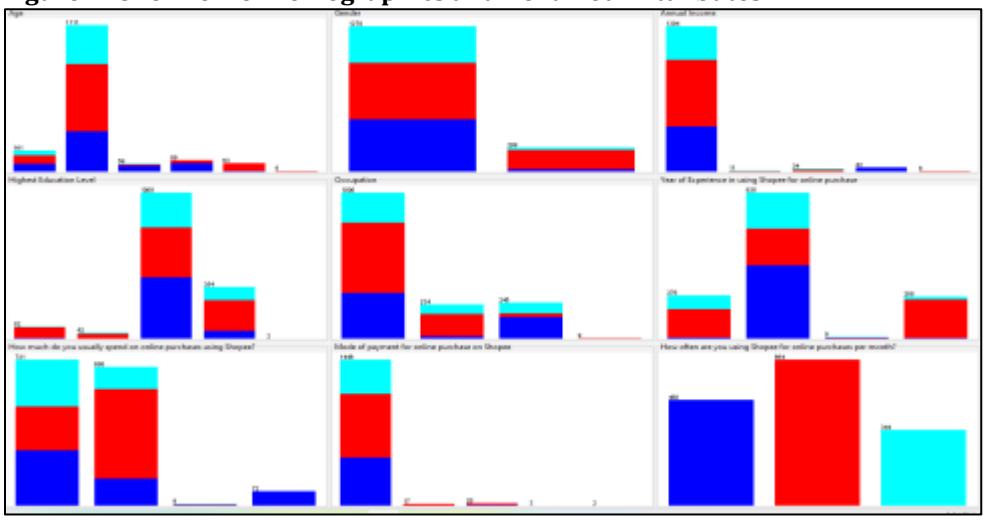
Dataset Description

The dataset used in this study was built with 9 attributes with 156 instances. These attributes cover the demographic and behavioral characteristics of the consumers. Table 1 below shows the dataset description of each attribute. Meanwhile, Figure 1 displays an overview of the demographic and behavior attributes. It shows deeper insights into the consumer demographic and behavior patterns of Malaysian consumers on the Shopee platform.

Table 1: Dataset Description

No	Attribute	Description
1	Age	Consumer's age
2	Gender	Consumer's gender
3	Annual Income	Consumer's annual income
4	Highest Education Level	Consumer's education
5	Occupation	Consumer's occupation
6	Year of experience in using Shopee for online purchase	Consumer's year experiences
7	How much do you usually spend on online purchases using Shopee	Consumer's spending
8	Mode of payment for online purchases on Shopee	Consumer's mode of payment
9	How often are you using Shopee for online purchases per month	Consumer's shopping frequency

Figure 1: Overview of Demographics and Behaviour Attributes



Pre-Processing

Preprocessing is the most crucial phase in data mining. During this phase, pre-processing transforms the data into an appropriate format, with which data mining and machine learning become much easier and smoother. It consists of a few steps required for cleaning the data by removing the missing value if any, followed by a selection of the attribute as per requirement of the study. In this work, the Synthetic Minority Over-sampling Technique is applied because this study possesses class imbalances in frequency attributes. After applying the SMOTE, the number of instances in the dataset has grown from 156 to 1488.

Data Modelling

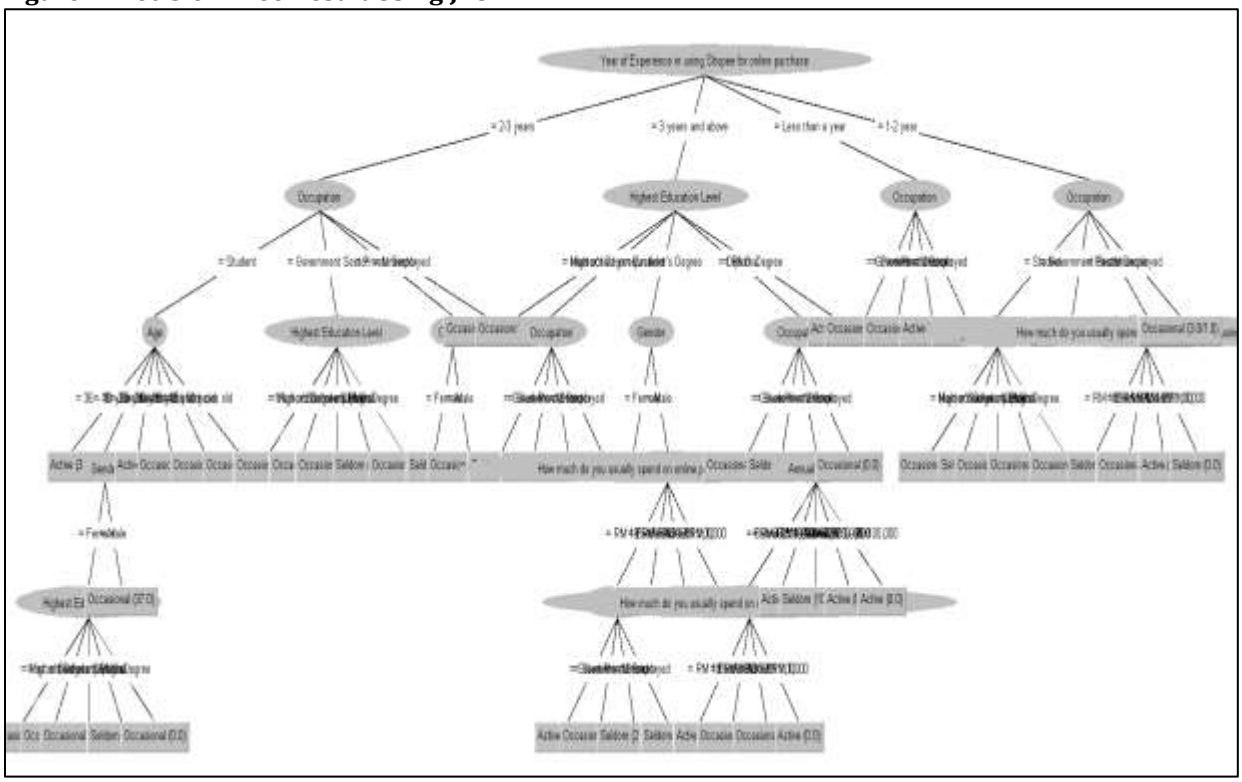
The data is then divided into training and test sets after cleaning. In this paper, for the evaluation of the performance of the model, a 10-fold cross-validation has been implemented. This process is a common approach in machine learning for the model to work well on unseen data. In the modelling stage, the J48 Decision Tree algorithm was applied to the dataset. The reason the J48 algorithm was selected in this study is because of its effectiveness in producing predictions, especially in the prediction of consumer behavior focusing on e-commerce.

Decision Tree

This study employs a classifier based on the decision tree. The reason why this study picks the decision tree is that it is the most common and simplest classification algorithm to be learned and implemented. The tree is made up of three components: root node, branch (edge or link), and leaf node. The root represents the test condition for different attributes, the branch represents all possible outcomes that can be there in the test, and the leaf nodes contain the label of the class to which it belongs.

The root node is at the start of the tree which is also called the top of the tree. It has been used in many studies, as an example by Abana (2019) Use the decision tree to foresee the behavior of consumer purchases since it makes it easy to see how logical rules work. As stated by Safarkhani & Moro (2021), the decision tree is a model that can be read and explained by humans. This research uses J48 as the model-building process. J48 is the open-source Java implementation in WEKA, and J48 is the C4.5 algorithm. The generated decision tree for the J48 algorithm is represented in Figure 2. This decision tree has 59 leaves and a tree size of 78.

Figure 2: Decision Tree Result Using J48



4. Experiments and Results

The J48 decision tree algorithm was also used for the analysis and performance evaluation of each machine learning classifier based on its results. Performance was evaluated in terms of accuracy, precision, recall, and F1-measure. In further analysis, the dataset was split into two subsets based on gender.

Exploratory Data Analysis

EDA is an approach that summarizes and analyzes the main characteristics of a dataset. The result from EDA will be plotted into some form of visualization, like a histogram or graph, which will be easy to understand. The goal of this analysis is to understand gender-specific patterns in online shopping behavior on the Shopee platform. The considerations are the frequency of shopping, modes of payment, and other behaviors that have differed between male and female shoppers. This can consequently help in improving the predictive models and provide insight into how e-commerce strategies can best be optimized on the Shopee platform to meet the needs of male and female consumers. The data for the above analysis is extracted from the survey among Malaysian consumers. This dataset includes demographic variables and behavior of consumer behavior on the Shopee platform. Descriptive analyses were conducted to realize the differences between male and female consumers of the Shopee platform.

As indicated from Figure 3 to Figure 6, the categories of frequency using the Shopee platform for purchases include active, occasional, and seldom. The results indicate that most of the consumers, 66.4%, use the Shopee platform occasionally to make purchases. This is followed by active consumers, who represent 48%, and those who shop seldom amount to 34.4%. Meanwhile, figure 4 shows gender distribution, reflecting the main objective of finding the gender difference between females and males. It highlights that most consumers who make their purchases through the Shopee platform are females. They contribute approximately 85.95% of the total consumers while males contribute about 14.05%.

According to Figure 5, for the female buyers in Shopee, the number of consumers who shop on an occasional basis is greater with 480 out of 1279. The number of active consumers is 384, while the ones who shop seldomly

are 415 each month. Thus, it can be identified that most of the female buyers are occasional shoppers of the Shopee online application. Figure 6 also depicts the analysis of male consumers on the Shopee platform. Out of 209 consumers, the highest 92 shop occasionally each month, while 56 shop seldom, and only 61 are active users. This therefore suggests that most male consumers use Shopee on an occasional basis, like the pattern observed in female consumers.

Figure 3: Shopee Categories on Consumer Usage Frequency

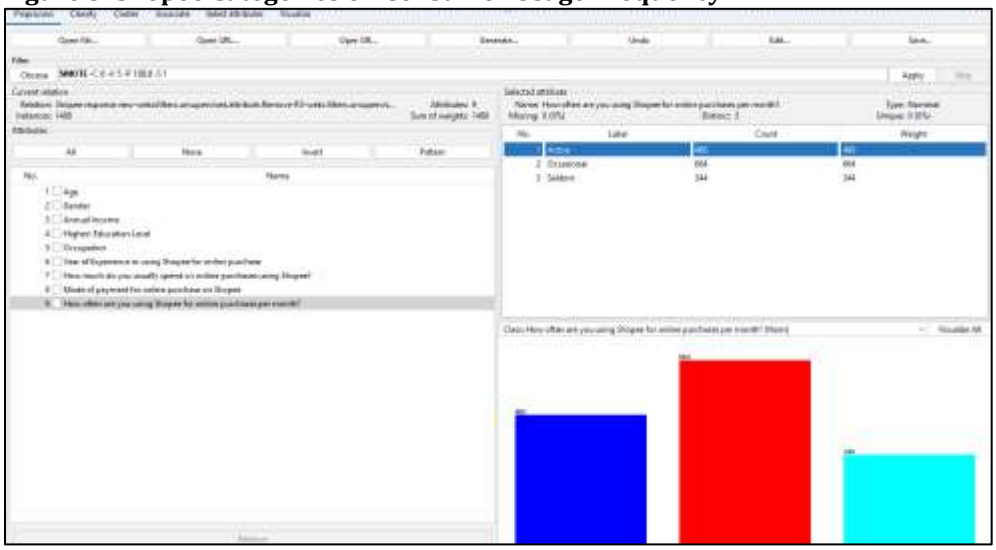


Figure 4: Shopee Usage Frequency by Gender

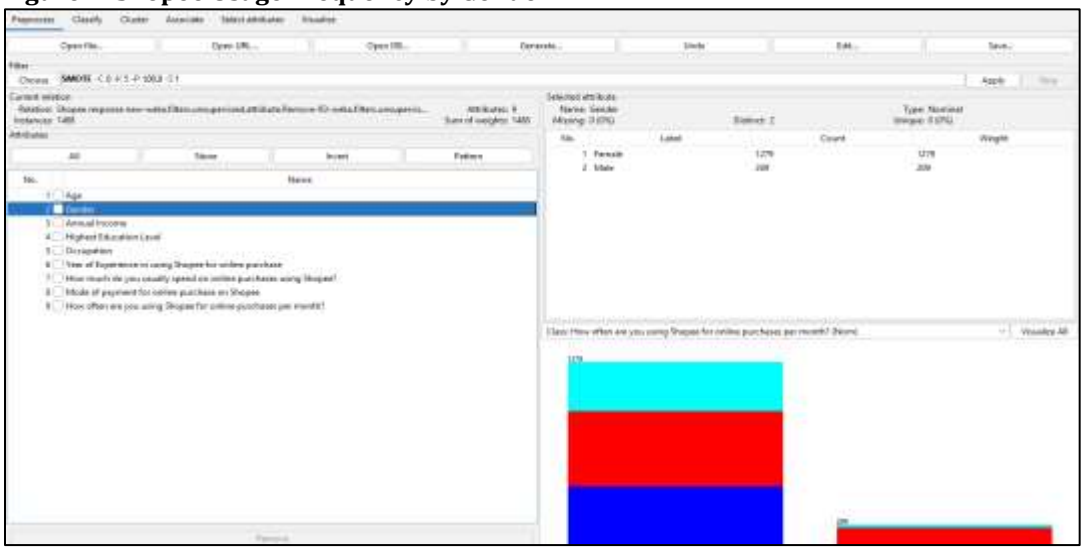


Figure 5: Shopee Usage Frequency for Female



Figure 6: Shopee Usage Frequency for Male



Performance Measurement

This section explains the performance measurement of the J48 decision tree model in terms of accuracy, precision, recall, and F1 measure. The model's evaluation uses cross-validation, which was utilized for both training and testing to ensure the strength and reliability of the performance metrics. Accuracy in the J48 decision tree model is an evaluation metric that measures the number of correct predictions made by a model about the total number of predictions being made. The calculation is performed by dividing the number of correct predictions by the total number of predictions made. Meanwhile precision is a metric that measures the proportion of positive class predictions that correctly belong to the positive class. A higher precision score indicates that the model exhibits greater accuracy and reliability in correctly identifying positive samples. Recall is a performance metric in classification. It is a performance metric that scores the ability of the model presented to it to retrieve its positive samples from all the actual positive samples in that data set. Recall is the ratio of the number of true positive instances the model has correctly classified as positive to the number of instances that are considered positive. Finally, combining precision and recall into a single important performance metric f-measure gives a balanced evaluation of how well a classification model performs. This is extremely important when the data set is highly imbalanced and the classes are very badly skewed, as it is then not a great choice to rely on any kind of accuracy measuring technique.

Table 2 summarizes the classification results of the J48 decision tree, divided into three datasets: the general dataset, the female dataset, and the male dataset. The accuracy for men is 91.38%, and for women, it is 70.68%. It can be seen from the results that each dataset performed differently in the J48 decision tree algorithm. The highest performance was recorded in the male dataset to depict that the algorithm had been more effective in the prediction of male shopping behavior on the Shopee platform compared to the prediction of female shopping behavior. Lower accuracy in the female dataset may refer to greater complexity or diversity in women's shopping habits for which another approach is needed to obtain better results. However, the general dataset that included both genders was moderately accurate, reflecting the mix of male and female shopping behaviors. This implies that separate models for females and males will yield more accuracy in the results while predicting shopping behavior.

Table 2: J48 Decision Tree Performance by Dataset

Algorithm	Dataset	Accuracy	Precision	Recall	F-Measure
J48	General	76.41%	0.784	0.716	0.748
	Female	70.68 %	0.751	0.712	0.731
	Male	91.38 %	0.913	0.912	0.912

Discussion

This paper, therefore, classifies the frequency of shopping online through the Shopee platform and determines the significant gap in online shopping behavior between female and male consumers. Based on the findings, it can be understood that, among the users of this study, the majority are female consumers, and most of the users are those who shop occasionally. It follows that, while the number of male consumers is fewer, their shopping behavior remains more consistent. The findings also testify to the fact that the J48 decision tree model is better at predicting male shopping patterns. The fact allows one to conclude that male purchasing patterns on Shopee platforms are more straightforward and easily predictable, whereas, for females, it's complex and varied. There is a large variance in the J48 decision tree algorithm performance among the three datasets. Specifically, it built the model with the highest performance in terms of accuracy when applied to predict male consumer behavior. This may be because male consumers have relatively homogeneous shopping preferences, thereby making it easier for algorithms to make more accurate predictions. On the other hand, the low accuracy of the female dataset may indicate greater diversity in shopping behaviors, where women consumers using the Shopee platform consider a broader range of factors when deciding which item to buy. Thus, because female consumers are so complex, enhancing the prediction accuracy requires coming up with a more advanced modeling technique or separate models.

These findings consequently bear an applied value for e-commerce platforms, such as Shopee, which may apply the gained gender-specific insights to improve their marketing activities and recommend products more efficiently. The knowledge gained concerning the differences in shopping behavior by male and female customers allows businesses to adapt their offerings better, possibly leading to higher customer satisfaction and improved sales performance. For example, targeted marketing campaigns might be more effective in entertaining the predictable patterns of male consumers, while in the case of females, more personalized strategies may be necessary to handle their diverse preferences. Despite these promising findings, some limitations of the present study need to be acknowledged. Although the sample size in this research is adequate, it cannot be representative of the population of Shopee users. The research covers only the Shopee platform; therefore, the generalization of findings may not be necessitated on every e-commerce platform. It is suggested that future studies investigate other machine learning algorithms that might be sensitive to capturing the complexity of the shopping behavior of females. Extension can also be made to other demographic variables, including age and income, for a holistic understanding of the online shopping pattern.

5. Conclusion and Limitations

These results are useful for e-commerce websites such as Shopee, where the knowledge will help suggest better products and set up better marketing strategies, both of which can tap into gender-specific information. These findings have contributed significantly to the comprehension of online shopping behavior by underlining clear gender differences in buying trends, especially within the Malaysian context. Value is added by the research study, as it makes use of a machine learning model J48 decision tree to analyze consumer behavior, hence

providing pragmatic insights useful in the making of effective marketing strategies. Knowledge acquired will be able to help businesses such as Shopee develop focused marketing strategies to achieve customer satisfaction and business growth. From a policy standpoint, this research study supports the notion of tailored marketing strategies to be based on gender-specific behaviors. These can, therefore, be useful to policymakers in businesses in advocating for gender-sensitive e-commerce policies that ensure inclusiveness in meeting diverse consumers' needs. This could imply that government agencies work out policies with e-commerce platforms that ensure marketing campaigns are targeted more toward serving varied groups of consumers. Besides, policies can be instituted that will incentivize local businesses to adopt advanced data analytics and machine learning models since this is the only way they could remain competitive in the rapid sea changes of the digital economy.

There are a few limitations regarding this research study. First, this is related to the sample size. Though the sample size is adequate in this research design, it may not represent the consumer base of Shopee, particularly in the Malaysian context. Because of this, it focuses only on the Shopee platform. Its results may therefore not apply to other e-commerce platforms like Lazada, eBay, and others. Future studies will research other machine learning algorithms to understand such complicated female shopping behaviors. Furthermore, extending other demographic aspects, for example, age and income, can also complement a study in the aspects of online shopping pattern understanding. The study brings out amply the differences in consumer behavior between the genders on Shopee and identifies areas that most definitely will help businesses in the improvement of marketing strategies through predictive analytics. E-commerce platforms will be able to handle the complexity of female shopping patterns by leveraging the more direct male behaviors to better position their offerings for improved customer experiences and better business outcomes. These findings set up a concrete foundation for further research and policy efforts that would help implement more inclusive and data-driven marketing strategies in e-commerce.

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Evaluating the Efficacy of Cosmetic Product Safety Regulations in Malaysia: The Role of the National Pharmaceutical Regulatory Agency (NPRA) and Industry Compliance

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Abstract: Various legislative measures, such as the Sale of Drugs Act 1952, Control of Drugs and Cosmetics Regulations 1984, Poison Act 1952, Guidelines for Control of Cosmetic Products 2022, and other directives introduced by the NPRA in Malaysia, are intended to control the safety of cosmetic products. Despite these existing laws and directives, cosmetic products containing hazardous ingredients persist in the Malaysian market. NPRA reportedly received 1,041 complaints about cosmetic products in 2022, while its website also displays an annual increase in cases involving cosmetic products that contain hazardous ingredients. The persistent presence of harmful cosmetic products in the market highlights significant gaps in efforts to control hazardous cosmetic products. This study examined the efficacy of cosmetic product safety regulations in Malaysia, focusing on the role of the National Pharmaceutical Regulatory Agency (NPRA) and industry compliance. This qualitative study gathered data from library databases and conducted semi-structured interviews with NPRA officers, cosmetic manufacturers, and cosmetic industry experts. Findings suggest that despite the extensive nature of the regulatory framework, its implementation, which heavily relies on self-regulation and post-market surveillance, requires serious improvement. While some cosmetic producers adhere to Good Manufacturing Practice (GMP) standards, there are still persistent issues related to product notification, misuse of self-regulation, and inadequate penalties for non-compliance. Therefore, an intensive awareness campaign aimed at cosmetic manufacturers is necessary to ensure the production of safe cosmetic products. Consumers must play their role in helping the NPRA control the sale of hazardous cosmetic products by performing safety checks before purchasing them.

Keywords: *Cosmetic products; National Pharmaceutical Regulatory Agency (NPRA); cosmetic product safety, safety regulation, cosmetics directives*

1. Introduction

The word “cosmetics” comes from the ancient Greek word “*kosmos*" meaning “adornment” (Power, 2010). Cosmetics also includes body and beauty care, which focuses on preserving, restoring, and improving the human body's attractiveness (Rahse, 2019). The Control of Drugs and Cosmetics Regulations 1984 defines cosmetics as “any substance or preparation intended to be placed in contact with various external parts of the human body (including epidermis, hair system, nails, lips, and external genital organs) or the teeth or mucous membranes of the oral cavity with a view, exclusively or mainly, to clean, perfume, change the appearance or correct body odors, and protect or keep the areas in good condition”.

The Control of Drugs and Cosmetics Regulations 1984 (CDCR) conclusively defines cosmetics as items used for various external body functions. The definition of cosmetics limits the purpose and function of cosmetic products for use only on permitted parts of the human body (Zakaria et al., 2019). The word "in contact" means that the function of cosmetic products cannot go beyond the epidermis, and it must be applied only to the epidermis, hair system, nails, lips, external genital organs, or the teeth or mucous membranes in the oral cavity. The function of cosmetics must be within the definition of cosmetics stipulated in CDCR, including cleaning, scenting, altering body appearance, correcting body odors, and protecting or maintaining a healthy human body.

Cosmetic products must comply with the laws, regulations, and directives related to cosmetic product safety if they are to be marketed in Malaysia. Cosmetic products’ safety is regulated by the Sale of Drugs Act 1952 (SODA), Poison Act 1952, CDCR, Malaysian Guidelines for the Control of Cosmetic Products (GCCP) 2022, and

other forms of legislation relevant to the regulation of cosmetic products in Malaysia. Section 27 of the SODA provides an extension of all the provisions in the SODA that apply to soap, cosmetics, and toiletry preparations. In addition, Section 28 of the SODA grants the Ministry of Health (MOH) the power to introduce CDCR for governing the sale of drugs and cosmetics in Malaysia. MOH also appointed NPRA to control cosmetic products in Malaysia.

NPRA is under the purview of the Pharmaceutical Services Division (PSD) in MOH and was one of the initiatives introduced by the MOH. NPRA, initially known as the National Pharmaceutical Control Bureau (NPCB), was established in October 1978 as part of the Pharmacy and Supply Program's quality control operation to implement this regulatory responsibility (NPRA, 2015). The Director of the NPCB serves as one of the drug control authorities, and starting from 15 July 2016, the NPCB became known as the National Pharmaceutical Regulatory Agency (NPRA, 2015). NPRA introduced the GCCP in 2022 and it contains directives for further controlling the safety of cosmetic products. Regulation 18 of CDCR mandates that each cosmetic company should notify the NPRA of its cosmetic product(s) before manufacturing, selling, supplying, importing, possessing, or administering the said cosmetics in Malaysia.

Notification can be considered an initial control mechanism of cosmetic products before the products are marketed to consumers. This control mechanism has been in force since the first Guideline for Control of Cosmetic Products (GCCP) was introduced in Malaysia in 2008. The GCCP has undergone several amendments, the latest of which was published in 2022. Despite this, the production and sale of hazardous cosmetic products persists in the Malaysian market. In 2022, NPRA reported receiving 1,041 complaints about cosmetic products (NPRA, 2022), while its website displayed an annual increase in cases involving hazardous cosmetic products (NPRA, 2024).

The hazardous ingredients commonly found in cosmetic products include mercury, hydroquinone, tretinoin, and betamethasone 17-valerate (NPRA, 2024). Mercury can damage the kidneys and nervous system (Bernama, 2024). Hydroquinone can cause erythema, discomfort, changes in skin pigmentation, hypersensitivity, and increases the risk of skin cancer, while Tretinoin can lead to erythema, irritation, tenderness, desquamation, and increased photosensitivity (The Sun, 2024). Conversely, using betamethasone 17-valerate can cause skin atrophy, making it more likely to get irritated, develop acne, change its color, and get absorbed by the body, which could lead to adverse side effects (Bernama, 2024). The persistent presence of hazardous cosmetic products in the Malaysian market indicates an inadequate quality control mechanism (Othman et al., 2020) and a deficiency in cosmetic product safety regulations, thus, highlighting the need to revise current laws and regulations to ensure consumer safety. This study examined the efficacy of cosmetic product safety regulations in Malaysia, focusing on the role of the NPRA and industry compliance.

Studies on cosmetic safety control are lacking, as most studies focus on consumers' behavior toward cosmetic products. However, two studies are related to the control of cosmetic products. Zakaria (2015) examined the European Union model for cosmetics operations and used Malaysia as a case study. The study referred to the EU Cosmetics Directive (76/768/EEC) and the European Parliament's EU Cosmetics Regulations (Regulation (EC) No. 1223/2009). The study found that Malaysia has dramatically benefited from the EU's regulatory framework, particularly in improving consumer safety against harmful products. Although this study discussed the law on cosmetic products, the discussion primarily focused on the regulation of cosmetic products before and during 2015. Othman et al. (2020) conducted a subsequent study on safety protection, specifically focussing on the application of cosmetic products in Malaysia. It focused on consumer protection by highlighting the Consumer Protection Act 1999, which aims to ensure consumer safety and prohibit the supply of hazardous cosmetic products. It also briefly discussed the Control of Drugs and Cosmetic Regulations 1984 (CDCR) but did not delve into a detailed discussion on safety control measures for cosmetic products. The gap in the literature concerning NPRA's role in regulating cosmetic products and industry compliance inspired this study.

This current study is significant given Malaysia's regulatory structure, which primarily relies on self-regulation and post-market surveillance, where consumers are highly exposed to dangerous and low-quality cosmetic products produced by unscrupulous cosmetics manufacturers and sellers. In addition, it intended to identify regulatory and industrial practice features that require improvement by addressing challenges faced by local

enforcement and exploring how the industry complies with guidelines. It also highlights the importance of enhancing laws and public education in countries with limited consumer awareness of cosmetic safety, thus, enabling consumers to make safer choices. Enhancing Malaysia's regulatory framework will strengthen public health safeguards and help the domestic cosmetics sector adhere to international safety standards, thereby fostering consumer confidence and economic development.

2. Literature Review

Regulatory frameworks governing cosmetic products

In Malaysia, cosmetic products are regulated by the Sale of Drugs Act 1952 (formerly the Sale of Food and Drugs Ordinance 1952) (SODA). Section 26 of SODA gives the Ministry of Health (MOH) the power to make regulations related to cosmetic products. As such, the MOH issued the CDCR to control the sale of drugs and cosmetics. The CDCR regulates the registration of products containing drugs and the notification of cosmetic products. Regulation 29 of the CDCR requires mandatory compliance with all the directives or guidelines issued by the Director of Pharmaceutical Services (DPS), in which any violation of CDCR shall be punishable according to the general penalty outlined in Section 12 of SODA.

Section 12 of SODA provides that “any person who commits an offense under this Act or any regulation made under this Act for which no penalty is expressly provided shall be liable on conviction to a fine not exceeding twenty-five thousand ringgit or imprisonment for a term not exceeding three years or both, and for a second or subsequent offense the person shall be liable on conviction to a fine not exceeding fifty thousand ringgit or imprisonment for a term not exceeding five years or both. A body corporate that commits an offense under this Act or any regulation made under this Act for which no penalty is expressly provided shall be liable on conviction to a fine not exceeding fifty thousand ringgits”.

Compliance with all regulations about cosmetic products should start before cosmetic companies notify the NPRA of their products. Cosmetic manufacturers must obtain the relevant licenses from local authorities (PBT) to conduct business and manufacturing activities. They must ensure that the factory layout, premises, and facilities adhere to the Guidelines for Cosmetic Good Manufacturing Practice (GCGMP).

A. Requirements for Cosmetic Good Manufacturing Practice (CGMP)

Good manufacturing practice (GMP) is not only compulsory for food production but is also obligatory for the cosmetics industry. Cosmetic companies are required to adhere to GMP before conducting product notifications (Ahmad et al., 2013). Cosmetic manufacturers must plan and design their manufacturing facilities according to the CDCR and Annex 1 Part 11 of the Guidelines for Cosmetic Good Manufacturing Practice. The CDCR does not highlight the manufacturing facility but emphasizes that the premises must be in excellent condition and observe a high standard of hygiene. GCGMP aims to ensure that the end product manufactured meets quality standards appropriate for its intended use, safety, and consumer benefits. Moreover, being GCGMP compliant enables cosmetic manufacturers to proceed with subsequent processes, such as product notification, manufacturing, and distribution of products to consumers (GCGMP, 2022). GCGMP emphasizes minimizing the risk of contamination in the manufacturing premises by addressing issues about quality control aspects, personnel, manufacturing premises, equipment, sanitation and hygiene, production, storage, quality control documentation, internal audits, storage, complaints, and product recall.

According to GCCMP, the manufacturing premises must maintain high levels of cleanliness. The walls, ceiling, and flooring in the processing area should be smooth and easy to maintain and sanitize. However, the GCGMP does not mention how the manufacturers should ensure the smoothness of their factory floors and walls. Clause 3.6 of the GCGMP states that the floor and walls must be "smooth" and easy to clean and sanitize. The processing area should be segregated from the packaging and the labelling process areas. Moreover, there must be sufficient space to accommodate the equipment and machines used in the production process, such as mixing and filling, which involves dissolving, charging, cooling, and filtering.

GMP also includes equipment and machinery. Equipment requires simple cleaning and proper maintenance to ensure its longevity (Gudowska, 2017). There is no need to provide evidence of the cleaning process's efficacy as this would entail a comprehensive analysis of surface residues and measurement of residues in rinsing

solvents, which can be a significant scientific undertaking (Moore, 2009). The equipment's surfaces that meet process materials should not react with or absorb them (NPRA, 2022). Leaky valves, oil leaks, and unsuitable changes or adaptations should not negatively affect the product (NPRA, 2022).

B. Notification Requirements for Cosmetic Products

Regulation 18A of the CDCR 1984 specifically mandates a compulsory notification for each cosmetic product before being manufactured, sold, supplied, imported, possessed, or administered. The Director of Pharmaceutical Services (DPS) may exempt the notification if a locally registered company manufactures or imports cosmetics for market sampling, internal evaluation, export, transit, sales, or supply in a free trade zone. The notification process is essential because it enables the NPRA to gather enough information about cosmetic products sold in the local market (Zakaria, 2015). The NPRA's website will serve as the notification platform for cosmetic products through the Quest 3+system. Since its establishment, the Quest 3+system has undergone three upgrades. It was previously known as the Quest System, but it underwent an upgrade to Quest 3 and is now known as Quest 3+. Notifying cosmetic products to NPRA is within the purview of Cosmetic Notification Holders (CNH). CNH is a Malaysian-registered local company specializing in cosmetics and oversees the placement of a product in the market. However, the CNH may or may not be the product owner (GCCP, 2022). To notify the NPRA, CNH should declare basic information about the product according to Clause 3.1 of the GCCP.

Clause 3.1 of the GCGMP stipulates that CNH must provide information about the product's name, type, intended use, presentation label, manufacturer's name and address, CNH's name and address, complete ingredient list with the content and percentage of restricted ingredients, authorization and declaration documents, manufacturing contract documents, and the product label. The Quest3+system's declared information binds manufacturers into producing products that align with what has been declared in the system. Quest 3+ is an auto-screen database that accepts only cosmetic products with acceptable and restricted ingredients within the approved composition percentage (NPRA, 2022). The system will automatically scrutinize the product's formula, as well as identify and block any prohibited ingredient in the cosmetic product or any new ingredient yet to be registered (NPRA, 2022). Hence, if the NPRA discovers any cosmetic product that contains prohibited substances, substances beyond permitted limits and conditions, or use of the claimed product for purposes beyond the scope of cosmetics, it will reject the product notification and deny the CNH a notification note (NPRA,2022).

The notification process can be the first step in regulatory control aimed at preventing the marketing of cosmetic products that contain prohibited ingredients. However, this control will fail if the CNH does not accurately declare the ingredients and all the information required under Clause 3.1. The NPRA will conduct post-notification controls as a subsequent control measure to verify the notification of the cosmetic product. Post-notification controls consist of auditing the Product Information File (PIF) and post-market surveillance.

Product Information File (PIF)

The CNH must develop a PIF, which is one of the post-notification processes, to substantiate a cosmetic product's safety, quality, and purported benefits (Salleh, 2013). The CNH should provide a PIF for every product introduced to the market. This document should include critical information, such as product safety, adverse effects, and ingredients contained in the marketed product. It must be available at the label's specified address and maintained for three years following the product's marketing (NPRA, 2022). The information about adverse side effects, product claims, and product efficacy must be derived from the cosmetic products' composition, tests, and supporting data (Zakaria, 2015). Contents of the PIFF must be consistent with both the notification note and the final product. The NPRA will conduct a PIF audit to verify the CNH's declaration of compliance during the notification submission process (Salleh, 2013).

The NPRA conducts PIF audits for products that meet specific criteria, including high-risk products, skin-whitening products, manufacturers or companies with a history of product complaints, consumer recalls poor Good Manufacturing Practice (GMP) practices, and products that fail laboratory tests (Salleh, 2013). Products with deceptive names and claims that go beyond cosmetics or intended for treatment purposes, such as mesotherapy, massage oils with therapeutic indications, or slimming products, are among the other criteria that trigger a PIF audit (Mesa, 2015). There are two possible PIF findings, namely major and minor. Major

findings will lead to cancelling the notification note and withdrawing products from the market. Meanwhile, for minor findings, cosmetic companies or the CNH will receive a warning letter without a product recall and will be required to take corrective measures within a specified time frame (Salleh, 2013).

Post-market surveillance (PMS)

The NPRA conducts ongoing post-market surveillance activities to monitor cosmetic products in the marketplace after notification (Huzaifi, 2014). The PMS program actively and systematically compiles information on the safety and quality of cosmetic products (Hegde and Konakanchi, 2011). It may be considered a monitoring tool for ensuring compliance with rules and guidelines stipulated by the Ministry of Health and protecting public health from adulterated and unsafe cosmetic products (Roslan et al., 2023). PMS activities about cosmetics include a screening of product formulation and information, product name and its purported benefits, sample collection, and testing, monitoring of label compliance, auditing of premises to ensure compliance with Cosmetic GMP, addressing product complaints, monitoring advertisements, monitoring adverse reactions, and auditing PIF.

The NPRA conducts PMS either through routine inspections or random sampling. A routine PMS would rely on the case list and information from the enforcement department. Whereas, random sampling would depend on complaints or inquiries from the public or queries from the Quest3+ system while issuing notifications and inputs from the GMP audit (Huzaifi, 2014). NPRA collects product samples either by requesting CNH to submit a product sample to NPRA or by buying directly from the market (also known as "best buy") (NPRA, 2022). According to Section 4 of the GCCP, if the NPRA requests a sample, the CNH must ensure that the sample packaging is unopened and in its original container, the test sample is similar to the production batch, the cosmetic product sample includes at least four units or containers with a net weight of 100 grams, and the sample label is attached to the packaging. The sample's expiry date should not be less than one year, based on the sample delivery date to the NPRA.

Section 5 of the GCCP delegates power to the DPS to cancel the notification note for any cosmetic product if the DPS believes, with reason, that the product has failed to adhere to the prescribed rules and guidelines. In addition, the DPS can issue a written order to the authorized person or person responsible for placing the notified cosmetic in the market to recall, remove, or withdraw the notified cosmetic from any premises (GCCP, 2022). A CNH, manufacturer, importer, or wholesaler can undertake a product recall by removing or withdrawing adulterous or defective cosmetic products from the market. The severity of the quality defect and adverse reactions to cosmetics determines the level of product recall (NPRA, 2022). Hence, if the product remains in the market, pharmacy enforcement officers can then take legal action against CNH and cosmetic manufacturers under the guidelines and the Act (NPRA, 2022).

Self-Regulation in Cosmetic Industry

Self-regulation is an industry regulatory tool (Sinclair, 1997) in which a structured group is represented by an industry-level organization (Gunningham & Rees, 1997) that controls the behavior of its members (Gunningham & Sinclair, 2017). Self-regulation is also considered a normative order practiced by private governments (corporations, schools, and hospitals), professional communities, and business networks. It also entails an industry-level organization issuing guidelines to its members who conduct business in the industry (Gunningham & Sinclair, 2017). Self-regulation allows a company to establish internal controls and enforce standards to govern the conduct of its entire workforce to guarantee compliance with industry regulations.

In the context of manufacturing and selling cosmetic products, self-regulation places the responsibility solely on the company to produce safe and quality cosmetic products they sell (Ismail et al., 2019). At the same time, it encourages a company's freedom to choose its strategy to comply with existing laws based on its own experience and conduct an assessment of its situation (Calcott, 2010). The duty to produce a safe product lies on the shoulders of the CNH, product owner, and product manufacturer, who are incidentally parties who should ensure that the product’s formulation and manufacturing process comply with stipulated laws and regulations.

Self-regulation has been widely criticized for its inability to control the safety of cosmetic products, but it is still used to establish a voluntary standard (Zakaria, 2015). Voluntary self-regulation is the most feasible and

efficient way to ensure consumer safety through aligned incentives (Daum, 2006). There are two incentives for industry self-regulation. The first involves industrial image control, in which controlling the industry's image is crucial for upholding the consumer's positive perception of product safety levels and sustaining retail sales (Daum, 2006). The second is to protect industry independence by ensuring an adequate level of industrial safety to avoid the formulation of stricter laws and regulations in the industry (Daum, 2006). However, limiting stricter laws and regulations in the industry cannot serve as a basis for implementing self-regulation. Unsupervised self-regulation in the cosmetics industry will create a state of dependence among the public on cosmetic companies whose business interests are primarily profit-oriented (Tecson, 2021). Furthermore, the lack of short-term detection of a cosmetic's effects renders it exceedingly hazardous, thus, casting doubt on its safety.

Self-regulation allows the company to monitor its compliance with legal requirements and to be accountable for verifying the ingredients' safety before manufacturing the product (Ismail et al., 2019). Therefore, self-regulation cannot stand alone. Cosmetic manufacturers and product owners should integrate self-regulation with the oversight of governing bodies and respective laws to ensure the production of safe products for consumers.

3. Methodology

This qualitative study collected data through a desktop study and semi-structured interviews. The desktop study facilitated the investigation by locating materials from numerous library resources, including online databases, textbooks, journal articles, and government documents. Library materials helped the study to comprehend the cosmetic control system, formulate interview questions, and establish the conceptual framework for this study. Subsequently, semi-structured interviews were conducted involving NPRA officers, cosmetic manufacturers, and industry experts. This study received approval from the National Medical Research Register (NMRR) (NMRR ID: 23-00744-N8L) to interview NPRA officers. It also interviewed five cosmetic manufacturers (CM), consisting of small, medium, and large companies, and finally reached data saturation. In addition, it also interviewed three experts from the cosmetic industry. It conducted an ethical protocol by obtaining a letter of consent from each of the participants before conducting the interviews. Information from the informants is summarised in Table 1.

Table 1: List of informants

Informants	Coding	Department/ Agency/
Officer from NPRA	N1	NPRA
Officer from NPRA	N2	NPRA
Officer from NPRA	N3	NPRA
Cosmetic manufacturer	CM1	Small sized company
Cosmetic Manufacturer	CM2	Small sized company
Cosmetic Manufacturer	CM3	Medium-sized company
Cosmetic Manufacturer	CM4	Medium-sized company
Cosmetic Manufacturer	CM5	Large sized company
Industry Expert	Expert 1	Trainer and consultant
Industry Expert	Expert 2	Trainer and consultant
Industry Expert	Expert 3	Trainer and consultant

4. Discussion

This study examined the efficacy of cosmetic product safety regulations in Malaysia. The laws and regulations monitoring the safety of cosmetic products have long been in place in Malaysia to prevent cosmetic products containing hazardous substances from entering the market. Malaysia had initially implemented a registration process that required manufacturers to register their products by providing details and other documentation for approval before the product could go into production, and only then did it introduce ASEAN collaborative efforts in the cosmetics industry (Zakaria et al., 2019). However, since the introduction of the ASEAN Cosmetic Directive (ACD), the registration system has been transposed into a notification system based on Regulation 18 of the CDCR and GCCP. Currently, cosmetic manufacturers only need to notify the NPRA of their compliance.

Cosmetic companies can sell their products once they receive a notification note from the NPRA. This notification requirement is simple, but the companies or cosmetic manufacturers must comply with all the pre-requisite conditions before receiving a notification. Cosmetic manufacturers must first obtain GMP from the NPRA.

The GMP regulatory controls are strict to ensure the quality of cosmetic products, but most cosmetic manufacturers obtain GMP for their factory premises. N1 reported that:

"*Most manufacturers meet GMP requirements. Out of 80 inspections, 7 or 8 cases are considered unacceptable. The factors that prevent them from receiving an acceptable GMP are the following: the product is not similar to that mentioned in the documentation, production outside the cleaning room, and damaged wall surfaces such as peeling paint and dirty factories. The factory is dirty and dusty. The cosmetic ingredient itself causes the factory to be dusty and dirty"* (N1, 2023).

This shows that although the requirement for obtaining an acceptable GMP status from the NPRA is quite strict, most cosmetic manufacturers strive to obtain it for manufacturing their cosmetics. Some cosmetic manufacturers hire a consultant to help them with GMP documentation and meet GMP requirements. Cosmetic manufacturers are aware that GMP emphasizes the cleanliness of the premises and requires the floor and walls to be "smooth" and easy to clean and sanitize. Thus, to meet the requirements, they paint the factory floor and ensure the premises floor is always clean. However, maintaining a smooth floor requires high maintenance costs and constant efforts (CM 4). It is crucial to prioritize consumer safety as a precaution for ensuring high-quality and safe products although it can be somewhat burdensome for cosmetic companies.

The CNH must complete the notification form in the Quest system for each cosmetic product or any variants, if any, upon receiving an acceptable GMP, and then proceed with the payment to the NPRA. (Roslan et al., 2023). The notification process involves information concerning a particular cosmetic product for the attention of the NPRA and consumers (N2, 2023). The system will screen the product information without human intervention upon receiving the notification (N2,2023). However, the system will query if the CNH mentions ingredients not listed in the system, and the CNH must respond to that query (N2, 2023). Cosmetic companies can receive a notification note shortly after uploading all pertinent documents into the system, provided there are no issues with the product notification. Cosmetic manufacturers stated that they have no significant issues with the Quest system. They expressed satisfaction with the Quest system and regarded it to be highly industry-friendly. Despite its age, the Quest 3+ system has not encountered too many technical issues, and it streamlines the notification process. The only problem is that this system is based on self-regulation, and the dependence on self-regulation has frequently led to non-compliance, resulting in the persistent availability of hazardous cosmetic products in the market. N2 informed that:

"*The issue we have is that some companies are abusing the system, which is being abused in a way by some companies because it is easy to do so. They were supposed to take responsibility, but they misuse it".* (N2, 2023)
Cosmetic manufacturers are responsible for ensuring that their products align with the notifications received by the Quest3+system. However, not all companies are trustworthy (N2, 2023) as some cosmetic companies prioritize their profits over the safety of their consumers. They will notify the NPRA about cosmetic products containing permitted ingredients, but they continue to produce products with different ingredients (Expert 2, 2023). Every year, the NPRA cancels notifications and bans numerous products from the market due to their hazardous or poisonous ingredients (NPRA, 2023). This unscrupulous action risks consumer safety as the product enters the market following notification. However, its safety remains unknown until consumers complain or the NPRA conducts post-market surveillance (Expert 2, 2023). This shows that consumers will first become unwell before realizing the product is unsafe and this underscores the need to refine the implementation of the notification law.

In addition, the product claim must be contextual to the purpose, as in the definition of a cosmetic product. Claims made by cosmetic products are related to various functions, such as cleaning, scenting, altering appearances, correcting body odors, and protecting, or maintaining conditions. However, the law permits cosmetic companies to assert a secondary claim that pertains to a minor function not included in the above scope, such as anti-dandruff, caries, cellulite, hair loss, bust contouring, acne or anti-bacterial (Annex I, Part 8,

GCCP). The cosmetic formulation and/or substantial evidence must justify each claim in the Product Information File (PIF). A PIF is a document that supports the safety, quality, and claimed benefits of the marketed cosmetic product(s). However, industry experts assert that not all cosmetic companies provide a PIF, and they only do so after the NPRA informs them about the PIF audit (Expert 1 and Expert 2, 2023). This indicates the gap between existing law and the practices of cosmetic companies, as the regulations require every cosmetic company to have a PIF ready and accessible for the NPRA at the address indicated on the label (GCCP, 2022). This would also compromise the safety of cosmetic products, as the PIF must contain substantial evidence to support the product's claims. Failure to provide this PIF indicates the ineffectiveness of self-regulation among cosmetic industry players.

NPRA will conduct PMS based on public complaints or inquiries, notifications that trigger PMS, or input from the GMP division (NPRA, 2022). NPRA will also conduct PMS by consulting the list of notified products and utilizing the PMS marketing alert system (N3, 2023). This system allows ASEAN countries to share information about the marketing of Malaysian products that have been reported to have adverse effects in countries like Brunei, Thailand, and Indonesia (N3, 2022). The most common adverse effects are itching, erythema, scaling, burning of the skin, allergic reactions, redness, or swelling (ASEAN Secretariat, 2013). The NPRA also monitors cosmetics and magazine advertisements along roads. For example, if a product advertises a 7-day brightening effect, the NPRA will proceed with PMS screening (N3, 2023). This implies that the NPRA is very active in controlling the safety of cosmetic products, and all industry experts agree that the NPRA is doing an excellent job. Although the NPRA conducts proactive supervision, many cases involving products with harmful ingredients still exist.

Expert opinion claims that there are still many cases of cosmetic products that contain dangerous ingredients because the punishment for irresponsible cosmetic manufacturers is less severe (Experts 1 and 2, 2023). Section 12 of the Sale of Drugs Act 1952 stipulates that an individual faces a fine not exceeding twenty-five-thousand-ringgit, imprisonment for a term not exceeding three years, or both. Whereas, for a body corporate, a fine not exceeding fifty thousand ringgit upon conviction is applicable. Any breaches of the cosmetic laws and regulations that are not subject to a specific penalty will be subject to this general punishment. The considerable passage of time since the establishment of SODA and its overly broad scope that includes all categories of offenses, warrants a revision of the penalty. In addition, science and technology have advanced to the point where they can now create cosmetic products with numerous chemicals and complex processes, making it challenging to promptly detect any adverse consequences to the human body. It is high time for the Ministry of Health (MOH) to consider revising the CDCR and introduce specific punishments for companies that manufacture and sell cosmetic products that contain substances harmful to consumers.

Aside from increasing specific punishments and the NPRA's efforts to govern the sale of cosmetic products, effective self-regulation necessitates supervision and awareness initiatives to ensure that producers and sellers consistently comply with pertinent safety regulations. Consumers should also actively engage in self-regulation by ensuring they only buy products they believe to be safe rather than opting for cheap but potentially hazardous and low-quality items.

5. Conclusion

This study emphasizes that despite Malaysia having developed extensive cosmetic product safety regulations, substantial deficiencies persist in achieving full compliance by manufacturers and consumer protection. Dependence on self-regulation and post-market surveillance has permitted certain non-compliant items to remain in the market, thus, presenting possible health hazards. To strengthen consumer safety, this study recommends enhancing enforcement mechanisms, revising penalties for non-compliance, and increasing public awareness initiatives. Ensuring manufacturers comply with Good Manufacturing Practices (GMP) and maintaining rigorous control of the notification procedure are also essential for promoting industry compliance and public trust in the safety of cosmetic products in Malaysia.

Contribution to existing knowledge and policy implication

This study has contributed significantly to cosmetic product safety in Malaysia. It provides a comprehensive analysis of cosmetics legislation and regulations; emphasizing the role of self-regulation and post-market

surveillance in identifying and exterminating the existence of harmful cosmetic goods. This study identified problems such as abuse of self-regulation and incorrect or incomplete reporting of product ingredients by analyzing the industry's compliance issues. It addressed a significant gap in the literature by concentrating on the Malaysian context and highlighting the necessity for enhanced consumer protection through improved public education, thereby encouraging consumers to actively participate in ensuring the safety of their purchased products.

This study also has policy implications by suggesting that relevant authorities strengthen enforcement by revising the penalties under the Sale of Drugs Act 1952 to impose harsher punishment on manufacturers who violate safety regulations to prevent companies from prioritizing profits over consumer safety. This study recommends introducing a more rigorous pre-market evaluation process to prevent unsafe products from reaching consumers. Frequent and mandatory audits and inspections should support self-regulation to ensure compliance instead of relying solely on post-market surveillance or consumer complaints. Self-regulation cannot stand alone but must be accompanied by more public awareness campaigns to inform consumers about product safety verification through NPRA platforms, which enhances overall consumer protection. Finally, this study advocates that Malaysian cosmetics regulations should be more closely aligned with international standards, such as those of the European Union, to improve product safety and increase the competitiveness of Malaysia's domestic cosmetics industry on a global scale.

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Towards the Development of Human Capital: Preliminary Results on a Study on Well-being Among Tertiary Students in Melaka, Malaysia

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Abstract: Economic development is intimately linked to human resource development. People who can improve themselves fast and efficiently successfully deal with life's problems and challenges, including those who are in tertiary education. Therefore, their stress level is an indicator of the well-being of our future leaders. This study investigates the various factors that can affect tertiary students' well-being. This preliminary research involves collecting data from higher education institutions in Melaka, with 191 completed responses. The findings were analyzed using frequencies, percentages, mean, standard deviation, and correlation. Findings show that 62.8% of respondents experience low stress, while 37.2% report high stress. Key stressors include time pressure, academic dissatisfaction, and subject matter issues, with financial and social factors also contributing to stress levels. However, relationships and environmental factors appear to have a lesser impact on their stress levels. Based on the correlation coefficient, stress level (dependent variable) does not relate to single variables. Most variables have a moderate correlation with the other variables. The study's findings show that tertiary students in Melaka do not experience alarmingly high levels of stress, but several factors do affect them. Therefore, well-being must be prioritized to ensure the best human capital can be created, as it represents future leaders and a skilled workforce. Recommendations are made for policy adjustments to address stress factors, providing human capital development for sustained national progress.

Keywords: *Well-being, tertiary students, development, human capital*

1. Introduction

Economic growth is essential for better living conditions, alleviating poverty, and improving access to healthcare, education, and infrastructure. It generates employment opportunities, stimulates intellectual development, and promotes technical progress, enhancing worldwide competitiveness. Furthermore, development fosters social stability, diminishes inequality, and furnishes governments with resources for public services and environmental sustainability.

Human capital development is crucial for economic progress since a skilled and well-educated labor force stimulates productivity, innovation, and economic expansion. Allocating resources to education, healthcare, and training amplifies individuals' capabilities, resulting in increased earnings, enhanced quality of life, and diminished poverty (Todaro & Smith, 2012). A strong human capital foundation not only attracts investment and enhances competitiveness but also promotes sustainable economic development, so it plays a crucial role in driving national prosperity. For that reason, many local universities also list the subject of 'Economics Development' as one of the main subjects to be studied.

Tertiary students are vital contributors to human capital development since higher education provides them with significant advanced skills, information, and expertise necessary for the labor market. The pursuit of specialized studies augments individuals' employability, productivity, and innovation potential, making a valuable contribution to economic progress (Borjas, 2010; McConnell et al., 2010). Educated graduates are crucial in driving research, entrepreneurship, and technological innovation, becoming essential resources in constructing a competitive and sustainable economy and promoting holistic societal development.

The well-being of tertiary students can impact human capital development by influencing their academic achievements, mental well-being, and general holistic welfare. High-stress levels can result in burnout, reduced productivity, and diminished knowledge retention, impeding the acquisition of crucial skills. This study aims to understand tertiary students' well-being status and the factors that contribute to their low or high levels of stress (first research objective). This study also examines the extent to which the determining factors of stress correlate to each other (second research objective).

Numerous studies in the past have discovered that students with high levels of stress are the result of a variety of factors that affect their learning, such as delaying studies and dropping out due to depression and other physical and mental health issues. However, there is a lack of studies focused on tertiary students in the state of Melaka, even though the number of tertiary students in Melaka is about 45,000 people from 41 public and private higher education institutes (State Economic Planning Unit Melaka, 2024). Therefore, the findings from this preliminary study are important to determine the direction of further research. Besides, the information obtained is very helpful for the initial action of all parties who expect human capital and the country's economic development to grow smoothly.

2. Literature review

Wellbeing can be defined as feeling healthy and happy, while stress is a condition of great worry caused by a difficult situation (Cambridge Dictionary Online, 2024a,b). Well-being is a positive state experienced by individuals and societies. Like health, it is a daily life resource determined by social, economic, and environmental conditions. (World Health Organization, 2024). Wellbeing comprises the capacity of individuals and societies to make a meaningful and purposeful contribution to society.

Ryff's Six-Factor Model of Psychological Well-Being is an extensive theory delineating six essential factors (self-acceptance, personal growth, purpose in life, environmental mastery, autonomy, and positive relations with others) that contribute to psychological health and well-being (Ryff, 1989). The intricacy of psychological well-being may support a comprehensive strategy that considers a range of aspects of the human experience. Although this theory was stated more than 35 years ago, it is still relevant and has become a source of reference for later studies.

The concepts of well-being and stress are mutually interdependent. Individuals with elevated levels of well-being, encompassing emotional, bodily, and mental health, generally exhibit greater resilience towards stress. When well-being is impaired by poor health, lack of social support, or emotional instability, stress becomes more difficult to control and more prone to result in adverse consequences such as anxiety, depression, or physical sickness (Indra et al., 2021).

Rynke Douwes et al. (2023) Found that the interaction between efforts directed toward studies and life beyond studies is a balancing factor that impacts well-being. This research added that students emphasized the interconnections between the individual experience of well-being and the influence of microsystem components, including support from and relationships with peers, family, tutors, teachers, and support facilities within the educational context.

Challenges development in study, time pressure, academic dissatisfaction, and subject matter problems are among the factors discussed by Williams et al. (2017). In addition, well-being can also be related to relationships with other individuals, which create factors such as love, social mistreatment, friendship, and family problems. Financial problems, health problems, and environmental problems are also said to interfere with the well-being of tertiary students.

Besides socio-economic and lifestyle factors, social support is a positive and critical factor for the mental health of college students (Wang et al., 2022). Similar research also adds that heavy academic burden and insufficient healthcare on mental health led to negative well-being among students. Research conducted by Beiter et al. (2015) Indicates that academic performance pressure, time management, and financial obligations influence student stress, which impairs their mental well-being. Recent research supports the notion that depression, anxiety, and stress levels are influenced by factors such as past mental health history, coping strategies, social support systems, and environmental factors (Kamruzzaman et al., 2024).

A study by Hefner & Eisenberg (2009) Emphasized that for students to be well, they need supportive families and positive relationships with others, such as friendships. Effective social networks boost life satisfaction, lessen loneliness, and offer emotional support. Consequently, balancing academic obligations, personal interests, and social life is critical in determining overall well-being. According to Misra & McKean (2000),

students who effectively manage their time and maintain a balanced lifestyle are likelier to experience improved well-being.

The statistic shows that even though there are counsellors appointed in every educational institution to help those who are dealing with stress problems, stress-related figures are still high and will be worrying if not dealt with immediately (Bouchrika, 2024). For that reason, as tertiary students are from different backgrounds, they have different experiences and different factors that affect their stress levels. As there is a lack of research on the status of well-being in tertiary students in Melaka, this study will add new literature to the research.

3. Research Methodology

This study's population involves tertiary students in Melaka, who numbered 45,071 people in May 2024 (State Economic Planning Unit, Melaka, 2024). Thus, a total of 381 students of samples were targeted based on the minimum number required (Krejcie & Morgan, 1970). This study targets tertiary students at the diploma or bachelor's degree level from public or private higher education institutions and various fields of study.

Questionnaires were distributed among tertiary students in Melaka based on a convenience sampling method. The selection of the sampling method is based on the appropriateness of getting the sample, which is distributed among lecturers and students among the respondents. This anonymous study uses the SurveyMonkey platform because of its features that facilitate the construction of question forms.

The questionnaire asked the respondents' stress status to determine their level of well-being. This study's questionnaire is adapted from the article "The Student Wellbeing Process Questionnaire (Student WPQ)" by Williams et al. (2017). Answer options for the depressed status (dependent variable) are given on a Likert scale, with a value of 1 (extremely depressed) to 10 (not at all depressed). This method provides space for students to indicate their level of pressure.

For the first research objective, this study divides the stress level into less and high stress. Students who answered 1 to 5 were assessed as high stress, while a value of 6-10 was evaluated as less stress. The same form of answer (Likert scale with 10 values) was given to the respondents to assess their respective stress levels based on the cause. However, the scale rules were changed to 1, meaning the problem does not involve them, while the value of 10 means that the problem is part of the students' lives. The purpose of changing the scale is to see how transparent the respondents are in answering the questions. Respondents' answers were analyzed using frequencies and percentages.

The next focus of this study (second research objective) is to see if the factors that cause stress are interrelated or vice versa. It is important to prove and confirm whether the previous author's research remains relevant for tertiary students in Melaka. Therefore, Pearson correlation from SPSS version 28 was used to achieve the purpose. Analysis in the form of mean values and standard deviations helps to explain more about the sample.

4. Findings

Of the 207 tertiary students who answered the questionnaire about their perception of well-being, only 191 (92.3%) answered it thoroughly. The demographic information of the respondents is as in Table 1. Compared to 24.1% of male students, 75.9% of female students answered this questionnaire. However, this is in line with the current statistics, which state that more female students are currently in higher education institutions. 54.5% of respondents are degree students, and 45.5% are diploma students. 44.0% of respondents were 18-20 years old, while the majority (2.9%) were 21-23 years old. In line with that, 69.1% of respondents are among those in year one and year 2 of the study.

Most of this questionnaire was answered by respondents in the field of Business & Management (64.9%) and among students at public higher education institutions (69.1%). Only 21.5% of respondents confirmed that they had repeated the subjects taken, compared to the others who had never repeated the subjects.

Based on Table 2, 120 respondents (62.8%) chose the Likert scale between 6 and 10, putting them in the less stressful category. Only 71 respondents (37.2%) chose a scale between 1 and 5, which puts them in the high-stress category.

Table 1: Demographic of the Respondents

Variable	Category	Total Frequency	%	Variable	Category	Total Frequency	%
Gender	Female	145	75.9	Age	18 - 20 years	84	44.0
	Male	46	24.1		21 - 23 years	101	52.9
	Total	**191**	**100.0**		24 and above	6	3.1
Study level	Degree	104	54.5		**Total**	**191**	**100.0**
	Diploma	87	45.5	Year of studying	Year 1	57	29.8
	Total	**191**	**100.0**		Year 2	75	39.3
Field of studies	Business & Management	124	64.9		Year 3	54	28.3
	Non-Business & Management	67	35.1		Year 4	5	2.6
	Total	**191**	**100.0**		**Total**	**191**	**100.0**
Institution	Public HEI	132	69.1	Have you repeated any course	Never repeat	150	78.5
	Private HEI	59	30.9		Have repeat	41	21.5
	Total	**191**	**100.0**		**Total**	**191**	**100.0**

Table 2: Stress level of tertiary students

Stress level		Less stress Frequency	%
1	Less stress	120	62.8
2	High stress	71	37.2
	Total	191	100.0

As stated in many literature reviews, many causes of stress lead to imperfect well-being for tertiary students. Thus, Table 3 shows respondents who are at high stress and those who are at low stress based on the cause of stress. The analysis is based on frequency values and percentages.

Table 3: Tertiary students' stress level by cause

Variable		Less stress		High stress	
		Frequency	%	Frequency	%
1	Challenges development in the study	56	29.3	135	**70.7**
2	Time pressure	51	26.7	140	**73.3**
3	Academic Dissatisfaction	106	**55.5**	85	44.5
4	Subject matter problem	85	44.5	106	**55.5**
5	Love problem	128	**67.0**	63	33.0
6	Social mistreatment	118	**61.8**	73	38.2
7	Friendship problem	105	**55.0**	86	45.0
8	Family problem	122	**63.9**	69	36.1
9	Financial problem	78	40.8	113	**59.2**

10	Health problem	135	**70.7**	56	29.3
11	Environmental problem	133	**69.6**	58	30.4

Based on the cause of stress, 70.7% of the respondents stated that the challenges they faced for their development in the study put them under high stress, while 73.3% stated they were under high stress due to time pressure. Academic dissatisfaction puts more than half of the respondents (55.5%) under lower stress, but subject matter issues put 55.5% of the respondents under high stress.

Because most respondents are between 18 and 23 years old and are usually still single, tertiary students are also involved in romantic relationships. However, the study's findings show that 128 tertiary students, or 67.0%, are in the less stressful category despite facing love problems. Based on the third and fourth highest percentages, the source of stress is 59.2% of respondents, who stated that their stress was due to financial issues and 55.5% due to subject matter problems.

Social mistreatment is a situation when a person feels social rejection, loneliness, or being taken advantage of by others. Table 3 shows that 118 tertiary students (61.8%) put themselves in the low-stress category based on the social mistreatment variable. Next, the variables of friendship problems, family problems, health problems, and environmental problems are in the less stressful category with percentages of 55.0%, 63.9%, 70.7%, and 69.6%, respectively. However, 59.2% of respondents stated they were stressed due to financial problems.

In parallel with the frequency and percentage values, the mean values in Table 4 also show that the variable of challenges development in the study, time pressure, subject matter problem, and financial problem show a mean value of more than 5.0. However, the highest value is at 6.54. For the other variables (academic dissatisfaction, love problems, social mistreatment, friendship problems, family problems, health problems, and environmental problems), the mean value was between 3.72 – and 4.91. With a low standard deviation value (2.24 - 3.09), it suggests that the data are closely clustered around the mean.

Table 4: Means, standard deviations, and correlations between variables

	1	2	3	4	5	6	7	8	9	10	11	12
1. Stress level	-											
2. Challenges development in study	-0.08											
3. Time pressure	-0.07	0.39 **										
4. Academic Dissatisfaction	-0.14	0.45 **	0.33 **									
5. Subject matter problem	0.14 *	0.51 **	0.48 **	0.62 **								
6. Love problem	-0.03	0.10	0.05	0.26 **	0.20 **							
7. Social mistreatment	-0.19 **	0.19 *	0.07	0.38 **	0.28 **	0.38 **						
8. Friendship problem	0.21 **	0.17 *	0.03	0.43 **	0.37 **	0.28 **	0.59 **					
9. Family problem	-0.09 **	0.13	0.09	0.24 **	0.18 *	0.39 **	0.45 **	0.47 **				
10. Financial problem	-0.08	0.39 **	0.24 **	0.22 **	0.34 **	0.26 **	0.29 **	0.31 **	0.44 **			
11. Health problem	-0.06	0.25 **	0.07	0.31 **	0.28 **	0.31 **	0.36 **	0.36 **	0.54 **	0.39 **		
12. Environmental problem	-0.08	0.42 **	0.23 **	0.48 **	0.37 **	0.25 **	0.46 **	0.43 **	0.40 **	0.33 **	0.47 **	-
Mean	6.07	6.54	6.50	4.87	5.51	3.72	4.49	4.91	4.04	5.81	3.99	4.28
Standard deviation	2.30	2.36	2.24	2.65	2.59	3.02	2.83	2.92	3.09	3.00	2.97	2.82

Note: * p<.05, ** p<.01

The Pearson correlation coefficient quantifies the linear link between two numerical or ranking variables. A coefficient of -1 signifies a perfect negative correlation, whereas a coefficient of +1 denotes a perfect positive correlation. (Saunders et al., 2009). According to Schober & Schwarte (2018)), a coefficient value of 0.00 - 0.10 indicates negligible correlation, 0.11 - 0.39 weak correlation, 0.40 - 0.69 moderate correlation, 0.70 - 0.89 strong correlation, while 0.90 - 1.00 means very strong correlation.

Table 4 indicates that the stress level (dependent variable) does not relate to single variables due to negligible (r=0.00–0.10) and weak (r=0.11-0.39) correlation coefficient. Besides, some have positive and some negative correlations with the stress level of tertiary students.

For the correlation among variables, there is a moderate correlation between time pressure and academic dissatisfaction (r=9.45) and subject matter problems (r=0.51). Academic dissatisfaction has a moderate correlation with subject matter problems (r=0.62), friendship problems (r=0.43), and environmental problems (r=0.48). Social mistreatment also has a moderate correlation with friendship problems (r=0.59), family problems (r=0.45), and environmental problems (r=0.46), while family problems show a value of r=0.44 with financial problems, r=0.54 with health problems and r=0.40 with environmental problems.

5. Conclusion

Many studies show that the causes of high stress among tertiary students are related to their learning process. Factors related to their relationship with other individuals, including the environment, do not have a high-stress effect. Thus, the findings of this study illustrate that the overall stress level of students is low and worrying. However, correlation analysis shows that the determining factor of stress level can come from various causes, which can be internal factors and external factors.

Stress levels that impact the well-being status of the tertiary student cannot be taken lightly. In addition, towards the Development of Human Capital, it is crucial to map research on well-being among university students to accurately determine their contributions and difficulties (Hernández-Torrano et al., 2020). The lack of well-being among them will destroy the hope of developing a capable human capital for developing the country's economy. For that reason, it needs to be taken care of because they are leaders, educated, and skilled workforce in the future.

Accordingly, the findings of this study contribute to the literature that tertiary students in Melaka are not exempt from facing stress. Future research should look at which factors have the greatest impact on students' stress levels. From there, policies to improve the well-being of tertiary students can be discussed more specifically.

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Broadband Services Quality of Experience on Public Higher Educational Institution Users: A Research Direction

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Abstract: Internet access is crucial in facilitating effective learning and communication. However, disparities in internet quality persist, especially within Public Higher Educational Institutions (PHEIs). Despite efforts by broadband providers to enhance services, complaints regarding quality persist among students and staff. Thus, this research aims to investigate users' Quality of Experience (QoE) with broadband services in PHEI campuses, focusing on coverage, service quality, reliability, and usability. Additionally, it seeks to identify user preferences and usage patterns, correlate broadband quality with user satisfaction, and propose improvements. A comprehensive methodology integrating qualitative and quantitative approaches, including surveys, and interviews is proposed. The implications of this research extend to regulatory and policy actions, including infrastructure improvement, ensuring quality of service, supporting online learning, and encouraging research and innovation in broadband technologies. This study aims to inform stakeholders and contribute to enhancing broadband access and quality in PHEIs, ultimately improving educational outcomes and experiences.

Keywords: *Internet Coverage, Quality of Experience (QoE), Broadband Infrastructure, Higher Education, User Satisfaction*

1. Introduction

In today's digital age, strong internet coverage has become an indispensable aspect of daily life. The internet profoundly influences how people work, communicate, learn, shop, and seek entertainment. Its pervasive presence and transformative capabilities have revolutionized virtually every aspect of modern society, shaping the way of interacting with the world.

Equally important, strong internet coverage is equally crucial for students, particularly in the surrounding areas of campuses where students and faculty from Public Higher Educational Institutions (PHEI) utilize broadband services (Asio et al, 2021). Many teaching and learning processes within universities heavily rely on robust internet access. Whether it's accessing online resources, participating in virtual classes, collaborating on group projects, or conducting research, students depend on uninterrupted internet connectivity to effectively engage with their academic pursuits (Coman et al., 2020). Strong internet coverage not only enhances the quality of education but also prepares students for the digital-driven world they will encounter in their future careers. It enables universities to embrace innovative teaching methods, adapt to evolving educational trends, and provide a dynamic and interactive learning environment that empowers students to thrive academically and professionally (Nordrum & Gracia, 2023; Rahiman & Kodikal, 2023).

However, despite the widespread importance of internet access for students, it's undeniable that they often encounter negative experiences, particularly when utilizing broadband devices. These challenges can range from slow connection speeds and frequent disruptions to limited bandwidth and unreliable network coverage (George et al., 2023). Besides, a study by Gong (2020) revealed that many universities, particularly those in rural and semi-urban areas, face significant challenges with inconsistent internet connectivity and insufficient Wi-Fi coverage. This lack of reliable access affects students' ability to engage in digital learning and utilize online resources effectively. Moreover, the research highlighted that limited bandwidth further aggravates the situation, with the existing infrastructure unable to accommodate the high demand during peak usage periods, often resulting in slow or unstable connections. In addition to these infrastructural limitations, the digital divide between urban and rural areas persists, leaving students in less developed regions at a disadvantage in accessing high-speed internet compared to their urban counterparts.

Socioeconomic disparities also play a crucial role in compounding these challenges. Students from low-income households often cannot afford personal high-speed internet connections, especially when off-campus (Mahdzan et al., 2022). This issue was amplified during the COVID-19 pandemic, as universities across Malaysia shifted to remote learning, placing additional strain on internet services and exposing the inequalities in digital access among students. Faculty members also encountered similar challenges, particularly in delivering online classes and conducting research. Inadequate internet infrastructure hindered their ability to provide quality instruction and collaborate on academic projects (Jafar et al., 2022).

The pandemic has further underscored the inadequacies of existing online learning platforms, many of which are ill-equipped to support the multimedia content and interactive elements essential for modern education. Frequent disruptions caused by poor campus internet infrastructure led to frustration for both students and faculty members (Rathinam et al., 2023). Additionally, concerns over the cost of internet services remain prevalent, as high data costs continue to burden students and staff accessing online learning materials off-campus, particularly those from the B40 income group (Ali et al., 2024).

Such issues can significantly impede students' ability to engage effectively with online learning resources, participate in virtual classrooms, and collaborate on digital platforms. Moreover, these connectivity issues can lead to frustration, and stress, and ultimately hinder academic performance and progress (Cullinan et al., 2021; Korkmaz et al., 2022). PHEI must address these challenges and strive to provide reliable, high-speed internet access to ensure that students can fully leverage the benefits of digital learning tools and resources. By addressing these connectivity issues, PHEI can enhance the overall learning experience and empower students to succeed in their academic endeavors.

Therefore, this research is conducted to study the quality of broadband services and factors influencing their adoption among users of PHEI. This study is important because it addresses the critical need to understand the experiences of users in accessing broadband services within educational settings. By exploring the quality of experience and adoption factors, this research aims to identify potential areas for improvement in broadband services provision and inform strategies for enhancing digital connectivity in educational environments. Ultimately, the findings of this study can contribute to optimizing broadband services to better support teaching, learning, and research activities in PHEI, thereby facilitating the advancement of education in the digital age.

2. Literature Review

Internet Service Coverage and Quality of Experience (QoE)

A previous study on internet coverage in Malaysia aimed to trace the diffusion of the internet in the country. The research focused on understanding how internet access has evolved in Malaysia. Moreover, another source highlighted that Malaysia has achieved significant progress in expanding its 4G broadband coverage to reach 96% of populated areas as of 2022 (Statista, 2024).

This achievement reflects the country's efforts to bridge the digital divide and improve internet access for rural and remote communities. The study emphasized the importance of diverse policy options and a flexible regulatory framework to support initiatives aimed at enhancing last-mile connectivity in underserved regions. Overall, these studies shed light on Malaysia's advancements in internet coverage, addressing challenges faced by rural and remote communities while emphasizing the need for inclusive policies to ensure widespread access to digital resources across the country (Nayan, Hashim, Saleh & Mahat, 2016).

The correlation between internet coverage and QoE is a critical aspect in assessing user satisfaction with internet services. QoE refers to the delight or annoyance a user experiences with a service, focusing on the overall service experience from the user's perspective (Staelens, Moens, den Broeck, Mariën, & Vermeulen, 2010; Xu & Zhang, 2019). QoE encompasses various factors, including system, human, and contextual influences that contribute to a user's perceived quality of a system or service (Xu & Zhang, 2019).

Internet coverage plays a significant role in shaping the QoE for users. Adequate internet coverage ensures reliable connectivity, faster speeds, and seamless access to online services, which are essential for enhancing

user satisfaction and overall experience. Studies have shown that network-related factors, such as bandwidth, delay, and jitter, directly impact the QoE of users accessing Internet services (Ahmad, Wahab, Schormans, & Arnab, 2023).

The availability of a stable network connection in different locations is crucial for maintaining a positive QoE. Furthermore, research has highlighted the importance of understanding the relationship between Quality of Service (QoS) metrics and QoE to improve internet services by assessing network traffic type-based QoE and utilizing methods like flow features extraction and QoS metrics evaluation, service providers can enhance the overall quality of user experience (Reichl, Egger, Schatz, D'Alconzo, 2010; Ahmad et al., 2023). There is a positive correlation between internet coverage and quality of experience. Reliable internet coverage contributes to improved QoE by ensuring consistent connectivity, faster speeds, and better access to online services. Service providers can leverage this understanding to optimize their networks and enhance user satisfaction with Internet services.

Service Quality and User Satisfaction

Service quality is a critical measure that reflects how well an organization meets or exceeds customer expectations in its service delivery. It encompasses the overall experience a customer has with a service provider, influencing customer satisfaction, loyalty, and the organization's reputation (Parasuraman et al., 1985). Together, technical/outcome and process-related elements play a vital role in shaping the overall perception of the quality of internet services (Mansoor & Khan, 2022)

The primary determinant of internet access quality is the speed of download and upload connections (Gerpott, 2018). Connection bandwidth significantly influences customer satisfaction with internet providers (Grzybowski et al., 2018). Consequently, connection speed is a vital factor. Customers can utilize testing tools to evaluate the delivery rates from their internet service providers (Zhang & Wang, 2023). When customers perceive a failure to deliver the promised connection bandwidth, they experience a psychological loss (Hashim et al., 2022). Repeated failures can lead to a decrease in perceived value and service quality, ultimately resulting in diminished consumer loyalty towards internet service providers (Hashim et al., 2022; Ikhsan et al., 2022).

Yusof et al. (2022) examine the relationship between service quality, price, and consumer satisfaction perceptions. Their research indicates a significant correlation between customer satisfaction and service quality. Nguyen et al. (2020) examined the relationships between service quality, customer value, customer satisfaction, and customer behavior intention in the context of mobile services and found that network quality is a critical dimension of service quality that significantly affects customer value and satisfaction.

Service Reliability

Online learning activities in higher education institutions are seriously affected by the reliability of Internet services. Approximately one out of every six students is strained to weak internet access and low-income students who are more likely to experience connection issues are disproportionately affected by this kind of disadvantage. (Cullinan et al., 2021). This digital divide leads to digital inequality which restricts student participation and limits online course offerings. Internet service quality including reliability and responsiveness is vital in determining students' satisfaction and academic achievement (Darawong & Widayati, 2021). To get control of these constraints, higher education institutions should adopt risk management strategies to identify, assess, and manage risks including the technological risks (Alexei, 2021). The improper ICT infrastructure and readiness including the internet access off-campus impact the delivery of online education and student engagement. To address these issues, higher education institutions should prioritize campus facility access in the less internet coverage areas (Cullinan et al., 2021) and invest in digital culture and equity (Ndibalema, 2022).

Service Usability

The usability of Internet services and their impact on higher education institutions has been a recent research focus. Studies have shown that e-learning software usability significantly affects student satisfaction in higher education institutions. (Al-Fraihat et al., 2020; Giray, 2021). Internet usage among university students has been associated with the application of social values in their communication with friends and family members. (Caldeiro-Pedreira, et al, 2021). Internet usability has been shown to have a significant correlation with

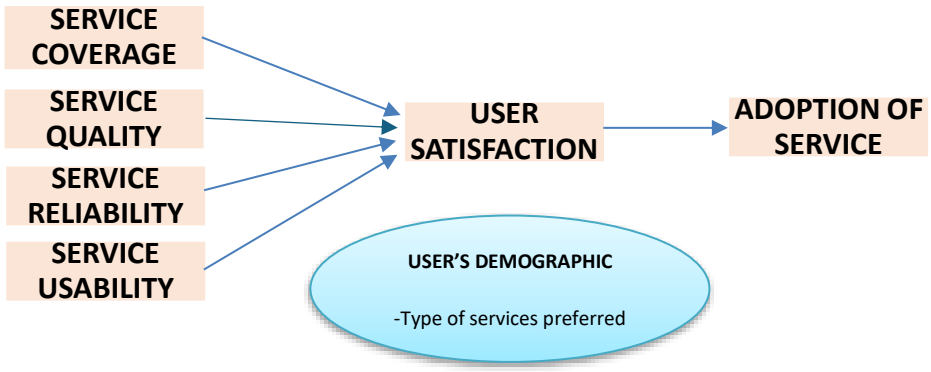
students' performance in academic in higher education institutions, despite difficulties in utilization. (Ladrón de Guevara Rodríguez et al., 2022). Research in Pakistan proved that internet usage positively affects students' academic achievement, with 60.4% of students reporting improved performance (Zamir et al, 2020). The Internet provides access to up-to-date information and research materials, enhancing students' learning experiences (Nawaz, 2021). To highlight the vitals of internet usage in higher education, usability issues must be addressed and promote responsible internet usage among students, balancing academic pursuits with entertainment and social media activities (Acut et al., 2016; Ladrón de Guevara Rodríguez et al., 2022; Shahibi, 2017).

Underpinning Theory

One of the prominent theories to explain the quality of experience (QoE) and the adoption of internet broadband is the Technology Acceptance Model (TAM). TAM was originally developed by Fred Davis in the 1980s and has been extended and adapted in various contexts since then.

The quality of experience (QoE) also falls under the umbrella of consistency theories in psychology and consumer behavior. These theories posit that if the actual performance of a product or service does not align with customers' expectations or predictions, it can lead to cognitive dissonance or tension. To reduce this tension, customers may adjust their perceptions of the product or service to align better with their expectations. Theories of consistency include assimilation theory, contrast theory, assimilation-contrast theory, and negativity theory, all of which offer insights into how individuals perceive and evaluate their experiences with products or services.

Figure 1: Proposed Research Framework



3. Research Methodology

To understand students and faculty staff's broadband services quality of experience (QoE) and adoption factors, a comprehensive research methodology incorporating either a qualitative or quantitative approach would be beneficial. First, existing literature on broadband services QoE and adoption factors, focusing on studies relevant to Public Higher Educational Institutions (PHEI) will be identified and reviewed. These include the identification of key concepts, theories, and methodologies used in previous research. Second, a survey questionnaire will be developed for data collection from students and PHEI staff. Descriptive questions on demographics, current broadband usage patterns, satisfaction levels, perceived benefits, challenges, and factors influencing adoption will be included.

There are twenty public universities in Malaysia, therefore for sampling technique, the target population potentially will be students and staff in Malaysia's PHEI. The sampling frame will be based on a directory from PHEI's Registrar Departments. Random sampling techniques may be employed to ensure the representativeness of the sample. Third, the questionnaire survey will be distributed via email or online platforms to reach a wide audience, for instance, Google Forms and Microsoft Forms which can be easily

accessed. We also will set a defined period for data collection to ensure timely responses.

Lastly, for data analysis, quantitative analysis using statistical techniques such as descriptive statistics, correlation analysis, and regression analysis will be utilized to identify patterns and relationships (SPSS or Smart-PLS). Additionally, qualitative analysis methods like thematic analysis may benefit in analyzing open-ended responses and identifying recurring themes and insights. Here, interviews with a subset of participants to gain deeper insights into their experiences and perceptions will be conducted. To ensure the confidentiality and anonymity of participants, their consent will be obtained before the data collection to adhere to ethical guidelines for research involving human subjects.

4. Implications of Study

This study may contribute through the body of knowledge in terms of instrument development in the questionnaire as well as providing insights on the elements of QoE that influence satisfaction among PHEI internet broadband users. Technological terms related to broadband services such as latency, bandwidth, speed, fiber, and data allowance may not be well understood by PHEI users.

In terms of managerial and policy implications, the findings of this study may indicate inadequate internet infrastructure or outdated technology on campuses, prompting regulatory bodies to invest in improving infrastructure to support the growing demands of higher education. In terms of quality of service, if the research highlights concern about the reliability or speed of internet broadband services, regulatory action may be necessary to set standards for service quality and hold providers accountable for meeting those standards.

Given the increasing reliance on online learning platforms, regulatory action may focus on ensuring that Internet broadband services meet the needs of students and staff engaged in distance learning, including measures to guarantee sufficient bandwidth and connectivity. Regulatory action can be taken to foster research and innovation in Internet broadband technologies, including incentives for the development of new solutions to improve access, speed, and reliability. Regulatory bodies may also facilitate partnerships between public higher education institutions, internet service providers, and other stakeholders to address challenges identified in the research collaboratively.

5. Conclusion and Limitations of Study

In conclusion, the article underscores the critical role of internet coverage and QoE in determining user satisfaction with internet services in Malaysia. The research highlights the significant progress Malaysia has made in expanding 4G/5G broadband coverage, particularly in rural and remote areas and the correlation between reliable internet access and improved QoE. The discussion extends to the impact of internet service quality on higher education, where connectivity issues can significantly hinder online learning. Furthermore, the study suggests that enhancing internet infrastructure and understanding the technological aspects of broadband services are essential for improving user satisfaction and academic achievement in higher education institutions. The findings also point to the need for regulatory action to ensure that internet services meet the evolving demands of users, particularly in the context of increasing reliance on online platforms for education and other critical services.

To address the persistent issues surrounding internet services in PHEIs, several actions and recommendations can be taken. First, there should be significant investment in upgrading the existing internet infrastructure, particularly in rural and semi-urban areas where connectivity is a recurring challenge. This can involve expanding Wi-Fi coverage on campuses and increasing bandwidth to accommodate peak usage times. Collaborations between universities, the government, and private telecommunications companies could expedite the development of more resilient Internet networks. By ensuring reliable and high-speed internet access, universities will be better equipped to support online learning, research, and other academic activities, thereby reducing the digital divide between urban and rural regions.

Additionally, policymakers and educational administrators must consider adopting comprehensive digital

inclusion strategies to address socioeconomic disparities in internet access. Financial assistance or subsidized broadband services should be provided for students from low-income households, ensuring that off-campus access to high-speed internet is available for all. Universities can also implement centralized digital resource hubs or provide low-cost mobile data plans in partnership with local internet service providers (ISPs). This would alleviate the burden of high data costs and improve equity in digital learning. By promoting both infrastructural improvements and inclusive policies, Malaysian PHEIs can foster a more supportive and equitable digital learning environment for students and faculty alike.

To enhance the effectiveness of online learning and research, PHEIS must prioritize the development and implementation of robust digital learning platforms and tools. Universities should invest in modern, scalable e-learning systems that are capable of supporting multimedia content and interactive features, which are essential for engaging students in a digital environment. Regular assessments and updates of these platforms should be conducted to ensure they meet the evolving needs of both students and faculty. Additionally, universities should provide training and support to staff and students to maximize their use of these digital tools, thereby improving overall user experience and academic outcomes. By addressing both the technological and educational aspects of digital learning, PHEIs can create a more dynamic and effective learning environment that adapts to the needs of the modern educational landscape.

There are a few possible limitations of this study. First, encouraging a high response rate can be challenging, as students and staff may be busy with academic or work-related commitments. Moreover, students and PHEI staff may have diverse needs and expectations regarding broadband services, depending on factors such as discipline, research requirements, and teaching methods. Tailoring research methodologies to capture this diversity can be demanding. To ensure accurate sample representativeness, certain groups of students or staff may be more likely to participate than others. Furthermore, urging participation by conveying the importance of the research and how the findings will be used might be very helpful, especially if the participants see direct benefits or incentives.

Second, students and staff may receive numerous survey requests, leading to survey fatigue and decreased willingness to participate. To overcome this, the number of items in the questionnaire survey will be short, focused, and designed concisely; it only includes essential questions relevant to research objectives. Limiting the number of questions reduces respondent burden and increases completion rates. Lastly, a different understanding of technological literacy among students and PHEI staff can affect their ability to articulate and interpret their broadband service experiences and adoption factors accurately. Some of them may struggle to express their needs or may not be aware of certain features or limitations. QoE is subjective and influenced by individual perceptions, making it challenging to quantify and analyze objectively. Users may have different interpretations of service quality, making it difficult to generalize findings. Thus, the questions will be simplified for easy understanding with less technical terms (layman's term).

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Determinants of Zakat Payment: The Viewpoint of Stakeholders in Seremban

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Abstract: Islamic countries widely recognize zakat as a significant means to promote equity in sharing wealth among Muslims. Despite the obligation of Muslims to pay zakat, the total amount collected is considerably lower than the amount acquired through taxes. Thus, this study aims to identify the determinants influencing zakat payment among Muslims in Seremban, Negeri Sembilan. It will provide a better understanding of the factors that shape zakat payment behavior in this district. The data collection method involved a quantitative survey using structured questionnaires administered to a sample of 400 Muslim residents in Seremban. The study utilized a range of statistical analysis techniques, including correlation and regression to examine the relationships between the determinants and zakat payment practice. The study found that convenience is the most significant determinant motivating individuals to pay zakat through zakat agencies. This finding provides valuable insights for zakat agencies, policymakers, and religious authorities in Malaysia to develop targeted strategies to increase zakat compliance behavior among Muslims. These may include improving religious education programs, implementing transparent reporting mechanisms, developing tailored outreach programs, leveraging technology to simplify and streamline the zakat payment process, and collaborating with community leaders to reinforce positive social norms in paying zakat.

Keywords: *Zakat, zakat agencies, determinants, convenience*

1. Introduction

Zakat plays a crucial role in Islamic economics and social welfare. It is a mechanism for wealth redistribution, aiming to close the gap between the rich and the poor in Muslim communities. By transferring resources from the wealthy to the underprivileged people, zakat will contribute to poverty alleviation, promote social cohesion, and foster a sense of solidarity among Muslims. Moreover, zakat is believed to purify the payer's wealth and cultivate generosity and compassion.

However, the analysis indicated that the collected amount of zakat remains suboptimal in many states. For example, Selangor had a population of around 2.814 million Muslims in 2022 but only 16.28%, or 458,348 individuals, paid zakat on their wealth to the zakat agency during that year. Therefore, this study tries to give an extensive understanding of the elements influencing the decision-making on zakat payment to the zakat agency. Are Muslims driven mostly by religious consciousness or any other factors enabling their zakat payment to the zakat agency? Understanding these determinants is paramount for zakat agencies and policymakers to develop effective strategies to encourage compliance, optimize the use of zakat funds and implement policies that can promote zakat payment through zakat agency.

While zakat has been extensively studied in various contexts, there is a notable lack of research specifically focused on the Seremban district, in Negeri Sembilan. This gap in the literature presents an opportunity to contribute valuable insights into the unique factors influencing zakat payment in this area. By addressing this research gap, the study can provide locally relevant information that may not be captured in broader, national-level studies or research conducted in other geographical areas.

Moreover, a significant inconsistency exists between the potential and actual zakat collection which indicates that several factors influence individuals' decisions to fulfill their religious obligations through zakat agency. The disparity between potential and actual zakat collection has far-reaching implications for social welfare programs, poverty alleviation initiatives, and the overall economic stability of the Muslim community in the region. Comprehending these determinants is essential for enhancing collection amounts, optimizing fund distribution, and ultimately improving the socio-economic conditions of the Muslim community.

There are two objectives to be fulfilled in this research:
To obtain the perception of the stakeholders in Seremban, Negeri Sembilan on paying zakat to zakat agency.
To ascertain the most significant determinant that influences an individual's decision to pay zakat to a zakat agency.

This study has significant implications for improving the zakat agency's collection, particularly in Seremban, Negeri Sembilan. By investigating the determinants of zakat payment, this paper addressed a critical need to have a zakat agency that can apply innovative approaches to cater to the diverse needs of the payers. Furthermore, zakat agencies can develop more effective strategies to promote zakat compliance and maximize its impact on community welfare.

2. Literature Review

Several studies have identified key determinants affecting zakat payment. Factors such as age, marital status, income, education, accessibility, and digital literacy have been recognized as significant factors of zakat payment behavior (Wijayanti et al., 2022; Beik et al., 2023; Durohman, 2023; Haryanto, 2023). Additionally, religiosity, intention, trust, and societal norms play pivotal roles in motivating individuals to fulfill their zakat obligations (Kateb, 2023; Ilmi, 2024; Sadallah et al., 2022; Syauqi et al., 2022). The governance structure of zakat agencies, including board composition, disclosure practices, and stakeholder management, also impacts stakeholders' trust and compliance with zakat payments (Aziz and Anim, 2020). The ease of access to digital zakat payment platforms has also been highlighted as a critical factor influencing stakeholders' intention to pay zakat online (Haryanto, 2023; Ramlee, 2023). The integration of financial technology and the modification of existing models have been proposed to enhance individuals' willingness to use online platforms for zakat payments (Mutmainah, 2024).

Good governance practices within zakat agencies are another contributing factor that encourages stakeholders to fulfill their zakat obligations (Sawmar & Mohammed, 2021). Some other studies have also explored the impact of demographic factors, religiosity, and individual beliefs on the intention to pay zakat, providing inputs into the diverse motivations behind zakat compliance (Aligarh et al., 2020).

Efficiency in collecting zakat funds is crucial for optimizing resources (Bahri, 2023). However, Maliha (2024) believed that efficiency in zakat agencies is not only about resource optimization but also about enhancing operational performance. Zakat agencies need to focus on reducing operational costs while increasing the collection. On the other hand, accountability and transparency play a crucial role in enhancing efficiency. Hadi (2024) highlighted that accountability in managing zakat leads to efficient resource utilization and will maximize the impact of zakat funds on poverty alleviation.

The service quality of Zakat agency is also a crucial factor that significantly impacts stakeholders' trust, satisfaction, and willingness to engage with the agency. Jannah and Al-Banna, (2020) found that service quality of zakat agencies significantly influences payers' intention to pay zakat through them. Moreover, Azzahra and Majid (2020) highlighted the importance of improving the service quality provided by the Zakat agency to attract *muzakki* (payers) to pay zakat. Additionally, Meerangani et al. (2022), suggested that digital platforms can enhance the quality of services provided by zakat agencies. The utilization of technology such as optimizing the use of management information systems (MIS) will streamline the zakat collection, distribution and reporting.

The study by Rejab et al. (2023) highlights the significance of customer satisfaction in the success of service-oriented organizations like Zakat agencies. Achieving high levels of customer satisfaction is crucial for improving organizational performance, internal rejuvenation, and stakeholder trust. Additionally, Isa et al. (2022) found a positive relationship between satisfaction with zakat agencies and stakeholders' willingness to pay zakat. Furthermore, Yusuf et al. (2022) and Fatoni and Fakhrudin (2021) emphasize the impact of service quality, transparency, and reputation on customer satisfaction and trust in zakat agencies. Building a strong reputation, ensuring transparency in operations, and delivering high-quality services are essential for fostering satisfaction and trust among payers.

The provision of accurate and comprehensive information also plays a crucial role in encouraging zakat payers to fulfill their obligations effectively. Information serves as a key determinant influencing individuals' decisions regarding online zakat payments (Hanafi, 2020). Studies have shown that the role of information is significant in reducing resistance to online zakat payments (Hanafi, 2020, 1). Moreover, providing information has been highlighted as a factor influencing the behavioral intention to adopt e-wallets for zakat payments (Bakar, 2022). According to Doktoralina et. al. (2019), providing information about zakat to payers is very significant and will enhance individuals' willingness to pay through zakat agency. Furthermore, information about the trustworthiness and efficiency of zakat agencies can influence zakat payers' confidence in making payments through official channels (Ramlee, 2023; Nurfadhilah and Sasongko, 2019). The dissemination of information regarding the distribution of zakat funds is essential in building trust among zakat payers (Nurfadhilah & Sasongko, 2019).

Theoretical Framework

Perception plays a critical role that can influence the decision-making process of an individual. The accuracy of perception is often contingent upon the individual's knowledge and the relevance of the information available to them. Knowledge significantly enhances the accuracy of perception. For instance, Sutriningsih et al. (2020) found that factual knowledge is more crucial than experience in triage decision-making among emergency nurses, indicating that a well-informed individual is more likely to make accurate judgments in high-stakes situations.

This aligns with findings from (Wu et al., 2017), which suggest that individuals with a deeper understanding of emotional expressions can make more rational inferences about others' beliefs and desires, thereby improving their social perception and decision-making. This indicates that when individuals are knowledgeable about a situation, their perceptions are more likely to align with reality, leading to better performance in supporting relevant actions.

The relevance of information is another critical factor influencing perception accuracy. Xu et al. (2022) demonstrated that drivers' speed perception accuracy is significantly affected by the characteristics of freeway curves, with experienced drivers showing better accuracy due to their familiarity with relevant contextual cues. This suggests that when individuals are presented with information that is pertinent to their situation, their ability to perceive accurately improves, which can enhance performance in tasks such as driving. In the context of decision-making, Melo et al. (2014) found that perceptions of emotional displays significantly influence expectations of cooperation in interdependent scenarios. The study emphasizes that accurate perception of emotional cues is essential for effective decision-making in social contexts, illustrating how relevant information can shape performance outcomes.

The concept of active inference provides a theoretical framework for understanding how perception and performance are interconnected. According to (Friston et al., 2010), perception is an active process that involves minimizing prediction errors by integrating sensory information with prior knowledge. This framework suggests that individuals who actively engage with relevant information and apply their knowledge are likely to achieve higher accuracy in their perceptions, which subsequently enhances their performance. Furthermore, Zhang (2023) explored how the brain represents values and uncertainty under the active inference framework, highlighting the importance of accurate perception in decision-making processes. The study indicates that when individuals can accurately perceive their environment, they are better equipped to make informed decisions, leading to improved performance outcomes.

Bennet and Savani (2002) investigated the accuracy of public perception of charity performance in the UK using a model that demonstrated the correlation between charity donors' conceptions of charity organizations and their willingness to donate to those organizations. The study's objective was to investigate the determinants of donor evaluations of charity performance accuracy, as well as the relationship between inaccurate ratings and an individual's favourability towards charities. Bennet and Savani (2002) argue that the reputation of a charity as 'inefficient' has a detrimental impact on its capacity to successfully gather funds. Similar factors subject a charity's administrators or trustees to perceptions of unlawful administration.

There is a contention that Muslims paying zakat is analogous to non-Muslims making donations. Though zakat payment is obligatory, and charity is voluntary, they share a common characteristic. Undoubtedly, zakat payment is mandatory; nevertheless, zakat payers have the freedom to select the suitable payment method to meet their responsibility. Should individuals consider the zakat administrator as inefficient, they may choose to deviate from making payments through the zakat agency. This is a shared characteristic with charity, where the donors have the freedom to select a trustworthy charitable organization. Such entities' unfavorable views will discourage them from making charitable donations to that organization.

Ahmad et al. (2005) contended that various instances of ineffective zakat management, unsatisfactory zakat distribution, misallocation of zakat funds, and corruption may negatively impact the image of zakat administrators. As a result, zakat administrators may be perceived negatively. This unfavorable perception may result in their refusal to pay zakat through the zakat agency. In that regard, Ahmad and Wahid (2005) believed zakat payers would remit zakat through the zakat agency if they were satisfied with the zakat administrator's performance. The findings of their investigation demonstrated that the recipients' satisfaction with the zakat administrator will dictate the location of their zakat payments. Ghazali (1989) also discovered that zakat payers were hesitant to pay zakat to the zakat agency due to their lack of confidence in the administration of zakat. They are uncertain about the distribution of the fund to the appropriate recipients. Naser et al. (2001), who found that zakat payers did not have a high level of confidence in zakat administrators, also corroborated this. According to the literature, payer satisfaction with the zakat administrator is critical in encouraging them to pay zakat through the official channel (Ahmad and Wahid, 2005; Ahmad et al., 2005). Nevertheless, the zakat administrator will face challenges in maintaining their reputation among zakat payers, including the misallocation of funds, unjust distribution of zakat, and bureaucracy. Based on the previous literature and the above argument, the hypotheses were framed as follows:

H1: Favorable perception of the convenience element in paying zakat is positively associated with the attitude of paying zakat to the zakat agency.

H2: Favorable perception of the self-satisfaction element in paying zakat is positively associated with the attitude of paying zakat to the zakat agency.

H3: Favorable perception of the sufficiency of information provided to the public is positively associated with the attitude of paying zakat to the zakat agency.

4. Research Method

To test the hypotheses, the researchers employed questionnaires to collect all relevant data. The first section of the questionnaire is on the demographic information. There are inquiries regarding gender, age, employment sector, and monthly income. It is crucial to examine the backgrounds of the respondents to verify that they all meet specified requirements, thereby ensuring the validity of their responses. The second section of the questionnaire assesses stakeholders' perceptions of the payment of zakat through the zakat agency, convenience, self-satisfaction, and sufficiency of information provided by the zakat agency. The respondents express their opinions by indicating the degree to which they agree or disagree using a scale of 1 to 5. The researchers distributed 400 sets of questionnaires to the respondents in Seremban who were available at the time of distribution resulting in a convenience sampling. Self-administered method of distributing questionnaires was adopted in the hope of enhancing response rate. The data was then analyzed using correlation and regression tests.

5. Results and Discussion

Demographic Data

Table 1 shows that 45.5 percent of respondents are male and 54.5% are female. The age of the respondents is between 25 to 60 years old. The analysis on the age showed that the majority of the respondents lie between the ages of 35 and 60 years old, thus are deemed to have a steady income since they are at the age range of steady employment and therefore are expected to pay zakat. As a result, it can be expected that their response can be taken with a high degree of credibility based on the experience and maturity of the respondents.

Table 1: Frequency Counts for Respondents by Gender, Age, Employment Sector, and Monthly Income

Grouping Variables	Frequency	Percent (%)
Gender		
Male	182	45.5
Female	218	54.5
Age		
25 – 34	158	39.5
35 – 49	115	28.7
50 – 60	127	31.8
Employment Sector		
Government	127	31.7
Private	122	30.5
Self-employed	151	37.8
Monthly Income		
< RM 2,500	127	31.7
RM 2,501 – RM 4,999	154	38.5
> RM 5,000	119	29.8

Analysis

As shown in Table 2, there is a positive relationship between the perception of paying zakat directly to the zakat agency and the perception of convenience, self-satisfaction, and sufficiency of information provided by the zakat agency in Seremban Negeri Sembilan. This result suggests that the convenience factor, with a correlation coefficient of 0.847 is the most significant determinant that contributes to the payment of zakat to the zakat agency. The result was followed by the information factor provided by the Zakat agency to the public with a correlation of .654. This result indicates that a more favorable perception towards the zakat agency will increase the perception of payment of zakat to the zakat agency.

Table 2: Spearman's Rho

	Payment to Zakat agency	Convenient Factor	Self-satisfaction Factor	Information Factor
Payment to Zakat agency	1	.847**	.523**	.654**
Convenient Factor	.847**	1	.658**	.708**
Self-satisfaction Factor	.523**	.658**	1	.569**
Information Factor	.654**	.708**	.569**	1

**. Correlation is significant at the 0.01 level (2-tailed).

The results for the univariate regressions show a significant relationship between the independent variables and the dependent variable. The F and associated p-values reflect the strength of the overall relationship between the independent variables and dependent variables (see Table 3). The results of the univariate regressions indicate that the more favorable the perception of the respondents on the convenience, self-satisfaction, and sufficiency of information, the zakat payment is more likely to be made through the zakat agency. These results are highly significant for all the variables.

Table 3: Coefficients (Univariate Regression)

PAYMENT $= \alpha + \beta_1$CONVENIENCE
PAYMENT $= \alpha + \beta_2$SELF_SATISFACTION
PAYMENT $= \alpha + \beta_3$INFOMATION

	Standardized Coefficients Beta	T	Sig	Adj R^2	F Value	Sig
CONVENIENCE	.846	31.67	.000	0.715	1003.53	**.000**
SELF_SATISFACTION	.576	14.07	.000	.331	198.01	**.000**
INFORMATION	.648	16.97	.000	.418	287.98	**.000**

Where:
PAYMENT = payment of *zakat* through the zakat agency
CONVENIENCE = perception of the convenient factors
SELF-SATISFACTION = perception of the self-satisfaction factor
INFORMATION = perception of the sufficiency of information provided to the public

The multivariate regression analysis in Table 4 shows that the adjusted R^2 is relatively high at 71.5%. This indicates that there is a strong relationship between variables or a strong correlation between them. Nevertheless, the F Test is significant at a 5% significance level, which indicates that the regression model is a good fit.

Table 4: Coefficients (Multivariate Regression)

PAYMENT $= \alpha + \beta_1$CONVENIENCE $+ \beta_2$SELF_SATISFACTION $+ \beta_3$INFORMATION

	Standardized Coefficients Beta	T	Sig	Adj R^2	F Value	Sig
Constant		2.957	.003			
CONVENIENCE	.738	.19.01	**.000**	.724	349.8	.000
SELF_SATISFACTION	.054	1.54	**.124**			
INFORMATION	.109	2.867	**.004**			

Where:
PAYMENT = payment of *zakat* through the zakat agency
CONVENIENCE = perception of the convenient factors
SELF-SATISFACTION = perception of the self-satisfaction factor
INFORMATION = perception of the sufficiency of information provided to the public
Therefore, the summary of the hypotheses analysis is as below:

Table 5: Research Hypothesis Summary (H1-H3)

No.	Hypothesis	Findings
H1	A favorable perception of the convenient element of paying zakat is positively associated with the attitude of paying zakat to the zakat agency.	Accepted
H2	A favorable perception of the self-satisfaction element in paying zakat is positively associated with the attitude of paying zakat to the zakat agency.	Accepted
H3	A favorable perception of the sufficiency of information provided to the public is positively associated with the attitude of paying zakat to the zakat agency.	Accepted

5. Conclusion

This study exhibits two credible constraints. The first involves generalizing the results. The generalisability of this study's findings to other districts or states may yield different results. Therefore, future studies should perform experiments in different states to discover methods for enhancing zakat payments using SIRCs across Malaysia. Furthermore, the questionnaires were distributed to the stakeholders using a convenience sampling technique. An improved approach to distributing questionnaires would involve either implementing random sampling or, ideally, distributing them to the stakeholders in the respective district, if time and financial restrictions allow for it.

In a nutshell, the result of this study indicated that the convenience, self-satisfaction, and sufficiency of the information provided by a zakat agency have a significant influence on the individuals' willingness to pay zakat through a zakat agency. Nevertheless, the findings from the demographic test indicated that there were no notable disparities in terms of gender, age, employment sector, or income.

In taking the comprehensive perspective, the results do indicate that many of the respondents do feel that the convenience factor in paying zakat plays an important role in them paying zakat to the zakat agency. As such, it is recommended that the Zakat agency be accommodative to the needs of Zakat payers. For example, to have

more mobile counters, efficient and safe online transactions, QR transactions, and competent customer service officers.

The Zakat agency should also disseminate more information regarding Zakat as well as enhance their disclosure practices to the public. This is because the findings evidenced that a favorable perception of the sufficiency of zakat information is an important factor in improving the payment of zakat through the zakat agency. Moreover, promoting the activities of the zakat agency, through disseminating more information, could enhance the general perception of the payers regarding the zakat agencies, hence increasing the payment of zakat through them.

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Exploring The Connection of Spirituality at Work in Enhancing Nurses' Job Performance: Insight from Malaysian Hospitals

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Abstract: The performance of nurses can be seen as a reflection of healthcare organizations, as they constitute the most critical human resources within hospitals. However, challenges arise when issues such as staff shortages, high turnover rates, and burdensome workloads contribute to poor nurse performance. Conversely, the incorporation of spirituality in the workplace provides nurses with an opportunity to align their inner selves within a supportive community environment, fostering a deeper sense of purpose in their professional responsibilities. This study sought to determine the connection between spirituality at work and nurses' job performance, surveying 350 nurses employed in public hospitals across Malaysia. Data analysis was conducted using Statistical Package for Social Sciences (SPSS) software version 27, revealing that all three aspects of spirituality at work, namely inner life, meaningful work, and sense of community, had a positive and significant influence on nurses' job performance. This study provides potential aid to decision-makers in Malaysian healthcare organizations by offering significant insights for the development of strong spirituality at work values within their organizational setting. Additionally, this study presents recommendations for future research and proposes methods for the authorities to incorporate spirituality at work values into nurses' jobs, ultimately enhancing the overall performance of healthcare services.

Keywords: *Spirituality at Work, Nurses' Job Performance, Self-Determination Theory, Nurses, Hospitals*

1. Introduction and Background

Healthcare is acknowledged as a burgeoning sector due to its provision of medical services to the entire population, with particular emphasis on the increasingly expanding elderly demographic. Moreover, healthcare services play an essential role in the country by delivering care to individuals affected by illnesses and preserving their lives, especially after the world has encountered the COVID-19 problem. (Nasurdin, Tan, & Khan, 2022). In Malaysia, most people seek medical care through the public healthcare system funded by taxation. (Ahmad, 2019). The Ministry of Health (2021) statistics reveal that public hospitals provided medical care to 2,284,303 patients in 2020, and private hospitals attended 916,294 patients.

In the healthcare environment, nurses have a primary role in delivering patient care (Asiamah, Mensah, & Ocra, 2019; Greenslade & Jimmieson, 2007), distinct from those of their colleagues, such as doctors and other medical staff (Ali & Qun, 2019) and they constitute the biggest segment among healthcare professionals (Asiamah et al., 2019). Thus, their job performance is critical to high-quality healthcare services (Russeng, Wahiduddin, Saleh, Diah, & Achmad, 2020). Nonetheless, according to a study by Manogaran and Muthuveloo (2019), there has been a decline in nurses' job performance in Malaysian healthcare. This decline coincided with a significant rise in the number of complaints reported to the Ministry of Health, rising from 401 cases in 2015 to 453 cases in 2018 (Public Complaints Bureau, 2018). Among the reasons was the rapid increase in patient numbers coupled with a shortage of manpower, which has resulted in heavy workloads and longer working hours among staff nurses (Zakaria, et al., 2021). Undeniably, the former Health Minister of Malaysia, Khairy Jamaluddin, has also announced a shortage of nurses in public hospitals and clinics (Arumugam, 2022). Simultaneously, a significant number of skilled and experienced nurses are opting to work overseas due to more attractive remuneration offers, for instance, 2,000 nurses relocating to Saudi Arabia, and 2,351 nurses choosing to work in Singapore. In addition, Malaysia's nurse-to-patient ratio currently stands at 1:297, much below the World Health Organization's suggested 1:200 ratio (Ministry of Health, 2021).

From the above explanation, it becomes evident that a shortage of healthcare workforce, excessive turnover, and overwhelming work demands will result in poor nurse performance, which, will have a direct influence on the quality of patient care and the overall effectiveness of healthcare delivery (Russeng et al., 2020; Manogaran & Muthuveloo, 2019; Nasurdin, Ling, & Khan, 2018). Consequently, the attainment of Sustainable Development Goal 3 (SDG3), which centers on advancing good health and well-being, faces considerable challenges. Therefore, nurses must be driven and inspired to enhance the quality of patient care, thereby improving their job performance.

Integrating spirituality in the workplace allows nurses the opportunity to harmonize their inner selves within a supportive community environment to find purpose when performing their work. (Daniel, 2019), which will alter their behavior and influence their job performance (Bharadwaj & Jamal, 2020). According to Gunawan, Hariyati, and Gayatri (2019), nurses who are highly motivated at work are 2.43 times more likely to do well in their roles compared to their less motivated nurses. Likewise, in a study conducted by Hisam and Sanyal (2021), as well as by Wagner, Brooks, and Urban (2018), it was demonstrated that spirituality at work is one of the internal factors that lead to a healthier and more efficient healthcare work setting, which subsequently adds to higher employee job performance (Ma'arof, Rashid, & Nasuredin, 2024). On the other hand, according to Kouhdasht et al. (2019) and Reutter and Bigatti (2014), an increase in spirituality at work correlated with a reduction in perceived occupational stress as well as enhanced psychological well-being among nurses. Furthermore, James, Miles, and Mullins (2011) claimed that spirituality at work can aid as a personal coping mechanism, especially in situations where nurses suffer from demotivation and excessive workplace pressure while fulfilling their duties and navigating workplace challenges (Fitriasari, 2020).

On top of that, this study supports the Self-Determination Theory developed by Deci and Ryan (1985), which claims that motivational inclinations that govern behavior have substantial consequences for successful behavioral control and psychological well-being. This theory is described as a motivational structure that emphasizes extrinsic and intrinsic motivation, assuming that individuals possess an innate inclination for personal development and advancement. (Deci & Ryan, 1985); that is to say, when a person is satisfied with the three basic psychological needs such as the need for autonomy, need for competence, and need for connectedness, he/she will foster significant levels of intrinsic motivation which will result in beneficial work-related results such as high performance at work, favorable attitudes, and behaviors as well as enhancement in overall well-being (Gagne & Deci, 2005). According to Sharma and Hussain (2012), spirituality is a notion that profoundly influences an individual's inner drive towards motivation. Hence, based on the Self-Determination Theory, intrinsic work satisfaction among nurses is likely to increase when they can discover meaning and purpose at work and articulate beliefs that align with the ideals of the organization. Consequently, nurses will experience an elevated sense of competence, autonomy, and connection with their coworkers and superiors, ultimately resulting in improved nurses' job performance.

Amin, Lubis, and Putra (2020), and Belwalkar, Vohra, and Pandey (2018) collectively emphasized the importance of conducting empirical studies on spirituality at work to unveil its possible connection with employee attitudes and behaviors. However, Wei, Wu, Lee, and Tung (2020) and Wagner et al. (2018) asserted that there is a scarcity of research specifically examining the topic of spirituality within healthcare settings and its impact on nurses' work environments. Similarly, Johari, Shamsudin, Yean, Yahya, and Adnan (2019) identified a gap in the research about the job performance among public sector workers, notably nurses employed in public hospitals. Meanwhile, in Malaysia's context, exploring the connection between spirituality and job performance can offer new ways to enhance nurses' well-being, reduce burnout, and improve the overall quality of healthcare services in Malaysian hospitals. At the same time, since nurse retention is also a critical issue in many Malaysian hospitals which will affect the continuity and quality of care, spirituality at work could help in creating interventions to foster a supportive work environment, thereby improving retention rates. Therefore, building upon this existing knowledge, this study aimed to examine how elements of spirituality at work, specifically inner life, meaningful work, and a sense of community, influence the nurses' job performance employed in public hospitals in Malaysia.

2. Literature Review

The section gives a comprehensive explanation of how spirituality at work relates to nurses' job performance

at public hospitals in Malaysia.

Job Performance: In the current business environment, employee job performance stands out as a paramount concern, as it serves as a direct reflection of the organization's image. Traditionally, job performance has been viewed as actions or behavior aligned with the aims of the organization (Campbell, 1990). Mahmoud and El-Sayed (2016) observed that job performance serves as a means to improve employee qualities, including traits, behavior, and attitudes, thereby bolstering an organization's productivity through adherence to established expectations and norms. Likewise, Viswesyaran and Ones (2000) regarded job performance as encompassing activities that may be modified and encompassing products and behaviors that contribute to the organization's objectives. In contrast, Motowidlo (2003) characterized job performance as the overall expected value to an organization of distinct behavioral occurrences done by an employee within a specific period. In alignment with this perspective, Greenslade and Jimmieson (2007) agreed that inside the healthcare sector, nurses' job performance assumes critical importance, as the high quality of care offered to patients is significantly influenced by the attitudes and behavior of nurses.

Nevertheless, throughout the years, studies have advanced the measurement of job performance by incorporating extra behaviors that complement essential task-related activities. Borman and Motowidlo (1993) introduced the concept that job performance can be split into a minimum of two theoretical categories: contextual performance and task performance. According to Borman and Motowidlo (1997), both aspects of performance play a crucial role in attaining organizational goals, as task performance involves the behaviors necessary for fulfilling work tasks or core technical aspects of the organization. In contrast, contextual performance is required to structure the social and psychological environment within the organization. Motowidlo and Van Scotter (1994) asserted that each aspect of performance makes its contribution to the overall rating of job performance. Meanwhile, in the context of healthcare, nursing roles encompass a diverse array of behaviors, encompassing both task-related and contextual activities that significantly impact overall care quality (Greenslade & Jimmieson, 2007). Task performance in nursing involves activities such as giving home care guidance, administering medications and treatments, and demonstrating care and concern toward patients. Conversely, contextual performance examples include assisting unit nurses in addressing work-related issues, staying up late to assist patients, and actively engaging in voluntary hospital initiatives and communities, which are not obligatory but enhance the overall work environment (Greenslade & Jimmieson, 2007).

Spirituality at Work: The notion of spirituality at work has gathered significant attention, emerging as a prominent area of inquiry. This heightened interest arises from a shift in people's motivations at work, emphasizing the pursuit of deeper meaning and satisfaction beyond mere financial compensation provided by organizations (Sony & Mekoth, 2019). Recent disruptions caused by the COVID-19 pandemic have led to significant changes in working conditions, presenting notable challenges on physical, emotional, spiritual, and psychological fronts (Ledi, Ameza-Xemalordzo, & Ansah, 2023). In today's workforce, employees are actively seeking an environment that aligns with their spiritual needs (Bharadwaj & Jamal, 2020). A spiritual-oriented workplace stems from the belief that such an environment can empower individuals to integrate their inner selves with a sense of purpose while working towards attaining organizational goals.

Ashmos and Duchon (2000) characterized spirituality at work as the acknowledgment of employees' inner life, which thrives and is nurtured through meaningful work conducted within a communal setting. In essence, a workplace can be considered spiritual when it offers employees the opportunity to openly express themselves, cultivate meaningful relationships with the community, and engage in work aligned with their life purpose. (Daniel, 2019). In the context of nursing, Wei et al. (2020) discovered a significant correlation between spirituality at work and job performance due to its ability to promote favorable workplace conduct that ultimately enhances the quality of nursing care.

Previous studies have provided evidence supporting the positive effects of spirituality at work on various outcomes. These outcomes encompass service quality (Ledi et al., 2023), and organizational commitment. (Labetubun & Dewi, 2022; Hisam & Sanyal, 2021), Employee engagement (Almotawa & Shaari, 2020), intention to stay (Milliman, Gatling, & Kim, 2018), task and contextual performance (Fox, Webster, & Casper, 2018), performance among nurses (Marwan, Rajak, & Abubakar, 2019) and organizational performance (Garcia-

Zamor, 2003). Further, the conceptualization of spirituality at work is made up of several facets. Duchon and Plowman (2005) and Ashmos and Duchon (2000) proposed three facets: inner life, meaningful work, and a sense of community. In contrast, Milliman, Czaplewski, and Ferguson (2003) suggested three elements: a sense of community, meaningful work, and organizational values. Kinjerski and Skrypnek (2006) divided spirituality into four groups: a sense of community, engaging work, mystical experience, and spiritual connection. Likewise, Petchsawang and Duchon (2009) identified four elements: compassion, transcendence, meaning at work, and mindfulness. Nevertheless, the three dimensions of spirituality at work that are frequently employed for conceptualization, as established by Ashmos and Duchon (2000), consist of inner life, meaningful work, and a sense of community. Therefore, this study employed the three dimensions of spirituality at work proposed by Ashmos & Duchon (2000).

Inner Life and Nurses' Job Performance: According to Iyer (2018), workers possess an inner drive and eagerly anticipate opportunities to show themselves on physical, emotional, and holistic levels within the workplace. Vaill (1998) described inner life as people's sentiments about who they are, what they are doing, and what they contribute. Similarly, Ashmos and Duchon (2000) viewed inner life as the degree to which an employee experiences optimism, self-awareness regarding personal values, and a connection to spirituality. Employees who can articulate their inner lives and exercise autonomy in their work tend to be more productive than others. (Ashmos & Duchon, 2000). According to Sarmad, Iqbal, Ali, and ul-Haq (2018), when employees feel a strong emotional connection to an organization that encourages them to express their authentic selves, they are likely to surpass their expected job responsibilities. Furthermore, a study conducted by Daniel (2019) demonstrated a significant correlation between inner life and job performance. Similarly, a study performed by Mousa (2020) at Abu Dhabi University reported that inner life significantly influences the job performance of faculty members. Therefore, the proposed hypothesis for this study is as follows:
H_1: *Inner life would significantly influence the nurses' job performance.*

Meaningful Work and Nurses' Job Performance: According to Sony and Mekoth (2019), employees derive value from their jobs for reasons beyond mere financial compensation. Therefore, individuals who perceive their work as meaningful may experience intrinsic motivation and contentment stemming from their growth opportunities (Hackman & Oldham, 1976). In contrast, employees who do not find their employment to be meaningful and purposeful are unlikely to perform at their fullest potential (Maslow, 1970). Hence, meaningful work can be defined as work that instills joy and enthusiasm, accompanied by a strong motivation to engage in daily work activities (Bharadwaj & Jamal, 2020). According to Belwalkar et al. (2018), when an individual's employment provides him/her with a feeling of purpose and connection with others, it leads to an emotional commitment to their work. Do (2018) argued that providing meaningful job tasks will make employees experience greater satisfaction in their work, ultimately resulting in an improvement in their job performance. Furthermore, Sarmad et al. (2018) revealed a significant influence between meaningful work and job performance. Likewise, a study conducted by Tong (2018) involving nurses in China found a significant association between meaningful work and both task and contextual performance. Consequently, the hypothesis posited for this research is as follows:
H_2: *Meaningful work would significantly influence the nurses' job performance.*

Sense of Community and Nurses' Job Performance: According to Do (2018), fostering strong collaboration among medical staff can give employees a positive sense of community among employees. Therefore, a sense of community refers to a feeling of interconnectedness among team or group members, accompanied by an environment of open expression, care, and support towards each other (Bharadwaj & Jamal, 2020). According to Sintaasih et al. (2018), when employees perceive fair treatment within the organization, experience personal development through their work, and witness a collective effort in addressing issues, they are inclined to develop a sense of community, which may lead to improved job performance. Do (2018) discovered a significant and positive association between a sense of community and the job performance of staff employed at an international hospital. Similarly, a study carried out by Azeez and Genty (2018) involving academicians from two public universities in Nigeria found a significant relationship between a sense of community and organizational citizenship behavior (contextual performance). Hence, the hypothesis put forth for this study is as follows:
H_3: *A sense of community would significantly influence nurses' job performance.*

3. Research Methodology

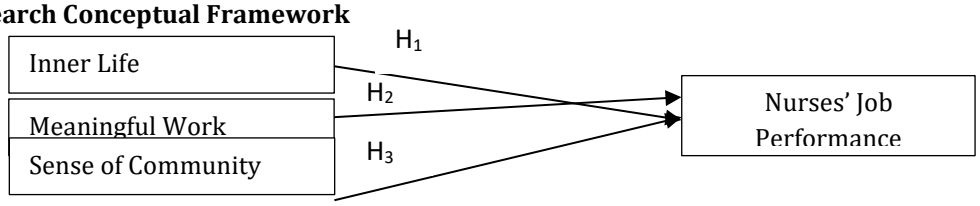
This section focuses on the research methodologies employed to determine the factors influencing spirituality at work and job performance within the context of Malaysian public hospitals.

Data and Sampling Method: Before collecting the data, ethical clearance was obtained from the Malaysia Medical Research and Ethics Committee (MREC). Following the approval, the researchers, with support from the Clinical Research Centre (CRC), contacted the directors of the Malaysian public hospitals to seek their participation consent in the study. However, only ten directors were granted their consent, and each participating hospital designated a matron to facilitate the distribution and collection of questionnaires. A total of 375 questionnaires were handed out to nurses and their respected direct supervisors (sisters) at Malaysia's ten public hospitals using a matching approach. Each sister was asked to assess not more than four nurses. The data collection returned 350 responses of which 345 were deemed usable, for an acceptable response rate of 92.00%.

Measurements and Data Analysis Tool: The questionnaires were prepared in bilingual (English and Malay Language) to cater to respondents from diverse races and educational backgrounds, and experts' opinions were taken into account to examine the translated questionnaire's content validity, readability, and general questionnaire design. The measurement of job performance was carried out using a 41-item Nursing Performance Scale designed by Greenslade and Jimmieson (2007). Among these 41 questions, 23 evaluated task-related performance, while the remaining 18 gauged contextual performance. The sisters were asked to evaluate the performance of their subordinates (nurses) performance on a 7-point Likert Scale. A rating of 1 denoted "severely below average" performance, while a rating of 7 signified "significantly above average" performance. The following are some examples of task performance questions: giving home care guidelines, attending to patients' worries, and notifying all unit nurses about patient tests and their findings. On the other hand, contextual performance was evaluated using a 7-point Likert Scale, with a rating of 1 indicating "not at all" and a rating of 7 signifying a "great deal". Samples of contextual performance questions encompassed activities such as assisting unit nurses in completing their tasks, staying up late to assist patients, and actively participating in hospital-related meetings. To evaluate spirituality at work, a set of 21 questions from Ashmos and Duchon (2000) was employed, and participants were asked to rate their responses on a scale ranging from 1 (strongly disagree) to 7 (strongly agreed). Some sample questions include "I feel hopeful about life" and "My supervisor encourages my development".

Before conducting the actual study, a pilot test was conducted on 90 staff nurses from one district hospital in Malaysia's Southern Region. As a result, Cronbach's alpha in the pilot study was more than 0.70. The data was analyzed using the Statistical Package for Social Sciences (SPSS) software version 27 as it is more flexible and functions very well in analyzing the survey data (Quinlan, 2011). The framework of this study is illustrated in Figure 1.

Figure 1: Research Conceptual Framework



4. Results

The descriptive results derived from SPSS showed that all staff nurses had a diploma. The majority of the respondents were females (94.20%), while the remaining 5.80% were male respondents. Most staff nurses were married (63.90%), whereas only 35.10% were categorized as single, and a mere 1.00% had another marital status. This study involved mostly Malay nurses (85.90%), with a smaller percentage of other ethnicities such as 6.40% from others, 4.00% Indian, and lastly 3.70% Chinese nurses. The findings also indicated that nurses were employed across different departments. Among these departments, most nurses worked in the medical department (26.20%), followed by surgical (14.10%), pediatric (13.90%), obstetrics and

gynecology (11.50%), orthopedic (11.00%), and the smallest is operation theatre (0.30%).

Table 1: Analysis of Demographic Profile for Nurses (N: 345)

Demographic Variable	Category	Percentage (%)
Gender	Male	5.80
	Female	94.20
Marital Status	Single	35.10
	Married	63.90
	Other	1.00
Ethnicity	Malay	85.90
	Chinese	3.70
	Indian	4.00
	Others	6.40
Education	Diploma	100.00
Department	Medical	26.20
	Surgical	14.10
	Pediatric	13.90
	Obstetrics & Gynecology	11.50
	Orthopedic	11.00
	Critical Care/ICU	5.60
	Ophthalmology	4.80
	Emergency	3.60
	Anesthesiology	3.40
	Oncology	2.80
	Multidisciplinary Unit	2.70
	Operation Theatre	0.30

Meanwhile, the findings of demographic features for sisters revealed that all sisters were female. The married sisters comprised the largest portion of respondents (90.90%), while 8.10% were single, and the remaining 0.90% fell into other categories. The majority of sisters participating in this study were Malays (76.30%), with Chinese comprising the next largest group (10.30%), followed by Indian sisters (10.00%), and the remaining referred to as Others (3.40%). In terms of education, 85.00% of sisters held a diploma, 13.10% held a degree, and the remaining 1.90% had a master's degree. The findings also indicated that most sisters were employed in the Medical Department (23.40%), with the subsequent highest in Surgical (15.00%), Pediatric (13.80%), Orthopedic (12.20%), Obstetrics and Gynecology (11.00%), and Operation Theatre (0.50%) departments.

Table 2: Analysis of Demographic Profile for Sisters (N: 88)

Demographic Variable	Category	Percentage (%)
Gender	Female	100.00
Marital Status	Single	8.10
	Married	90.90
	Other	0.90
Ethnicity	Malay	76.30
	Chinese	10.30
	Indian	10.00
	Others	3.40
Education	Diploma	85.00
	Degree	13.10
	Master	1.90
Department	Medical	23.40
	Surgical	15.20
	Pediatric	13.80
	Orthopedic	12.20
	Obstetrics & Gynecology	11.00
	Critical Care/ICU	4.20

Ophthalmology	4.00
Emergency	3.60
Anesthesiology	3.40
Oncology	2.80
Multidisciplinary Unit	1.90
Operation Theatre	0.30

Multiple Regression Analysis: This study used multiple regression analysis to investigate the link between spirituality at work and the nurses' job performance in Malaysian public hospitals (H_1-H_3). The result presented in Table 3 shows that each aspect of spirituality at work, including inner life, meaningful work, and sense of community, was able to explain 25.00% of the observed variations in job performance (R^2change = 0.25, F-change = 107.51, $p<0.01$). Hence, it confirmed that inner life, meaningful work, and a sense of community were positively and significantly associated with nurses' job performance. The multiple regression results also reveal that meaningful work ($\beta = 0.33$, $t = 9.72$, $p<0.01$) was a more critical factor in explaining the nurses' job performance because of its highest Beta value. Thus, these results support H_1, H_2, and H_3.

Table 3: Multiple Regression of Spirituality at Work and Job Performance

Independent Variables	Dependent Variable: Job Performance	
	t value	**Std. β**
Inner Life	5.25	0.15*
Meaningful Work	9.72	0.33*
Sense of Community	4.85	0.16*
R^2	0.25	
R^2 Change	0.25	
F-Change	107.51	

Discussion

The present study examined the effects of spirituality at work, namely inner life, meaningful work, and a sense of community, on the nurses' job performance employed in public hospitals in Malaysia. All three hypotheses are supported by statistical findings. The findings revealed that spirituality at work positively and significantly influences nurses' job performance. That is to say, the utilization of spirituality at work could enhance the work atmosphere and facilitate nurses' job performance. Nurses can achieve higher performance or perform better in the workplace when they can openly communicate their inner life requirements at work, believe that their employment is important and meaningful, and foster a sense of connection and appreciation by their colleagues, especially while giving exceptional care to patients.

The findings of this study are consistent with prior works of literature. According to a recent study by Mousa (2020), spirituality at work has significant influences on employee job performance. Meanwhile, within the nursing context, Pasikhani and Kuchesfahani (2018) established a link between meaningful work, a sense of community, inner life, and contextual performance. Similarly, Marwan et al. (2019) also showed that spirituality at work has a significant influence on nurses' job performance. Wei et al. (2020) argued that spirituality at work is strongly tied to nurses' job performance because it can foster excellent workplace behaviors which directly impact the quality of patient care delivered by nurses.

Furthermore, several empirical studies have shown that inner life significantly affects job performance, consistent with previous research. (Mousa, 2020; Daniel, 2019). In line with previous findings, meaningful work was discovered to influence job performance significantly (Do, 2018; Sarmad et al., 2018; Tong, 2018). Furthermore, the study findings supported the significant effect of a sense of community on job performance, which is consistent with the findings of other studies (Azeez & Genty, 2018; Do, 2018; Sintaasih et al., 2018). This is understandable, given that scholars like Ali et al. (2021) and Moon et al. (2020) have mentioned spirituality at work has the potential to increase an individual's intrinsic motivation, which can have a good impact on an organization, including being dedicated and have a strong commitment towards achieving their work objectives.

Moreover, from the standpoint of Self Determination Theory by Deci and Ryan (1985) perspective, nurses who express their need for inner life are more prone to have high motivation while meeting day-to-day challenges and are likelier to perform better in their tasks. Along the same lines, nurses who experience a deeper meaning in their work are more likely to trigger high performance and improve patient quality of care. Nurses who can meet their desire for connectivity will experience a sense of belonging within the organization, which will lead to individual development and togetherness in resolving problems, consequently increasing the likelihood of greater job performance. Hence, this highlights the importance of supporting spirituality at the workplace so that both parties (health care organizations and health care personnel) can take equal benefits in the long term.

5. Managerial Implications and Recommendations

The study findings offer valuable contributions and recommendations for hospital administration and supervisors regarding the role of spirituality at work and how it influences the behavior of nurses working at public hospitals in Malaysia. The hospital management should include spirituality in organizational culture and actively promote values such as compassion, empathy, and a sense of purpose in the workplace by organizing seminars, workshops, and training sessions that focus on exploring and strengthening different initiatives to raise awareness and perception on spirituality values. This is because cultivating a spiritual environment can enhance job satisfaction and reduce occupational stress which ultimately improves job performance and better patient care among nurses. At the same time, Matrons and sisters should adopt a supportive leadership style that aligns with spiritual values by being approachable, fostering open communication, providing regular feedback, and recognizing the spiritual needs of nurses which can lead to a more engaged and motivated employee. Supportive leadership practice by acknowledging spirituality at work can strengthen the connection between employees and organizations as well as between employees and their superiors, leading to high levels of performance and commitment. Hospital management also can encourage team-building activities that include elements of spirituality such as group reflections and shared purpose exercises. These activities can strengthen team cohesion through shared spiritual practices that can foster a supportive work environment which can reduce conflicts and ultimately enhance nurses' job performance. The significant findings of the study also could help policymakers in the healthcare sector to integrate spiritual well-being initiatives into human resource management practices, improving workplace morale and patient care quality.

Conclusion

The present study offers empirical evidence for the proposed relationship based on Self Determination Theory by Deci and Ryan (1985). The findings indicate that the Malaysian Ministry of Health and administrators of public hospitals should prioritize how spirituality at work may lead to constructive workplace behavior, while nursing leadership must take steps to incorporate spiritual values within their working environment. Nursing management and sisters can enhance their nurses' view of inner life, meaningful work, and community by promoting professional growth, enriching job experience, boosting cooperation, and nurturing a supportive and cooperative atmosphere. These hold significance as how hospitals handle their human resources will significantly influence nurses' work behavior.

While conducting this study, several limitations should be considered. First, the study sample included only nurses and their sisters who worked in public hospitals excluding those in private hospitals. Future studies should try broadening the scope to boost the generalizability of findings. Second, due to the study's cross-sectional nature, it is hard to show the causality of variables. As a result, a longitudinal study is recommended for future research to validate the precision of findings because individuals' behavior could change over time. Finally, this study only examined spirituality at work dimensions. Future research may want to investigate other variables, such as psychological capital, human resource management practices, and job characteristics.

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Examining Islamic Environmental, Social and Governance (ESG) Current and Future Research– A Bibliometric Analysis

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Abstract: This bibliometric analysis offers a comprehensive look at the current research trends in Islamic environmental, social, and governance (ESG) over 12 years, from 2012 to 2023. The study encompasses a dataset of 54 papers from the SCOPUS database and employs various bibliometric metrics, including author-based, country-based, and organization-based citations. The results indicate a variable growth in the number of publications in this research domain over the period, with a particularly significant surge observed between 2021 and 2023. The descriptive analysis identifies the most prolific countries and document types within Islamic environmental, social, and governance realms. The citation analysis identifies the most influential authors, organizations, and countries shaping this field. In summary, the results show that environmental, social, and governance (ESG) research and practices that include Islamic teachings and values still demonstrate a significant gap, and recommendations are provided for future research based on the primary issues and gaps discovered from the current trends. These findings are valuable for researchers, practitioners, and policymakers seeking insights into this study area.

Keywords: *ESG, ESG integration, sustainable development, corporate governance, bibliometric analysis*

1. Introduction

Environmental, social, and governance (ESG) practices have become a key priority for companies, policymakers, and investors. By definition, ESG is a framework that helps businesses and their related stakeholders understand how an organization manages risks and opportunities around sustainability issues related to the environment, community, and ethical business. This shift is fuelled by a growing recognition of these factors' risks and opportunities for achieving long-term financial performance and sustainability. Alongside this, research on ESG has emerged as a foundational element in the study of sustainable finance and corporate responsibility.

Integrating Islamic teachings and values into ESG practices offers a distinct perspective that merges traditional financial principles with ethical and religious considerations. ESG principles align closely with Islamic finance's ethical and moral foundations guided by Shariah law. Islamic finance emphasizes social justice, environmental stewardship, and responsible governance, making it naturally compatible with the goals of ESG. As an example, investments in the context of Islamic finance are assessed not only for their financial returns but also for their social and ethical impact, reflecting the core principles of ESG.

Integrating ESG principles into Islamic finance has gained significant attention, with scholars highlighting the strong alignment between ESG criteria and Islamic ethical standards. This convergence positions Islamic financial institutions to lead in sustainable and responsible investing while offering opportunities to create innovative financial products that meet ethical and religious requirements (Hayat & Malik, 2014).

The need to thoroughly understand the academic landscape and research trends surrounding the Islamic ESG motivates the study of bibliometric analysis on this topic. By applying bibliometric methods to examine the literature, this study will enhance the scope and depth of research on Islamic ESG and provide recommendations for future research based on the primary issues and gaps discovered from the current trends. This study aims to answer the following research questions:
What are the present landscape, evolution, and publication trends in Islamic ESG?
Who are the key stakeholders (authors, institutions, organizations, countries) contributing to the expansion of Islamic ESG literature?

What are the potential areas for future research in Islamic ESG that warrant further exploration?

This study makes several contributions to the literature. First, it offers a comprehensive overview of the historical development of Islamic ESG research, enabling researchers to understand how the field has progressed over the past 12 years. Second, it provides valuable direction for future research by highlighting key factors such as methodologies, leading authors, affiliations, organizations, countries, and journals. Third, the findings of the study will benefit not only researchers but also companies, policymakers, and other stakeholders who seek to understand the importance of integrating Islamic principles into conventional ESG practices. Considering the usefulness and importance of Islamic ESG, this study is motivated by the need to analyze publications regarding the topic through bibliometric analysis, making a novel contribution to the literature by providing a detailed view of the current state of Islamic ESG research.

2. Literature Review

ESG is a specific framework that encompasses a range of non-financial criteria used to evaluate companies' operations and performance based on environmental, social, and governance practices. The environmental aspect assesses a company's effect on natural resources, including its carbon footprint, energy consumption, waste management, and climate change mitigation efforts. The social aspect examines how a company handles relationships with employees, suppliers, customers, and communities, including human rights, labor practices, diversity, and community engagement. The governance aspect refers to the company's leadership structure, executive compensation, audits, internal controls, and shareholder rights, which shape its ethical decision-making framework.

An increasing amount of research has explored the pathways through which ESG factors impact corporate performance. Eccles et al. (2014) demonstrated that companies implementing sustainability policies significantly outperform their peers over the long run, both in terms of stock market returns and profitability. This trend is further supported by the growing demand from investors for sustainable and responsible investment options, which has led to the integration of ESG factors into mainstream investment analysis and decision-making processes.

Research by Friede et al. (2015) indicates that companies with strong ESG practices tend to have lower risks, as they are better positioned to anticipate and manage emerging challenges related to environmental regulations, social expectations, and governance standards. Furthermore, other studies have emphasized ESG's role in risk management, proving that companies with robust ESG practices are less susceptible to financial shocks and exhibit greater resilience during economic downturns (Giese et al., 2019).

Research on the integration of ESG frameworks into Islamic finance demonstrates how these frameworks can be adapted to align with Islamic principles. For example, Mohd Zain et al. (2024) explore the integration of ESG principles with Shariah compliance and identify the potential for harmonizing ESG principles with the *Maqasid al-Shariah*, offering Takaful operators a roadmap to enhance their ethical credibility, societal impact, and environmental stewardship. Similarly, Sacarcelik (2018) provides examples of how Islamic financial institutions implement ESG practices while adhering to Shariah principles, highlighting successful strategies and improvement areas.

From an Islamic perspective, the principle of *Khalifah* (stewardship) aligns with the environmental sustainability component of ESG. This principle of *Khalifah* obliges individuals and organizations to minimize environmental harm, promote sustainability, preserve natural resources, and protect the earth as a trust from *Allah* (God) for future generations (Dusuki & Abdullah, 2007). A study by Bsoul et al. (2022) highlights the consideration of Islam's perspective in solving environmental problems, activating the role of religious and scientific institutions in preserving the environment and providing appropriate solutions.

The social component of ESG intersects with Islamic values through principles of *adil* (justice) and *ihsan* (benevolence), which emphasize fairness, equity, and compassion when dealing with others. This includes ensuring the well-being of employees, supporting community development, and upholding human rights

(Siddiqi, 2004). For instance, Islamic teaching promotes social welfare and equitable treatment, as seen in practices like *Zakat* (charitable giving).

Meanwhile, the governance component in ESG is governed by the principles of *shura* (consultation) and *Amanah* (trustworthiness), which stress the importance of transparency, accountability, and ethical leadership in business operations (Hasan, 2011). Islamic governance structures are designed to prevent fraud, corruption, and exploitation, aligning closely with the governance pillar of ESG. Wahab et al. (2024) discuss how Islamic corporate governance practices can enhance transparency and accountability, thereby supporting ESG objectives.

The ESG principle is increasingly recognized as a crucial element of sustainable finance, offering valuable guidance into how companies can align their operations with broader societal and environmental goals. While significant progress has been made in integrating ESG into corporate and investment strategies, combining these principles with Islamic teachings presents a holistic approach to sustainable finance. This integration harmonizes environmental stewardship, social responsibility, and ethical governance with Islamic values. Continued research and practical applications in this field are essential for advancing both ESG practices and Islamic teaching, ensuring a balanced approach to ethical and sustainable development.

3. Data and Methodology

The bibliometric analysis for mapping the Islamic ESG literature is carried out in this study, including a comprehensive literature assessment of the publications published in high-quality journals. To the best of the author's knowledge, there has yet to be review research that has concentrated on papers published in journals of high quality. The emphasis on "high quality" is significant since the significance of high-quality academic research is increasing, and there is a growth in the number of journals that engage in predatory practices (Sahoo et al., 2022). In addition to quantifying and mapping the academic literature through bibliometric analysis, this study conducts a comprehensive literature evaluation of high-quality studies in the Islamic ESG domain. This is done to bridge the gap that has been identified in the previous reviews.

According to Donthu et al. (2021), bibliometric analysis is a comprehensive method that may be used to investigate and evaluate a significantly large amount of data. Various tools can be used to detect similarities among huge datasets (Jain et al., 2021). The datasets were obtained from Scopus to carry out bibliometrics. After screening, 57 documents from Scopus databases were considered for bibliometric analysis.

Data-collection method and procedure

Data consisting of bibliometric and content analysis was obtained from Elsevier Scopus for this activity on February 25, 2024. According to Jain and Tripathi (2023) and Pranckut (2021), this database is one of the most comprehensive electronic databases for retrieving literature, covering key worldwide journals. According to the recommendations made by Jain and Tripathy (2023) and Sahoo et al. (2022), this review study has utilized a content screening technique that consists of three stages.

During the initial phase of the screening process, the search query "Islamic ESG" was utilized to search within the "title, abstract, and keyword category" of the database. The second part of the screening process consisted of refining the papers depending on the period, which was chosen to be 2012-2023. Because the result documented the first paper published this year, 2012 was selected as the year of publication. During the final phases, the language screening is performed, and only articles written in English are taken into consideration for the study. Within the scope of the study, a total of 54 research publications from Scopus were incorporated.

Data analysis techniques

Jain and Tripathy (2023) and Donthu et al. (2021) have proposed a two-stage analytical technique for bibliometric analysis. Both groups have proposed this technique, which consists of performance analysis and science mapping. According to Donthu et al. (2021), performance analysis is comprised of descriptive statistics that describe the contribution of research constituents of documents by subject, year, source, author, affiliations, and nation. On the other hand, science mapping illustrates the relationship between research constituents. Data was extracted directly from the SCOPUS database to carry out the preliminary examination

of the data. The VOSviewer was utilized to conduct a performance analysis. According to Eck and Waltman (2010), the performance analysis showed that the features and research patterns were classified and analyzed individually using descriptive statistics. These statistics included the co-authorship, co-occurrence, and citations among the authors, organizations, nations, sources, and keywords.

PRISMA Model

This study adopted the PRISMA model, an acronym for Preferred Reporting Items for Systematic Reviews and Meta-Analyses. This widely adopted framework for conducting systematic reviews and meta-analyses in various fields, including bibliometrics, provides a structured approach to literature review and synthesis aimed at enhancing transparency, reproducibility, and the quality of research outputs.

4. Findings

Trends in Publications

Table 1: Distribution of Publications by Subject

	Subject area	Frequencies
1	Economics, Econometrics and Finance	36
2	Business, Management and Accounting	30
3	Social Sciences	9
4	Environmental Science	8
5	Decision Sciences	6

The multidisciplinary nature of this field of study is reflected in the fact that research output on Islamic Environmental, Social, and Governance (ESG) is distributed throughout a variety of academic disciplines. The widespread applicability of this field of study is particularly noteworthy. Scholars investigate incorporating environmental, social, and governance (ESG) principles into Islamic finance practices, analyzing the financial performance and impact of Islamic ESG investments compared to their conventional counterparts and investigating the alignment of ESG criteria with Shariah-compliant investment guidelines. The field of Economics, Econometrics, and Finance is the most prominent publication in this area, with 36 publications. Business, management, and accounting disciplines make a significant contribution by publishing thirty articles that concentrate on the social responsibility initiatives of Islamic financial institutions, corporate governance practices within these institutions, and the ethical dimensions of Islamic environmental, social, and governance investments. These publications all contribute to responsible finance and ethical business conduct.

Nine publications in the field of social sciences provide insights into the societal implications of Islamic environmental, social, and governance practices. These publications include studies on social development, poverty alleviation, and financial inclusion that are made possible by Islamic microfinance institutions. Additionally, these publications cover consumer behavior and preferences regarding Islamic ethical products and services. Through investments in renewable energy, green infrastructure, and environmentally responsible projects, Environmental Science critically evaluates Islamic finance's environmental sustainability. Additionally, it addresses climate change mitigation and adaptation efforts within Islamic financial markets. Environmental Science has a total of eight publications. With six papers, Decision Sciences contributes to establishing standardized reporting frameworks for Shariah-compliant environmental, social, and governance (ESG) disclosure. They also provide insights into the regulatory framework governing Islamic ESG finances.

Table 2: Distribution of Publications by Year

	Year	Frequencies
1	2023	18
2	2022	13
3	2021	11
4	2020	6
5	2019	1

It is possible to gain insights into the changing research landscape and the growing interest of academics in this topic by analyzing the distribution of the number of publications on Islamic Environmental, Social, and Governance (ESG) throughout different years. There was an increasing momentum in research efforts and a heightened focus on researching various elements of Islamic environmental, social, and governance (ESG) in 2023, as seen by the most significant number of publications ever recorded, which was 18. This rise in publications may reflect the growing realization of the significance of incorporating environmental, social, and governance (ESG) principles into Islamic banking practices and tackling sustainability concerns within nations with a predominantly Muslim population and Islamic financial markets. A consistent increase trend in the number of publications has been observed throughout the prior years. In 2022, there were thirteen publications, whereas in 2021, there were eleven. This indicates that there is a continued interest in advancing knowledge and understanding in this particular field. It is possible that the rise in research production over the past few years can be ascribed to rising awareness of the potential synergies that exist between Islamic finance and ESG principles, as well as the necessity of addressing severe environmental, social, and governance challenges within the Islamic finance industry.

An indication of a nascent stage of research development and a gradual accumulation of scholarly activity on this topic is that the number of publications was relatively low before the year 2020. In 2019, just a few articles were recorded, representing a relatively low number of publications. However, it is essential to note that even during these eras of low publication activity, there were intermittent instances of research output, highlighting academics' continued interest in investigating Islamic environmental, social, and governance concepts and practices. In general, the progression of publication numbers over the years exemplifies the growing prominence of Islamic environmental, social, and governance (ESG) as a study field and highlights the increasing significance of this field within the academic community as well as the broader financial business sector.

Table 3: Distribution of Publications by Source

	Source/ Journals	Frequencies
1	Borsa Istanbul Review	3
2	Journal of Islamic Monetary Economics and Finance	3
3	Asian Economic and Financial Review	2
4	International Journal of Emerging Markets	2
5	International Journal of Supply Chain Management	2
6	International Review of Economics and Finance	2
7	Journal of Asset Management	2
8	Lecture Notes in Networks and Systems	2
9	Research In International Business and Finance	2
10	Springer Proceedings in Business and Economics	2

An understanding of the diffusion of research findings and the scholarly discourse within this topic can be gained through the distribution of publications on Islamic Environmental, Social, and Governance (ESG) throughout a variety of academic periodicals. In terms of the number of publications they produce, the "Borsa Istanbul Review" and the "Journal of Islamic Monetary Economics and Finance" emerged as the leading journals. Each of these journals features three publications on Islamic environmental, social, and governance issues. These publications likely serve as prominent platforms for academics to publish their work and contribute to advancing knowledge in Islamic principles, which are connected with environmental, social, and governance aspects.

In addition, the "Asian Economic and Financial Review," "International Journal of Emerging Markets," "International Journal of Supply Chain Management," "International Review of Economics and Finance," "Journal of Asset Management," "Lecture Notes in Networks and Systems," "Research in International Business and Finance," and "Springer Proceedings in Business and Economics" each feature two publications on Islamic ESG. This further demonstrates a wide variety of journals within the academic world, where there is a growing

interest and participation in exploring Islamic environmental, social, and governance (ESG) concepts and practices. This is demonstrated by the distribution of articles across a variety of journals.

Table 4: Distribution of Publications by Author

	Authors	Frequencies
1	Dreassi, A.	4
2	Hassan, M.K.	4
3	Paltrinieri, A.	4
4	Piserà, S.	4
5	Chiaramonte, L.	3
6	Ghaemi Asl, M.	3
7	Qoyum, A.	3
8	Ahmed, A.	2
9	Erragragui, E.	2
10	Nathan, R.J.	2

The dissemination of publications on Islamic Environmental, Social, and Governance (ESG) by the author highlights a wide variety of academics who have contributed to the discussion in this area of study. A few authors, like Dreassi, Hassan, Paltrinieri, and Piserà, have four publications. These publications demonstrate their significant contributions and active engagement in the process of promoting knowledge within Islamic environmental, social, and governance principles. The scholarly landscape is further enriched by the research findings and ideas of other prolific authors such as Chiaramonte, Ghaemi Asl, and Qoyum, who each have three publications to their credit.

In addition, a considerable number of authors have made noteworthy contributions by publishing two works each. These authors include, amongst others, Ahmed, Erragragui, Nathan, Revelli, Sakti, Setiawan, and Tekin. In this field of study, researchers from various academic backgrounds and geographical locations have come together to investigate the intersection of Islamic principles with environmental, social, and governance considerations. The extensive list of authors highlights the collaborative and multidisciplinary nature of scholarship in this field. In general, the contributions made by these authors collectively contribute to the improvement of knowledge and understanding of Islamic environmental, social, and governance (ESG) issues. They also shape the discourse and inform practice within the academic and broader financial communities.

Table 5: Distribution of Publications by Affiliation

	Affiliations	Frequencies
1	University of New Orleans	5
2	Kharazmi University	4
3	Università degli Studi di Trieste	4
4	Università Cattolica del Sacro Cuore	4
5	Università degli Studi di Udine	4
6	Università degli Studi di Verona	3
7	KEDGE Business School	3
8	Universitas Islam Negeri Sunan Kalijaga, Yogyakarta	3
9	INCEIF University	3
10	Jihočeská Univerzita v Českých Budějovicích	2

The information regarding publications on Islamic environmental, social, and governance (ESG) research organized according to affiliation highlights various academic institutions' intellectual production and engagement on this topic. The University of New Orleans, Kharazmi University, Università degli Studi di Trieste, Università Cattolica del Sacro Cuore, and Università degli Studi di Udine each contributed four publications,

demonstrating their active participation in the academic discourse surrounding Islamic ESG and the contributions they have made to that discourse.

Furthermore, it is worth noting that KEDGE Business School, Universitas Islam Negeri Sunan Kalijaga in Yogyakarta, INCEIF University, and Jihočeská Univerzita v Českých Budějovicích and Jihočeská Univerzita v Českých Budějovicích each have three publications with their affiliations. This is evidence of their substantial scholarly engagement and contributions to the advancement of research in this field. The multidisciplinary and collaborative nature of study on Islamic environmental, social, and governance issues is reflected in these affiliations, representing various academic institutions worldwide. The information presented here highlights the active engagement and scholarly contributions made by a wide range of educational institutions worldwide to the ever-evolving subject of Islamic environmental, social, and governance study.

Table 6: Distribution of Publications by Country

	Countries	Frequencies
1	Malaysia	13
2	Indonesia	9
3	Italy	7
4	United Kingdom	6
5	United States	6
6	France	5
7	Bahrain	4
8	Iran	4
9	Turkey	4
10	India	3

It is possible to gain significant insights into the global distribution of scholarly output and participation within this domain by analyzing the breakdown of publications by nations in the field of Islamic Environmental, Social, and Governance (ESG) study. In the field of Islamic environmental, social, and governance (ESG), Malaysia has emerged as a key contributor, with thirteen publications indicating its considerable role and leadership in expanding research and understanding. Indonesia comes in a close second with nine articles, which demonstrates the country's active participation and significant impact in the academic discourse on Islamic environmental, social, and governance issues. There is a significant amount of scholarly involvement in Italy, the United Kingdom, and the United States, with seven, six, and six publications, respectively. This highlights the tremendous contributions that these countries have made to the ever-evolving area of Islamic environmental, social, and governance study.

Furthermore, France is a prominent example of scholarly activity, as evidenced by its five publications, which demonstrate its involvement and contributions to the advancement of knowledge in this field. Furthermore, Bahrain, Iran, Turkey, and India each have four publications that are attributed to their respective countries. This further highlights the global reach and collaborative efforts of researchers worldwide who are investigating the intersections of Islam, environmental sustainability, social responsibility, and governance. The material presented here highlights countries' diversified and widespread engagement in encouraging research and knowledge transmission in Islamic Environmental, Social, and Governance studies. This engagement reflects the worldwide significance and relevance of this topic.

Trends in Co-authorship

Table 7: Most Cited Co-authorship by Authors

	Author	Documents	Citations	Total Link Strength
1.	Dreassi, Alberto	4	74	13
2.	Paltrinieri, Andrea	4	74	13

3.	Piserà, Stefano	4	74	13
4.	Chiaramonte, Laura	3	28	11
5.	Hassan, M. Kabir	4	21	8
6.	Qoyum, Abdul	3	38	0
7.	Ghaemi Asl, Mahdi	3	6	0

The co-authorship details for Islamic Environmental, Social, and Governance (ESG) research highlight collaborative efforts among authors to produce scholarly output in this field. Among the authors listed, Alberto Dreassi, Andrea Paltrinieri, and Stefano Piserà stand out with four documents each, indicating their active involvement in research collaborations. These prolific authors have also amassed a significant number of citations, with Dreassi and Piserà receiving 74 citations and Paltrinieri garnering 74 citations as well. Notably, Laura Chiaramonte, M. Kabir Hassan, and Abdul Qoyum have contributed to three documents each, demonstrating their engagement in collaborative research endeavors within the realm of Islamic ESG. Overall, the collaborative efforts of these authors underscore the importance of teamwork and knowledge exchange in advancing research and understanding in the field of Islamic ESG, as evidenced by their collective contributions and citation impact.

Table 8: Most Cited Co-authorship by Organization

	Organization	Documents	Citations	Total Link Strength
1.	Department Of Business Administration, University of Verona, Verona, Italy	3	28	12
2.	Department of Economics and Business Administration, Università Cattolica Del Sacro Cuore, Milan, Italy	3	28	12
3.	Department of Economics and Finance, University Of New Orleans, New Orleans, LA, United States	3	28	12
4.	Department of Economics and Statistics, University of Udine, Italy	3	28	12
5.	Department of Economics, Business, Mathematics and Statistics, University of Trieste, Trieste, Italy	3	28	12
6.	Faculty of Economics, Kharazmi University, Tehran, Iran	4	23	0

The co-authorship details for Islamic Environmental, Social, and Governance (ESG) research highlight collaborative efforts among organizations in producing scholarly output within this field. Several organizations, including the Department of Business Administration at the University of Verona, the Department of Economics and Business Administration at Università Cattolica del Sacro Cuore in Milan, the Department of Economics and Finance at the University of New Orleans, the Department of Economics and Statistics at the University of Udine, and the Department of Economics, Business, Mathematics, and Statistics at the University of Trieste, all based in Italy, have collaborated on three documents each. These collaborations have resulted in a total link strength of 12 for each organization, indicating robust connectivity and influence within the network of co-authoring institutions. Additionally, the Faculty of Economics at Kharazmi University in Tehran, Iran, has contributed to four documents, although its total link strength is lower at 0, suggesting limited connectivity or influence within the collaborative network. These collaborative efforts among organizations reflect a global engagement in research on Islamic ESG, with Italian institutions demonstrating significant connectivity and influence within the scholarly community.

Table 9: Most Cited Co-authorship by Country

	Country	Documents	Citations	Total Link Strength
1.	Malaysia	13	119	7
2.	Indonesia	9	61	4
3.	Italy	7	82	4

4.	United Kingdom	6	55	4
5.	France	5	62	1
6.	United States	6	41	4

The co-authorship details for Islamic Environmental, Social, and Governance (ESG) research shed light on collaborative efforts among countries in producing scholarly output within this field. Malaysia emerges as a prominent contributor, with 13 documents demonstrating a robust engagement in collaborative research endeavors related to Islamic ESG. Furthermore, Malaysia has garnered a substantial number of citations (119) and a total link strength of 7, indicating robust connectivity and influence within the network of co-authoring countries. Indonesia follows closely with 9 documents and 61 citations, underscoring its active participation and impact in the scholarly discourse on Islamic ESG.

Italy and the United Kingdom have contributed 7 and 6 documents, respectively, with both countries achieving a total link strength of 4, highlighting their collaborative efforts and influence within the global research community. With 5 documents, France showcases its engagement in collaborative research on Islamic ESG, albeit with a lower total link strength of 1. The United States has also contributed 6 documents, reflecting its involvement in the scholarly discourse on Islamic ESG, with a total link strength of 4. Overall, these co-authorship details illustrate the global collaboration and knowledge exchange among countries in advancing research and understanding in the field of Islamic Environmental, Social, and Governance.

Trends in Co-occurrence

Table 10: Co-occurrence Analysis of Author Keywords

	Keyword	Occurrences	Total Link Strength
1	ESG	17	15
2	Islamic Finance	9	9
3	Islamic Banks	5	7
4	Corporate Governance	4	2
5	Corporate Social Responsibility	4	5
6	Disclosure	3	5
7	Environmental	3	5
8	ESG Disclosure	3	6
9	Governance	3	7
10	Islamic	3	6

The co-occurrence details with author keywords for Islamic Environmental, Social, and Governance (ESG) research provide insights into the thematic associations and connectivity among crucial research topics within this field. The keyword "ESG" emerges as the most prevalent, with 17 occurrences and a total link strength of 15, indicating its central role in the discourse on Islamic ESG research among authors. This underscores the overarching focus on integrating Environmental, Social, and Governance considerations within Islamic finance literature. Keywords related to specific dimensions of ESG, such as "corporate governance," "corporate social responsibility," "disclosure," "environmental," "governance," "sustainability," and "socially responsible investing (SRI)," demonstrate significant co-occurrences, reflecting the multidimensional nature of ESG research within the Islamic finance domain. Additionally, keywords specific to Islamic finance, including "Islamic banks," "Islamic corporate finance," "Islamic finance," and "sharia-compliance," exhibit strong associations, highlighting the integration of Islamic principles with ESG considerations in financial practices. Notably, the keyword "volatility" shows fewer occurrences and limited link strength, indicating a lesser focus within the context of Islamic ESG research among authors. Overall, the co-occurrence details elucidate the interconnectedness of thematic areas and research priorities within Islamic Environmental, Social, and Governance research, offering valuable insights for further exploration and analysis in this evolving field.

Table 11: Co-occurrence Analysis of Indexed Keywords

	Keyword	Occurrences	Total Link Strength
1	Carbon	2	5
2	Investments	2	5
3	ESG	2	4
4	Sustainable Development	2	4
5	Commerce	2	2

The co-occurrence details with indexed keywords for Islamic Environmental, Social, and Governance (ESG) research reveal thematic associations and connectivity among specific indexed keywords within this field. Keywords such as "carbon," "sustainable development," and "investments" demonstrate moderate co-occurrences, each with two occurrences and varying total link strengths, indicating their relevance and interconnectedness within the context of Islamic ESG research. These keywords reflect the growing emphasis on environmental sustainability, responsible investment practices, and the integration of ESG considerations within Islamic finance literature. Additionally, the keyword "ESG" shows two occurrences and a total link strength of 4, underscoring its significance as a central theme in the discourse on Islamic ESG research among indexed keywords. However, the keyword "commerce" exhibits two occurrences but limited link strength, suggesting a lesser focus or connectivity within the context of Islamic ESG research among indexed keywords. Overall, the co-occurrence details provide valuable insights into the thematic associations and research priorities within Islamic Environmental, Social, and Governance research, guiding further exploration and analysis in this evolving field.

Trends in citations

Table 12: Most Cited Documents

	Document	Citations	Total Link Strength
1	Paltrinieri (2020)	46	1
2	Erragraguy (2015)	33	6
3	Peng (2020)	32	1
4	Erragragui (2016)	27	3
5	Qoyum (2022)	26	4
6	Bukhari (2020)	25	0
7	Kabir Hassan (2021)	20	1
8	Yesuf (2020)	19	0
9	Asl (2022)	17	0
10	Buallay (2020)	13	0

The citations with documents for Islamic Environmental, Social, and Governance (ESG) research provide insights into specific publications' impact and scholarly engagement within this field. Among the documented publications, those by Erragragui & Revelli (2016), Bukhari et al. (2020), Yesuf & Aassouli (2020), and Erragraguy & Revelli (2015) stand out with high citation counts of 27, 25, 19, and 33 respectively, indicating their significant influence and recognition within the scholarly community. These publications have also garnered multiple links, suggesting their robust connectivity and relevance within the broader discourse on Islamic ESG research. Additionally, Paltrinieri et al. (2020) and Qoyum et al. (2022) demonstrate substantial citation counts of 46 and 26, respectively, further highlighting their impact and contribution to the field. Notably, publications by authors such as Hassan et al. (2021) have received moderate citation counts, indicating their recognition and influence within specific contexts or subfields of Islamic ESG research. Overall, the citations with documents underscore the varied impact and scholarly engagement of publications in Islamic Environmental, Social, and Governance research, reflecting scholars' diverse contributions and research priorities in advancing knowledge and understanding in this domain.

Table 13: Most Cited Source

	Source	Documents	Citations	Total Link Strength
1	Borsa Istanbul Review	3	46	0
2	Islamic Finance and Sustainable Development: A Sustainable Economic Framework for Muslim And Non-Muslim Countries	3	11	0
3	Journal Of Islamic Monetary Economics and Finance	3	10	0

The citations with sources for Islamic Environmental, Social, and Governance (ESG) research provide insights into the dissemination and impact of specific publications within this field across different academic journals. The "Borsa Istanbul Review" emerges as a significant source, with three documents cited a total of 46 times, indicating its prominence as a platform for scholarly discourse and research dissemination in the realm of Islamic ESG. The "Journal of Islamic Monetary Economics and Finance" and the publication "Islamic Finance and Sustainable Development: A Sustainable Economic Framework for Muslim and Non-Muslim Countries" each feature three documents, with citation counts of 10 and 11, respectively. These sources serve as essential outlets for publishing research findings and contributing to the academic dialogue surrounding Islamic ESG, reflecting their role in advancing knowledge and understanding within this domain. Overall, the citations with sources highlight the diverse channels through which research on Islamic ESG is disseminated and recognized within the academic community, underscoring the multidisciplinary nature and global reach of scholarship in this field.

Table 14: Most Cited Author

	Author	Documents	Citations	Total Link Strength
1	Dreassi, Alberto	4	74	6
2	Paltrinieri, Andrea	4	74	6
3	Piserà, Stefano	4	74	6
4	Hassan, M. Kabir	4	21	6

The citations with authors for Islamic Environmental, Social, and Governance (ESG) research provide insights into specific authors' impact and scholarly engagement within this field. Alberto Dreassi, Andrea Paltrinieri, and Stefano Piserà stand out with four documents each, each garnering significant citation counts of 74, indicating their substantial influence and recognition within the scholarly community. These authors have also amassed multiple links, suggesting robust connectivity and relevance within the broader discourse on Islamic ESG research. Additionally, M. Kabir Hassan demonstrates significant scholarly engagement with four documents but a comparatively lower citation count of 21, indicating recognition and impact within specific contexts or subfields of Islamic ESG research. Overall, the citations with authors highlight researchers' varied impact and scholarly engagement in Islamic Environmental, Social, and Governance research, reflecting scholars' diverse contributions and research priorities in advancing knowledge and understanding in this domain.

Table 15: Most Cited Organization

	Organization	Documents	Citations	Total Link Strength
1	Department Of Business Administration, University of Verona, Verona, Italy	3	28	8
2	Department Of Economics and Business Administration, Università Cattolica Del Sacro Cuore, Milan, Italy	3	28	8
3	Department Of Economics and Finance, University Of New Orleans, New Orleans, LA, United States	3	28	8

4	Department Of Economics and Statistics, University Of Udine, Italy	3	28	8
5	Department Of Economics, Business, Mathematics and Statistics, University of Trieste, Trieste, Italy	3	28	8
6	Faculty Of Economics, Kharazmi University, Tehran, Iran	4	23	0

The citations with organizations for Islamic Environmental, Social, and Governance (ESG) research shed light on specific academic institutions' impact and scholarly engagement within this field. Several organizations, including the Department of Business Administration at the University of Verona, the Department of Economics and Business Administration at Università Cattolica del Sacro Cuore in Milan, the Department of Economics and Finance at the University of New Orleans, the Department of Economics and Statistics at the University of Udine, and the Department of Economics, Business, Mathematics, and Statistics at the University of Trieste, all based in Italy, have contributed to three documents each. These organizations have garnered a considerable number of citations, with a total link strength of 8, indicating their significance and influence within the scholarly community engaged in Islamic ESG research. Additionally, the Faculty of Economics at Kharazmi University in Tehran, Iran, has contributed to four documents, although its total link strength is lower at 0, suggesting limited connectivity or influence within the network of co-authoring organizations. Overall, the citations with organizations underscore the scholarly engagement and impact of academic institutions in advancing research and understanding in the field of Islamic Environmental, Social, and Governance.

Table 16: Most Cited Country

	Country	Documents	Citations	Total Link Strength
1	France	5	62	33
2	Indonesia	9	61	17
3	Malaysia	13	119	13
4	Bahrain	4	39	9
5	India	3	4	7
6	Italy	7	82	6
7	United Kingdom	6	55	5
8	United States	6	41	5
9	Iran	4	23	4
10	United Arab Emirates	3	0	1

The citations with countries for Islamic Environmental, Social, and Governance (ESG) research provide insights into the global impact and scholarly engagement of specific nations within this field. France emerges as a prominent contributor with five documents, garnering a substantial citation count of 62 and a total link strength of 33, indicating its significant influence and recognition within the scholarly community engaged in Islamic ESG research. Indonesia follows closely with nine documents and 61 citations, reflecting its active participation and impact in the discourse on Islamic ESG. Malaysia demonstrates a robust scholarly engagement with 13 documents and the highest citation count of 119, underscoring its prominence and leadership in advancing research and understanding within the field of Islamic ESG. Other countries, such as the United Kingdom and the United States, have also contributed significantly, with six documents each and citation counts of 55 and 41, respectively, highlighting their substantial scholarly engagement and impact in this domain. Overall, the citations with countries underscore nations' diverse global engagement and collaborative efforts in advancing research and knowledge dissemination in Islamic Environmental, Social, and Governance research.

5. Conclusion and Future Research Recommendations

The results from the bibliometric analysis show that environmental, social, and governance (ESG) research and practices that include Islamic teachings and values still demonstrate a significant gap. Thus, it is recommended that the following research on Islamic ESG is conducted.

It is feasible to research the differences between conventional environmental, social, and governance (ESG) and Islamic ESG based on the different frameworks and criteria for investment decision-making. This study may be done. Environmental, social, and governance (ESG) is a conventional approach that focuses on environmental, social, and governance concerns without taking into consideration particular ethical or religious frameworks. On the other hand, Islamic ESG is a method that combines Environmental, Social, and Governance (ESG) issues with Islamic financial principles. This method adheres to Shariah law and forbids investments in activities that are considered to violate Islamic values.

Research on the factors that determine Islamic environmental, social, and governance (ESG) performance and the results of such performance is another important topic of study. Adherence to Shariah principles, compliance with ESG standards, effective governance structures, ethical corporate practices, environmental stewardship, social responsibility, and openness in reporting are some of the elements that are included in this category. Each element contributes to improved performance when considered as a whole. On the other hand, the consequences of Islamic environmental, social, and governance performance manifest themselves in a multitude of ways. These include enhanced financial performance, decreased risk, enhanced reputation, increased trust among stakeholders, and alignment with ethical and religious convictions.

It is possible to focus research on non-financial performance indicators in addition to quantitative measurements. These indicators include environmental impact assessments, social welfare initiatives, ethical business conduct, and governance practices. These indicators are essential to evaluating Islamic environmental, social, and governance practices, as well as financial metrics. Several moderating factors influence Islamic environmental, social, and governance (ESG) performance. These factors include the regulatory environment, market dynamics, industry characteristics, corporate culture, stakeholder expectations, management commitment, technological advancements, and external shocks. These factors can either facilitate or hinder the implementation of Islamic ESG practices, and another aspect that can be investigated is their effectiveness.

Finally, in terms of reporting, there is the possibility of researching Islamic ESG narrative reporting. This type of reporting entails the open and honest communication of a company's adherence to Shariah principles and the incorporation of ESG considerations into its operations, strategies, and performance. It also aims to cultivate trust and credibility among stakeholders by providing disclosures on Shariah compliance, ESG initiatives, social impact, governance practices, and future sustainability goals.

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Green Innovation and Firm Performance: An Empirical Study of China's Power Industry

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Abstracts: With China's goal of achieving "carbon peak and neutrality", green innovation has become an inevitable choice to accomplish the dual objective of ecological protection and economic growth. The objective of this study is to examine whether green innovation can contribute to enhancing firm performance. Specifically, this study empirically investigates the relationship between green innovation and firm performance by analyzing a sample of listed firms in China's A-share power industry from 2009 to 2022. By using panel fixed effect regression, this study found that green innovation markedly and positively enhances the firm's current performance. Furthermore, this paper tested the effect of green innovation on the firm's future performance, which is positive and greater than the effect on the current performance. Through data support spanning 14 years, this study verifies the theoretical hypothesis that green innovation can substantially enhance firm performance in the power industry. This not only deepens the understanding of how green innovation affects firm performance but also offers empirical evidence to support the further implementation and advancement of green innovation within the power industry. This study only uses a sample of a single industry, so the conclusions of this study do not have explanatory power for firms in other industries.

Keywords: *Green innovation, firm performance, power industry*

1. Introduction

Power is the basis of modern industrial production. It provides energy support for manufacturing, construction and other heavy industries. A stable and reliable supply of power not only ensures smooth industrial production but also directly affects the quality of life of the residents. It can be seen that the power industry is the core pillar of the modern economic system, which supports and promotes economic development in a variety of ways. The power sector significantly contributes to enhancing the economic and financial conditions of both the country and the area, while also promoting social progress (Zhao et al., 2023).

The power industry is widely recognized as a major source of pollution, with the primary issue arising from traditional fossil fuel-based power generation. These polluting fuels generate greenhouse gas emissions, air pollutants, and water and solid waste pollution, which enter the atmosphere and cause global warming and climate change. Furthermore, these pollutants damage the ecological environment and threaten human and animal health by entering waters and ecosystems (Ukaogo et al., 2020).

China's power industry is still undergoing industrialization, which is characterized by efficient management of resources, resulting in significant environmental protection challenges. An effective strategy is to adopt green innovation, which provides a strong answer for balancing economic growth and ecological protection (Pancholi et al., 2024). Along with China's "carbon peak and neutral" goal, a green, innovative economic model has become an inevitable choice to accomplish the dual objective of ecological protection and economic growth. As a crucial component of China's market-oriented green innovation system, enhancing the accomplish the dual objective of ecological protection of energy-saving and environmentally friendly technologies is key for firms in China's power industry to secure a competitive edge (Abbas et al., 2024).

Green innovation is essential for achieving long-term growth and progress. Through technological and product innovation, green innovation can contribute positively to economic growth, environmental protection, and social well-being, thereby supporting sustainable development goals (Younas et al., 2023). Green innovation can develop more environmentally friendly technologies and products and promote resource conservation and environmental protection, and this aligns closely with the core objective of environmental sustainability. (Wang et al., 2022). Green innovation also contributes to environmental protection and brings new economic opportunities and markets. The growing demand for green technologies and products has driven the development of emerging industries, which aligns with the economic growth goal of sustainable development (Khan et al., 2022). Additionally, green innovation allows companies and communities to deliver products and services that are safer, improving the overall quality of life (Ning et al., 2023). Improving human life quality and social welfare is also one of the goals of sustainable development.

Recently, there has been increasing focus on the link between green innovation and company success, particularly in industries that have a substantial environmental impact. This study focuses on China's power industry, where integrating sustainable practices is increasingly seen as essential for long-term success. As environmental regulations tighten and societal expectations for firm responsibility grow, companies in this sector are pressured to innovate to reduce their environmental footprint while maintaining or enhancing their financial performance.

Due to the environmental pollution caused by the power industry, examining the impact of green innovation on firm performance is crucial. Green innovation not only enables power companies to capitalize on market opportunities and enhance financial performance but also supports their long-term sustainable development and the fulfillment of social responsibility.

This paper is structured as follows. The following section reviews the literature on green innovation and firm performance, while the next section outlines the data sources and model design. Following that, the models and findings of the study are presented. Finally, discussions and conclusions are elaborated in the final section. Recommendations are also made on the way forward for green innovation, especially in the power industry.

2. Literature Review and Hypothesis Development

Early scholars from different perspectives have defined green innovation from different perspectives (Braun & Wield, 1994; Jawahar & McLaughlin, 2001; Norberg-Bohm, 1999). Braun and Wield (1994) Were the first to define green innovation. They identify green innovation as a wide range of technologies, and products, as well as procedures, aimed at mitigating environmental contamination and minimizing the depletion of raw materials, including non-renewable energy sources.

In addition, the Organization for Economic Co-operation and Development (OECD) defines green innovation as the introduction of new advancements or substantial improvements by companies in their goods, processes, marketing techniques, organizational structures, and institutional arrangements, resulting in better environmental performance relative to other companies in the same industry (OECD, 2009). In the study by Zhuang et al. (2022), green innovation is defined as all technologies conducive to green development and ecological civilization construction.

Building on previous research, this research defines green innovation as the creation of novel or enhanced goods, processes, and technology that are environmentally friendly and management practices (Xie et al., 2019) That enhances value for both customers and companies while significantly mitigating environmental harm (Karimi Takalo et al., 2021).

Green Innovation and Firms' Current Performance

Most research supports a positive link between green innovation and firm performance. Green innovation typically focuses on enhancing the efficiency of resource usage, such as energy and raw materials. Firms can significantly reduce operating costs by adopting energy-efficient technologies and reducing waste (Li et al., 2020; Yi et al., 2023). Additionally, green innovation involves improving waste management in the production process, and optimizing waste treatment and recycling processes not only reduces disposal costs but may also generate revenue through recycled materials (Farzaa et al., 2021; Xie et al., 2019).

Prior research has demonstrated that the use of green innovation and environmental protection measures may enhance current industrial methods to reduce negative environmental effects, which can help shape a firm's green brand image, gain consumers' trust, and enhance consumer loyalty to the brand (Chen et al., 2023; Chouaibi et al., 2022).

Furthermore, green products and services can satisfy the increasing demand for environmentally friendly offerings, and the firm can enter new market segments, providing the firm with a differentiated competitive advantage. (Abbas et al., 2024;Padilla-Lozano et al., 2024).

Through green innovation, the firm can reduce the legal risks and fines it faces for violating environmental regulations and safeguard the stability of its business operations. (Hu et al., 2021). Meanwhile, the firm can obtain national and regional subsidies and tax incentives for green innovation (Zhao et al., 2023). Moreover, green practices can boost a firm's reputation and enhance its brand value, attracting environmentally conscious consumers and investors and further bolstering its competitive advantage.

However, some scholars argue that the costs associated with green innovation cannot be offset by environmental benefits such as energy conservation, reduced consumption, and improved productivity (Khan et al., 2021; Xie et al., 2022). Aguilera-Caracuel and Ortiz-de-Mandojana (2013) employed an institutional approach, analyzing a sample of 88 green innovative firms alongside 70 matched pairs, comparing both green and non-green innovative firms. They found that firms engaging in green innovation do not experience an immediate boost in financial performance compared to those not involved in green innovation. This result may be because the potential benefits of green innovation on financial performance often require time to become evident (Qing et al., 2022). Conversely, converting green innovation into financial gains relies on various underlying mechanisms and contingent conditions (Khan et al., 2022).

Most research supports a positive connection between green innovation and firm performance. Consequently, this study posits the following hypothesis:

H1: Green innovation is positively associated with the firm's current performance.

Green Innovation and Firms' Future Performance

Given that some aspects of a firm's green innovation may require time to transition from granted to practical application, the outcome of green innovation on the firm's performance will not have an immediate effect. However, future benefits must be accumulated and adapted for a certain period before they can be reflected by improving the firm's performance.

This lag effect is reflected in the following aspects: firstly, green innovation usually needs time for research and development, testing, and marketing. After investing resources and time in green innovation, it takes time for the firm to get feedback from the market and establish a differentiated competitive advantage, which impacts performance. (Padilla-Lozano et al., 2024). Second, green innovation is often accompanied by higher initial investment. Firms may face higher initial costs, and performance improvement may take time to achieve the break-even point from green innovation investment and gain profit (Chen et al., 2018). Finally, green innovation

can enhance a firm's brand image and social responsibility, but it usually takes time to build a brand reputation and change consumer perceptions. Firms may require a period to market their products and align consumer perceptions before observing the positive effects of brand reputation on performance (Lestari & Soewarno, 2024; Przychodzen et al., 2019). Considering the time lag between the green innovation investment and firm performance, this study proposes the second hypothesis：

H2: Green innovation is positively associated with the firms' future performance.

3. Methodology

Sample Selection and Data Source

This study uses the power industry data in Chinese A-share listed firms from 2009 to 2022 inclusive. The firm performance and control variables data were gathered from the China Stock Market & Accounting Research Database (CSMAR). Meanwhile, data on green innovation were gathered from the China Research Data Service Platform (CNRDS).

The samples were screened based on the following steps. First, this study excluded ST, *ST, and PT firms.[1] Second, this study also excludes IPO-listed firms and delisted firms from 2009 to 2022. Third, this study eliminates the missing data. Then, the final sample of this study consists of 1,134 firm-year observations. Then, to deal with normality, this study winsorizes data at 1% to reduce the effect of extreme values (Abuzaid & Alkronz, 2024; Wan Ismail et al., 2024).

Measurement of variables

The explained variable is firm performance represented by Tobin's Q. Tobin's Q is calculated as the ratio of the firm's market value to its total assets (Yao et al., 2021). Tobin's Q has advantages because it is difficult for the firm's management to manipulate as the market value captures the current value. Tobin's Q ratio can predict the firm's future cash flow and long-term performance and is less sensitive to inflation (Chen & Lin, 2021).

This study uses the natural logarithm of the number of green patents granted plus 1 as the proxy variable for green innovation (Ma et al., 2021). The quantity of green patents granted refers to the number of applications ultimately granted after the examination. The granted innovation patent can directly demonstrate firms' actual innovation capability and success and can be used as an effective indicator of firms in green innovation (Yuan & Cao, 2022). As shown in Table 1, drawing on existing research, this study introduces the following control variables: firm size (Size), leverage (Lev), cash holding (Cash), firm age (Age), and total asset turnover (Turnover).

Table 1: List of variables

Type of Variables	Variable	Operationalization
Dependent Variable: Firm Performance	Tobin's Q	The proportion of market value to total assets
Independent Variable: Green Innovation	Green-Patent	Natural logarithm of (number of green patents granted + 1)
	Firm size (Size)	Total assets' natural logarithm
	Firm leverage (Lev)	The ratio of total assets to total liabilities
	Cash holding (Cash)	The ratio of net operating cash flow to total assets
Control Variables	Firm age (Age)	The natural logarithm of (age + 1)

[1] In Chinese stock markets, **ST** firms are companies flagged for financial instability, typically after two years of losses, while ***ST** firms face more severe financial issues, often with three consecutive years of losses and a higher risk of delisting. **PT** firms may refer to companies nearing delisting or suspension due to significant risks.

	Turnover of total assets (Turnover)	Operating income divided by total assets

Research Model

The following equation models were developed to test Hypothesis 1 and Hypothesis 2:

$$CP(\text{Tobin's Q})_{i,t} = \beta_0 + \beta_1 \text{Green-Patent}_{i,t} + \beta_2 \text{Control}_{i,t} + \text{Year} + \varepsilon_{i,t} \quad (1)$$
$$CP(\text{Tobin's Q})_{i,t} = \beta_0 + \beta_1 \text{Green-Patent}_{i,t-1} + \beta_2 \text{Control}_{i,t} + \text{Year} + \varepsilon_{i,t} \quad (2)$$

Where i denotes the ith firm, t is the TTH year, Tobin's $Q_{i,t}$ signifies firm performance, $\text{Green-Patent}_{i,t}$ represents green innovation, $\text{Control}_{i,t}$ encompasses all control variables, Year represents year fixed effect, $\varepsilon_{i,t}$ represents error term.

4. Result and Discussion

Descriptive Statistics

Table 2: Descriptive Statistics of Dependent, Independent, and Control Variables

VarName	Obs	Mean	SD	Min	Median	Max
Tobin's Q	1344	1.526	0.951	0.899	1.226	6.766
Green-Patent	1344	0.990	1.309	0.000	0.000	6.862
Size	1344	23.043	1.518	19.715	22.951	26.139
Lev	1344	0.559	0.182	0.051	0.578	0.934
Cash	1344	0.120	0.105	0.016	0.093	0.729
Age	1344	2.562	0.764	0.000	2.833	3.434
Turnover	1344	0.395	0.275	0.080	0.332	2.639

Table 2 presents the descriptive statistics for all variables. The standard deviation of Tobin's Q is 0.951, with a minimum value of 0.899, a maximum value of 6.766, and an average of 1.526, suggesting that firms in China's power industry exhibit underperformance with considerable variability. The green patent variable ranges from a minimum of 0 to a maximum of 6.862, indicating substantial differences in green innovation levels among the sample firms, with an average value of 0.990, reflecting relatively low levels of green innovation within the sector.

Regression Analysis

Table 3: Multiple Regression Results of Green Innovation and Firm Performance

	(1) Tobin's Q	(2) Tobin's Q
_cons	19.8256***	19.2695***
	(0.6656)	(0.7588)
Green-patent	0.0708***	
	(0.0183)	
Lag Green-patent		0.0914***
		(0.0194)
Size	-0.8318***	-0.7984***
	(0.0290)	(0.0320)
Lev	0.2283*	0.2032
	(0.1330)	(0.1453)
Cash	0.8200***	0.9361***
	(0.1997)	(0.2126)
Age	0.2773***	0.2058**
	(0.0623)	(0.0945)
Turnover	-0.7773***	-0.7524***
	(0.0902)	(0.0980)
Year effect	Yes	Yes
R^2	0.5151	0.4976
N	1344	1198

Notes: ***, **, and * represent significance at 1, 5, and 10 percent levels respectively (using a one-tailed test)

Column (1) of Table 3 displays the regression results regarding the effect of green innovation on firm performance. The coefficient for green patents is 0.0708, which is positive and statistically significant at the 1% level. This suggests that green innovation has a substantial positive impact on improving current firm performance. This finding also aligns with the results of Yi et al. (2023) And Chouaibi et al. (2022), indicating that the unique and scarce resources and capabilities accumulated in green innovation can improve the firm's performance. Therefore, hypothesis 1 is supported.

To examine whether green innovation exhibits a delayed effect, column (2) shows the results of the relationship between one-period lagged green patents on firm performance. The regression coefficient for lagged green patents is 0.0914, which is positive and statistically significant at the 1% level. It indicates that green innovation can enhance the firm's current performance and significantly enhance its future performance in the power industry. The results also reveal that the effect of green innovation on the firm's future performance is higher than on the current performance.

Concerning the firm characters, firm size (Size) is negatively significant on firm performance. This implies that excessive firm size leads to organizational rigidity, limits innovation and flexibility, and affects market competitiveness and performance (Salihi et al., 2024). Firm leverage (Lev) is positively significant on firm performance, suggesting that moderate debt can help firms use leverage to magnify returns (Jiang & Lan, 2022).

The cash holding ratio (Cash) is positive and significant on firm performance, which indicates that an appropriate cash holding ratio can enhance the financial flexibility and stability of the firm (Xu et al., 2023). Firm age is positively significant on firm performance. This indicates that as the firm has been in business for a more extended period, it has gradually accumulated a wealth of industry experience, brand reputation, and market position, thus enhancing its performance. Total asset turnover (Turnover) is positively significant on firm performance and indicates that high turnover does not necessarily lead to improved performance (Patin et al., 2020).

5. Conclusion and Recommendations

Research Findings

This study empirically investigates the influence of green innovation on firm performance by analyzing data from Chinese A-share listed companies in the power industry between 2009 and 2022. The results reveal that green innovation positively impacts a firm's current performance. Moreover, green innovation significantly enhances a firm's future performance, with its impact on future performance surpassing its effect on current performance. The results of this paper are also consistent with Padilla-Lozano et al. (2024), Zhao et al. (2023) And Chouaibi et al. (2022). Furthermore, the study reveals that the benefits of green innovation are more noticeable in firms that consistently invest in sustainable practices over the long term. This highlights the importance of sustained commitment to green strategies.

Research Contribution

The finding of this study contributes significantly to the policymakers and industry leaders. This is achieved by analyzing the impact of green innovation on firm performance, specifically within China's power industry, a sector vital to both economic growth and environmental sustainability. By empirically examining the relationship between sustainable practices and firm outcomes, this research contributes valuable insights into how firms can balance economic goals with environmental responsibilities. It is crucial to comprehend the strategic benefits of green innovation as China progresses towards a low-carbon economy. Furthermore, understanding the strategic advantages of green innovation is essential for firms seeking to remain competitive and compliant with increasingly stringent environmental regulations.

Recommendations

The analysis shows that green innovation can significantly enhance firms' performance. Business managers, especially in the power industry need to recognize the profit potential of green innovation for their firms, they should rationally allocate their resources to production and operations, increase R&D efforts in green innovation, and enhance their green innovation capabilities. From the investors' perspective, green innovation is about environmental protection, sustainable development, and long-term financial returns. Investors should allocate more funds to the green industry to help China's green industry transform and upgrade.

Furthermore, the government should improve policies to encourage green innovation in the power industry as soon as possible to incentivize firms to innovate green. The government could also actively advocate cultivating consumers' green consumption awareness and demand to promote firms to implement green innovation spontaneously. Besides, the government should guide financial resources and supportive policies to tilt towards green innovation industries to balance the significant investment and risk features associated with green innovation. This can promote China's economic development model from resource-consuming to sustainable development.

Research Limitations and Future Research Directions

This study uses an empirical analysis of listed firms in China's power industry. Therefore, the findings have no explanatory power for firms in other industries. They must be generalized to only some of the Chinese A-share market. Future research could extend the methodology of this study to other industries or even all listed firms to provide more comprehensive confirmation of the relationship between green innovation and firm performance.

Using patent grant data, this study differentiates green patents based on the World Intellectual Property Organization's classification criteria (Wu & Shan, 2024). It evaluates firm green innovation through the output

of green innovation. Future research could consider exploring suitable proxy variables from the perspective of green innovation inputs to further broaden and deepen the scope of green innovation studies.

Nevertheless, this study provides valuable insights into the relationship between green patents and firm performance in China. By focusing on green patent outputs, it sheds light on how firms' innovative activities in the environmental sector can drive performance improvements. The findings offer a clearer understanding of the role green innovation plays in enhancing competitiveness and sustainability, particularly in industries like power generation, where environmental impact is a critical concern.

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Evaluating Internal Control Mechanisms in Malaysian Public Sector Initiatives: Insights from the Public Accounts Committee (PAC) Reports

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Abstract: This study examines internal control challenges in Malaysian government projects, drawing on Public Accounts Committee (PAC) reports from 2019 to 2022. The focus on this period stems from the shift in PAC chairmanship from government to opposition, which enhanced perceived independence. However, the literature suggests that the PAC's success depends more on collaborative decision-making than on the chairman's political affiliation. Analyzing 29 government agencies across various sectors revealed recurring weaknesses in internal controls. The study employed the Committee of Sponsoring Organizations of the Treadway Commission's (COSO) Internal Control-Integrated Framework (ICIF) to systematically identify these weaknesses. A content analysis method was used to examine the themes, which were grouped into five ICIF components: control environment, risk assessment, control activities, information and communication, and monitoring. Weaknesses in the control environment include conflicts of interest, compromised ethical values, inadequate governance, and a lack of accountability and transparency. Risk assessment deficiencies were found in financial risk management, procurement and acquisition risks, geopolitical and strategic risks, intellectual property and technology risks, and project management risks. Control activity weaknesses involved poor resource and process management, non-compliance, and flawed decision-making. Information and communication issues included poor documentation, inadequate system integration and data sharing, limited stakeholder engagement, weak communication protocols, and poor information management. Monitoring deficiencies were noted in regulatory compliance, contract management, financial oversight, monitoring systems, and disbursement tracking. Addressing these weaknesses in internal controls is crucial for minimizing the risks of fraud, waste, and loss of public trust.

Keywords: *Public accounts committee, control environment, risk assessment, control activity, information and communication and monitoring.*

1. Introduction

The management of public funds is a fundamental aspect of governance, with significant implications for a nation's economic stability and public trust. However, governments worldwide often grapple with challenges in ensuring transparency and accountability in financial management. In Malaysia, the magnitude of this challenge is starkly illustrated by the findings of the Global Financial Integrity (GFI) Report 2017, which revealed that the country lost RM1.8 trillion to illicit financial outflows between 2005 and 2014. This figure, which dwarfs the nation's largest-ever budget of 2021 by more than five times, represents not only a significant economic loss but also a missed opportunity for national development. The potential for these funds to sustain Malaysia's operations and administration for five years highlights the gravity of the situation.

The far-reaching consequences of such financial losses include undermining the country's governance, eroding economic progress, and diminishing the quality of life for its citizens. These issues underscore the need for robust internal control systems within government institutions to prevent financial mismanagement and corruption. In Malaysia, the Public Accounts Committee (PAC) serves as a crucial oversight mechanism, tasked with examining national audit reports, investigating financial discrepancies, and holding government entities accountable for their fiscal practices.

This research explores the internal control challenges faced by the Malaysian government, as documented in PAC reports from 2019 to 2022. The study aims to identify, categorize, and evaluate internal control weaknesses in government-managed projects using the Committee of Sponsoring Organizations of the Treadway Commission's (COSO) Internal Control-Integrated Framework (ICIF). By analyzing the internal control mechanisms within 29 government agencies across various sectors, this study seeks to provide insights

into the effectiveness of these controls and their impact on the integrity and transparency of public sector initiatives.

These findings are critical for policymakers, government agencies, and stakeholders seeking to strengthen internal controls, enhance governance, and ensure efficient use of public resources. Addressing these weaknesses is essential for mitigating risks, improving accountability, and maintaining public trust in government operations.

The structure of this chapter is as follows: first, a review of relevant literature is provided; next, the research methodology is detailed; the subsequent sections present and discuss the study's findings; and finally, the chapter concludes with recommendations and reflections on the study's implications.

2. Literature Review

The literature review is divided into three sections: The first section explores the existing literature on the practices of the Malaysian Public Accounts Committee (PAC). The second section discusses the Committee of Sponsoring Organizations of the Treadway Commission's (COSO) Internal Control-Integrated Framework (ICIF) and its components. The third section examines the significance of the ICIF as highlighted by previous studies.

The Malaysian Public Accounts Committee (PAC)

The Malaysian Public Accounts Committee (PAC), as defined by Standing Order No. 77 of the Dewan Rakyat, is responsible for scrutinizing the federal government's accounts, approved budget, and Auditor General's reports (Parliament of Malaysia, 2018). The PAC's key function is to assist Parliament in ensuring that government actions and expenditures align with parliamentary approval. It serves as a "watchdog" to safeguard public funds and resources while assessing the efficiency and effectiveness of the government's resource management (Zainal Abidin, Muhammad Sori, Mat Daud, & Senik, 2019). This oversight role has historical significance. For example, the UK Parliament established the first PAC in 1857, following the traditional Westminster model, which is widely adopted in Commonwealth countries (Padlee, 2021). As a result, the existence of the PAC fosters a culture of accountability, as noted by Yaakob, Kadir, and Jusoff (2009).

Since its inception in 1959, a representative from the government side has traditionally held the chairmanship of the PAC in Malaysia. However, contemporary insights, as articulated in Watkinson's (2022) recommendation found in the *Handbook on Parliamentary Financial Oversight: Adapting PAC best practices for small legislatures*, propose a departure from this convention. Advocating for a committee chair from the opposition party, this recommendation aims to inject a fresh dynamic into the PAC, fostering increased motivation and potentially enhancing its overall effectiveness. This suggestion aligns with established practices in Westminster parliaments, where it is commonplace for the PAC chairman to come from the opposition party.

A significant shift occurred in 2019 when the reins of power transitioned from Barisan Nasional (BN) to Pakatan Harapan (PH). This transition marked a departure from the norm, as, for the first time, the chairman of the PAC was chosen from the ranks of the opposition party (please refer to Table 1 for details). While research suggests that appointing an opposition member as the PAC chairman is a positive step toward enhancing the PAC's independent image, it also concludes that changes in the chairman's appointment do not significantly impact the PAC's effectiveness. This is because the PAC's decisions are primarily shaped by consensus among its members. The chairman's core task is setting the committee's agenda in consultation with committee members and the Auditor General (Padlee, 2021), indicating that the effectiveness of the PAC is more rooted in collaborative decision-making than the political affiliation of the chairman. This underscores the importance of conducting additional studies to assess the PAC's effectiveness, particularly in light of changes in the chairman's political affiliation.

Table 1: Chairmanship of the Public Accounts Committee (PAC) from 2013 to present

Period	Government	Chairperson	Affiliation
From July 2013 to November 2015	Barisan Nasional (BN)	Datuk Nur Jazlan bin Mohamed	The chairperson is a member of the government-aligned political party, the United Malays National Organization (UMNO).
From November 2015 to April 2018	Barisan Nasional (BN)	Dato' Hasan bin Arifin	The chairperson is a member of the government-aligned political party, the United Malays National Organisation (UMNO).
From August 2018 to April 2019	Pakatan Harapan (PH)	Datuk Seri Dr. Ronald Kiandee	The chairperson is a member of the government-aligned political party, the Parti Pribumi Bersatu Malaysia (BERSATU).
From April 2019 to March 2020	Pakatan Harapan (PH)	Dato' Dr. Noraini binti Ahmad	The chairperson is a member of the opposition political party, the United Malays National Organisation (UMNO).
From August 2020 to October 2022	Perikatan Nasional (PN)	Tuan Wong Kah Woh	The chairperson is a member of the opposition political party, the Democratic Action Party (DAP).
From April 2023 to the present	Pakatan Harapan (PH)	Datuk Wira Mas Ermieyati binti Samsudin	The chairperson is a member of the opposition political party, the Parti Pribumi Bersatu Malaysia (BERSATU).

Source: The official website of the Parliament Public Accounts Committee (PAC)

In the Dewan Rakyat, two distinct types of reports are associated with PAC investigations: the PAC report and the response report. Between 2019 and 2022, 23 PAC reports were tabled in the Dewan Rakyat. However, during the same period, government ministries submitted only 21 response reports. Notably, the two outstanding response reports pertained to the development and acquisition of the MySejahtera application and the acquisition of a second-generation patrol ship—a littoral combat ship (LCS) for the Royal Malaysian Navy. This discrepancy might indicate potential communication challenges between the PAC and government ministries, suggesting possible delays. Ministries may still be in the process of preparing responses for certain PAC reports, which could contribute to the observed inconsistency. Therefore, a thorough examination is essential for a more nuanced understanding of this issue.

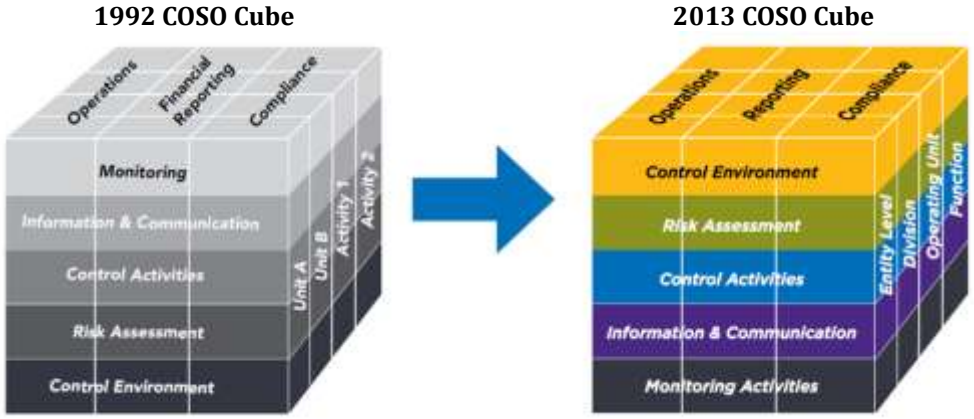
Committee of Sponsoring Organizations of the Treadway Commission's (COSO) Internal Control-Integrated Framework (ICIF) and Its Components

The Internal Control-Integrated Framework (ICIF), developed by the Committee of Sponsoring Organizations of the Treadway Commission, is widely recognized as a comprehensive model for assessing, identifying, and improving weaknesses in the internal control systems within organizations (Gul & Mahzan, 2013). Prior research highlights the significance of COSO's ICIF in various areas, including internal Sharīʿah audits (Bouheraoua & Djafri, 2022). The framework also ensures the reliability of financial reporting (D'Aquila, 1998; Sofyani, Abu Hasan, & Saleh, 2022; Alaraji, Ali, & Sabri, 2023), mitigates fraud (Zakaria, Nawawi, & Salin, 2016; Le & Tran, 2018; Sofyani et al., 2022; Rendon & Rendon, 2022; Mardjono, Suhartono, & Hariyadi, 2024), and fosters financial performance and income generation (Musah, Padi, Okyere, Adenutsi, & Ayariga, 2022; Hamed, 2023; Mahmud, Susilowati, Anisykurlillah, Aeni, & Sari, 2024).

In 1992, COSO introduced the ICIF to address significant issues related to fraudulent corporate financial reporting (COSO, 2023). Approximately 21 years later, in 2013, a revised iteration known as the Internal Control-Integrated Framework (ICIF-2013) was released, superseding its predecessor and becoming the principal operational guide. The updated ICIF-2013 was developed to address evolving needs and challenges in internal control practices, including corporate social responsibility, corporate citizenship, sustainability, and

reporting on environmental, social, and governance (ESG) issues. Despite these updates, the framework retains its five core components: control environment, risk assessment, control activities, information and communication, and monitoring (refer to Figure 1).

Figure 1: Evolution of ICIF



Source: *COSO, 2023*

The components of the control environment, risk assessment, control activities, information and communication, and monitoring work together to create a cohesive internal control system. These essential components are elaborated as follows:

a. Control Environment: The board of directors and senior management set the tone for the control environment, which serves as the foundation for other elements (Li & Wang, 2023). It includes the organization's commitment to integrity and ethical values (COSO, 2023). Other key aspects include establishing standards of conduct, evaluating adherence to these standards, and addressing deviations promptly (COSO, 2023). Additionally, the control environment encompasses clearly defined employee duties, organizational charts, accounting manuals, segregation of duties, and staff work schedules (Akinleye & Kolawole, 2020). It also involves fostering integrity and ethical values, ensuring the development and compliance of internal controls, maintaining a well-structured organizational framework (including authorization, responsibilities, and reporting lines), and demonstrating a commitment to recruiting, training, and retaining skilled individuals (Yahya, Said, Zakaria, & Fuad, 2022).

b. Risk Assessment: Every enterprise faces numerous risks, both beneficial and unfavorable to its operations (Li & Wang, 2023). Risk assessment involves a dynamic and iterative approach to identifying and analyzing risks to align with the entity's objectives (COSO, 2013). Yahya et al. (2022) identified three elements of risk assessment: conducting risk assessments based on internal control objectives, managing risks using established mechanisms, and developing control activities to mitigate hazards. Meanwhile, Akinleye and Kolawole (2020) implemented risk assessments using operating budgets, expenditure controls, regular physical audits, and annual audits.

c. Control Activities: Actions established by policies and procedures to ensure that management directives effectively mitigate risks to the achievement of objectives (COSO, 2013). These activities aim to prevent negative occurrences such as fraud and embezzlement (Li & Wang, 2023). Yahya et al. (2022) identified three key elements of control activities: the development of technological controls to support internal control objectives, the implementation of policies and procedures to enforce control activities, and the assurance of proper segregation of duties, custody, and recordkeeping personnel. Conversely, Akinleye and Kolawole (2020) identified four elements of control activities: the existence of an internal audit unit, the independence of this unit, the generation of internal audit reports, and the subsequent review of these reports.

d. Information and Communication: Effective communication of organizational policies to various stakeholders ensures that the methods and channels of information transmission meet the needs of enterprise development (Li & Wang, 2023). Communication occurs both internally and externally, providing the organization with the necessary information to conduct day-to-day internal control activities. It enables staff members to understand their internal control responsibilities and their role in achieving organizational objectives (COSO, 2013). Proper documentation and written procedures of operations are essential in this process (Akinleye & Kolawole, 2020). Yahya et al. (2022) identified three key elements of information and communication: utilizing relevant and high-quality information to support internal control functions, timely communication with stakeholders regarding relevant information, and informing stakeholders about matters that affect internal control functions.

e. Monitoring Activities: This component ensures that regular internal checks of activities are in place (Akinleye & Kolawole, 2020). Ongoing evaluations, separate evaluations, or a combination of both are used to determine whether each of the five components of internal control, including controls to affect the principles within each component, is present and functioning (COSO, 2013). Effective monitoring is essential for enabling accountability, increasing transparency, strengthening internal connections, and promptly identifying problems in internal operations (Li & Wang, 2023). Yahya et al. (2022) identified three elements of monitoring: evaluating and informing responsible parties of internal control deficiencies promptly for corrective action, continuously assessing the presence and functioning of internal control components, and monitoring fund recipients to ensure that funds are spent only on authorized activities.

The Significance of ICIF

The significance of the Internal Control-Integrated Framework (ICIF) is widely recognized across various contexts. Bouheraoua and Djafri (2022) highlight its importance in Shariah audits within Islamic Financial Institutions (IFIs), noting that the COSO framework offers an integrated approach to internal control principles that is adaptable to Shariah audits.

In addition to its application in Islamic finance, (Ariffin, Mohd Hanif, Ali, Abdul Razak, & Muhamad Sori, 2016) Emphasize the relevance of COSO principles within Malaysian credit cooperatives. Their findings reveal a high level of awareness among respondents regarding the internal control system, particularly about monitoring activities. However, awareness of risk assessment is slightly lower, indicating a potential knowledge gap.

Yahya et al. (2022) explore the application of ICIF within Malaysian statutory bodies, highlighting a consensus on the effectiveness of the information and communication dimension and monitoring practices. While the control environment and control activities are acknowledged as robust, risk assessment practices receive somewhat lower recognition, suggesting areas for improvement.

Similarly, Baral and Cakirsoy (2023) examine adherence to the ICIF within Turkey's metropolitan municipalities. Their study shows a high level of familiarity with the framework, particularly in the area of strategic planning and financial services. Respondents generally express positive views on the effectiveness of monitoring, information and communication, control activities, and the control environment. However, risk assessment receives a slightly lower rating, although overall sentiment remains optimistic.

Moreover, Akinleye and Kolawole (2020) analyze tertiary institutions in Ekiti State, Nigeria, and find that COSO components, particularly control activities, information and communication, and monitoring activities, positively influence organizational performance. However, they observe that the control environment and risk assessment hold less significance.

In summary, these studies collectively underscore the broad applicability and importance of the ICIF across diverse settings. While elements such as the control environment and monitoring activities are generally effective, there are identified areas for improvement, particularly in risk assessment practices. This highlights opportunities for improvement within organizations, as well as the need for continuous enhancement of internal control systems.

3. Methodology

This study evaluates internal control mechanisms in Malaysian public sector initiatives using reports from the Public Accounts Committee (PAC). The focus is on government agencies across various sectors, including finance, security, education, transportation, health, and governance, which have interacted with the PAC. The analysis includes a total of 29 agencies, encompassing ministries, the Central Bank of Malaysia, government-linked companies (GLCs), and other governmental entities. The subsequent sections discuss details on these agencies and specific findings.

Data Collection Process

Data were collected from the PAC reports available on the official Parliament PAC website. The study focused on reports from 2019 to 2022 to assess the impact of the shift in PAC chairmanship from the government to the opposition. Of the twenty-three PAC reports available for this period, one was excluded due to technical issues with downloading, potentially introducing sampling error. Consequently, twenty-two reports were analyzed: seven from 2019, five from 2020, eight from 2021, and two from 2022. Detailed distribution information is provided in the following sections.

Data Analysis Approach

A content analysis methodology was employed to systematically examine the PAC reports. Content analysis allows for identifying recurring themes and patterns in textual data. This approach was chosen for its structured framework, which facilitates the categorization of internal control weaknesses according to the Internal Control-Integrated Framework (ICIF). The ICIF includes five key components: control environment, risk assessment, control activities, information and communication, and monitoring.

To enhance the validity of the findings, it is important to acknowledge potential researcher bias during coding and interpretation. Triangulating content analysis with other methodologies, such as interviews with PAC members or public administration experts, is recommended. This complementary approach can validate emerging themes and provide a richer contextual understanding.

Classification of Findings

The weaknesses reported in the PAC reports were categorized into the five ICIF components, with specific themes identified within each component:

a. Control Environment: Themes include conflicts of interest, compromised ethical values, inadequate governance, lack of accountability, and transparency.

b. Risk Assessment: Thematic areas include financial risk management, procurement and acquisition risks, geopolitical and strategic risks, intellectual property and technology risks, and project management risks.

c. Control Activities: Themes involve misuse of resources and funds, deficient process management, inadequate compliance and contract management, absence of standard operating procedures (SOPs), poor decision-making, and deficient evaluation and review processes.

d. Information and Communication: Themes include lack of transparency and documentation, inadequate system integration and data sharing, insufficient stakeholder engagement and feedback, inadequate communication protocols, and poor information management.

e. Monitoring: Themes include inadequate regulatory compliance oversight, ineffective contract management monitoring, lack of financial oversight, insufficient oversight of essential monitoring systems, and inadequate oversight of disbursement processes.

4. Results and Discussion

The Public Accounts Committee Report (2019-2022)

From 2019 to 2022, the Public Accounts Committee (PAC) of the Malaysian Parliament issued 23 reports addressing various issues within the Malaysian public sector. These reports provide valuable insights into internal control mechanisms and highlight areas of concern in government-managed projects.

2019 Reports

In mid-2019, following the transition of the chairmanship from a government-aligned party to the opposition in April, the PAC issued seven reports, six of which are available on the PAC's official website. The topics covered include:

Liquid petroleum gas (LPG) subsidy management
Film production incentive program in Malaysia and the National Film Development Corporation Malaysia (FINAS)
Investment losses incurred by Khazanah Nasional
Goods and services tax (GST) refund arrears totalling RM19.4 billion
Public marina management
Management of the redevelopment project of existing facilities at the Bukit Jalil National Sports Complex, Kuala Lumpur
Air mobility development

2020 Reports

The PAC issued five reports in 2020, a decrease from the previous year, likely due to the impact of the COVID-19 pandemic and the subsequent Movement Control Order on parliamentary operations. The reports investigated:

Control activities against foreign workers
The management of Educational Malaysia Global Services (EMGS)
The sale of land owned by Kuala Lumpur City Hall (DBKL)
The Road Charge (RC) and Foreign Vehicle Entry Record (VEP) collection system project
The project management of the Malaysian Sports School (SSM) Perlis

2021 Reports

In 2021, the number of reports increased to eight, attributed to the resumption of parliamentary sessions, unresolved issues from previous years, and new issues arising from the pandemic. The reports covered:

My Second Home Malaysia program management (MM2H)
Expenses using the distribution of zakat funds of the Federal Territories Islamic Religious Council (MAIWP)
Land acquisition Lot 41
Malaysian maritime zone security control and enforcement activities
Procurement of the COVID-19 vaccine and its distribution
Automated Enforcement System (AES) Project
Amanah Raya Berhad
Interest claims for PR1MA housing project delays

2022 Reports

In 2022, only three reports were released. This reduced number coincided with the 15th general election (GE15) held on 19 November 2022, which resulted in Malaysia's first hung parliament. The unique challenges posed by the hung parliament likely affected the PAC's reporting activities. The topics covered were:

MySejahtera application development and procurement
Acquisition of a second-generation patrol ship, the littoral combatant ship (LCS), for the Royal Malaysian Navy
Government-integrated telecommunications network service (MyGov*Net)

Overall, the PAC's reports from 2019 to 2022 reveal fluctuations in the number and scope of issues addressed, influenced by factors such as the COVID-19 pandemic and political changes, including the transition of the PAC chairmanship. Despite these challenges, the PAC consistently highlighted significant weaknesses in internal control mechanisms within the government projects.

Agencies Engaged in Public Accounts Committee (PAC) Oversight (2019-2022)

Between 2019 and 2022, the Public Accounts Committee (PAC) has been actively involved in overseeing various ministries and agencies to enhance accountability and transparency within the Malaysian government. This engagement has been crucial in addressing significant financial and operational issues. The following are the top ten agencies that have been most engaged with the PAC in scrutinizing financial and operational matters:

Ministry of Finance (MOF)
Prime Minister's Department (JPM)
Ministry of Transport (MOT)
Ministry of Home Affairs (KDN)
Ministry of Health (KKM)
Ministry of Defence (MINDEF)
Royal Malaysian Customs Department (JKDM)
Ministry of Education (KPM)
Khazanah Nasional Berhad
PR1MA Corporation Malaysia

Other agencies involved in PAC oversight include Amanah Raya Berhad (ARB), the Central Bank of Malaysia (BNM), the Immigration Department of Malaysia (JIM), the Ministry of Youth and Sports (KBS), the Ministry of Economic Affairs (KE), the Ministry of Works (KKR), the Ministry of Communications and Multimedia (KKMM), the Ministry of Foreign Affairs (KLN), the Ministry of Domestic Trade and Consumer Affairs (KPDNHEP), the Ministry of Agriculture and Food Industries (MAFI), the Ministry of Science, Technology, and Innovation (MOSTI), the Ministry of Human Resources (KSM), the Ministry of Federal Territories (KWP), the National Security Council (MKN), the National Film Development Corporation Malaysia (FINAS), Education Malaysia Global Services (EMGS), Ministry of Tourism, Arts and Culture (MOTAC), Ministry of Housing and Local Government (KPKT) and the Malaysian Administrative Modernisation and Management Planning Unit (MAMPU).

Control Environment: Key Themes and Weaknesses

The PAC reports identify systemic weaknesses in the control environment across various projects. These shortcomings have led to poor decision-making, potential misconduct, and ineffective management of public funds. The scrutinized projects revealed the following key themes and weaknesses:

Conflicts of Interest

A significant weakness identified was the influence of personal or political factors on decision-makers. Conflicts of interest often led individuals and companies to prioritize their gains over the public good, resulting in decisions that did not align with the best interests of the projects or the public.

Compromised Ethical Values

Ethical standards were undermined through the involvement of intermediaries and political pressure on decision-making processes. Unauthorized policy changes further eroded integrity and trust, reflecting a disregard for established rules and procedures.

Inadequate Governance

Governance structures were found to be deficient, with key government representatives frequently absent from crucial meetings. This absence, combined with flawed contractor appointments and favoritism, increased the risk of misconduct and failed to provide effective oversight and accountability.

Lack of Accountability

The reports revealed several instances of inadequate accountability in the management of various projects. Contractors were granted extensions without sufficient justification, modifications to ship designs were made without proper protocols or stakeholder input, and contract terms were unfavorable to the government. These issues suggest a failure to enforce accountability and protect the government's interests.

Lack of Transparency

Transparency issues were evident, particularly with the implementation of new program requirements without stakeholder consultation and the opaque sale of land to finance the 1MDB plan. Such actions raised concerns about fairness, potential misconduct, and the proper use of public resources.

Risk Assessment: Key Themes and Weaknesses

The PAC reports reveal significant weaknesses in financial and risk management across several key projects and initiatives. These shortcomings—such as deficiencies in procurement and acquisition processes, geopolitical and strategic considerations, intellectual property and technology protection, and project management—have led to substantial financial losses, compromised project integrity, and increased exposure to legal and geopolitical challenges. If left unaddressed, these issues could threaten the government's financial stability and erode public trust. These themes and weaknesses are briefly discussed below.

Financial Risk Management

The reports highlight significant deficiencies in financial risk management, including inadequate due diligence in land acquisitions, poor risk assessments for projects, and ineffective management of government funds.

Procurement and Acquisition Risks

The reports point out major issues in procurement and acquisition processes, including the misuse of corporate social responsibility (CSR) funds without proper procedures, which undermined fair competition and transparency. Poor risk assessment was also evident in the procurement of a major defense project, resulting in significant financial challenges and delays.

Geopolitical and Strategic Risks

Weaknesses were identified in the assessment and management of geopolitical risks, particularly disputes over maritime boundaries and intrusions by foreign vessels. These issues are likely due to inadequacies in maritime security operations, such as insufficient asset readiness and capacity for security control and enforcement in the Malaysian Maritime Zone (ZMM), as well as malfunctioning equipment including radar systems, navigation systems, and surveillance cameras.

Intellectual Property and Technology Risks

The report reveals weaknesses in the management of intellectual property rights for a significant digital health application. The failure to secure necessary protections has exposed the government to potential legal risks. Additionally, this shortfall became more apparent when the developer proposed commercializing the application, further highlighting its potential as a national asset. This underscores the need for improved intellectual property management.

Project Management Risks

The report identifies weaknesses in project execution and funding, such as delayed payments to contractors, which have contributed to increased financial costs and project delays, as seen in a high-profile development project. These operational inefficiencies, coupled with poor returns on long-term investments, failure to generate profits from short-term investment activities, and increased impairment losses, signal inadequate risk mitigation strategies and delayed corrective actions.

Control Activities: Key Themes and Weaknesses

The reports highlight significant deficiencies in control activities across various areas, including resource management, process management, compliance and contract management, standard operating procedures (SOPs), decision-making, and review processes. These areas are discussed in detail below.

Misuse of Resources and Funds

The reports highlight significant challenges in resource management within government initiatives, including inefficient subsidy distribution, underutilized funds for film production incentives, and concerns over outstanding Goods and Services Tax (GST) refund claims. These issues underscore the need for improved financial management practices to prevent resource wastage and ensure the effective use of public funds.

Deficient Process Management
Significant deficiencies in process management were identified, including issues related to foreign worker qualification processes, contractor evaluation for a sports development project, and the use of corporate social responsibility (CSR) in procurement. Delays in the delivery of a major defense project, despite substantial payments, further highlight the need for a comprehensive review of process management practices.

Inadequate Compliance and Contract Management
The reports reveal major deficiencies in contract management and legal compliance. Poor management and compliance practices in a government-linked company may have led to potential financial risks. Challenges in a major infrastructure project were exacerbated by unfavorable contract terms that imposed financial burdens on the government. The failure to protect the interests of a government-funded housing development project in contractual agreements underscores the need for enhanced legal oversight and a more proactive approach to public-private partnerships.

Absence of Standard Operating Procedures (SOPs) and Poor Decision-making
Significant deficiencies were identified due to the absence of clear guidelines and poor decision-making. The lack of SOPs for land disposal created opportunities for inconsistencies and potential irregularities. Furthermore, the failure of the Road Charge Collection System Project to meet its objectives highlights shortcomings in planning and implementation, underscoring the need for improved strategic oversight.

Deficient Evaluation and Review Processes
Weaknesses in evaluation and review processes were noted, such as the absence of a performance assessment study for a film production incentive program. This lack of assessment limits the government's ability to measure program outcomes effectively and make necessary adjustments, potentially impacting overall governance and efficiency.

Information and Communication: Key Themes and Weaknesses
Inadequate information and communication practices have contributed to government inefficiencies, poor decision-making, and reduced transparency. To address these issues, the government should prioritize improving documentation and reporting, enhancing system integration for better data sharing and decision-making, fostering stakeholder engagement, establishing clear communication protocols, and upgrading information systems. These actions are essential for restoring efficiency, effectiveness, and public trust in government operations. The key themes and weaknesses identified are as follows:

Lack of Transparency and Documentation
The reports revealed weaknesses in financial governance, such as the absence of documentation for ministerial actions and the exclusion of specific funds from the national budget during critical periods. These deficiencies undermine transparency and accountability in financial management.

Inadequate System Integration and Data Sharing
Inadequate system integration and data sharing have negatively impacted the management of foreign worker quotas and security operations. Incomplete integration of relevant systems has led to inefficiencies and potential vulnerabilities. Additionally, the use of disparate systems across agencies has hindered effective information flow, complicating the response to security threats.

Insufficient Stakeholder Engagement and Feedback
Deficiencies in stakeholder engagement and feedback processes were identified, including discrepancies between approved plans and public presentations, and a lack of input during the sale of public assets. Insufficient engagement may result in decisions that do not align with community needs or concerns, potentially leading to public dissatisfaction and legal disputes.

Inadequate Communication Protocols
Significant deficiencies in communication protocols were noted. For example, a lack of communication between government agencies regarding a sports development project led to uninformed decisions and the selection of unqualified contractors, potentially compromising the project's success.

Poor Information Management

The report identified significant deficiencies in the management of information. Difficulties in generating accurate reports for a government program and missing critical information in a housing development project contributed to poorly informed decisions, resulting in project delays and increased costs.

Monitoring: Key Themes and Weaknesses

The reports highlight significant shortcomings in the monitoring systems of various government initiatives, including inadequate regulatory compliance and oversight, ineffective contract management and monitoring, lack of financial oversight, lack of essential monitoring systems, and insufficient oversight of disbursement processes. These deficiencies have resulted in inefficiencies, financial mismanagement, and a lack of accountability in key projects. To address these issues, strengthening monitoring mechanisms through improved systems, processes, and oversight structures is crucial for achieving better outcomes. A detailed discussion is provided below.

Inadequate Regulatory Compliance and Oversight

The report identified significant deficiencies in regulatory compliance and oversight. For example, in the management of a government subsidy program, industry players failed to meet regulatory requirements and maintain proper records, reflecting ineffective enforcement. Additionally, the absence of essential checklists and inspection reports for a government incentive program indicates insufficient monitoring of compliance with program requirements.

Ineffective Contract Management and Monitoring

The reports highlighted significant deficiencies in the management and monitoring of contracts. For instance, some projects suffered due to inadequate oversight when monitoring responsibilities were delegated to third-party companies. This lack of direct oversight hindered the government's ability to effectively supervise contractors, potentially leading to mismanagement and poor performance.

Lack of Financial Oversight

Certain projects revealed failures in financial oversight, resulting in delays, cost overruns, and potential mismanagement. The government's inability to provide adequate financial control and accountability underscores the need for more robust monitoring of financial allocations.

Lack of Essential Monitoring Systems

The absence of comprehensive surveillance systems for critical areas exposes significant gaps in security monitoring capabilities within the country’s coastal waters. This deficiency compromises the government's ability to detect and respond to threats, increasing the risk of security breaches.

Insufficient Oversight of Disbursement Processes

The reports identified opportunities to enhance oversight and improve efficiency in disbursement processes. Implementing robust monitoring mechanisms, streamlining procedures, and ensuring compliance with relevant regulations can minimize delays and ensure timely delivery of financial support to beneficiaries.

5. Conclusion

This study illustrates the practical application of the Committee of Sponsoring Organizations of the Treadway Commission's (COSO) Internal Control-Integrated Framework (ICIF) in identifying specific weaknesses within the control environment, risk assessment, control activities, information and communication, and monitoring in government-run projects. In the control environment, prevalent issues included conflicts of interest, compromised ethical values, inadequate governance, and a lack of accountability and transparency. The risk assessment component uncovered concerns related to financial risk management, procurement and acquisition risks, geopolitical and strategic risks, intellectual property and technology risks, and project management risks. Control activities were inadequate in areas such as resource and fund management, process management, compliance, and decision-making. The information and communication systems exhibited weaknesses, including inadequate transparency and poor documentation, insufficient system integration and data sharing, limited stakeholder engagement, and ineffective information management. Finally, the study

identified monitoring deficiencies in regulatory compliance, contract management, financial oversight, and the supervision of disbursement processes. This study not only highlights the effectiveness of the ICIF in evaluating existing controls but also offers actionable insights for policymakers. To enhance risk mitigation, governance, and project management within public sector organizations, policymakers should adopt a strategic approach focused on the continuous improvement of internal control mechanisms. Furthermore, they should establish clear guidelines and a transparent system to hold individuals accountable for internal control breaches, thereby preventing future occurrences of these weaknesses. While the study provides valuable insights, it acknowledges its limitations, particularly its focus on PAC reports from 2019 to 2022. Future research could benefit from a broader scope and the use of mixed methodologies, such as content analysis and interviews, to strengthen the reliability of the findings. Addressing these gaps will offer a more comprehensive understanding of the challenges and potential solutions.

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Development of A Radio Frequency Identification System for The Manufacturing Packing Process Via The DMAIC Approach

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Abstract: Quality has long been a critical metric for determining a company's competitiveness in the business world. The use of tools, methods, and concepts to improve and regulate product quality has been widespread. The purpose of this research is to solve the missing accessories issue that occurs during the packing process by using the Lean Six Sigma tool DMAIC (Define, Measure, Analyze, Improve, and Control). As part of the Lean Six Sigma quality effort, the DMAIC technique is frequently defined as a problem-solving methodology and a data-driven quality strategy. The actual root cause for these missing accessories is the lack of a proper validation process during the packing process. A brainstorming session was held to develop solutions to this problem, and one suggestion was to employ the radio frequency identification (RFID) validation system. This new implementation was set up during the kitting process by pasting RFID labels for all accessories. These accessories were validated back during the packing process to ensure no missing accessories after the operator sealed the carton box. After implementing the RFID system, the company managed to reduce the cost of manpower and parts that needed to be replaced in case of missing data. It also improves the efficiency of the business, as the addition of a validation RFID system avoids mistakes by detecting missing accessories before the product is delivered to the customer.

Keywords: *Radio frequency identification, DMAIC, lean Six Sigma, manufacturing packing process*

1. Introduction and Background

RFID is part of the automated detection and data capture (AIDC) set of technologies (Lin & Ho, 2009). AIDC techniques categorize items automatically, collect data, and enter that data directly into computer systems with little to no human intervention. An RFID tag or smart tag, an RFID reader, and an antenna are the three essential components of an RFID system. RFID tags feature an integrated circuit and antenna for transmitting data to an RFID reader (also known as an interrogator). The reader converts radio waves into a more usable format. The data collected from the tags are subsequently sent to the host computer system via a contact interface, where they may be saved in a database and analyzed later (Chong et al., 2015).

RFID is a fantastic business tool that can be used in a variety of industries, including supply chain management (SCM). RFID is a rising technology that allows supply chain partners to collaborate more closely by providing real-time knowledge visibility. RFID contributes to supply chain operations by increasing data accuracy, accelerating procedures, permitting traceability and visibility of commodities via supply chains, increasing physical flow speed, and reducing work-in-progress and inventories (Nof, 2012). By using RFID, the quality assurance system (QAS) can identify and even avoid quality issues more efficiently than the conventional quality assurance system can. This is because the QAS was developed and used to inspect the quality of a product; classify the causes of abnormalities by gathering, reviewing, and checking data from the product line; and then decide how the improvement plan can be applied (Lyu, et al., 2009).

RFID technology has gained increasing attention in many fields, such as the manufacturing, agriculture, hospitality, and parking management sectors. By referring to our case study, we are facing customers complaining that some of the parts are either missing or mismatched with their order. This usually happens during the packing process before the product is shipped to the customer. A total of 17 cases were reported from customers from May 2019 until May 2020. Furthermore, it also impacts financial issues in terms of manpower and part replacement, which are sent to support customer complaints. This is a major problem that affects company operations since consumers are hesitant to reward new product introductions (NPIs) because the company has consistently failed to meet customers' quality expectations. Excellent quality is one of the most critical components for any business to achieve to deliver crucial service for customer satisfaction, which breeds customer loyalty.

The significance of this study comes from its ability to address ongoing problems with missing parts in customer orders, which affect satisfaction, efficiency, and profitability. By using RFID technology along with the DMAIC method, the research seeks to minimize inefficiencies, lower complaints, and improve quality control. This could strengthen operational dependability and rebuild customer trust, helping to smoothly launch new products and fostering long-lasting customer relationships. To address these problems, continual improvement is necessary. To solve these issues, ongoing development is necessary. Thus, the main objective is to understand the main root cause of missing accessories and eliminate the missing accessories during the packing process via the DMAIC method.

The discussion in this study is organized as follows: Section 2 presents the literature review, while Section 3 focuses on the methodology, Section 4 outlines the analysis results and Section 5 wraps up with the conclusion and recommendations for future research.

2. Literature Review

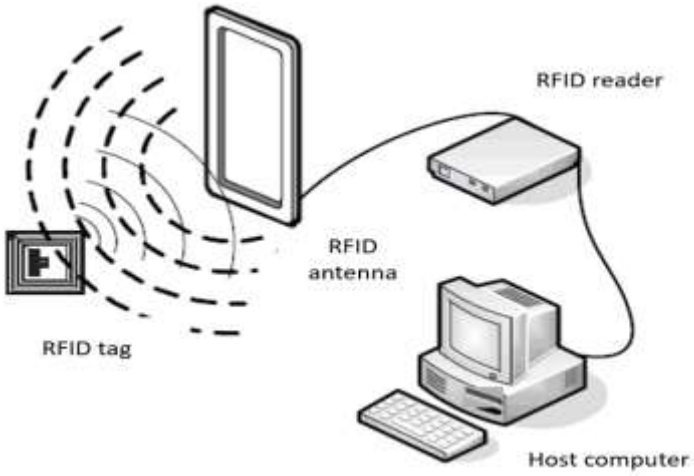
Automatic identification and data capture (AIDC) is a term that refers to a range of technologies that capture data from a person, an object, an image, or a voice without requiring manual entry (Hodgson et al., 2019). AIDC systems are used to manage inventory, delivery, assets, security, and records. AIDC systems are used in a variety of industries, including distribution, manufacturing, transportation, medical, government, and retail (Parlikad et al., 2009). Several types of AIDC technologies have been implemented. These methods include barcodes, magnetic stripes, smart cards, optical character recognition (OCR), and radio frequency identification (RFID).

A basic RFID system includes tags for recording data, readers for recognizing the data on the tag, and an application for identifying the data via the readers shown in Figure 1. RFID tags are information-storage devices that are applied to distinctive goods to allow them to be identified. Tags come in a variety of forms and sizes, depending on the service or purpose. Integrated circuitry, an antenna, and a tag housing are the three primary components of a tag. The integrated circuitry and antenna are housed in the tag housing. The antenna communicates with a reader to transfer data and obtain the appropriate power. The antenna's capacity is determined by the frequency employed, as well as the antenna's size and position. Information is stored in the integrated circuitry. The memory capacity varies depending on the application needs (Kuei, 2005). Another important component of an RFID system is readers. The reader is the device that determines whether information in a tag is valid or provides power to a tag. To activate RFID tags, a reader creates a radio frequency field or an interrogate zone. Scanners and fixed readers are the two types of readers available. The fixed readers are normally placed in a certain location. Fixed readers, which are larger and more complicated, can be utilized in systems that move more quickly, such as a conveyer classification system (Dobkin, 2013).

RFID antennas are a key factor in determining how successfully a reader and a tag interact with one another. The higher the data transfer rate in a specific radio frequency zone, the more antennas there are. A tag and a reader both have RFID antennae. The antenna and internal electronics of a tag or reader are protected by the housing. The location of antennas is one of the most critical considerations. Because the antenna's location impacts the reading rate, the antenna's position is considered while the position and direction of a tag to be affixed to an object are determined. Another key driver of the reading rate is the antenna height. The height of the antenna impacts the reading rate of the tag, which does not need to pass through the reader. Interference

between antennas should be a problem in an RFID system with several antennas since the radio frequency from one reader in the system might impact another reader nearby. To achieve a good reading, each antenna should be placed in a location where a reader will not disrupt another reader (Gjeldum, et; al., 2018). A host computer is a physical system that runs application-specific software. The host computer is made up of many software components that enable RFID reader connections, filter the raw data obtained, and clean the RFID data. The host computer is generally responsible for integrating the RFID system's components and filtering the data obtained (Gjeldum, et; al., 2018). Many industries are already implementing RFID technology to improve efficiency in their operations. Airlines, banking, retail, manufacturing, and transportation/logistics are among these businesses (Raza, 1999).

Figure 1: Basic RFID system



What is the definition of quality? Most of the responses are categorical. Everyone expects the finest in terms of quality, as these individuals would agree. Quality improvement is defined as a goal to attain a level of exceptional performance which is a significant improvement over any prior or current level. In other words, "improvement" may be thought of as a "breakthrough" activity that helps an organization become more efficient (Ishak et al., 2021). Varying authors have different meanings for this phrase, yet they all agree on what it means. Quality improvement, on the other hand, is intimately linked to process improvement, with most activities performed toward improvement, including process improvement (Pica et al., 2017).

In 1987, Motorola's Mikel Harry and Bill Smith developed the DMAIC technique as part of their Six Sigma quality effort. DMAIC stands for Define, Measure, Analyze, Control, and Improve. After a few decades, many companies have implemented the DMAIC approach, which is part of the Six Sigma tools. The DMAIC method shown in Figure 1 may help with a variety of industrial problem-solving situations. Therefore, this research adopts this technique because it focuses on a data-driven approach to problem-solving and procedure improvement (Slack, 2015).

3. Method

DMAIC is utilized to evaluate and assess the present order of the manufacturing packing process. The abbreviation DMAIC stands for define, measure, analyze, improve, and control, which are the five steps of the problem-solving technique. Figure 2 shows the method flow chart of how DMAIC was implemented for this research, and Table 1 explains the definitions and tools used in each process.

Figure 2: The Flow of the Six Sigma DMAIC Improvement Process

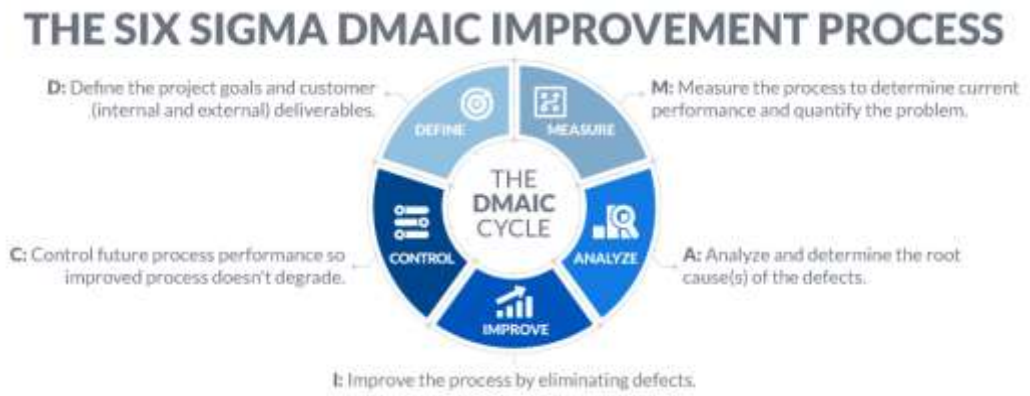


Table 1: Definitions of DMAIC and Tools Used for Data Collection

No.	Steps	Definition	Tools
1	Define	Define the problem, improvement activity, opportunity for improvement, project goals, and customer (internal and external) requirements.	SIPOC diagram Voice of customer Process mapping
2	Measure	Measure process performance.	Pareto chart
3	Analyze	Analyze the process to determine the root causes of variation and poor performance (defects).	Fishbone diagram 5 whys analysis
4	Improve	Improve process performance by addressing and eliminating the root causes.	Decision matrix Pilot trial
5	Control	Control the improved process and future process performance.	Process control plan Work instruction

This research was conducted in one engineering department of a manufacturing company in Penang State that implemented the DMAIC process in its daily operation. The data were collected by observing and interviewing personnel in the department, as shown in Figure 3. Details of the job scopes of the participants are tabulated in Table 2. The participants were informed about the objectives of the research, and they provided their consent and support to ensure that the research was successful.

Figure 3: Represent the roles and responsibilities of each team

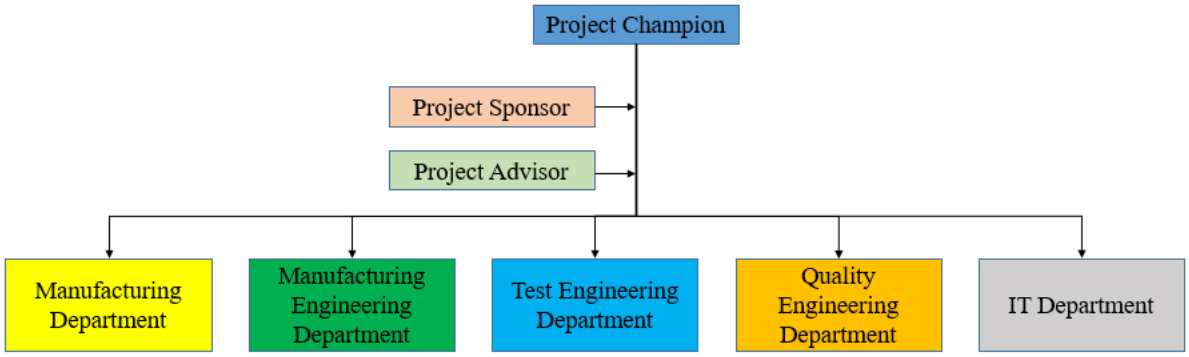


Table 2: Represent the roles and responsibilities of each team

Roles and Responsibility				
Project Champion	Project Sponsor	Project Advisor	Manufacturing Department	Manufacturing Engineering Department
1. Lead by Manufacturing Engineering Department. 2. The reason person from MFE was selected because is all the process and product under their ownership.	1. Project Sponsor responsibility is to provide financial support and funding of this project. Organizations have more chances to work with than cash and individuals. 2. The project sponsor advocates for the project's acceptance and subsequent funding. Besides, it ensures the project's strategic significance. The project sponsor supports and defends the project as a worthwhile use of organizational resources that will help the company achieve its strategic goals. 3. Project sponsors are often individuals of senior management with a high level of influence and power who advocate for initiatives	1. The Project Advisor oversees project management and support activities in order to contribute to the creation and implementation of a variety of projects that are consistent with the organization's goals. 2. The candidate for this position is typically from Lean Manufacturing Department.	1. Manufacturing Department will provide resources as runner and execution.	1. Manufacturing Engineering Department will provide and advise the process to involve related to project.
Test Engineering Department	Quality Engineering Department	IT Department		
1. Test Engineering Department able to contribute their knowledge on hardware and software to be use on this project.	1. Quality Engineering Department will provide data analysis, customer report and feedback.	1. IT Department will contribute on the support for Test Engineering Depart for installation software and hardware related to this project.		

Figure 4: Project timeline

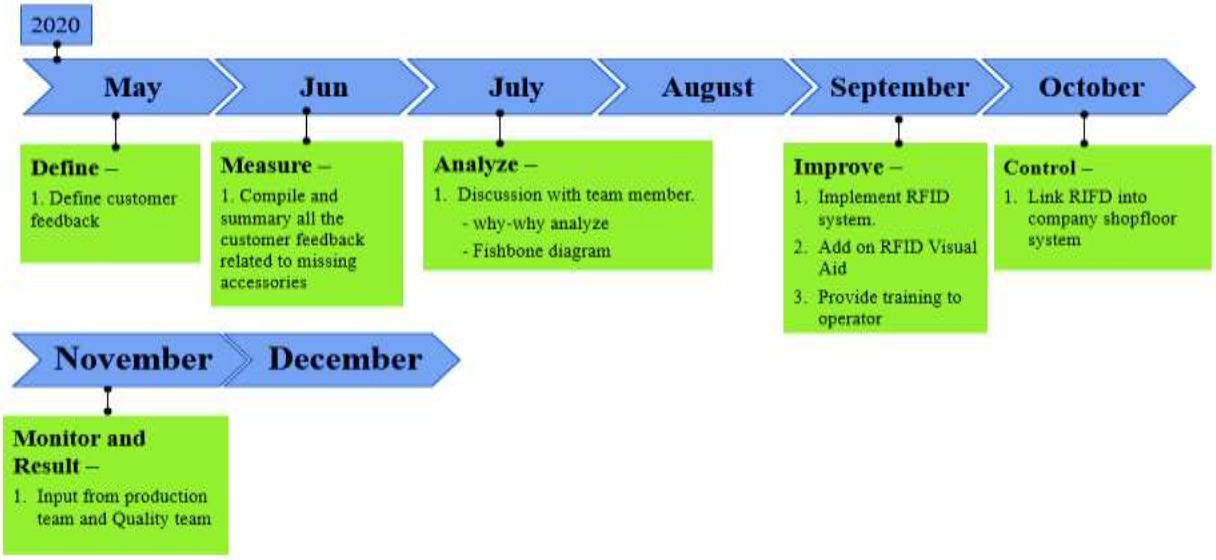


Figure 4 shows the project timeline, which illustrates how the researchers observed the DMAIC process implemented in the department and interviewed the respective participants. It took six months for the researchers to complete the study.

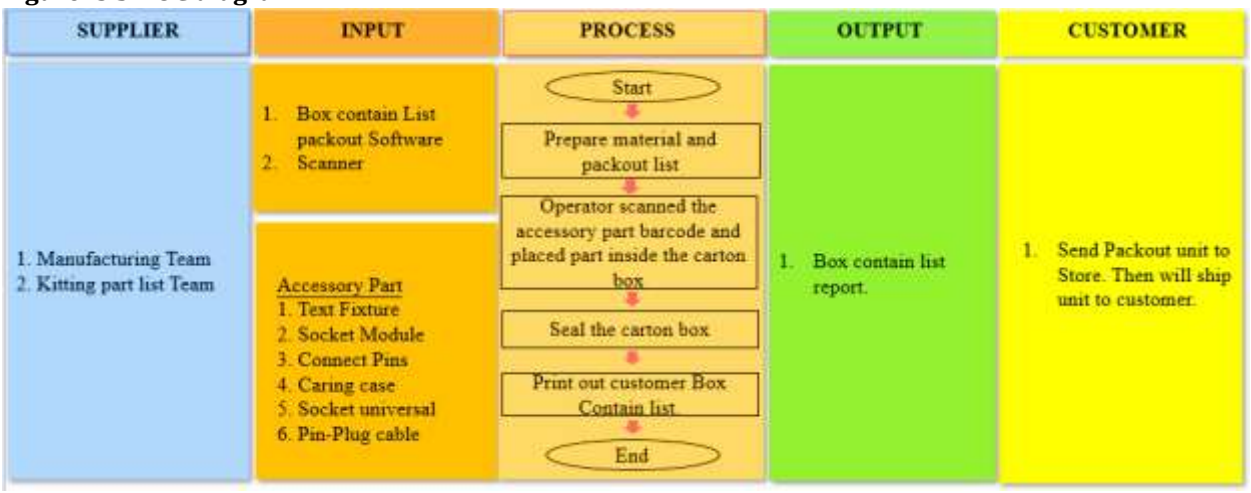
4. Results

The DMAIC starts with the formation of a team for information on the duties and responsibilities of each team member (Figure 3 and Table 2). Additionally, while creating the project's set timeframe, refer to Figure 4. This guarantees that there are no gaps between the various phases of the project. This timeline serves to demonstrate the project timetable and guarantee target achievement.

Define

By creating the SIPOC diagram shown in Figure 5, we can identify the project's critical-to-quality factors to fulfill the research objective. The SIPOC diagram is used to identify all relevant elements of a process improvement project before work begins. These identified suppliers included manufacturing teams and cooking teams internally. The identified inputs included Box Contain List Software and Scanner. Additionally, the list of accessories was also part of the input category. The process is a process flow to pack all the accessories list from beginning until end. The list generated from the software to match with the physical accessories is output. Finally, the identified customer-include process sends the complete finished good to store and deliver to the customer.

Figure: 5 SIPOC diagram



The interviews were conducted at the site of the manufacturing department involved in the process, which needed to be improved. Twenty participants participated in this activity, and most of them had more than five years of experience working in the department. The interviewees were asked semi-structured open-ended questions. The questions included about the inefficiencies in the present process as well as ways to address them. Some of the responses revealed were as follows:

"Too many accessories need to be packed, and it can go to more than 100 types for each order." – Participant 1

"Manual process caused some escape from the operator." – Participant 4

"No check and balance process. all the accessories were kitting at upfront process transfer at end process which is packing." – Participant 7

"The current system might cause the operator to escape and not validate at the end of the process." – Participant 11

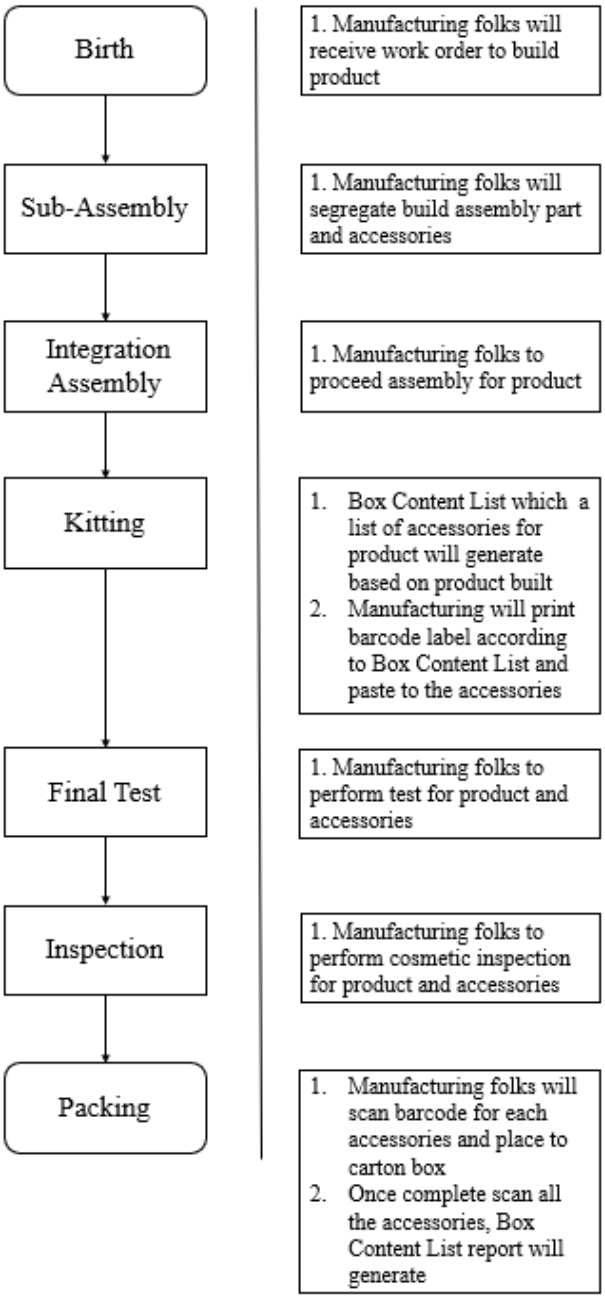
"Need to have an error-proving system to validate upfront until the end process." – Participant 12

"A higher demand for order can cause escape from the operator through manual processing." – Participant 15

The process map in Figure 6 is a graphic representation of the existing production process from beginning to finish. The process map developed during this phase is high-level, containing only the information needed to offer a visual depiction of how the activities that make up the current order processing process work. The whole project team collaborated to design the process map to generate an accurate visual depiction. Based on process mapping, the current packing process is the most critical current packing process that requires the operator to scan the barcode for each accessory and place it in the carton box. Here, loopholes form the current process,

whether operators place accessories in the correct carton box or not. Furthermore, the current control was not poka-yoke or full proof to avoid any missing or mismatched accessories.

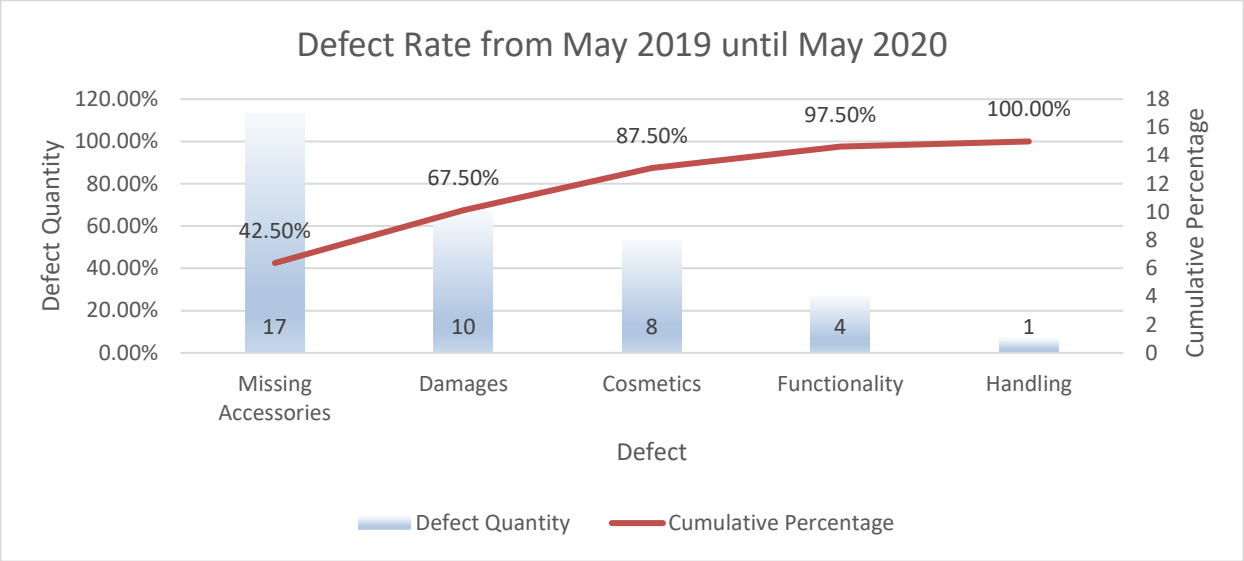
Figure 6: Explanation of process mapping



Measure

The Pareto chart shown in Figure 7 indicates the number and cumulative percentage of defects from customer feedback. The data were collected from May 2019 until May 2020. Based on the Pareto chart, missing accessories are the highest contributor, accounting for 42.5% of the total defects, which is equivalent to 17 issues out of 40 within one year, followed by damage, which contributes to ten issues, and eight cosmetic issues. This top Pareto missing accessories defect should be solved to prevent any escalation issue raised by the customer.

Figure 7: Pareto chart defect from May 2019 until May 2020

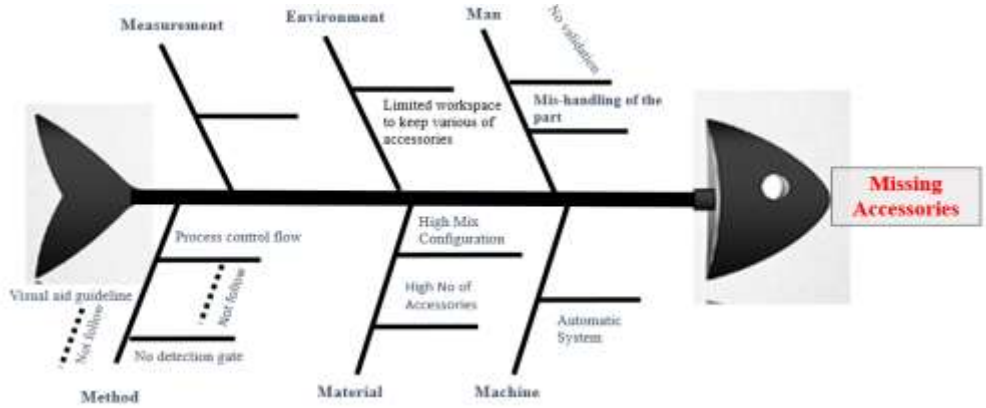


Analyze

A fishbone diagram of the missing accessories is shown in Figure 8. The result is that the first Man factor is the main failure because there is a manual validation process that is handled by the operator. In addition, operators may misplace accessories in other areas of different places during the packing process. The SIPOC diagram in Figure 5 shows that the packing process is critical because the operator that handles this packing process seals the carton box and does not check and balance the process to ensure that they pack accessories correctly.

The second factor is the method factor, which has three major issues: it does not follow the current process control flow, whereby the operator places the accessories inside the box and only scans; it does not follow the visual aid guidelines, whereby the operator scans all accessories at one time and places them inside the box; and there is a manual validation process in place to validate what has been packed inside the box. The machine factor has only 1 issue: there is no automated validation system to detect missing accessories. Fourth, the material factor determines the product's nature under high mixing and low volume, and various configurations lead to this product. The fifth factor is the measurement factor, which has a quantity that is mismatched from the kit list. Finally, because of the environmental factor, there is congested space for the workstation, which may lead to this issue.

Figure 8: Fishbone diagram



The 5-word analysis shown in Table 3 is used to identify the root cause of missing accessories. As a result, the current packing process is a human-dependent process, and the use of a proper validation method would increase the degree of adherence to quality requirements.

Table 3: Why analysis for missing accessories

No.	Question	Answer
Why 1?	Why is the accessory part missing from the carton box?	The operator's mishandling during the packaging process likely resulted in the accessory part being misplaced or omitted from the carton box.
Why 2?	Why is the operator having difficulty placing the part inside the carton box?	The operator is packing a high mix configuration part inside the carton box and overlooks the accessories part.
Why 3?	Why did the operator overlook the placement part on the box?	The operator did not detect any abnormal issues during the manual packing process.
Why 4?	Why did the operator not detect any abnormal issues during the manual packing process?	The packing process relies on human dependence to confirm.
Why 5?	Why does the packing process rely on human dependence to confirm?	**Do not have proper validation on the accessories packing process. (No check and balance process)**

Improving

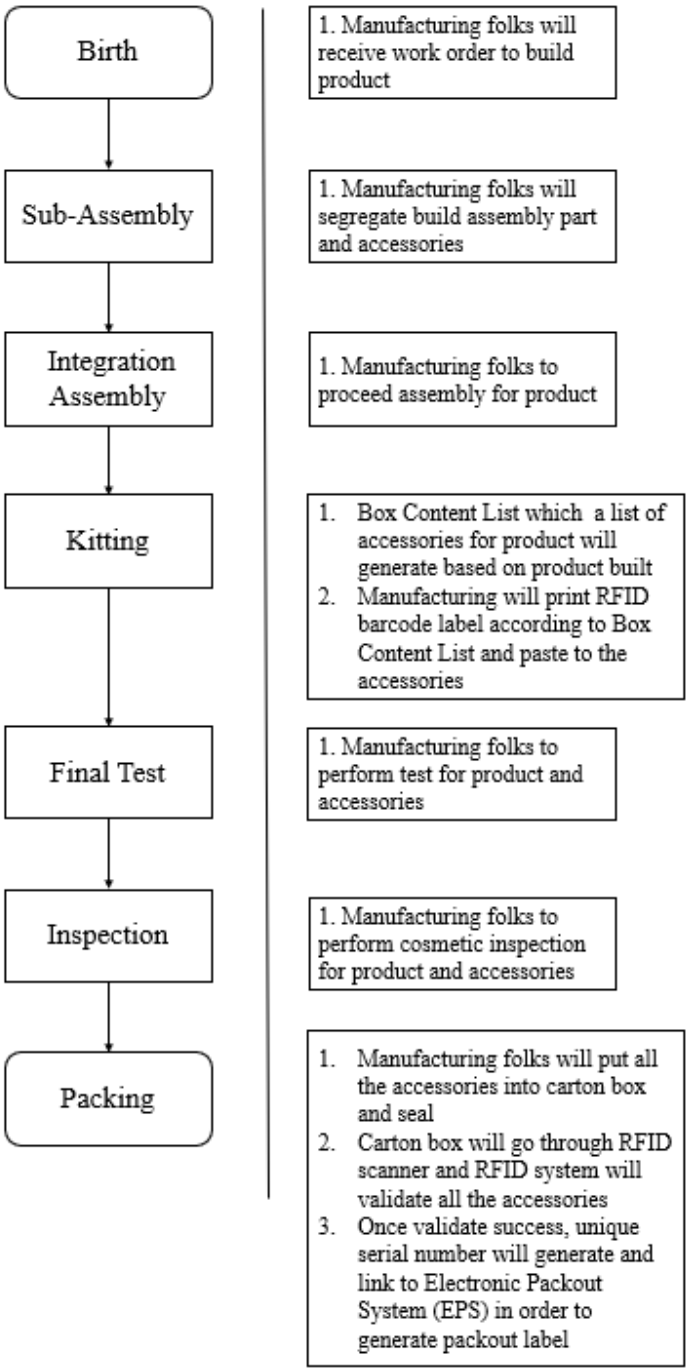
In this phase, the main reason for missing accessories can be identified via root cause analysis. Therefore, in the brainstorming session within the team, a few proposals provided possible solutions to address the main root cause of the missing accessories that shipped to the customer, as shown in Table 4. Two criteria need to be calculated before implementation, namely, the effectiveness or sensitivity of the proposal and the ROI factors. The ROI factor was presented in the form of weight to understand low and medium investment. The first proposal is to hire a second operator for validation. This is the cheapest investment among all possible solutions. However, it is not foolproof. The second proposal is to use weight machine validation on the accessories that are packed. This solution has the disadvantage of false alarms if the accessories that are packed are light in weight, for example, on paper or certificate weights. The results revealed that RFID validation systems have a foolproof system that precisely validates all the accessories that are packed inside the box. The system will generate an RFID report that will save the server if the report needs to be retrieved when necessary.

Table 4: Team proposal with criterion effectiveness and the ROI factor

Possible Solution	Effectiveness/Sensitivity	ROI Factor
2nd Operator Validation	Low	Low
Weight Machine Validation	Medium	Medium
Automated RFID Validation	High	Medium

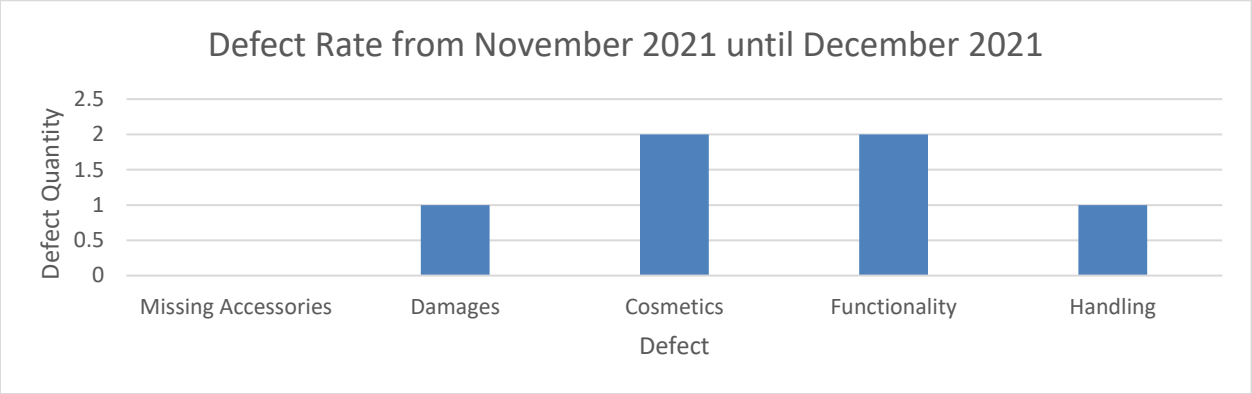
The RFID validation system was set up during the kitting process by pasting RFID labels for all accessories, as shown in Figure 9. These accessories are validated back during the packing process to ensure that there are no missing accessories after the operator seals the carton box. This RFID system is also able to detect any missing accessories, prompts error messages, and blocks the process from proceeding to the next event. In addition, this system has been enhanced to print out a confirmation report with a unique serial number. This unique series of reports is scanned in the Electronic Packout System (EPS) to generate package labels, and the entire history of the product is tracked in the production shop floor system.

Figure 9: The process flow is improved by adding an RFID validation system



The pilot evaluation of the RFID system was carried out for one quarter from November 2020 until February 2021. The results revealed a positive impact; within a pilot evaluation, there were no repeated missing accessories highlighted externally or internally. A histogram is plotted in Figure 10 to address the current improvement. Within the pilot evaluation period, the team also initiated and updated the product FMEA.

Figure 10: Histogram chart to address the improvement of defects on missing accessories



Control

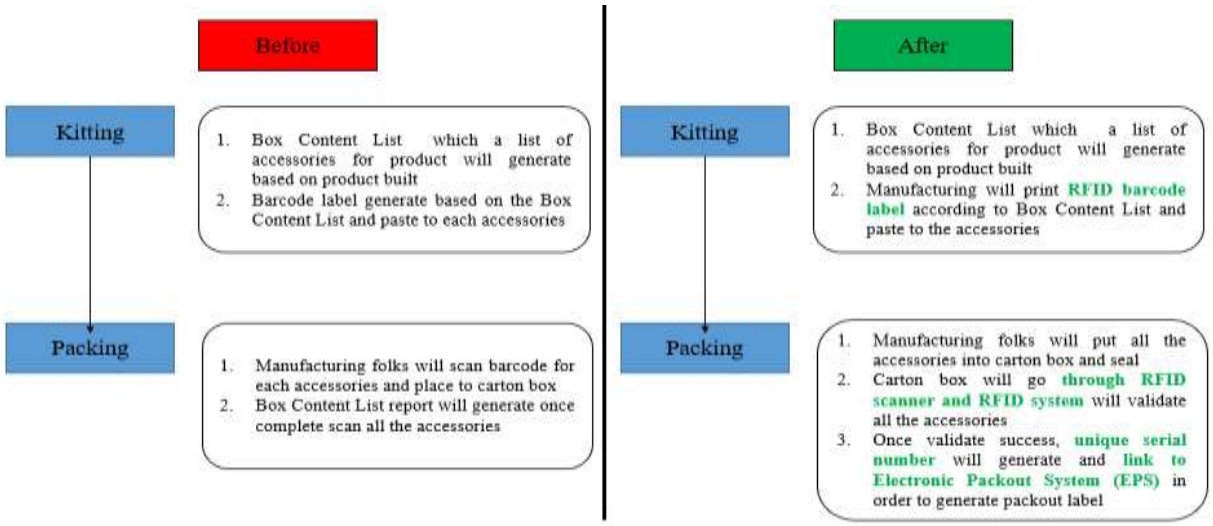
For the control phase, the process control plan (PCP) has been revised based on the improvement result taken in the previous phase. This document also serves as a reference for future continuous process improvement. In addition, work instructions (WIs) are also prepared and used as training documents for operators in the future.

The successful improvement of the RFID system in the packing process has been recognized by customers as a result of the zero issues highlighted in missing accessories. Furthermore, this is also correlated with employee satisfaction because the implementation of RFID systems can reduce the manufacturing lead time during the packing process. Previously, operators needed to scan each accessory and place it in a carton box. Now, the operator can save packing time by placing all the accessories into a carton box without scanning each part, and the system RFID automates scanning and detecting if any missing accessories occur.

5. Conclusion

The conclusion was simplified before and after the implementation of the RFID validation system, as shown in Figure 10. The packing process was the main contributor and led to the missing accessories issue, which had the highest number of complaints by customers from May 2019 until May 2020. After reviewing the current process, it was found that the current practice was not foolproof and that the manufacturing operator easily escaped and potentially did not place the accessories in the designated carton box. Furthermore, there is no system validation after manufacturing places accessories inside the carton box.

Figure 11: Before and after implementation of the RFID validation system



It was proven by using a 5-whys analysis and a fishbone diagram tool. In summary, the actual root cause occurs because a human-dependent process without a proper validation method may lead to missing accessories. To overcome this issue, a brainstorming session within the team was organized, and a few proposals came out with possible solutions to address the main root cause of the missing accessories that were shipped to the customer. One of the proposed solutions is to implement RFID system validation. RFID validation systems have a foolproof system that precisely validates all the accessories that are packed inside the box. After monitoring the pilot implementation of the RFID system validation, the results revealed a positive impact, and no repetition for missing accessories was highlighted externally or internally. To make this process sustainable, the process control plan (PCP) has been revised to include RFID system validation. In addition, work instructions (WIs) are also prepared and used as training documents for operators in the future.

The RFID validation system helped in solving the problem of missing accessories. In addition, the study demonstrates the effectiveness of RFID technology in minimizing human error and enhancing operational reliability within the packing process. By showing how technological interventions can reduce errors, the research provides valuable insights into how RFID systems can improve quality assurance and customer satisfaction in manufacturing environments. However, some limitations were noted. First, the initial cost taken to implement the RFID system was high for the companies, and this may not be preferred by small manufacturing companies especially those that are starting. Moreover, depending on how much of it is embraced by operators, the project depends on their compliance with the new processes, and hence constant monitoring and formation are expected. One weakness to mention is that the RFID interferes with electrical metallic items and electromagnetic interference could limit the functionality in such an environment. The findings of this study could be used for further research on the identification of cheaper ways of implementing the technology or other supplementary technologies that would complement the RFID system. Future research should also explore the ideas of a sustainable environment for the RFID system and how effective this manufacturing system is in various environments. Furthermore, studies on the RFID application combined with other innovative technologies such as the IoT and blockchain can shed more light on inventory tracking and identification. Furthermore, comparing the effects of RFID implementation on the optimization of the company's performance and the customers' satisfaction levels over a longer period would give richer findings regarding the advantages and disadvantages of implementing RFID and twenty-two possible development needs.

In addition, two implications have been identified for this study. For theoretical implications, the study demonstrates the importance of integrating RFID technology in quality assurance processes, reinforcing theories related to automation and error reduction in manufacturing. It provides empirical evidence supporting the idea that technological interventions can mitigate human error, thus contributing to the broader understanding of technology's role in enhancing operational reliability. For practical implications, implementing RFID validation systems in the packing process leads to significant improvements in operational efficiency and customer satisfaction. By ensuring that all accessories are correctly included, this practical application minimizes errors and enhances quality control, demonstrating RFID technology's value in real-world manufacturing environments.

Meanwhile, the study's primary limitation is its focus on a single manufacturing process, which may not be generalizable to other contexts. Additionally, the duration of the pilot implementation might not capture the long-term challenges or adjustments required for sustained success. Future research should address these limitations by exploring diverse manufacturing settings and longer implementation periods. Future studies should explore the long-term impacts of RFID system implementation across various manufacturing settings and industries. Investigating the integration of RFID with other emerging technologies, such as IoT and machine learning, could provide deeper insights into enhancing manufacturing efficiency and accuracy. Additionally, examining the cost-benefit analysis over extended periods could offer valuable data for broader adoption and sustained success.

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The Impact of Task Management, Social Support and Income on Work-Life Balance among Gig Workers

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Abstract: The study addresses the growing concern about work-life balance among gig workers in Malaysia, a population facing unique challenges due to the nature of gig employment. This issue is particularly critical as gig workers often struggle with task management, securing social support, and dealing with income volatility, all of which impact their ability to achieve a balanced work-life dynamic. This study aims to analyze the effects of task management, social support, and income stability on the work-life balance of gig workers in Malaysia. A quantitative research methodology was employed, involving a survey of 70 gig workers across various sectors in Kedah. The data was analyzed using correlation analysis to assess the relationships between the independent variables, task management, social support, and income stability, and the dependent variable, work-life balance. The findings reveal that task management, social support, and income stability are all significantly correlated with better work-life balance, with task management being the most influential factor. The implications of this study suggest that improving task management practices, enhancing social support systems, and stabilizing income are crucial strategies for gig platforms and policymakers to consider. These measures can significantly improve the well-being of gig workers and contribute to a more sustainable gig economy. The study also highlights the need for further research to explore these relationships in different cultural contexts and over time, to better understand their long-term effects.

Keywords: *Work-life balance, gig workers, task management, social support, income stability*

1. Introduction

The global workforce is undergoing a significant transformation, largely driven by the rapid growth of the gig economy. This shift is redefining traditional employment structures, with an increasing number of individuals opting for freelance or contract-based work instead of conventional full-time jobs. Gig workers are drawn to this model due to its flexibility and autonomy; however, this flexibility often comes at a cost. Task management, social support, and income stability are crucial factors that directly influence the work-life balance of gig workers, a demographic increasingly vulnerable to burnout and job insecurity.

Globally, the gig economy has expanded rapidly, with an estimated 1.1 billion freelancers worldwide as of 2023, contributing significantly to various economies (Payoneer, 2023). However, the benefits of this flexible work arrangement are often offset by the challenges gig workers face in managing their tasks effectively, securing adequate social support, and ensuring a stable income. Notably, the role of social support and income stability in this context has been underexplored. By examining how access to support systems such as healthcare, retirement plans, and worker protections affect gig workers' mental well-being and stress levels, this study will provide valuable insights into interventions that could alleviate social isolation and improve job satisfaction. Furthermore, analyzing the impact of income stability on gig workers' financial planning, personal commitments, and risk of burnout is essential for addressing the broader challenges they face. These challenges can lead to significant work-life balance issues, with many gig workers struggling to maintain boundaries between their professional and personal lives (Kässi & Lehdonvirta, 2018).

The gig economy in Malaysia has emerged as a significant part of the labor market, with around 26% of the workforce, or approximately four million people, involved in gig work as of 2023 (World Bank, 2023). Its appeal lies in the flexibility of work hours and the ability to control income, making it particularly attractive to younger Malaysians and those who face barriers to traditional employment. Gig work allows individuals to choose when, where, and how they work, which is ideal for those seeking work-life balance or managing multiple

responsibilities, such as students, caregivers, or part-time workers. However, while it provides an alternative for those struggling with unemployment or seeking extra income, the shift towards gig work raises concerns about maintaining a healthy work-life balance, with challenges often exacerbated by Malaysia's local economic conditions.

Recent studies in Malaysia highlight that while gig work offers flexibility, it often leads to poor work-life balance due to irregular working hours and the lack of job security. According to a survey by the Employees Provident Fund (EPF) in 2023, a significant portion of Malaysian gig workers reported working more than 60 hours per week, with many struggling to maintain a balance between their work and personal lives. This extended working time is often a result of the need to compensate for income instability, as gig workers typically do not have access to fixed salaries, benefits, or social protections available to traditional employees (EPF, 2023). Furthermore, the lack of social support and the precarious nature of gig work in Malaysia contribute to heightened stress levels among workers. The same survey indicated that over 60% of Malaysian gig workers expressed concerns about their financial security and long-term prospects, factors that significantly impact their mental well-being and overall quality of life (EPF, 2023). The Malaysian government's initiatives, such as allocating RM40 million in the 2023 budget to support 30,000 gig workers, reflect an awareness of these issues but also underscore the need for more comprehensive strategies to address the work-life balance challenges faced by gig workers (Ministry of Finance Malaysia, 2023).

Task management in the gig economy is complex due to the unpredictable nature of assignments, often leading to irregular working hours and difficulties in managing workload. This unpredictability can result in increased stress levels and decreased job satisfaction, ultimately affecting workers' overall well-being (Wood et al., 2019). Additionally, the lack of social support, both from employers and personal networks, exacerbates these challenges. Without the backing of a traditional work environment, gig workers often face isolation, which can negatively impact their mental health and ability to cope with work-related stress (Taylor et al., 2022). Income volatility is another critical issue for gig workers, as their earnings can be highly inconsistent. Unlike traditional employees, gig workers do not have the security of a regular paycheque, which can lead to financial instability and anxiety. This financial uncertainty further complicates their ability to maintain a healthy work-life balance, as they may need to work longer hours or take on multiple gigs to meet their financial needs (Warren, 2021).

Despite the growing body of literature exploring the gig economy, significant gaps remain in understanding the specific factors that influence work-life balance among gig workers. Much of the existing research has focused on the broader impacts of gig work, such as job satisfaction and financial security, but has often overlooked the interconnected roles of task management, social support, and income. While studies like those by Wood et al. (2019) and Taylor et al. (2022) provide valuable insights into the challenges faced by gig workers, there is a need for more comprehensive research that specifically examines how these factors collectively impact work-life balance, particularly in the context of Malaysia. Additionally, the unique socio-economic dynamics of Malaysia's gig economy, including cultural expectations and varying levels of access to social support, suggest that a localized study could yield important findings that differ from those in other regions.

To address this research gap, the objectives of this study are threefold: First, to analyze the impact of task management on work-life balance among gig workers in Malaysia. Second, to examine the role of social support in mitigating the challenges faced by gig workers, particularly in managing stress and maintaining mental well-being. Third, to investigate how income volatility affects gig workers' ability to achieve a balanced work-life dynamic. By achieving these objectives, this study aims to contribute to the literature by providing a nuanced understanding of the factors influencing work-life balance in the gig economy, with a specific focus on the Malaysian context.

2. Literature Review

Defining Work-Life Balance and the Gig Economy: Work-life balance refers to the equilibrium that individuals strive to maintain between their professional responsibilities and personal lives. Achieving this balance is crucial for overall well-being, as it reduces stress, increases job satisfaction, and improves mental health (Greenhaus & Allen, 2011). Traditionally, work-life balance has been associated with standard employment, where fixed working hours and a stable income allow employees to allocate time effectively

between work and personal commitments. However, with the rise of the gig economy, this balance has become increasingly difficult to achieve.

The gig economy, characterized by short-term contracts or freelance work as opposed to permanent jobs, has transformed the traditional employment landscape. Gig workers, including freelancers, independent contractors, and platform-based workers, are drawn to the gig economy for its flexibility, autonomy, and potential for higher income (De Stefano, 2016). However, this flexibility often comes with trade-offs, such as income instability, lack of social protections, and irregular working hours, which can negatively impact work-life balance (Kässi & Lehdonvirta, 2018). As the gig economy continues to expand globally, with an estimated 1.1 billion freelancers worldwide in 2023 (Payoneer, 2023), understanding the factors that influence work-life balance in this context is critical for both workers and policymakers.

Theoretical Framework: Job Demand-Resources Theory: The Job Demand-Resources (JD-R) Theory provides a useful framework for understanding the factors that influence work-life balance in the gig economy. According to this theory, job demands are the physical, psychological, social, or organizational aspects of a job that require sustained effort and are therefore associated with certain physiological and psychological costs (Demerouti et al., 2001). In contrast, job resources refer to the physical, psychological, social, or organizational aspects of a job that assist in achieving work goals, reduce job demands, and stimulate personal growth and development.

In the context of the gig economy, task management, social support, and income can be viewed through the lens of the JD-R Theory. Task management, which includes the ability to manage workload and maintain control over working hours, can be seen as a job demand that, if not handled effectively, can lead to stress and burnout. Social support, on the other hand, acts as a job resource that can buffer the negative effects of job demands. The presence of strong social support, whether from family, peers, or professional networks, can mitigate the stress associated with gig work and enhance work-life balance (Bakker & Demerouti, 2017). Lastly, income serves as both a job demand and a resource; while the need to secure income can increase stress, a stable and sufficient income can improve job satisfaction and contribute to a better work-life balance (Warren, 2021).

Factors Influencing Work-Life Balance in the Gig Economy

Task Management: Task management in the gig economy presents inherent challenges due to the unpredictable nature of assignments. Unlike traditional jobs with fixed hours, gig work often involves fluctuating demands, leading to irregular working hours and difficulties in maintaining a consistent workload. Wood et al. (2019) found that while gig work offers autonomy, it is also accompanied by algorithmic control, which can exacerbate stress and disrupt work-life balance. This unpredictability complicates the separation of work and personal life, contributing to higher stress levels and lower job satisfaction among gig workers.

Social Support: The absence of a structured work environment in the gig economy means that gig workers often have limited access to social support from employers or colleagues. This lack of support can intensify the difficulties associated with gig work, as workers may struggle to find the emotional and practical assistance needed to manage work-related stress. Taylor et al. (2022) revealed through a quantitative survey that the absence of social support exacerbates mental health issues among gig workers. Conversely, strong support networks from family or peers can help alleviate stress and enhance work-life balance, highlighting the critical role of social support in mitigating job demands.

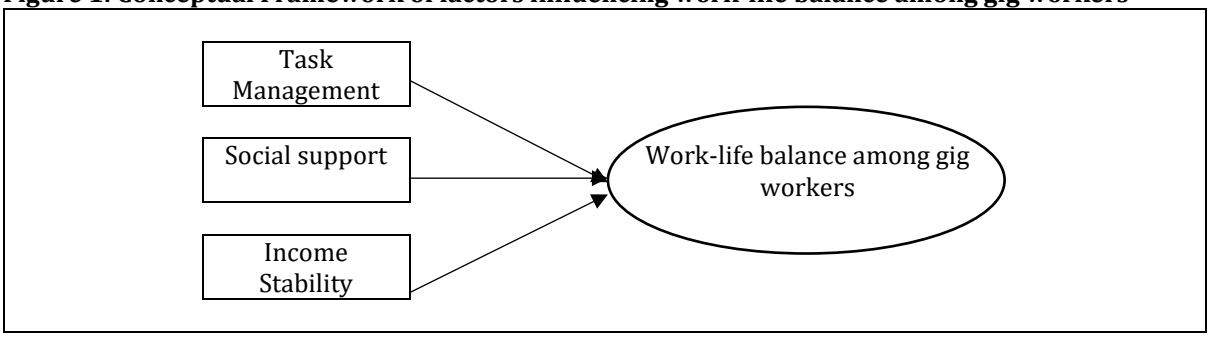
Income Stability: Income volatility is a significant concern in the gig economy, as earnings can vary widely from month to month. Unlike traditional employees with regular paychecks, gig workers often face financial instability, leading to anxiety and a constant need to secure additional work to meet financial obligations (Warren, 2021). This financial pressure can result in longer working hours and fewer opportunities for rest and leisure, further disrupting work-life balance. Zulkefli and Omar (2023) demonstrated that income instability and irregular hours negatively impact work-life balance, with income stability correlating with higher job satisfaction.

Recent studies reinforce these findings across various contexts. Jain et al. (2023) used bibliometric analysis to highlight how remote gig work blurs work-life boundaries, underscoring the need for improved support mechanisms. Rasheed et al. (2022) qualitatively explored how unpredictable work schedules challenge gig workers' ability to maintain balance, emphasizing the importance of personal time management and social support. Asfahani et al. (2023) examined how structured human resource practices in the Saudi gig economy could enhance job satisfaction and work-life balance, while Sakarji et al. (2018) provided insights into how job demands, similar to those in gig work, impact mental health and balance, revealing parallels between different work environments.

Research Gaps and Conclusion: Despite the growing body of literature on the gig economy, significant gaps remain in understanding the specific factors that influence work-life balance among gig workers. While the JD-R Theory provides a valuable framework for exploring these factors, there is a need for more empirical research that examines how task management, social support, and income collectively impact work-life balance, particularly in different cultural and economic contexts. Most studies have focused on Western countries, and there is a lack of research addressing the unique challenges faced by gig workers in developing economies like Malaysia.

In conclusion, task management, social support, and income are critical factors that influence work-life balance in the gig economy. While these factors are interrelated, their impact can vary depending on the specific context in which gig workers operate. As the gig economy continues to grow, it is essential to develop strategies that address these challenges and promote a healthier work-life balance for gig workers. Future research should focus on exploring these issues in greater depth, particularly in regions where gig work is becoming increasingly prevalent, such as Southeast Asia.

Figure 1: Conceptual Framework of factors influencing work-life balance among gig workers



The conceptual framework for examining work-life balance among gig workers is grounded in the Job Demands-Resources (JD-R) Theory, which delineates how job demands and job resources influence employees' well-being and performance. This framework identifies task management, social support, and income stability as key components impacting work-life balance. According to the JD-R Theory, task management serves as a job demand that can increase stress and disrupt work-life balance if not effectively handled (Bakker & Demerouti, 2017). The unpredictable nature of gig work, characterized by fluctuating tasks and irregular hours, intensifies these demands (Wood et al., 2019).

In contrast, social support functions as a job resource that mitigates the negative effects of high job demands by providing emotional and practical assistance, thereby enhancing work-life balance (Taylor et al., 2022). Income stability is another crucial job resource; it reduces financial stress and supports a healthier work-life balance by diminishing the need for excessive working hours (Warren, 2021; Zulkefli & Omar, 2023). The framework posits that effective task management, robust social support, and stable income each positively influence work-life balance by reducing stress and improving the integration of work and personal life. This approach highlights the importance of balancing job demands with adequate resources to foster a sustainable work-life equilibrium in the gig economy.

3. Methodology

This study employs a quantitative research design to investigate the factors influencing work-life balance among gig workers. The unit of analysis is the individual gig worker, with a specific focus on e-hailing riders. According to Roscoe (1975), a sample size of between 30 and 500 is typically adequate for most behavioral studies. Therefore, the sample size consisted of 70 respondents, all of whom were gig workers operating in Alor Setar, Kedah. The study utilized a combination of purposive sampling as the primary approach and snowball sampling as a secondary technique. Purposive sampling was applied to ensure that respondents met specific criteria: they must be e-hailing riders visibly carrying a company-branded bag, identified at specific locations within Alor Setar. Following this, snowball sampling was employed, whereby initial participants were asked to recommend other potential respondents who met the study's criteria.

To gather quantitative data on work-life balance, task management, social support, and income stability, a questionnaire was developed. Table 1 provides the list of variables and the number of items used to measure each variable in the study. The questionnaire was bilingual, available in both English and Malay, to accommodate the language preferences of the respondents.

Table 1: Measurement and data analysis

Variables	Items	Data analysis
Work-life balance (DV)	6	
Task management (IV)	6	Bivariate Analysis
Social support (IV)	6	(Correlation)
Income stability (IV)	6	

The collected data were analyzed using the Statistical Package for the Social Sciences (SPSS) software. Descriptive statistics provided a summary of the data, while bivariate analysis (correlation) was conducted to examine the relationships between the variables of interest.

4. Findings

Table 2: Demographic Profiles

No.	*Profile*	*Frequency*	*Percentage (%)*
1	Gender		
	Male	59	84.3
	Female	11	15.7
	Total	70	100
2	Age		
	18 – 22	11	15.7
	23 – 27	39	55.7
	28 – 32	18	25.7
	33 – 37	2	2.9
	38 – and above	0	0
	Total	70	100
3	Status		
	Single	55	78.6
	Married	15	21.4
	Others	0	0
	Total	70	100
4	Doing the delivery job as		
	Part-time	45	64.3
	Full-time	25	35.7
	Total	70	100

The demographic profile of the respondents in this study provides insight into the characteristics of gig workers in Alor Setar, Kedah. Out of the 70 respondents, 84.3% were male, and 15.7% were female, highlighting

a predominance of male gig workers in this area. Age distribution shows that the majority of respondents (55.7%) were between 23 and 27 years old, followed by 25.7% aged 28 to 32, and 15.7% aged 18 to 22. Only a small fraction, 2.9%, were between 33 and 37 years old, with no respondents over 38 years old. In terms of marital status, 78.6% of the respondents were single, while 21.4% were married. Regarding the nature of their work, 64.3% of the respondents worked part-time as gig workers, while 35.7% worked full-time. This demographic data underscores the youth-dominated, predominantly male, and largely part-time nature of the gig workforce in the region.

Table 3: Result of Pearson Correlation

No.	Variable	R-value	p-value
1	Task Management	0.855	< 0.05
2	Social Support	0.760	< 0.05
3	Income Stability	0.744	< 0.05

The analysis revealed a strong positive correlation with an R-value of 0.855 and a p-value of less than 0.05, indicating that effective task management significantly improves work-life balance among gig workers. Next, the results showed a positive correlation with an R-value of 0.760 and a p-value of less than 0.05, suggesting that social support plays a crucial role in enhancing work-life balance. Furthermore, a positive correlation was found with an R-value of 0.744 and a p-value of less than 0.05, demonstrating that income stability is a key factor in achieving a balanced work-life dynamic for gig workers.

Discussion

The findings of this study provide significant insights into the factors influencing work-life balance among gig workers in Malaysia, particularly in the context of task management, social support, and income stability. The results indicate a strong positive relationship between task management and work-life balance (R-value = 0.855, $p < 0.05$), suggesting that effective task management practices significantly enhance gig workers' ability to balance their work and personal lives. This finding aligns with the Job Demand-Resources (JD-R) theory, which posits that better management of work tasks can reduce job demands, thereby improving overall work-life balance.

Similarly, social support was found to have a positive impact on work-life balance (R-value = 0.760, $p < 0.05$). This underscores the importance of social networks in mitigating the stress associated with gig work, which often lacks the structural support found in traditional employment. The protective role of social support in mental well-being, as highlighted in previous studies, is particularly relevant in the gig economy, where workers face unpredictable work schedules and income instability (Liu et al., 2024).

Income stability also demonstrated a positive correlation with work-life balance (R-value = 0.744, $p < 0.05$). The results suggest that stable income is crucial for gig workers to achieve a balanced work-life dynamic, supporting previous literature that emphasizes the financial uncertainty inherent in gig work as a significant stressor. These findings highlight the need for policy interventions aimed at improving income stability and providing greater financial security for gig workers.

Overall, the study contributes to the existing literature by confirming the critical roles of task management, social support, and income stability in enhancing work-life balance among gig workers. Future research should explore these relationships further, considering different contexts and additional variables that may influence work-life balance in the gig economy.

5. Conclusion

This study has identified critical factors influencing work-life balance among gig workers in Malaysia, including task management, social support, and income stability. The key findings revealed strong positive correlations between these factors and work-life balance, with task management, social support, and income stability all significantly contributing to gig workers' ability to maintain a balanced life. In addition to contributing to the growing body of literature on work-life balance in the gig economy, the study's focus on e-hailing riders in a developing country fills a gap in the existing research, which has predominantly centered on gig workers in

Western economies. These findings provide a more comprehensive understanding of how gig workers in diverse socio-economic and cultural contexts manage work-life balance, making a valuable contribution to the discourse on gig work and well-being.

The findings support and extend the Job Demand-Resources (JD-R) theory, highlighting that effective task management and robust social support systems can serve as resources that mitigate job demands and improve work-life balance. The positive impact of income stability also adds a new dimension to the theory, emphasizing the role of financial security in the gig economy. Practically, these results suggest that gig platforms and policymakers should prioritize the development of tools and support mechanisms that help workers manage their tasks efficiently, foster strong social networks, and ensure income stability. These measures could enhance the well-being and productivity of gig workers, leading to a more sustainable gig economy.

Despite the valuable insights, the study has limitations. The sample was limited to gig workers in Malaysia, which may not fully represent gig workers in other regions. Additionally, the study's cross-sectional design restricts the ability to establish causality between the variables. Future research should explore these relationships longitudinally to better understand the causal effects and investigate additional variables such as job autonomy and flexibility. Comparative studies across different countries would also provide a more comprehensive understanding of the factors influencing work-life balance in the gig economy globally.

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Predicting the Elements of Life Necessities for Students at UiTM Melaka

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Abstract: This research delves into the hotly contested topic of residency requirements in our country, which is now receiving a lot of attention from the media. Students at public colleges, especially those from low-income families who already face many obstacles, should pay special attention to this issue. Students who must manage the challenges of university life in addition to having to repay student loans are even more disadvantaged. Thus, the purpose of this study is to investigate the social, psychological, and financial aspects that impact the need for living on campus. 200 questionnaires in all were disseminated using Google Forms and then analyzed. The study utilized multiple regression analysis to evaluate the predictor factors that influence kids' fundamental survival needs. According to the findings, societal factors (b = -.455) had the biggest impact on the fundamental requirements of UiTM Melaka degree and diploma holders. The kids' basic needs were also strongly impacted by psychological (b = -.310) and economic (b = -.357) aspects. These results highlight the vital role that social, economic, and psychological interventions have in improving people's quality of life—not just in college settings, but also in general. The study's high R Square value (.978) indicates that these factors together account for almost all variances in quality of life. As a result, this research supports all-encompassing approaches that target these important factors to enhance people's general well-being, especially those of those who are vulnerable.

Keywords: *Psychology, social, financial, students, necessities of life.*

1. Introduction

Numerous teenagers are refusing to continue their education in universities, whether public or private, according to reports in the mainstream media lately. This problem contradicts the historical situation in which families' and students' ambition was to pursue higher education (Turner, Holdsworth, & Scott-Young, 2017). The ability of teens and their families to live as students facing significant financial, psychological, and social problems is one of the main factors that drives them to decide against continuing their education. Academic and personal changes are part of this life system shift, which exposes college students to demanding living situations and calls for a high level of adjustment (Rahat & Ilhan, 2016; Skovholt & Ronnestad, 2003). University students' well-being and academic performance will suffer if they are unable to handle this life shift (Bayram & Bilgel, 2008). Students must adapt to these changes and have a very high level of self-endurance (Wang, 2009). According to the research by Erdogan, Ozdogan, and Erdogan (2015), self-resilience can aid college students in adjusting to the changes that come with living on campus. According to Dyrbye et al. (2010), students must be able to adjust both inwardly and externally to university life. If not, there's a good chance they'll give up on their education or experience depression, which will make it harder for them to function as college students.

According to earlier research, kids who are adaptable to a new situation can enhance their quality of life, have a more favorable attitude toward their learning environment, and succeed academically (Tyre, Griffin, & Simmons, 2016). Furthermore, students' academic success may also be influenced by their capacity to overcome social, psychological, financial, and economic challenges in life. To support students living their lives as distant and alone students, we must identify the most important variables in their lives.

It is impossible to discount the possibility that the current scenario may result in higher living expenses across the board, including for groceries, services, and raw materials. A person's educational costs will go up as a result of changing lifestyles and Malaysia's growing cost of living. In the interim, in addition to having to pay for educational supplies like textbooks and stationery, they are also indirectly impacted by price increases, particularly when the government begins raising the Sales and Services Tax (SST) to 8% in 2024. Students need

to know the importance of treating this part of financial management seriously due to the escalating difficulties of modern life.

In light of the points put forward, a study on the factors predicting university students' life necessities ought to be conducted to ascertain what needs students have in the areas of psychology, social work, finance, and economics while they pursue their studies at UiTM.

2. Literature Review

Financial

Management is the deliberate and ongoing process of assisting a group or a person in reaching their objectives. Brigham et al. (2014) define financial management as the art and science of managing money, utilizing a range of economic theories and accounting objectives to help individuals and businesses reach their objectives. Being a student is not an easy task because, in addition to doing tasks like reviewing lessons and turning in assignments from lecturers, students also need to manage their money wisely and effectively to continue their education in higher education without experiencing any financial difficulties. Undergraduates are more likely to successfully meet their demands in life if they possess strong self-management abilities, such as time management and money management. In addition to making it more difficult to meet fundamental needs, poor self-management can raise stress and anxiety levels (Baumeister & Heatherton, 1996).

Psychology's Impact

Recent research on student psychology has demonstrated the important influence that psychological elements including social support, coping mechanisms, and academic anxiety have on students' living needs. To help students deal with concerns connected to their requirements, such as stress management and mental resilience development, psychological treatments are crucial, according to a study by Roberts and Smith (2021) (Roberts & Smith, 2021). The psychological aspects of stress, positive psychology, self-management, and self-assurance are among the key psychological elements that influence students' requirements. A thorough comprehension of these variables can aid in the development of more successful support plans for UiTM Melaka students, enabling them to better satisfy their basic needs and achieve success in both their personal and academic lives. Maslow classified human needs into five levels: security, love, admiration, self-actualization, and physiological needs. Before undergraduates can concentrate on higher requirements like self-esteem and personal performance, they must first attend to their physiological needs, such as food and shelter, and their security needs, such as financial stability (Maslow, 1943).

Social Factor

When discussing the needs of life, the term "social factor" refers to the impact that relationships, social interactions, and community involvement have on an individual's well-being and quality of life. These elements cover a wide spectrum of social dynamics, such as Social support. It is the mental, practical, and informational help that one gets from friends, family, and the community. Robust social support systems can support people in times of need, ease stress, and improve their general mental and emotional health (Cohen & Wills, 1985). The degree to which a person is involved in social activities and linked to their society is known as their social integration. According to Putnam (2000), social integration can improve life satisfaction, lessen feelings of loneliness, and promote a sense of belonging. A person's happiness and sense of fulfillment in life are greatly influenced by the strength and depth of their relationships, including their friendships, love partnerships, and family ties. Emotional stability and personal fulfillment are facilitated by positive interactions (Reis & Gable, 2003). Cultural norms and values are the accepted ideas and customs that shape a community or culture and shape people's behavior and attitudes. One's feeling of identity and belonging can be affected by adhering to or departing from these norms (Markus & Kitayama, 1991).

3. Methodology

The purpose of this study was to investigate the predictive variables that influence UiTM Melaka students' basic requirements. This study was conducted at the UiTM Melaka Branch, which comprises three campuses: the Kampus Jasin Melaka (KJM), the Kampus Bandaraya Melaka (KBM), and the Kampus Alor Gajah Melaka (KAG). This study uses a quantitative methodology to analyze primary data that was obtained using a Google Form

questionnaire. The questionnaire was broken down into four sections: Part A provided background information about the respondents, while Parts B, C, and D each had 28 question items that the respondents had to respond to meet the study's goals.

The study's research started with a reliability analysis of the data collected to gauge students' living necessities. To ascertain the coefficient strength that has been examined for the factors of measurement of students' living needs, as indicated in Table 1, the study will employ a table by Hair et al. (2003). According to the analysis, this questionnaire's Alpha value is 0.86, which is Very Good and is displayed in Table 1.

Table 1: Alpha Cronbach value and interpretation

Alpha Coefficient Range	Coefficient Strength
< 0.60	Weak
0.60 to < 0.70	Moderate
0.70 to < 0.80	Good
0.80 to < 0.90	Very Good
>0.90	Excellent

Source: Hair et al. (2003)

The study's objectives were then analyzed using the multiple regression approach to identify the elements that determine students' living needs. The relationship between dependent and non-dependent factors is found using this method, which helps identify the living needs of pupils. The relationship between the dependent and non-dependent variables for the study was ascertained using this method. The impact of the non-dependent variable on the dependent variable will be examined in this analysis. The sample size for this quantitative investigation was determined to be 140 respondents. The process of choosing a sample size involves using the G-Power sample selection application. It is a free tool that may recommend sample sizes based on the impact of sample size and strength of the kind of analysis that will be performed and the total population is not required (Wan Ahmad, et. al., 2018). The lowest suggested sample size for research needing Multiple Regression analysis (effect size: 0.8 and eer prob.: 0.05) was 49 individuals. Following the determination of the sample size and the stratified random selection of respondents, the study instruments were distributed to the participants. Once the respondents had completed responding to every question the researchers had sent them, the study instruments were once more gathered. The required data are measured and gathered using study tools. There are two elements to the tool, or questionnaire, which were employed in this investigation. Student demographic data from UiTM Melaka is included in Part A. Predictor elements affecting UiTM Melaka students' living needs are listed in Part B.

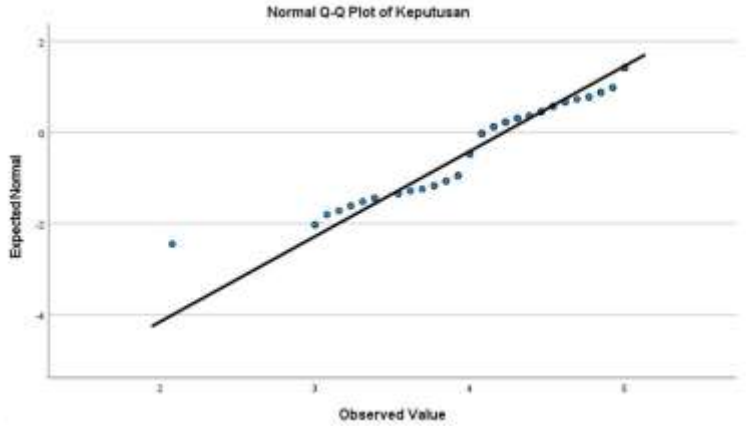
Analysis, both descriptive and inferential

The percentage value for the first research question, which concerns the participation of Muslim women by field in technical sector jobs in career selection by institution, was obtained through the analysis of the study using SPSS 23.0 software. The Multiple Linear Regression Analysis test was used to identify the predictor characteristics that influence profession selection to investigate the link between these factors and job choice.

Test of Normality

To find out if the distribution is normal or not, one needs to run the Data Sample Normalcy Test. A parameterized statistical test is inappropriate for the given data if the distribution is aberrant or does not fit the normal distribution criteria. To ascertain whether or not the data from these trials were normally distributed, multiple tests were required. The histogram's form indicates whether the frequency distribution of the study's data is dispersed normally or not. The histogram's shape indicates that the high middle, where the majority of the scores are concentrated, and the low left and right indicate that the frequency of the distribution of the study's data is typically dispersed.

Figure 1: Normal Q-Q Plot with Data Histogram



The Q-Q analysis of the plot for the predictor factor for each respondent is displayed in Figure 1. The data is concentrated along the straight line of the Q-Q plot, as indicated by the form of the histogram, which depicts the data's normal distribution. Pallant (2020) and Hair, et al. claim that... Al (2010) dispersed data if the information obtained from the instrument by the respondents is 45 degrees above a straight line. The left and right histograms' shapes indicate a low distribution since a little proportion of respondents have both too few and too many scores. If the data is represented as a graph, an arc line is a bell. Normal scattered data can be presumed when normal curves are displayed in the form of a bell-shaped curve. The data used in this study are distributed normally, according to the Normal Probability Plot (also known as the Normal Q-Q Plot). All of the responder data that was gathered from the instrument is dispersed in a straight line that extends to the diagonal. As stated by Pallant (2010) and Hair, et al. (2010) Normal distributed data if every response gathered from the device is above a straight line at a 45-degree angle.

The study's non-leaning and leaning factors had a linear connection. This study's data are dispersed randomly and don't follow any particular trend. As stated by Hair, et al. Since there is a linear relationship between the non-leaning and leaning variables, al. (2010) found that the data is distributed regularly. The results of the tests indicate that the study data satisfies the requirements for a normal distribution. Additionally, the test displays a linear association between leaning and non-leaning characteristics. In summary, the test's results demonstrate normalcy utilizing a Q-Q analysis of the plot, which indicates that the study's data are all distributed normally.

4. Results and Discussion

This questionnaire was completed by 200 UiTM Melaka students who come from B40 households.

Finding predictors factor in university students' living necessities
It's critical to understand the components that significantly impact university students' necessities. This is because to enhance the welfare and well-being of the students, this is what the university administration needs to emphasize.

Table 2: Findings from the Living Needs Predictor Factors

Predictive Factor	n	beta	p
Sosial	200	.455	.000
Psikologi	200	.310	.000
Kewangan	200	.357	.000

The regression coefficient for social factors is significantly positive (b =.455, p <.001). This implies that social characteristics and quality of life have a strong positive correlation. In this case, a rise in social elements corresponds to an improvement in life quality. A significant positive regression coefficient (b =.357, p <.001) is also seen for financial considerations. This demonstrates that money plays a significant role in determining life quality and that bettering one's financial situation is linked to a higher standard of living. Additionally, quality of life was significantly and favorably impacted by psychological characteristics (b =.310, p <.001). This indicates that improving one's psychological state is a significant component in raising one's standard of living.

Table 3: Synopsis of Model

Model	R	r Square	Adjusted R Square	Std. The error of the estimate
1	.989	.978	.977	.11784

A high r value (.989) suggests that quality of life and all three predictor categories (social, financial, and psychological) are highly correlated. These three factors account for 97.8% of the difference in quality of life, according to r Square (.978) and Adjusted r Square (.977). The little Std. The great degree of accuracy with which this regression model can predict quality of life is indicated by the Error of the Estimate value (.11784). All things considered, these results point to the importance and strength of social, economic, and psychological variables as quality-of-life determinants. Nearly the whole variation in the study participants' quality of life could be explained by the combination of these three characteristics.

We may relate and explain how social, financial, and psychological aspects affect quality of life by referring to prior studies based on the data from Tables 2 and 3. This can be accomplished by emphasizing how each of these variables is a significant predictor in earlier research and how the results of the present investigations either confirm or expand upon that knowledge.

Social Elements

Numerous prior research has demonstrated the significance of social factors in affecting an individual's quality of life. For instance, Ryff and Singer (1998) stress the significance of meaningful social relationships as a crucial element of psychological health and a high standard of living. Strong social ties lower stress and offer emotional support, both of which enhance quality of life, according to the study. This view is supported by the current study's results, which demonstrate a high regression coefficient for social factors (b =.455, p <.001). Social variables unquestionably have a considerable impact on quality of life. This could be a result of the vital emotional and psychological resources that people receive from their families, communities, and supportive social relationships.

Aspects of Finance

Numerous studies on quality of life have also recognized financial problems as a significant component. For instance, Diener and Biswas-Diener (2002) discovered a positive correlation between income and happiness, particularly in civilizations where meeting fundamental necessities is challenging in the absence of sufficient financial means. The current study's results, which indicate a substantial association between money and quality of life (b =.357, p <.001), support the idea that achieving financial stability is crucial to enhancing personal well-being. A stable financial situation makes it possible to obtain improved social, educational, and health services, all of which improve one's quality of life.

Psychological Elements

Qualitative aspects of life are also influenced by psychological elements, such as mental and emotional wellness. According to the WHO (2001), mental health is a key factor in quality of life, and those who experience psychological distress typically have worse quality of life ratings. In reality, according to a report by the Malaysian Security Council, half a million Malaysians suffer from depression, indicating that the country's mental health status is extremely concerning (MKM 2024). The current study's results, which indicate that psychological elements have a significant impact on quality of life (b =.310, p <.001), corroborate earlier research emphasizing the importance of psychological well-being for a high standard of living. This shows that in an attempt to enhance overall quality of life, therapies targeted at enhancing mental health and lowering psychological distress are crucial.

5. Conclusion

The results of this study show that social, financial, and psychological variables are significant predictors of life quality. These results are in line with earlier studies that have repeatedly highlighted the significance of these three categories in determining a person's overall well-being. This study highlights the significant influence these variables have on people's lives by confirming that they jointly explain nearly all the variance in life quality—with an extraordinarily high R Square value of.978.

The strong association that has been seen indicates that specific actions in these domains are crucial for improving the overall well-being of the populace. In addition to being essential elements of well-being, psychological health, financial security, and social support systems are interrelated pillars that, when improved, can significantly increase life satisfaction and pleasure in general. To promote a healthier and happier society, legislators, medical professionals, and social planners should give priority to integrated initiatives that address these factors comprehensively. This study supports the idea that raising people's quality of life necessitates a multidimensional strategy that takes into account both their unique needs and the larger social context in which they live.

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Comparative Analysis of Government Website and Service Monitoring System Ratings among State Islamic Religious Councils (SIRCs) in Malaysia

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Abstract: This study explores the comparison of websites of various State Islamic Religious Councils (SIRCs) in Malaysia using the Government Website and Service Monitoring System known as SPLaSK ratings. SPLaSK, an initiative by the Malaysian government serves as a critical tool for monitoring and evaluating the performance of government websites and services. By focusing on the SIRCs, this study seeks to identify patterns, strengths, and areas for improvement in digital governance. Using qualitative content analysis and semi-structured interviews, the study analyzes SPLaSK ratings of SIRCs to understand how these councils utilize digital platforms to engage with the public, disseminate information, and provide services. Websites registered with SPLaSK are assessed based on six (6) dimensions, namely accessibility, ease of use, quality of content, privacy or security, responsiveness, and reliability. It has been disclosed that only 10 out of 14 SIRCs were registered with SPLaSK in 2023, with 40% achieving excellent ratings of above 80%. The overall scores of the websites also suggest that four (4) SIRCs have underperformed, receiving scores below 50, attributed to inefficient website management. The findings offer valuable insights into the effectiveness of SPLaSK in promoting transparency, efficiency, and user-friendliness in government digital services, thus contributing to the broader discourse on digital governance within government agencies in Malaysia.

Keywords: *Digital governance, website performance, monitoring systems, ratings, SIRCs*

1. Introduction

The integration of digital technology into government operations has transformed how governments interact with their citizens. Numerous benefits are attributed to e-government portals, such as fostering greater efficiency, transparency, and accessibility in public service delivery (Saengchaia et al., 2020). Developing an e-government portal that offers up-to-date public services on both web and mobile platforms will encourage the adoption and use of e-government services (Yıldırım & Bostancı, 2021). An important consideration in fostering effective digital disclosure by the government is the concept of website performance. Almaiah and Nasereddin (2020) suggest that website performance, such as functionality, content quality, ease of use, and security, positively influences the performance expectancy of e-government services.

In Malaysia, the Sistem Pemantauan Laman Web dan Servis Kerajaan (SPLaSK), or Government Website and Service Monitoring System, plays a critical role in this digital transformation. Administered by the Malaysian Administrative Modernization and Management Planning Unit (MAMPU), SPLaSK is designed to monitor and assess the quality of government websites and services, ensuring they adhere to standards across various dimensions, including accessibility, ease of use, content quality, security, responsiveness, and reliability (MAMPU, 2024). These dimensions are particularly relevant in the context of government disclosure practices. Government agencies are expected to provide timely, accurate, and comprehensive information to the public through their digital platforms.

SPLaSK's assessment criteria directly influence the effectiveness of these disclosure practices by evaluating the extent to which government websites are user-friendly, transparent, and capable of delivering essential information securely and reliably (Khalid & Yang, 2024). The history of SPLaSK reflects Malaysia's ongoing commitment to improving digital governance, starting with the Malaysia Government Portals and Website Assessment (MGPWA) in 2005, and evolving into a more sophisticated tool with the introduction of SPLaSK

v2.0 in 2019, which incorporates real-time monitoring and automated compliance checks (Abdul Rahim et al., 2019).

Despite the implementation of SPLaSK, significant disparities persist in the performance of government websites and services, especially among the State Islamic Religious Councils (SIRCs) in Malaysia. These councils, tasked with managing Islamic affairs in their respective states, rely on digital platforms for public engagement, information dissemination, and service delivery. However, the effectiveness of these platforms varies widely, with some councils achieving high SPLaSK ratings while others lag. This variability not only reflects inconsistencies in digital governance but also highlights deficiencies in the disclosure practices of these agencies.

The uneven performance of SIRCs' websites has implications for public trust and transparency, as inadequate disclosure practices can hinder citizens' access to critical information and services. This is particularly concerning given the role of digital platforms in facilitating government transparency and accountability. Prior research underscores the importance of robust digital governance frameworks in supporting effective disclosure practices, which are essential for fostering public confidence in government operations (Fong & Meng, 2009; Leong & Lee, 2021). Understanding the factors contributing to these disparities, whether they stem from resource limitations, technical challenges, or organizational inefficiencies—is vital for improving the digital governance and disclosure practices of underperforming councils. Without addressing these issues, the broader goals of transparency and effective governance may remain unmet, undermining the progress made in Malaysia's digital government initiatives (Radzi et al., 2021).

Therefore, the main objective of this study is to conduct a comparative analysis of website performance using SPLaSK ratings among different SIRCs in Malaysia, to identify patterns, strengths, and areas for improvement in their digital governance and disclosure practices. This study employs a qualitative research design, combining content analysis of SPLaSK ratings with semi-structured interviews with key stakeholders, to gain a deeper understanding of how these councils utilize digital platforms, the challenges they face, and the impact of these platforms on public engagement and service delivery. By examining these aspects, the study seeks to provide evidence-based insights that can inform policy recommendations and strategic interventions aimed at enhancing the digital governance capabilities and disclosure practices of SIRCs. This research aims to contribute to the broader discourse on digital governance in Malaysia, offering practical solutions to bridge the performance gap among government agencies and improve transparency and accountability (Ramli, 2017; Radzi et al., 2021).

2. Literature Review

E-Government

In an incredibly increasingly digitized world, governments around the world are adopting and embracing information technology (IT) to assist the duties performance of government for its citizens, especially in the provision of information and services. The implementation of IT systems such as e-government represents a shift towards modernizing traditional government processes. To be more reliable, transparent, accountable, and efficient in obtaining government services. The evolution from e-government to digital government reflects a broader global trend of integrating advanced technologies to enhance public sector efficiency and citizen engagement. This evolution is defined as the production and delivery of information and services inside the government and between the government and the public using a range of information and communication technologies (Abdul Rahim et al., 2019). In addition, according to Naswir et al. (2019), digital government is a way of digitizing government services to improve service delivery systems efficiently and effectively to maintain relations with the citizens. It leads to the improvement of government functions and services and works to provide comprehensive service delivery that will satisfy the citizens.

E-government in Malaysia

From the local perspective, Malaysia launched e-government in 1995, known as eGOV1.0, and since then the e-government has evolved from a website with the only goal of informing people about the services they provide to the utilization of information and communication technologies (ICT) and neighboring scientific and technological domains, towards societal problem solving, resource optimization, and citizen well-being. (eGOV

3.0 (Abdul Rahim et al., 2019). In addition, MAMPU launched SPLaSK v2.0 (System for Public Sector Website and Online Service KPI Assessment). This improved platform utilizes a web crawler to automatically assess website compliance with established criteria in real time. This evolution in website monitoring systems demonstrates MAMPU's ongoing commitment to ensuring government websites are not only user-friendly but also effective in delivering services and supporting the country's digital government goals (MAMPU, 2024). The SPLaSK initiative plays a critical role in enhancing digital governance by promoting efficiency, transparency, and citizen engagement. As Malaysia embraces digital governance, significant efforts are being made to utilize data and advanced analytics for improved decision-making and public service delivery (Khalid & Yang, 2024)

Website Systems and Components

To ensure digital government, especially online services, are delivered accurately, efficiently, cost-effectively, and robustly, there should be appropriate models, tools, and techniques to measure, monitor, and maximize the efficiency and effectiveness of these services (Fong & Meng, 2009). Government website and service monitoring system ratings reveal significant insights into the effectiveness and reliability of these systems across different countries. Key components of government websites include accessibility, ease of use, content quality, privacy/security, responsiveness, and reliability.

Accessibility: Accessibility is vital to government websites, ensuring they are easy to use on a wide range of devices and platforms. Raut and Singh (2024) highlight that government websites must adhere to accessibility standards to ensure usability for all citizens, which includes optimizing for mobile devices and different operating systems. The accessibility of government websites in Malaysia is a significant concern, as highlighted by multiple studies. Research indicates that while there has been progress in the use of e-government platforms, compliance with web accessibility standards remains inadequate. It is therefore essential to ensure greater compliance of the government websites with established web accessibility standards and guidelines (Ahmi & Mohamad, 2016).

Ease of Use: The ease of use of government websites is critical in ensuring effective communication and service delivery to citizens. Research indicates that government websites must be accessible and user-friendly to enhance public engagement. Malaysian government websites significantly influence citizen satisfaction and their intention to utilize e-government services. Research indicates that perceived ease of use is a critical determinant of citizen satisfaction, ranking alongside service quality and content quality as significant predictors of overall satisfaction with e-government portals in Malaysia (Baharon et al., 2017). Improving user-friendly features and ensuring reliable information is vital for improving the overall experience of Malaysian government websites.

Quality of Content: The quality of content is multifaceted and involves more than just delivering accurate information. It encompasses several aspects to ensure that the content not only informs but also engages and effectively meets its intended goals. The quality of content on Malaysian government websites is assessed using various metrics and dimensions, which greatly influence user satisfaction. Key metrics identified include security, performance, content structure, technology, and accessibility, which are essential for effective e-government services (Rakhani et al., 2023).

Privacy Policy: The integration of private policy and security measures in government websites is crucial for enhancing transparency and accountability through digital platforms. Electronic government policies significantly improve public service transparency and accountability by facilitating faster service delivery and increasing citizen engagement, but challenges such as data security and uneven access remain (Wijaya et al., 2024). Further development and adaptation are needed to overcome these challenges and ensure the effectiveness of e-government in promoting transparency and accountability. Thus, a comprehensive approach that prioritizes robust security measures alongside transparent communication is vital for fostering trust and accountability in government operations.

Responsiveness: The responsiveness of government websites is important for enhancing transparency and accountability through digital platforms. Research by effective government responses to citizen inquiries significantly boosts public satisfaction and engagement. For instance, a study by Schmidthuber et al. (2022) indicates that crowdsourcing platforms reveal that citizens are less likely to participate when their requests

are denied without a clear rationale, emphasizing the need for transparent communication from the government to sustain citizen involvement.

Reliability: The reliability of government websites is essential for enhancing transparency and accountability through digital platforms. Reliability emphasizes the consistency and dependability of the services. According to Taufiqurokhman et al. (2024), technology-enabled service processes can streamline time and cost, quick processing time, and prompt responses may contribute to a positive user experience. A good quality public service can provide easier access for citizens to various services without the need to physically visit government offices.

In summary, The literature review reveals a consensus on the importance of the dimensions and criteria used by SPLaSK in evaluating the performance of government websites. These factors are not only critical for enhancing the accessibility, usability, and reliability of digital platforms but also play a significant role in advancing transparency and accountability in the public sector. This study, focusing on the application of SPLaSK in evaluating the State Islamic Religious Councils (SIRCs), aims to provide a detailed analysis of the current state of digital governance within these councils and identify possible improvement areas.

3. Methodology

This study uses a qualitative research approach, mixing content analysis with semi-structured interviews. The content analysis looks at the SPLaSK ratings for State Islamic Religious Councils (SIRCs) in six key areas, as outlined by the Malaysian Administrative Modernization and Management Planning Unit (MAMPU). To support this analysis, interviews with MAMPU IT officers were held to better understand SPLaSK operations and challenges. The questions for the interviews were developed after reviewing studies on digital governance and website performance and discussing them with MAMPU officials. The interviews focus on key issues like usability, content quality, and security of government websites, and how SPLaSK ratings affect public engagement and services. The insights from these interviews will add important context to the study's analysis and suggestions.

Table 1: Dimensions and criteria for SPLaSK assessment

Dimensions	Criteria
Accessibility	Active Link
	Device responsiveness
	Search Engine Optimization (SEO)
	Mobile App
	Multi-language Content
	Sitemap
	Find Website using Search Too
Ease of Use	Link to MyGov Portal
	Search Function
	W3C Disability Accessibility
	Advanced Search Option
Quality of content	Publication
	Updated Content
	Number of Online Services
	Electronic Archive
	Publicizing an agency CIO/CDO or equivalent
	Online procurement announcement
	Online E-Participation
Policy/Security	Privacy Policy
	HTTPS Availability
Responsiveness	Feedback form
Reliability	Loading Time
	Downtime

(Source: MAMPU, 2024)

SPLaSK users are assessed based on the grading scale below, with very low for grading less than 20% to very high for more than 80% marks. The diagrammatic flow of the grading scale is depicted in Figure 1. The formula for the grading is based on the below formula:

SPLaSK's grade = [(Accessibility dimensions/7)*100) + ((Ease of use dimension/4) * 100) + ((Quality of Content/9) * 100)) + ((Privacy/Security dimension/2)*100) + (Responsiveness dimension *100) + ((Reliability dimension)/2 * 100)

Figure 1: Grading scale



Source: (MAMPU, 2024)

4. Findings and Discussion

Demographics of the interviewees

For the study, an interview was set up with the MAMPU's IT department discussing their role and duties in handling SPLaSK. Below is the summary of respondents.

Table 2: Profile of MAMPU's Interviewee

Interviewees Codes	Position
R1	Head of Department
R2	Assistant Manager
R3	IT Executive 1
R4	IT Executive 2
R5	IT Officer 1
R6	IT Officer 2

The interview was conducted with the Head of the IT Department of MAMPU together with the Assistant Manager, two (2) IT Executives, and two (2) IT Officers to elicit detailed operation of SPLaSK as a tool to monitor the digital governance of the respective government agency websites.

Compliance Score of SIRCs based on SPLaSK Criteria

As of 31 December 2023, a total of 10 out of 14 SIRCs have registered with MAMPU for the SPLaSK application. A rating on SIRCS for the SPLaSK application has been gathered to compare and interpret the performance of these SIRCs under SPLaSK. For this study, the compliance scores for the whole year of the respective SIRCs have been gathered. The compliance score is generated by the SPLaSK application automatically every month to monitor the performance of the agencies registered for the SPLaSK application. As depicted in Table 3, out of 10 registered SIRCs with SPLaSK, only four (4) or 40% have achieved scores of more than 80% or are considered very high, whereas two (2) SIRCs score within 40 to 80% or are considered as medium to high performance, while four (4) SIRCs underperformed with scores lower than 40%.

An analysis using SPLaSK revealed a clear performance gap among the SIRCs. SR3 topped the rankings with a score of 96.82%, likely due to rigorous state oversight of website management. Conversely, SR8 scored the lowest (23.01%), highlighting challenges faced by some SIRCs. Interestingly, SR9, which began using SPLaSK later (May 2023), achieved better results compared to others who started earlier (January 2023). Interviews suggest that insufficient funding and personnel hinder website management for lower-performing SIRCs, potentially explaining the performance disparity. The high performance of SIRCs, scoring above 90% is credited to the organizational dedication to maintaining their websites efficiently. Specifically, SR3's leading score can

be attributed to the State Council's rigorous oversight of website management across various state agencies. This is consistent with research by Chung (2015). Conversely, interviews suggest that the SIRCs with lower scores (SR2, SR4, SR6, and SR8) struggle with inadequate funding and lack the necessary personnel to effectively manage their websites, reflecting similar challenges highlighted in studies on e-government implementation (Rakhani et al., 2023; Ahmi & Mohamad, 2016).

Table 3: Average score for compliance with SPLaSK by MAMPU (by month) in 2023

SIRCs/ Month	(SR1) *	(SR2)	(SR3)	(SR4)	(SR5)	(SR6)**	(SR7)	(SR8)	(SR9) **	(SR10)
Jan		37.16	99.15	28.69	77.55		39.05	23.22		96.98
Feb		39.12	95.83	27.89	89.37		37.03	22.16		94.19
March		38.92	99.46	26.54	89.26		39.59	23.22		96.21
April		38.06	98.95	28.09	90.84		39.59	23.22		99.22
May		38.83	97.55	27.09	93.37	3.25	39.61	23.29	43.7	97.83
June		35.53	90.18	25.3	90.60	32.61	37.10	21.81	77.89	89.19
July		39.95	95.26	27.38	91.78	35.82	39.68	23.02	93.64	98.85
Aug		41.97	98.08	27.38	95.75	34.04	39.88	16.4	93.32	99.57
Sept		41.5	97.15	32.93	91.63	32.93	41.13	22.93	94.94	99.33
Oct	39.82	4159	97.81	27.78	99.77	33.93	86.16	23.22	98.33	98.85
Nov	94.91	40.79	95.44	27.32	96.98	33.65	84.72	22.94	98.37	96.05
Dec	95.78	42.26	96.97	27.51	93.3	33.26	83.93	30.72	99.46	94.68
Average score	76.84	39.64	96.82	27.83	91.68	29.94	50.62	23.01	87.45	96.74

*Starts using SPLaSK Oct 23
**Starts using SPLaSK on May 23

Interviews conducted with the IT Department revealed:
"*Employee turnover in the agency can be a challenging condition for us. The challenges are that work will be stalled and tasks will change. The solution is to provide training, or often when people change, they will ask to be shown again. Sometimes we will go there, or they will come here*" (R1)

Another respondent elaborated on the challenge in handling SPLaSK, R4 highlighted that,
"The vast array of content management systems (CMS) used by different agencies creates a challenge. Providing specific training for each platform is difficult, and agencies may lack the in-house expertise to implement tagging, a crucial SPLaSK functionality, across all these diverse CMS systems. Furthermore, technical limitations can arise when agencies lack the skills to fix errors identified by SPLaSK. Finally, SPLaSK itself can be blocked by agency servers or the Public Sector Data Center (PDSA), hindering its ability to effectively crawl and monitor websites"
The above view aligns with findings by Fisdian et al. (2024), which emphasize the impact of technical and resource limitations on the reliability and effectiveness of e-government services.

For details on compliance score, a further investigation of the six (6) dimensions of the SPLaSK's criteria was conducted as depicted in Table 4. In line with Table 3 earlier, it justifies that SR3, SR5, SR9, and SR10 have managed to secure scores above 80% predominantly due to their commitment to excel in all dimensions outlined by MAMPU. This shows their commitment to fulfilling the SPLaSK requirement as an effort to promote better websites in the form of user-friendliness, information disclosure, and service efficiency. On the other hand, the four (4) SIRCs with lower scores, namely SR2, SR4, SR6, and SR7, with scores less than 40%, have also obtained lower scores for each dimension, reflecting their poor overall performance in fulfilling the SPLaSK criteria.

An analysis of Table 4 shows that all eight criteria under the 'Accessibility' dimension for device responsiveness, all criteria under 'Ease of Use' for linking to the MyGov Portal, all criteria under 'Quality of Content' for updated content, and all criteria under 'Privacy or Security' for HTTPS availability are met by 100% of the SIRCs (State Internal Revenue Commissions). Notably, 'reliability'' is the only dimension where all SIRCs achieved perfect compliance across all criteria. Conversely, compliance is lowest for 'Accessibility' in terms of

Search Engine Optimization (SEO) and Mobile Apps, with only 5 out of 10 SIRCs meeting those criteria. The remaining dimensions typically have a compliance rate between 60% and 70% for SIRCs.

Table 4 also overleaf reveals that only four SIRCs namely SR3, SR5, SR9, and SR10 met all the criteria outlined in the SPLaSK dimensions. Conversely, SR8 achieved the lowest score (34.78%), fulfilling only 8 out of 23 criteria sets.

Table 4: SIRCs Compliance to SPLaSK requirement in 2023 (average days or minutes/second compliance in a month)

Dimension	Criteria	SR1	SR2	SR3	SR4	SR5	SR6	SR7	SR8	SR9	SR10	Compliance (dimension)
Accessibility	Active Links	24.33	0	26.17	6.5	28.5	9.75	3.58	0	26.38	24.42	80%
	Device Responsiveness	24.33	28.42	29.42	29.08	29.33	25.63	29.58	29.25	29.38	29.92	100%
	Search Engine Optimization (SEO)	24.33	0	29.67	0	29.33	0	0	0	12.63	29.5	50%
	Mobile Apps	0	0	29.42	0	15.17	0	7.58	0	11.63	29.58	50%
	Multi-Language for Content	24.33	0	29.75	0	28.83	0	7.75	0	26.5	29.83	60%
	Sitemap	24.33	0	29.50	0	29.5	0	0	0	26.75	30	60%
	Find Website Using Search Tools	12.67	0	30.17	2.08	30.17	26	0	0	29.63	30.08	70%
Ease of Use	Link to MyGov Portal	24.33	28.17	29.83	2.5	29.42	25.25	29.42	29	28.63	29.75	100%
	Search Function	24.33	28.58	30.00	0	29.25	0	21.75	0	29.25	29.5	70%
	W3C Disability Accessibility	24.33	27.92	29.92	0	29.25	0	29.33	0	29.5	29.42	70%
	Advanced Search Option	24.33	0	29.58	0	28.17	0	7.75	0	26.75	29.83	60%
Quality of Content	Publication	24.33	0	29.33	0	7.17	0	0	0	21.63	29.75	60%
	Updated content	30.33	29.67	27.08	0.17	28.5	0.5	8.08	0.75	23.88	22.67	100%
	Number of Online Services	24.33	0	29.83	0	28.83	0	7.75	0	26.88	29.75	70%
	Electronic Archive	24.33	0	29.5	0	28.92	0	7.75	0	26.38	29.75	70%
	Publishing an Agency or Equivalent	20.00	0	27.42	0	28.08	0	7.67	0	23.5	24.92	60%
	Online Procurement Announcement	24.33	0	29.58	0	28.92	0	7.75	0	26.75	30.08	60%
	Online E-participation	24.33	0	29.75	0	29.67	0	7.75	0	26.63	29.42	60%
Privacy/Security	Privacy Policy	24.33	0	29.58	0	28.08	0	775	0	26.5	29.25	60%
	HTTPS Availability	34.67	29.42	29.83	29	30.08	26	29.58	2.42	23.13	29.75	100%
Responsiveness	Feedback form	24.33	0	29.67	0	28.17	0	7.75	0	26.88	29.5	60%
Reliability	Downtime (days)	23.33	27.00	29.67	27.83	29.42	25	28.58	27.92	28.75	29.42	100%
	Downtime (minutes)	0.61	2.61	0.75	0.64	0.97	1.05	0.70	1.85	0.82	1.4	100%
	Loading time (days)	23.67	27.33	29.08	28.17	29.97	25.13	28.83	28.92	29.25	29.58	100%
	Loading time (seconds)	1.39	1.57	1.34	0.45	0.12	2.58	0.69	1.72	1.36	0.61	100%
Compliance to dimensions (x%, xx/23)		95.6% (22/23)	43.48% (10/23)	100% (23/23)	43.48% (10/23)	100% (23/23)	43.48% (10/23)	82.6% (19/23)	34.78% (8/23)	100% (23/23)	100% (23/23)	

Table 5 below (based on the MAMPU SPLaSK grading scale) summarizes the distribution of scores among the SIRCs. There is a positive trend for SIRCs that have registered for SPLaSK. Even though only 10 out of 13 SIRCs registered with SPLaSK (76.9%), the majority (60%) scored in the 'very high' category (over 80%).

Table 5: Distribution of Scores among SIRCs based on the SPLaSK Grading Scale

Grading	Number of SIRCs	Percentage (%)
Very low (< 20%)	Nil	Nil
Low (20 – 40%)	1	10
Satisfactory (41 – 60%)	3	30
High (61 – 80%)	Nil	Nil

Very high (>80%)	6	60
Total	10	100

The SPLaSK assessment revealed a significant disparity in website quality among SIRCs. While some, like SR3, achieved near-perfect scores due to strong organizational commitment, others, like SR8, struggled. Interestingly, even later adopters like SR9 showed promising results. These findings suggest that resource allocation and dedicated personnel are important for effective website management under SPLaSK.

5. Conclusion

The SPLaSK assessment serves as a strong indicator of the effectiveness of this framework in enhancing digital governance among Malaysian State Islamic Religious Councils (SIRCs). The significant performance disparity highlights areas for improvement, particularly for SIRCs struggling with resource allocation. Investing in well-trained personnel and sufficient funding can significantly elevate website quality and user experience. Implementing SPLaSK empowers SIRCs to deliver vital services more efficiently, strengthening digital governance. However, continuous monitoring and adaptation to evolving technological advancements remain crucial to ensuring the long-term effectiveness of SPLaSK.

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The Role of Knowledge Management, Kaizen Culture and Training on Employee Performance

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Abstract: The study establishes the relationship between employee performance, training, knowledge management and Kaizen culture. Primary sources, specifically questionnaires distributed to respondents via online Google Forms and printed copies, provided the data for this study. This study included a convenience sample of 113 respondents from selected private companies in Johor, Melaka, and Negeri Sembilan. The study found no statistically significant relationship between training and knowledge management about employee performance. The introduction of Kaizen culture in certain organizations in the southern region of Malaysia proved to have a significant influence on employee performance. This study highlights the significance of implementing a kaizen culture to enhance employee performance. Implementing the kaizen principle would immediately affect several aspects such as employee engagement, empowerment, communication, and recognition. Although earlier studies have examined employee performance and its management antecedents, there is a lack of understanding of the relationship between training, knowledge management, and the kaizen culture, specifically within the private sector in Malaysia.

Keywords: *Training, Knowledge management, Kaizen, Culture, Employee performance*

1. Introduction

Organizations must continue to strengthen their employees' competence and abilities if they wish to gain a competitive advantage by assisting their employees in adopting the organization's mission, internalizing its shared values, and integrating its practices. Employee performance is one of the most important variables in organizational and work psychology, and businesses that want to advance must pull out all the stops to assist them in advertising their specialized goods and services and therefore achieve their goals, Gencer et al, (2023). Organizations must learn how to quickly minimize the inverse impacts of uncertainty and ambiguity by creating dynamic core skills as the business world stays dynamic and turbulent. 'Experts' have frequently bombarded us with many programs purporting to answer all the sector's management problems (Cheng & Leong, 2017). These include training and guidance (Surucu, 2021), the attainment of the objectives of continuous improvement (Kharub et al, 2022), and the vital sharing of knowledge, particularly in the reworking process of technical developments and discoveries, which would, seemingly, heighten employee job performance. Today, there is little doubt that the "quality program" revolution is in full swing. This phenomenon has been observed to have an impact on almost every sort of business, industry, organization, and person. The assessment of an employee's performance encompasses multiple dimensions and is consistently emphasized as having a significant influence on a company's profitability.

Training, knowledge management, and the cultivation of a kaizen culture are management strategies that have previously been implemented within organizations to enhance employee performance. For example, training should create quality employees, with an improvement in employee performance achieved by personally improving their knowledge, skills, and attitudes toward tasks that are their responsibility (Sidik, 2021). The concept of kaizen culture pertains to a managerial approach aimed at optimizing the work environment by minimizing wasteful practices and fostering an atmosphere that is both efficient and productive (Kusumaningrum, 2017). Finally, knowledge management can be defined as a systematic process that involves the creation, acquisition, comprehension, dissemination, and utilization of knowledge, regardless of its storage location. The primary objective of knowledge management is to improve organizational learning and boost overall performance (Di Vaio, et al., 2021). Despite previous research on employee performance and its management antecedents, there is a lack of understanding regarding the connection between training,

knowledge management, and the kaizen culture, particularly within Malaysia's private sector. This study sought to investigate the connection between the aforementioned three criteria and their potential influence on employee performance.

2. Literature Review

Employee Performance

Organizations implement various upgrades or modifications to enhance work performance, which can potentially increase productivity and yield if consistently applied. Performance is essentially the evaluation of an employee's accomplishments about the established benchmarks for their specific position. The metrics used to assess the enhancement's efficacy include improvements in employee performance and the quality of work produced. Omoush et al. (2020) discovered a direct correlation between the quality of completed work and both work performance and overall job satisfaction. Employees enhance the quality of their work by first familiarizing themselves with the concept of work quality and reflecting on the importance of their contribution to the business's success. This allowed employees to better understand how to improve the quality of their work. Work effectiveness can be defined as an employee's satisfying performance that leads to achieving predetermined goals. These goals are based on the employee's productivity, quality of work output, quantity of work completed, timely completion of duties, and workplace reliability. The employee's productivity and the quality of their work output measure the effectiveness of their work. Gunawan et al. (2022) further strengthened this argument by asserting that adherence to established standards, such as those for service firms, primarily determines the quality of the scope of work, including the timely delivery of goods or services and the ability to meet or exceed consumer expectations.

Training

Both newly hired and existing personnel receive training, a methodical form of teaching, to equip them with the essential abilities required to proficiently carry out their job duties. Training is a proactive initiative that aims to improve people's competence and skills in the workplace (Soelton, 2018). Through training, employees could acquire new skills and enhance their existing abilities, enabling them to perform their current tasks more effectively and efficiently, ultimately contributing to achieving organizational goals (Sidik, 2021). Training allows employees to acquire the skills, information, and capabilities essential to accomplishing the duties required of them on the job. As a result, employee performance is considerably improved. According to research, participation in training programs leads to improvements in one's productivity, level of job satisfaction, level of motivation, level of engagement, and level of competitiveness. According to Al Karim (2019), proper training contributes to organizational success and growth. Therefore, based on the foregoing discussion, the following hypothesis is developed:

H1: There is a significant relationship between training and employee performance.

Knowledge management (KM)

Knowledge management (KM) refers to the systematic approach of identifying, organizing, storing, and disseminating information within an organization. It involves the management of diverse assets, including human resources and information resources documented in various forms, such as manuals or documents. The primary objective of KM is to enable employees to effectively utilize this knowledge in the execution of their tasks and responsibilities (Payal et al. 2019). KM could alternatively be defined as the process of producing, acquiring, comprehending, sharing, and using knowledge, regardless of where the knowledge is physically held, to improve the learning and performance of an organization (Di Vaio, et al., 2021). This includes the identification, acquisition, transfer, sharing, and exploitation of knowledge (Albassami et al., 2019). Among the various interpretations of knowledge management (KM), the most straightforward rendition posits it as a strategic approach aimed at acquiring appropriate knowledge and facilitating the dissemination and assimilation of information to improve organizational effectiveness. Companies must curate and disseminate knowledge that aligns with the specific requirements of their diverse range of job roles. It is of the utmost importance that the acquired knowledge be communicated to the appropriate persons; failing to do so would render it useless or wasteful (Sidik, 2021). According to a study conducted by Aladwan et. al (2020), it was demonstrated that the many dimensions of knowledge management, including knowledge acquisition,

knowledge storage, information sharing, and application of knowledge, collectively have a simultaneous impact on employee performance. According to Abun (2021), whose research examined the impact of knowledge management on employee work performance. The study's findings suggested a strong direct impact of these elements on organizational performance based on its criteria, which aimed to evaluate the impact of knowledge production, transfer, sharing, organizational learning, and innovation on organizational performance. Therefore, the following hypothesis is developed:
H2: There is a significant relationship between knowledge management and employee performance.

Kaizen culture
Kaizen is a Japanese management philosophy for incremental, methodical, and continuous change that results in incremental improvement. According to Tariku & Aden (2020), Kaizen is a philosophy of continuous improvement. Kaizen is a value-based management system that encompasses every aspect of our lives for consistent improvement. According to Shewareged (2019), in business, kaizen refers to activities that perpetually improve all functions with the support of all employees. Kaizen works well within collective cultures for implementing incremental changes that result in long-term transformation. The Kaizen philosophy was more centered on people, simpler to implement, and required discipline over the long term. This was also supported by Deme, (2018) where Kaizen was a participative process that incorporated everyone from top management to shop floor employees.

Kaizen is the continual improvement of day-to-day operations in all facets of the company, including for everyone (managers as well as frontline and shopfloor employees) and everywhere (all areas, departments, or processes), and it has a direct influence on the performance of employees. For instance, Kumar, et al (2018) and Ishigame (2020) showed that Kaizen led to improvements in productivity and other performances. Therefore, the following hypothesis is developed:
H3: There is a significant relationship between Kaizen culture and employee performance.

3. Methodology

The target population for this study consists of employees working in private-sector companies situated in the southern area of Malaysia. The purposive sampling method selected a total of 113 respondents, ensuring representation across various levels of positions within their respective organizations. The present study encompasses four primary variables, including training, knowledge management, kaizen culture, and employee performance. The items utilized in this study were derived from prior research, with a particular emphasis on studies that closely align with the organizational environment. All variables were assessed using a five-point Likert scale. Then, this data was analyzed using statistical analysis to obtain the relationship between several variables in this study. The quantity of items corresponds to each variable depicted in Table 1 below.

Table 1: Operationalization of Variables

Variable	Number of Items	Source
Training	10	Al-Saudi (2016) Nassazi (2013) Vo et al (2019)
Knowledge Management	10	Karim & Latif (2019) Payal et al (2019) Yao et al (2020)
Kaizen Culture	9	Erdogan (2015) Vo et al (2019)
Employee Performance	6	Karim & Latif (2019) Al-Saudi (2016)

4. Findings

Cronbach's alpha was carried out, and as shown in Table 2, the alpha value (α) for all items was above 0.7. Therefore, it can be concluded that the items applied in this study were valid and reliable. Due to the α value being close to 1, it can be considered that the variables used have a high level of reliability. Next, Table 3 shows the breakdown of the respondents by gender, age group, education level, designation, and years of working experience in the current organization. The majority of respondents were female, with 49.6% of them being between the ages of 31 and 40. As for education level, the majority of respondents obtained a first degree with 51.3%, and only 5.3% qualified with a postgraduate degree. Designation in the organization, executives indicated a high percentage with 58.4%, followed by clerks with 23.9%. Finally, based on their working experience, most of them involved in the current organization for between 10 and 15 years, with 31.0%.

Table 2: Reliability Analysis

Variable	Number of Items	Cronbach's Alpha
Training	10	0.965
Knowledge Management	10	0.945
Kaizen Culture	9	0.927
Employee Performance	6	0.934

Table 3: Respondents profile

Criteria	Category	Number	Percentage
Gender	Male	42	37.2
	Female	71	62.8
Age Group	19-25	2	1.8
	26-30	16	14.2
	31-40	56	49.6
	41-50	23	20.4
	51 and above	16	14.2
Education Level	Higher Secondary	24	21.2
	Diploma	24	21.2
	Degree	58	51.3
	Post Graduate	6	5.3
	Professional Certificate	1	0.9
Designation	Clerks	27	23.9
	Executive	66	58.4
	Middle-Level Manager	17	15.0
	Senior Manager	3	2.7
Working experience	1-4 years	6	5.3
	5-9 years	30	26.5
	10-15 years	35	31.0
	16-19 years	19	16.8
	More than 20 years	23	20.4

Table 4: Result of Multiple Regression

Dependent variable: Employee performance		
Independent variables	**Standardized Coefficient (BETA)**	**Sig.**
(Constant)		
Training	0.121	0.127
Knowledge Management	0.157	0.070
Kaizen Culture	0.365	0.000
F value	28.589 (0.000)	
R square	0.440	

5. Conclusion and Discussion

According to Table 4 above, the only variable with a significant relationship is kaizen culture, whose significant value is 0.00 because it is less than 0.05. The beta value of kaizen culture (β = 0.365) also indicated that kaizen culture is the highest predictor among the other independent variables. The result also specifies the positive relationship between the kaizen culture and employee performance, suggesting that the increase of one unit of kaizen culture may increase the value of employee performance in an organization.

However, for the other two independent variables, training and knowledge management, the results turned out to be not significant at values of 0.127 and 0.070, respectively, as they are not within $p<0.01$ or even $p<0.05$. In this research, those two variables did not significantly influence the dependent variable, employee performance.

Based on this empirical evidence, this study proves that Kaizen culture is highly relevant in the context of improving the performance of employees in organizations, especially in the private sector in Malaysia. This aligns with current research findings about this significant relationship, as exemplified by several studies undertaken by Ekhsan et al. (2023), Nasution et al. (2023), and El Hasan et al. (2022). Thus, it is suggested that each organization be encouraged to apply this new culture set as it can promote teamwork, waste reduction, continuous improvement practices, employee development, and innovativeness, which will foster better employee and organization performance.

Several implications might be obtained from this advantage of Kaizen culture toward improving employee performance. For example, Kaizen encourages employees to participate actively in identifying and implementing process improvements for their work. Employees are more engaged and motivated to perform at their best when they influence how their work is performed and when their suggestions are implemented. Secondly, Kaizen empowers employees by allowing them access to their work processes. When employees have a sense of ownership and control over their tasks, they are more likely to take pride in their work and aspire for improved performance. Moreover, Kaizen frequently involves cross-functional teams collaborating on improvement initiatives. This enhances employee communication and collaboration, thereby enhancing overall performance. Lastly, organizations that implement Kaizen usually acknowledge and reward employees for their contributions to continuous improvement. These incentives can encourage workers to continue seeking improved performance.

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Re-visiting the E-SERVQUAL and Expectancy Disconfirmation Theory in the Context of the Service Industry in Malaysia

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Abstract: The SERVQUAL model has been used for several years to illustrate the relationships between tangible, assurance, reliability, responsiveness, empathy, and customer satisfaction. This paper posits that the SERVQUAL model requires an extension to better explain the relationships between the factors that influence customer satisfaction. The main difference is that the revised SERVQUAL includes the dimensions that apply to the online service industry or e-commerce, thus the proposed e-SERVQUAL comprises fulfillment, efficiency, privacy, and system availability. In this paper, e-SERVQUAL pinpointed two underpinning theories which are e-SERVQUAL and Expectancy Disconfirmation Theory (EDT). This study delves into the foundation, expansion, and evolvement of both theories particularly in the online food delivery service industry in Malaysia. The main objective of this paper is to present the reviews of the literature on e-SERVQUAL and Expectancy Disconfirmation Theory on the relationship between the elements that influence e-customer satisfaction. The study contributes to developing and improving the model that defines service quality in a digital service context. Correspondingly, it emphasizes the robustness of the theories and further enriches the academic literature.

Keywords: *e-SERVQUAL, Expectancy Disconfirmation Theory, e-customer satisfaction*

1. Introduction

During the Pandemic Covid-19 the Online Food Delivery (OFD) service is high in demand for most customers. Covid-19 has raised the demand for food delivery services as people cannot go to congested places due to lockdown back in the day. Nowadays, with the Endemic Covid-19, businesses have shifted partially from physical to online including food delivery services. Food delivery is a courier service that delivers food from retail restaurants or cafes to customers. Customers can make an order through the website or mobile apps of online food service providers. Customers nowadays use the OFD due to the lifestyle that developed from the pandemic Covid-19 and remarkably customers now are familiar with the application, interface, and website. Moreover, they feel it is more convenient to order food online which will benefit in time-saving orientation and sometimes get more online promotion from the service provider. The consumer can save time and do other things while the food is on its way to be delivered. Customers are given two options to order the food which is by website or mobile apps.

In Malaysia, OFD has started to upsurge since the Pandemic Covid-19 outbreak due to a total lockdown made by the government that customers cannot go outside freely. Service providers such as Grabfood, Foodpanda, ShopeeFood, Bungkusit, DeliverEat, Tapau, and OdaMakan are among the most popular food delivery services in Malaysia. Online Food Delivery (OFD) has become more competitive in the business nowadays. This has been possible due to OFD could satisfy the needs of people who live in city areas who are busy and prefer their meals to be delivered to their location. Therefore, to meet the needs of customers, a business needs to fulfill the customer's expectations. Among the most used food delivery service providers in Malaysia are Grabfood, and Foodpanda, which are the powerhouse in the OFD industry with a total number of apps installed is 100 million plus and 50 million plus respectively. It indicates that the number of apps installed is equivalent to the number of users but this data is only collected in the Google Play store (YellowBees, 2021).

Despite the large number of customers using the OFD, there are still some who are dissatisfied with the service. There are too many complaints were made that the authorities had to establish a special channel for customers of OFD to make a complaint with concern to any issue of OFD. According to the Ministry of Domestic Trade and Consumer Affairs, (2021), more than 1,900 complaints were received. In 2021, the ministry received

complaints from Foodpanda and Grabfood a total of 946 and 43 respectively (Yin, 2021). This indicates a significant number of consumers that are not satisfied with OFD service in Malaysia hence the business must improve their service quality to ensure the customer is well satisfied. Among the prominent issues highlighted are delivery issues, technical problems in the application or website, and the payment issue. Hence, this paper will begin by briefly reviewing the main construct (e-customer satisfaction), followed by the proposed variables (fulfillment, efficiency, privacy, and system availability), the underpinning theories to support the hypothesized link, and finally the findings. As a result, the study was conducted to examine the association between factors that influence customer satisfaction. This conceptual paper aims to further explore how the variables in the SERVQUAL model can be tested empirically. The service industry in Malaysia must understand the customer satisfaction level so that they can enhance a better service.

2. Literature Review

E- Customer Satisfaction

Customer satisfaction is a central part of businesses, it's a measurement of how well the business is running and how it satisfies the customer's needs and wants (Muhammad Maladi, 2019). A higher degree of customer satisfaction leads to the development of a lucrative relationship (Fuentes-Blasco et al., 2017). Customer satisfaction must be prioritized because eventually it will persuade customers to repeat purchases, allowing the business to thrive and compete (Jasin & Firmansyah, 2023). According to Puspasari et al., (2022) satisfaction of the customer is significant to keep their customers in the market. While according to Mongdong & Tumewu, (2015) Customer satisfaction refers to a person's feelings of excitement or dissatisfaction subsequently evaluating what they think of the good or service that they expected. Moreover, customer satisfaction means either enjoyment or disappointment as a result of analyzing the goods or services they consumed compared to customer expectations (Su et al., 2016). Customers will be very delighted if the presentation of the company's services matches what they expect. Customer satisfaction scopes are made up of various components. Numerous studies have examined customer satisfaction as a dependent variable as mentioned above. According to the Expectancy Disconfirmation Theory (EDT), the satisfaction of a customer is shaped by the perceived gap between expectancy and real experiences (Oliver & Desarbo, 1988). In electronic commerce, customers have specific expectations regarding the services they receive. These expectations include punctuality of delivery, precise order fulfillment, and privacy. If the business fails to meet these expectations can lead to unhappiness (Zeithaml et al., 2002). Several studies have examined the relationship between e-service quality and e-customer satisfaction within the online business environment. Improving the quality of the service is an encouraging strategy to ensure the businesses are more attractive and to boost customer pleasure (Fasihah et al., 2020). Farooq et al. (2018) reported on the perceptions of service quality and its special effects on customer satisfaction. Dalbehera (2020) explored academics' views on e-service quality and its influence on perceived value, satisfaction, and constancy toward e-library services.

Fulfillment

Parasuraman et al. (2005), fulfillment refers to the e-commerce website meeting its promises regarding the delivery of order and availability of the items. This concept encompasses various elements, such as the accuracy of service commitments, availability of the orders, and the timely delivery of correct items to customers (Wang et al., 2003). De Vos et al. (2015) expand on this by emphasizing the importance of accurately displaying products to customers, ensuring that the received product matches what was ordered, and delivering within the promised timeframe. Rafiq et al. (2012) identified fulfillment as the most crucial factor in online business. Multiple research has demonstrated the constructive impact of fulfillment on e-customer satisfaction in online shopping. Research by Singh Shergill et al. (2005) established that fulfillment enhances customer satisfaction, a finding supported by Kandulapati Shekhar Bellamkonda (2014) and Jain et al. (2017). Effective fulfillment practices not only improve a company's visibility but also help build a positive reputation, deliver a superior customer experience, and ultimately increase satisfaction (San et al., 2020). Additionally, several studies have validated the substantial and positive effect of fulfillment on e-customer satisfaction (Çelik, 2021; Ding et al., 2011; Kim & Kim, 2010; Rita et al., 2019). Consistently, these studies indicate that meeting promises, accurately and promptly delivering products, and fulfilling customer expectations are vital for ensuring satisfaction in e-commerce environments.

Efficiency

Efficiency refers to the easiness and speediness of consumers to use and operate an online platform, such as an auction site (Parasuraman et al., 2005). Zeithaml et al. (2002) emphasize that efficiency is a critical dimension reflecting customers' ability to explore and use the website, locate their products, and attain the information with little effort. Achieving efficiency involves having a user-friendly, well-organized website. Thus, evaluating efficiency is essential for evaluating the quality and functions of the website. Similarly, Wang (2003) describes efficiency as the capability of the customer to operate the website and find desired products effortlessly. Essentially, efficiency is a time-saving and convenient use of applications or websites, which includes how companies simplify and accelerate website or application access (Mayasari et al., 2020). Khan et al. (2015) highlight the significance of the efficiency of business websites. Several studies in the literature demonstrate a positive correlation between efficiency and e-customer satisfaction. For example, Khan et al. (2019) found a significant positive relationship between efficiency and customer satisfaction. Elsharnouby and Mahrous (2015) similarly reported that the efficiency dimension significantly influences customer satisfaction. Durmuş et al. (2015) also found that the efficiency dimension of e-service quality impacts e-customer satisfaction. Research by Leonnard (2019) further supports the notion that efficiency significantly affects e-customer satisfaction. Consequently, the literature consistently confirms that efficiency is closely correlated with e-customer satisfaction.

Privacy

Privacy is the extent to which a website ensures the safety and protection of buyer details (Parasuraman et al., 2005). It involves safeguarding customer shopping behavior data, preventing the disclosure of personal information to external parties, and securing their financial details (Zeithaml et al., 2002). Customers tend to perceive higher service quality in e-commerce websites that implement robust privacy measures (Mamakou et al., 2023). In the e-commerce context, privacy pertains to protecting customer data during online transactions ensuring the confidentiality and security of sensitive information (Cheng et al., 2021). Similarly, Khan et al. (2019) describe privacy as the platform's ability to protect customer information from unauthorized access or misuse. Akin (2017) highlights that privacy features ensure the confidentiality of customer-provided information throughout the purchasing process, preventing unauthorized third-party access. Customer concerns about data processing, storage, and security issues (Libaque-Sáenz et al., 2021). For instance, Andrew et al. (2019) demonstrated that privacy significantly influences customer dependence and the agreement of online services, such as e-wallets. This finding aligns with recent research, consistently indicating a constructive association between privacy and satisfaction (Bozbay et al., 2016; Chang et al., 2005; Wang et al., 2019; Yoo & Donthu, 2001). The literature clearly shows that privacy positively influences e-customer satisfaction.

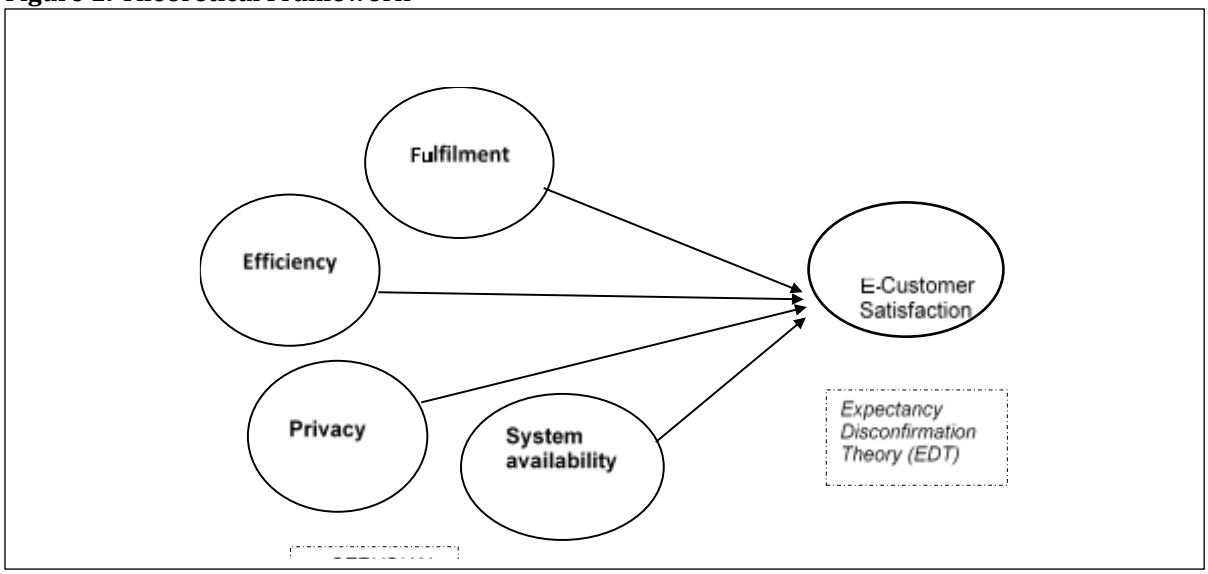
System availability

System availability pertains to the operational functionality of a website, including its effortlessness of accessibility (Parasuraman et al., 2005). This entails the speediness of a website to appear and load during the processing. Similarly, primary functions include website availability, stable transmission of the data, accuracy of ordering and minimal times (Bauer et al., 2006). Khan et al. (2019) describe system availability as the smooth and glitch-free technical operation of a website, ensuring seamless navigation and functionality. The ordering system is crucial as it enables customers to make orders, complete payments, and trail deliveries, highlighting the necessity of its availability and reliability. Rapid load speeds and user-friendly online payment systems are crucial to increasing the satisfaction of the customers, underscoring the prominence of system availability in improving the overall user experience (Cheng et al., 2021; Kang & Namkung, 2019). Studies on system availability have consistently demonstrated its constructive influence on e-customer satisfaction (Kim & Kim, 2010). Zhuang and Babin (2015) found that customers feel dissatisfied if a website's system availability needs to be improved. Additionally, San et al. (2020) identified system availability as the strongest predictor of customer satisfaction among various factors of electronic service quality. This highlights the importance of online retailers emphasizing system availability to meet customer expectations (San et al., 2020). The literature indicates that system availability has a substantial impact on e-customer satisfaction.

3. Research Methodology

The current study utilized an extensive literature review to investigate the development of two theories in this study, e-SERVQUAL and Expectancy Disconfirmation Theory (EDT). This paper aims to analyze the effect of electronic service quality on the level of satisfaction among online food delivery customers in Malaysia. This study explores the foundation, expansion, and evolvement of both theories particularly in the online food delivery service industry in Malaysia.

Figure 1: Theoretical Framework



In Figure 1 illustrates the hypothesized link between four independent variables comprised of fulfillment, efficiency, privacy, and system availability, and their impacts on e-customer satisfaction. In this paper, e-SERVQUAL identified two underpinning theories which are e-SERVQUAL and Expectancy Disconfirmation Theory (EDT).

4. Underpinning Theories and Findings

E- SERVQUAL

Parasuraman and Berry (1980) created the theoretical framework known as SERVQUAL. It is to evaluate and analyze the level of service that businesses offer. It is a popular technique for measuring and raising the quality of the service delivered by businesses. The foundation of SERVQUAL is the idea that consumers assess the level of service they receive based on five elements which are tangible, assurance, reliability, responsiveness, and empathy (Parasuraman et al., 1985). Table 1.1 shows, that since its creation in the 1980s, the SERVQUAL model has undergone several updates and adjustments. Some of the significant changes in SERVQUAL's development. In the early 1990s, several studies hypothesized that the SERVQUAL consistency dimension was unnecessary because it was fully covered by the other four dimensions. Furthermore, in the late 1990s, as technology usage increased for service delivery, researchers questioned whether the SERVQUAL theory applied to online services. A redesigned model dubbed E-S-QUAL was then put forth in response, and it now incorporated three further dimensions, website design, security and privacy, and reliability. After that, Zeithaml created a 22-item version of the SERVQUAL questionnaire in 2002 to reduce respondent fatigue and boost response rates. (Buttle, 1996).

To make the SERVPERF model more useful and user-friendly, it was also simplified to a 22-item questionnaire in 2005. Lastly, The SERVQUAL model was revised in 2010, aiming to address some of the critiques of the original theory, such as the absence of a strong theoretical underpinning and the failure to consider the role of emotions in service quality. In 1985, the SERVQUAL model, developed by Parasuraman and colleagues, introduced five critical dimensions for assessing service quality: tangibility, assurance, reliability,

responsiveness, and empathy (Parasuraman et al., 1985). Recognized as a preeminent tool for evaluating and enhancing service quality, the SERVQUAL model has been widely applied in numerous studies (e.g., Cook & Thompson, 2000; Kansra & Jha, 2016; Khan et al., 2019; Kitapci et al., 2014; Van Der Wal et al., 2002), underscoring its significant impact in the field. In 1992, Cronin and Taylor (1992) advanced the SERVQUAL model by creating the Service Performance (SERVPERF) framework, responding to criticisms about the SERVQUAL model's conceptual underpinnings and its approach to measuring service satisfaction. Initial adaptations were directed to the expansion of models such as WebQual in 2000 by Barnes et al. (2000), concentrating on the quality of information and usability. However, criticisms regarding WebQual's comprehensiveness prompted further refinements. Yoo and Donthu (2001) responded by developing SITEQUAL, which emphasized user-friendliness, in terms of design, speediness and safekeeping.

Nevertheless, it also faced criticisms for potentially overlooking critical aspects of the online buying process. In 2003, Wolfinbarger and Gilly (2003) presented the Electronic Retail Quality (eTailQ) model, which included dimensions such as reliability/fulfillment, website layout, customer service, and security. Despite its utility, eTailQ was criticized for neglecting the hedonic aspects of internet shopping and its dimensional structure. To address these issues, Zeithaml et al. (2002) introduced e-SERVQUAL, a scale designed to analyze the perceived service quality in online retailing. Subsequently refined by Parasuraman et al. (2005) into the E-S-QUAL and E-RecSQUAL scales, which evaluate website service quality through variables such as efficiency, fulfillment, system availability, and privacy. According to Parasuraman et al. (2005), electronic service quality involves the degree to which a website facilitates efficient and effective shopping, purchasing, and delivery in the context of online services. Understanding e-service quality is essential for identifying customer preferences in online transactions. As shown in Table 1.1 there is wide usage and recognition in the existing literature. Many researchers utilized the E-SERVQUAL model due to its consistency in measuring service quality. Despite the research on customer satisfaction as a dependent variable, there remains a scarcity of studies specifically to examine customer satisfaction from the perspective of OFD.

Table 1: The summary of e-service quality evolution scales

Author	Theory	Dimension
Parasuraman et al. (1985)	SERVQUAL	Tangible, assurance, reliability, responsiveness and empathy
Cronin and Taylor (1992)	SERVPERF	Tangibles, reliability, responsiveness, empathy, and assurance
Barnes et al. (2000)	WebQual	Usability, information quality, and service interaction quality
Yoo & Donthu (2001)	SITEQUAL	Ease of use, aesthetic design, processing speed, and security
Wolfinbarger & Gilly (2003)	eTailQ	Reliability/fulfillment, website design, customer service, and privacy/security
Zeithaml et al. (2002)	e-SERVQUAL	Efficiency, compensation, reliability, fulfillment, contact, responsiveness, and privacy
Parasuraman et al. (2005)	E-S-QUAL	Efficiency, fulfillment, system availability, and privacy
Blut (2016)	E-SQUAL	Website design, customer service, security/privacy, and fulfillment
Xu et al., (2017)	e-SERVQUAL	Fulfillment, after-sales, agreement, information
Khan et al., (2019)	e-SERVQUAL	Fulfillment, efficiency, privacy/security, system availability, e-customer loyalty
Raza et al. (2020)	e-SERVQUAL	Site organization, reliability, responsiveness, user-friendliness, personal need, efficiency
Ashiq & Hussain (2023)	SERVQUAL e-SERVQUAL	Reliability, responsiveness, security, convenience e-trust

Expectancy Disconfirmation Theory (EDT)

Expectancy Disconfirmation Theory (EDT) is a prominent framework in marketing, initially developed by Oliver & Desarbo in 1988 to explain how customer satisfaction is identified by comparing perceived performance with pre-existing expectations. According to Oliver (2014), EDT postulates that customer satisfaction is contingent upon the gap between expectations and experiences. Specifically, if a customer's

expectations are met or exceeded, they experience pleasure; conversely, unmet expectations lead to dissatisfaction.

EDT outlines a five-step process from expectation formation to repurchase intention, explaining consumer satisfaction (C. H. Lin et al., 2005). Initially, consumers develop expectations about a product or service before purchase. Subsequently, they use the product or service and form performance perceptions based on critical attributes. These performance perceptions are then compared to their initial expectations, resulting in one of three outcomes: positive disconfirmation (performance exceeds expectations), confirmation (performance meets expectations), or negative disconfirmation (performance falls short of expectations). Based on this disconfirmation, consumers develop feelings of satisfaction or displeasure, moderate satisfaction outcomes from confirmation, delight from positive disconfirmation, and disappointment from negative disconfirmation. Ultimately, happy consumers are likely to reuse the offerings, whereas dissatisfied consumers are not. Studies by Lin et al. (2005) confirmed that expectation confirmation significantly influences satisfaction, which in turn positively affects the continued use of search engines and websites. Recent literature further demonstrates that EDT has been applied in various fields to investigate the impact of customer satisfaction on service quality (Matolo & Salia, 2021; Nugroho & Suprapti, 2022; Uzir et al., 2020).

Findings

A business should consider increasing its value of service quality from several dimensions such as responsiveness, assurance, tangibility, dependability, and empathy to satisfy the customer. Meanwhile, Mahadevan et al., (2019) stated that tangibility, reliability, responsiveness, assurance, and empathy are the factors that influence customer satisfaction. In addition, consistently introducing new features could increase customer satisfaction with the intense competition in the market for food delivery apps, app developers need to focus on consumer needs and perceive them as user-friendliness (Wen et al., 2022). Agreeing to Sarwar (2016) responsiveness plays a significant role in influencing customer satisfaction since every customer wants an instant response from the service provider. On the other hand, studies from (Mahadevan et al., 2019) found that responsiveness is rejected and not significant to customer satisfaction. Due to the inconsistency of findings by the previous author thus, this study postulates the additional factors such as fulfillment, efficiency, privacy, and system availability and their relationship to e-customer satisfaction. Numerous studies have confirmed the substantial and positive effect of fulfillment on e-customer satisfaction. Several studies in the literature demonstrate a positive correlation between efficiency and e-customer satisfaction. The literature clearly shows that privacy positively influences e-customer satisfaction and from the above extensive literature review had identified system availability as the strongest predictor of customer satisfaction among various factors of electronic service quality.

5. Discussion and Conclusion

Building on the insights obtained from the review of the development and pertinent of both theories in the setting of OFD service in Malaysia, findings revealed a substantial association between four constructs; efficiency, fulfillment, system availability, and privacy on e-customer satisfaction. This study addresses the need for additional variables or factors for a service provider to increase service quality and satisfy the customer. The result of the current study will help businesses to provide better provisions in the OFD industry. The study enriches the understanding of e-service quality and e-customer satisfaction with online food delivery by examining the crucial factors influencing e-customer satisfaction. The study contributes to developing and improving the model that defines service quality in a digital service context. The findings of this study will provide a deeper understanding of service providers in the e-commerce sector, especially in the OFD market. The study offers practical suggestions for creating effective marketing and branding strategies in the competitive online food delivery business. Understanding customer preferences and the impact of online presence helps firms to strategically position themselves and establish powerful brand identities.

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Banks' Performance Amid the Unexpected Crises: An Assessment from Malaysia's Islamic Banks

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Abstract: Islamic banks play an important role in Malaysia's financial system by offering various services to individuals, businesses, and governments. Nonetheless, as the world confronted unprecedented crises the Islamic banks faced a new set of tests that would not only define their performance but also underscore their adaptability and durability. This paper aims to evaluate the impact of unexpected crises on the performance of Islamic banks. It also delves into various Islamic bank's key characteristics that might influence the Islamic bank performance such as capital adequacy, bank size, credit risk, and non-interest income. Data spanning from 2000 to 2022 and covering seven (7) Islamic banks are utilized using the panel static method. It reveals that bank characteristics such as capital adequacy, credit risk and non-interest income significantly impact Islamic bank performance. Nonetheless, deposit and bank size do not influence Islamic bank performance. The major highlight of the unexpected crises depicts a negative relationship with bank performance nonetheless it is not significant. This finding supports the claim that Islamic banks remain largely unaffected by unexpected crises. Therefore, a comprehensive understanding of these factors is crucial for policymakers, investors, and bank stakeholders to assess the health and performance of Islamic banks.

Keywords: *Islamic bank, bank performance, bank characteristics, financial crises, panel data*

1. Introduction and Background

Islamic banking in Malaysia has experienced remarkable growth, establishing itself as a significant and dynamic segment of the global financial industry. They offer a unique and ethical approach to banking and finance that aligns with Shariah principles, Islamic banking institutions in Malaysia operate alongside conventional banks in harmony. These institutions play a pivotal role in fostering economic growth, encouraging responsible financial practices, and contributing to Malaysia's status as a global hub for Islamic finance. The banks' performance is crucial for Islamic banks to achieve profitability and maintain their stability and sustainability. Basri, Muhamat and Jaafar (2019) highlighted that Malaysia's Islamic banking has been well received by customers since its establishment thus increasing growth performance which has been the hallmark of Islamic banking in various countries.

The performance of Islamic banks in Malaysia is a subject of immense significance, as it serves as a barometer of the health of the Islamic finance sector and an indicator of the broader economic landscape. The term performance refers to a subjective measurement of a bank's execution or achievement. Jayasekara et al. (2020) stated that bank performance is evaluated from a variety of perspectives, using both financial and non-financial measures. Islamic banks are different from other kinds of businesses in the way they act as an intermediary between depositors and borrowers but rather they act more as share partners for the banks to remain competitive to thrive in the long run period. Besides that, Islamic banks have a unique resilience to crises, given their operational models and ethical considerations.

In Malaysia, Islamic banks are one of the businesses in a developing country with the biggest market in Southeast Asia facing Islamic financing. Bank Islam Malaysia, Maybank Islamic, and CIMB Islamic are the top three strongest Islamic banks in Malaysia. Among them, Maybank Islamic stands out as one of the most successful financial institutions, with total assets of $64 billion. It dominates the Malaysian market, controlling over 30% of both the Islamic banking sector and market share (Stubing, 2021). Maybank Islamic offers a wide range of Shariah-compliant products and services through an extensive network spanning Malaysia, Singapore, Indonesia, Hong Kong, New York, and Dubai.

The COVID-19 pandemic sent shock waves through the global economy, triggering the most significant economic crisis in over a century (The World Bank, 2022). The pandemic's impact is far-reaching, influencing society, the global economy, and lots of other areas, causing practically every aspect of people's lives to change

(OECD, 2022). The profits of most banks in the world have been greatly affected by this pandemic. Throughout the pandemic, central banks around the world, including Malaysia, lowered interest rates to boost economic growth (BNM, 2020). As the world confronted unprecedented challenges such as the Global Financial Crisis and the COVID-19 pandemic, Islamic banks encountered a new set of trials that would both shape their performance and highlight their resilience and adaptability amid economic turbulence. As Islamic banking's behavior during crises is less studied compared to conventional banking, therefore this paper aims to evaluate the impact of unexpected crises on Islamic banks' performance.

2. Literature Review

Research on Islamic Banks has gained much attention, especially in explaining the influence of the key bank's characteristics on Islamic bank performance. Several studies have been done worldwide such as in Pakistan (Ijaz, Akmal & Gillani, 2015), Jordan and Syria (Ramadan, 2011) and the Gulf Cooperation Council (Al-Damir, 2014). Abdullahi and Yusuf (2022) conducted a similar study in the context of Nigeria. In Malaysia, numerous researchers have explored this topic, including Wasiuzzaman and Tarmizi (2014), as well as Sahari and Ubaidillah (2017). Most of these studies used return on assets (ROA) or return on equity (ROE) as proxies for measuring bank performance.

The internal bank characteristics such as capitalization and bank size the widely used key characteristics in the previous studies of bank performance. Saad, Abdul Majid and Rozali (2012), along with Wasiuzzaman and Tarmizi (2014), found that capitalization is negatively and significantly related to bank performance, while bank size has an insignificant effect. These findings align with Husain, Affandi and Abdul Shukur (2015) who examined 16 Islamic banks in Malaysia. Conversely, Khan, Ijaz and Aslam (2014), as well as Kanwal and Nadeem (2013), reported that bank size is positively related to bank performance but negatively related to capitalization. A study has been one on the determinants of profitability for conventional commercial banks listed on the Indonesia Stock Exchange. This study conducted by Serly (2021) revealed that bank size has a negative significant relationship with ROE, while capital adequacy shows a positive but insignificant relationship with ROE. Serly (2021) also found that deposits have a positive and significant relationship with ROE. The higher the deposit will lead to higher Islamic bank performance. This is supported by Abdullahi and Yusuf (2022) who have studied the case in Nigeria bank deposit. This study found that there is a positive and significant influence on Islamic banks' financial performance. However, studies by Khan, Ijaz, and Aslam (2014), Wasiuzzaman and Tarmizi (2014), and Kanwal and Nadeem (2013) revealed an inverse relationship between deposits and bank performance. The more money deposited in the bank there will be fiercer deposit competition which leads to a lower profit rate. This will consequently reduce the ROA for Islamic bank for Islamic banks.

Credit risk is a crucial internal bank characteristic in influencing the bank performance. Credit risk has an impact on bank stability independently, and their interplay makes banks more unstable. Kaaya and Pastory (2013) aimed to determine the relationship between credit risk and bank performance. Using a regression model to compare indicators of credit risk and performance, it is found that a negative relationship between credit risk and bank performance. This indicated that a higher credit risk leads to poorer bank performance. Similarly, Abdellehi et al. (2017) showed that credit risk had a significant impact on return on assets, a key profitability indicator. In contrast, Abdullahi and Yusuf (2022) reported a positive relationship between credit risk and bank performance in Nigeria.

Kohler (2014) and Karakaya and Er (2013) stated that banks with a higher share of non-interest income tend to exhibit higher performance. This is supported by Williams (2016) who examined the impact of non-interest income on Australian banks. This study revealed a direct relationship between higher non-interest income and increased risk, which affected bank performance. Alhassan and Michael (2017) investigated the effect of non-interest revenue on MENA banks and also concluded that it positively influenced bank performance. Contrary, several studies (Meslier et al., 2014; Salike & Biao, 2018, & Phan et al., 2023) found that a decline in non-interest income reduces profitability and leads to inefficient performance. Studies by Lee et al. (2014) and Sun et al. (2017) also depicted a negative relationship, indicating that excessive reliance on non-interest income increases risk and, consequently, lowers profitability. Similarly, Abu Khalaf, Awad, and Ellis (2024) revealed that non-interest income significantly influences the profitability of banks in the MENA region across all three

static panel models.

The major issue of this paper is unexpected crises. There is substantial literature on the area of unexpected crises (Muda et. al, Almanaser, 2014; Ahmad and Ali, 2014; Ahmad and Abdul Majid, 2017, Ahmad et al 2018). The term unexpected crises refers to unexpected and unpredictable situations or events that cause a sudden halt in the economy (Arjen, 2009, Justin & Volker, 2012). These crises are found an important part of how the economy reacts and how severe its impact is on others, especially in financial institutions. Malaysia has been experiencing several impact of unexpected crises involving the economy and finance, including the most recent which is the pandemic crisis. Despite the different features and challenges shown by the different crises, however, the effect of the crises was found as critical, as they severely affected the economy and banking system of the country.

Focusing on unexpected crises and bank performance, Muda et al (2013), Tiemsani and Al Suwaidi (2016), Mongid (2016) and Ibrahim (2020) found there is a significant impact of unexpected crises on Islamic banks' performance. Mongid (2016) explored the determinants of profitability for Islamic banks in the MENA region and assessed the effects of the global financial crisis on their performance. The findings indicated that the GFC negatively influenced Islamic banks' profitability. In parallel with Mongid (2016), Ibrahim (2020) also showed that the crisis had a significant adverse impact on the performance of Islamic banks in the UAE. The most severe effects were observed in 2008 and 2009. Similarly, Almanaseer (2014) examined the impact of the financial crisis on Islamic bank profitability in GCC countries. Analyzing data from 24 banks over the period 2005-2012, the study found that the crisis had no significant effect on Islamic bank profitability. This conclusion is further supported by Ahmad et al. (2018), who studied 16 Islamic banks in Malaysia. It was found that their profitability remained unaffected by the financial crisis. These studies suggest that Islamic banks may be immune to unexpected financial crises.

3. Research Methodology

In investigating Islamic bank performance, internal bank characteristics are used to estimate the relationship. Return on Asset (ROA) represents the Islamic bank's performance. The use of ROA as a measure of bank performance followed many studies such as Abdullahi and Yusuf (2022) and Phan et al. (2023). According to Ghosh (2019), ROA is a valuable indicator of a bank's profitability as it reflects how effectively a bank manages its assets to generate earnings. Moreover, ROA provides a comprehensive assessment of a bank's performance by incorporating the impact of income generation, asset utilization, and risk management (Khalaf et al., 2024). Therefore, ROA is an appropriate measure to assess the performance of Islamic banks. A negative ROA also supports the hypothesis under consideration.

To measure the variation in the bank performance, the credit risk (CR), deposit (DEP), Bank size (BS), Non-interest income (NII), and lagged bank performance (ROA(-1)) are added to the model. The Unexpected Crises (UNEXC) for the Global Financial Crisis and the pandemic of COVID-19 crisis are used to estimate the impact on Islamic bank performance. The dummy variables of UNEXC were included to indicate the period of the Global Financial Crisis and Pandemic crisis (COVID-19). These variables are assigned a value of 1 during the crisis periods and 0 otherwise, resulting in a sequence of isolated 1s surrounded by 0s. Consequently, the estimation model is structured as follows:

$$ROA_{i,t}= \alpha - \beta_1 CA_{i,t} + \beta_2 CR_{i,t} + \beta_3 DEP_{i,t} + \beta_4 BS_{i,t} - \beta_5 NII_{i,t} + \beta_6 ROA(-1)_{i,t} - \beta_7 UNEXC + \varepsilon_{i,t} \quad \text{Equation (1)}$$

Three-panel static models are tested to obtain the final results: the Pooled Ordinary Least Squares Model (POLS), the Random Effect Model (REM), and the Fixed Effect Model (FEM). The equation for the Pooled Ordinary Least Squares Model is:

$$Y_{i,t} = \alpha + \beta_1 X_{i,t} + \varepsilon_{i,t} \quad \text{Equation (2)}$$

As an alternative the Random Effect Model is expressed as;

$$Y_{i,t}= \alpha + \beta_1 X_{i,t} + (\varepsilon_{i,t} + \mu_{i,t}) \quad \text{Equation (3)}$$

To determine whether to use the Pooled Ordinary Least Squares Model or the Random Effect Model, the Breusch-Pagan Lagrangian multiplier test is applied. The hypotheses for this test are;
H0: Choose Pooled Ordinary Least Square Model
H1: Choose a Random Effect model

If the probability of Chi^2 is less than 0.05, H0 is rejected, and the Random Effect Model is selected. The study can also be extended by using the Fixed Effect Model, represented by the equation;

$$Y_{i,t} = \alpha_i + \beta_1 X_{i,t} + \varepsilon_{i,t} \quad \text{Equation (4)}$$

If the analysis proceeds to decide the model of Random Effect Model or Fixed Effect Model another test of Hausman Fixed Test is applied. The hypothesis of the Hausman Fixed Test is;
H0: Choose a Random Effect Model
H1: Choose Fixed Effect Model

If the Chi^2 probability is less than 0.05, H1 is accepted, and the Fixed Effect Model is selected.

The panel data set used in the analysis was obtained from Eikon Thompson. The data is collected annually with the data consisting of 154 observations. This data covered a period from 2000 to 2022, totaling 22 years. There are 16 Islamic banks in Malaysia including both fully-fledged Islamic banks and Islamic windows of conventional banks. The sample of the study includes seven (7) Islamic banks. These banks are chosen based on their significant market share and availability of accessible and detailed financial data over the crisis periods.

4. Results

This study used panel data with a series of tests to determine the appropriate model for the analysis Three estimation methods in panel data statistics namely Pooled Ordinary Least Squares (POLS), Random Effects (REM), and Fixed Effects (FEM). In determining whether the POLS or REM model is more suitable, the Breusch-Pagan Lagrange Multiplier (LM) test was performed. Due to the high Chi-squared (Chi^2) statistic, the null hypothesis was rejected, favoring the FEM model.

The Hausman test was then employed, calculating the p-value (Prob>Chi^2) to decide between the FEM and REM. The results indicated that the REM is appropriate. The Hausman test revealed that the probability is more than 0.05 and there is insignificant variation within entities over time that would be captured by the Fixed Effects Model. Table 1 provides a summary of the results from the Random Effects Model.

Table 1: Summary of the Random Effect Model

VARIABLE	COEFFICIENT	S.E	T STAT	PROB
C	1.4732	0.2233	6.5972	0.0000
CA	-0.0309	0.0123	-2.5133	0.0131
CR	-0.0262	0.0082	-3.1781	0.0018
DEP	-0.0017	0.0035	-0.5010	0.6171
BS	0.0001	0.0002	1.5424	0.1252
NII	-0.2736	0.1383	-1.9772	0.0499
ROA(-1)	0.2894	0.0790	3.6616	0.0004
UNEXC	-0.0675	0.0751	-0.8977	0.3708
		R^2 = 0.21664		
		F Stat = 5.7287 (0.000)		

Based on Table 1, the R-squared value for the RE models is 0.2166 indicating that it is possible to explain 21.66% of the variation in ROA by the models. The F-statistics in the model are significant at the $p < 0.01$ level, verifying the overall significance of the model.

Capital adequacy (CA) is expected to have either a positive or negative impact on the performance of Islamic banks. This study revealed that significant negative bank profitability is found at a 0.05% significance level. The finding is parallel with some authors (Saad et al.,2012; Wasiuzzaman and Tarmizi, 2014; Abdullahi and Yusuf, 2022) who argue that high capital adequacy can increase their vulnerability. According to this perspective, there will negative relationship between capital adequacy.

Another Islamic bank characteristic, credit risk indicates a negative relationship with Islamic bank performance at a highly significance level (1% level of significance). It depicts that the higher the credit risk the lower the profitability of Islamic banks. The finding is in parallel with Kaaya and Pastory (2013) and Abdullahi and Yusuf (2022). The credit risk serves as an indicator of asset quality. This will be associated with the additional cost of monitoring expenditure. If the additional costs for managing the credit risk increase the bank's operating expenses also increase, which in turn reduces returns.

The negative coefficient for deposits (DEP) suggests that a higher DEP leads to lower Islamic bank performance. The estimate indicates that a 1% increase in DEP would raise ROA by 0.0017%, contradicting the expected direction of the relationship. However, DEP is statistically insignificant (p-value = 0.6171). While, Bank Size (BS), on the other hand, shows a positive relationship with ROA, as expected, though it is also statistically insignificant (p-value = 0.1252). The random effects finding suggests that an increase in bank size improves Islamic bank performance. Despite the high expectations for BS to influence the variation in Islamic bank performance, it does not have a significant effect on ROA in Malaysia's Islamic banks.

Non-interest income (NII) is regarded as a key determinant of profitability, showing strong statistical significance at the 5% level. However, it yields a negative relationship between NII and bank performance. The result is against the popular hypothesis of a positive relationship. It is found that the finding is similar to Lee et al (2014) and Sun et al. (2017). It shows that the higher NII will decrease the profitability as well as increase the risk of saving. When there is too much dependency on non-interest income will lead to higher risk and therefore will lower profitability. The previous performance of Islamic banks (ROA (-1)) significantly the current bank performance amid financial crises. It is found that ROA(-1) has a positive impact on ROA and significantly influences Islamic bank performance at a 1% significance level. It is revealed that the actual ROA is significantly impacted by the lagged indicators (historic) of existing Islamic bank performance.

The major highlight of this study is the unexpected crises (Global Financial Crisis and the Pandemic crisis of COVID-19). It is revealed that unexpected crises did not significantly influence Islamic bank performance as expected. The relationship between financial crises and the profitability of Islamic banks aligns with the expected negative correlation. Crises can reduce Islamic banks' funding due to lower personal savings and declining corporate profits, affecting their investment and financing activities, while increasing exposure to additional risks. Moreover, certain instruments like options and bonds become less accessible during such periods, further impacting profitability. However, consistent with previous findings (Hidayat and Abduh, 2012; Almanaseer, 2014; Ahmad et al., 2018), this study confirms that unexpected crises do not significantly affect the performance of Islamic banks. This supports the view that Islamic banks remain resilient during unforeseen events such as the Global Financial Crisis and Pandemic crisis (COVID-19).

5. Conclusion

With the emergence of COVID-19 which is considered an unexpected crisis, there are many claims that the Islamic banks' challenges escalated in Malaysia. Summarizing from the literature review, it is found there are mixed results of the unexpected crises on Islamic bank performance. Nonetheless, the unexpected crises together with Islamic bank characteristics play a fundamental role in determining a bank's overall performance in Malaysia. Therefore, this study evaluates the impact of unexpected crises and Islamic bank performance in Malaysia. Based on the findings, bank characteristics such as capitalization, credit risk, non-interest income, and previous bank performance are just a few of the key factors that significantly influence the Islamic bank's performance. The highly significant influence of bank characteristics creates an influence on an Islamic bank's ability to generate profits and contribute to financial stability. Besides that, the unexpected crises such as Global Financial Crisis and COVID-19 fail to depict a significant impact on Islamic banks' performance. From the findings, it can be concluded that Islamic banks in Malaysia have demonstrated resilience during unexpected

crises due to their unique financial structures and adherence to ethical principles. Therefore, the finding supports the claims that Islamic banks are unharmed by the unexpected event. However, they still face challenges in terms of bank performance and must continue to adapt to changing economic conditions and technological advancements. It is suggested that bank regulators and policymakers must closely monitor these characteristics to ensure the stability of the performance of Islamic banks. Investors and stakeholders also can analyze these characteristics to make informed decisions regarding their involvement with Islamic banks. Future research should explore these challenges further and assess the long-term implications of the solely unexpected crisis of the COVID-19 pandemic on Islamic banking in Malaysia.

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Halal Logistics, Halal Manufacturing, Competitiveness, and Halal Organizational Sustainability: A Conceptual Exploration

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Abstract: The Malaysian halal industry, especially in logistics and manufacturing, confronts several challenges due to globalization, including competitiveness issues. As a result, ensuring sustainable competitiveness has become crucial for maintaining compliance with Islamic halal Syariah standards. Preserving the sector's competitive edge while upholding halal management practices is a significant concern for businesses in Malaysia's halal industry. However, many halal companies lack the resources needed to identify the most effective strategies and methods to enhance their performance and competitiveness. This conceptual paper examines the interplay between Halal logistics, Halal manufacturing, competitiveness, and organizational sustainability within the Halal industry. The paper posits that effective integration of Halal logistics and manufacturing practices is not only essential for compliance with religious standards but also for enhancing the competitive advantage and sustainability performance of organizations. By exploring theoretical frameworks and existing literature, this paper highlights the critical role that Halal practices play in driving organizational success and proposes directions for future research in this growing field.

Keywords: *Halal Logistics, Halal Manufacturing, Competitiveness, Organizational Sustainability, Halal Industry*

1. Introduction

The Halal industry has emerged as a significant global market, driven by the demand for products that comply with Islamic dietary laws and ethical standards. As the industry expands, businesses are increasingly recognizing the importance of not only adhering to Halal standards but also leveraging these practices to enhance their competitiveness and sustainability. This conceptual paper explores the relationship between Halal logistics, Halal manufacturing, competitiveness, and organizational sustainability, proposing that these elements are deeply interconnected and mutually reinforcing.

The Malaysian government has implemented substantial measures to foster the growth of the halal sector by enforcing regulations and promoting halal products and services (Awan et al., 2015; Ambali & Bakar, 2013). As highlighted by Husny et al. (2018), Ali & Suleiman (2016), and Halim and Salleh (2012), the Department of Islamic Development Malaysia (JAKIM) has been designated as the sole authority responsible for maintaining the integrity of halal certification and overseeing all halal-related activities in Malaysia, as part of the Ninth Malaysia Plan (2006-2010). JAKIM is responsible for issuing this certification, and halal items must display the halal logo on products and business premises (Bashir et al., 2019; Ali et al., 2017; Hashim, Hussin & Zainal, 2014).

Malaysia's halal certification covers both local and international standards, extending beyond food items to include beverages, supplements, meals in cafes, restaurants, and hotels, as well as consumer goods. It also encompasses non-food products such as cosmetics, personal care items, pharmaceuticals, slaughterhouses, and halal logistics, including retail, warehousing, transportation, and original equipment manufacturers (Bux et al., 2022; Ezanee et al., 2016; Baharuddin et al., 2015). According to Fajar (2017), the certification process requires strict adherence to halal standards throughout the manufacturing process, including handling, packaging, shipping, and storage. JAKIM is also tasked with enhancing the global reputation and credibility of Malaysian halal certification (Damit et al., 2018; Faul et al., 2016; Nurul et al., 2014). Through the efforts of JAKIM and the Halal Industry Development Corporation (HDC), Malaysia has gained recognition as a global leader in halal certification, one of the few countries with strong government support in developing the halal industry (Daisuke et al., 2018; Zulfakar et al., 2014; Rezai, Mohamed & Shamsudin, 2012).

However, organizations in various industries have often tried to operate independently, but they need to collaborate and share resources to address both current and future challenges (Mitra & Datta, 2014; Narasimhan, Swink & Viswanathan, 2010). As interdependence among organizations grows, effective coordination of resources becomes increasingly important (Shaharudin et al, 2023). Companies must be competitive by providing high-quality products and services (Olhager & Prajogo, 2012; Mollenkopf et al., 2010; Naslund & Williamson, 2010; Stock et al., 2000). Halal manufacturers must ensure their products, whether food or non-food, reach consumers in the same location and timeframe, adhering to halal standards to maintain a competitive advantage in the industry (Manzouri et al., 2013). Resource dependency within halal organizations necessitates strategic coordination to improve performance (Shariff et al., 2016; Latif et al., 2014).

Halal manufacturers are encouraged to leverage their resources in halal logistics to boost competitiveness. Rajeb et al. (2021) and Ririn et al. (2019) suggest halal manufacturers should handle retail, storage, transport, and warehousing with proper segregation to comply with halal Syariah standards. Moreover, they must monitor halal transportation practices across land, air, and sea from their production facilities to the consumer (Mohamed & Hamid, 2015). By integrating halal logistics with organizational resources, manufacturers can strengthen their market position, increase customer loyalty, and boost revenue (Budi & Dika, 2017; Azam & Abdullah, 2020).

Furthermore, Halal manufacturers must ensure their production processes comply with Syariah standards (Talib et al., 2020). This includes product ingredients that must not contain a mixture of Halal and non-halal substances. Suppliers involved in the halal supply chain must align with halal standards and be approved by the manufacturer's control and inspection departments (Tan et al., 2020). Additionally, several critical aspects of halal manufacturing must be adhered to, such as using compliant tools and equipment, sourcing halal raw materials, employing knowledgeable staff, and maintaining hygiene, safety, and security standards in line with the halal tayyiban concept (Mega, 2019; Manzouri et al., 2013). These practices, involving suppliers, internal staff, vendors, and contractors, demonstrate best practices among Malaysian halal manufacturers, contributing to their operational efficiency and enhancing the customer experience.

As emphasized by Tan et al. (2020), enhancing competitiveness in halal manufacturing is vital for improving organizational performance by achieving high standards of safety, security, hygiene, integrity, and customer satisfaction. Halal manufacturing requires the integration of various functional areas and the support of competitive organizational structures, including environmental stewardship, total quality management, and customer relations management, to maximize business success (Bux et al., 2022; Budi & Dika, 2017). Nevertheless, many halal-focused companies in Malaysia struggle to achieve the desired competitiveness, leading to shortcomings in their overall halal performance and sustainability.

In addition, as noted by Talib et al. (2020) and Budi and Dika (2017), many logistics and manufacturing departments in Halal organizations are reluctant to engage in halal logistics activities due to challenges such as the need for specialized machinery, the requirement for segregated storage spaces for halal and non-halal products, and additional costs associated with ritual cleansing (known as simak in Islam), specialized staff, and training on halal logistics (Tan et al., 2020). These factors add to the overall cost of doing business and competitiveness.

The purpose of this paper is to provide a conceptual framework that links Halal logistics and manufacturing with competitiveness and organizational sustainability. By examining these relationships, the paper aims to contribute to the broader understanding of how Halal practices can drive long-term success for organizations operating in this sector.

2. Literature Review

Halal Logistics

Halal logistics encompasses the halal business management to control the flow of halal goods within the halal supply chain and comply with halal standards, ensuring that all processes comply with Islamic law (Shariah). Halal logistics is observed as a continuous enrichment sequenator to mete out halal products as cost-effective, innocuous, earlier, and workable with the latest technology as a constituent of competitive edge for the Halal

practice firm that outdoes with Halal obligation and obliges to halal stakeholders (Wel, Ashari & Ismail, 2022). Furthermore, it has been expansively acknowledged that Halal logistics is a value creation, accomplishment, and part of a competitive feature amongst halal stakeholders in the Halal industry as emphasized by Tieman, Marco & Barbara (2020). Halal logistics is a strategic tool to increase Halal market competitiveness to fulfill religious responsibilities, build Halal consumer trust, and ingrain Halal brand loyalty.

Incontrovertibly, Halal logistics play an important role in Halal practices, and determine competitiveness and sustainability perspective in the Malaysian Halal industry (Jamaludin & Ramli, 2023). Nevertheless, lack of infrastructure and the right method of Halal logistics services affected halal organizational sustainability performance. For instance, the halal manufacturer lacking in suit with a halal logistics company that can offer different modes of warehousing and transportation that comply with sustainability standards (Jaafar, 2024). This consists of the seclusion of halal and non-halal products, the hygiene and purity of transportation, and storing and loading amenities. Besides, the assurance that no cross-contamination arises at any stage is still questionable with several issues of halal meat contamination such an example along the logistics process. In addition, implementing Halal logistics can be challenging due to the additional costs and complexities involved in maintaining strict compliance. These challenges include the need for specialized facilities, trained personnel, and the development of robust certification and monitoring systems. Despite these challenges, companies that excel in Halal logistics are better positioned to capture market share in the global Halal industry (Mohamed et al., 2020).

There are more than a few reasons for Halal manufacturers do not engage with Halal logistics service providers and most are due to the conventional thought of cost apprehension that will distress Halal product's price to be traded to Halal consumers. Based on that situation, as stated by Kamarulzaman and Tarmizi (2020), most of those Halal manufacturers are keen to set up their own logistics units and hire certain project management teams to handle logistics activities. This effort seems like significant cost management in business but it will have a substantial impact and it can be sum on as a competitiveness initiative among Malaysian Halal manufacturers to stay competitive in the Halal industry.

Halal Manufacturing

Manufacturing activity that complies with Islamic law is known as Halal manufacturing. This ensures that Halal products are devoid of any forbidden elements according to Islamic law and that all tools and materials used in production have been aligned with the Halal regulator's certification standards (Ibrahim & Aghwan, 2022). Halal manufacturing is in various sectors including food, cosmetics, pharmaceuticals, and modest fashion where halal customer demand for Halal items with Halal certification endorsement is rising swiftly. Halal manufacturers must adhere to this hall standard criteria to reap future business benefits from a halal sustainability perspective. To ensure the quality and safety of Halal products, strict adherence to Halal criteria is crucial, and fulfilling the demands of an increasing number of ethically concerned customers is just as important to Halal manufacturing as adhering to Syariah requirements. Halal manufacturer can improve their brand image and appeal to a wider market by complying with Halal standards. This includes non-Muslim consumers who identify Halal with ethical and high-quality manufacturing techniques.

From the standpoint of Halal manufacturing, it is evident in the Malaysian context that the notion of sustainability is currently being used in Halal business practices from a social and environmental concept. Halal business management is becoming more mindful of social and environmental issues as a result of growing concerns about its triple bottom-line agenda (Showole & Haruna, 2024). In the meantime, from a social standpoint, it is evident from the human aspect that Malaysian Halal manufacturers have been concerned about the welfare of their employees, the training that they have received that complies with halal standards, the job opportunities that arise from the booming Halal industry, and not only that but also the provision of job security to them, particularly after the outbreak of the global pandemic and world economic turmoil recently (Talib, Ngah & Kurniawati 2022).

Furthermore, green procurement, ecologically friendly manufacturing methods, and societal obligation are only a few of the larger sustainability objectives that are frequently reflected in halal manufacturing activities. This alignment enables businesses to stand out in the market and develop a competitive advantage based on sustainability and Islamic religious conformity. Halal products should be produced and delivered at a lower

cost, with less processing required time, faster turnaround, greater safety measures, and cleaner conditions through continuous development in Halal manufacturing practices. Moreover, as stated it is well known that Halal manufacturing is essential to the Halal industry's growth. Malaysia and other nations across the globe have established halal standards that have had an excellent impact on the Halal industry.

Competitiveness in the Halal Industry

In the context of the Halal industry in Malaysia, Rajeb et al. (2021), stated that competitive advantage is realized in terms of the sources of Halal practices, which are obtained from Halal knowledge, Halal logistics, Halal manufacturing, Halal standards, Halal regulatory, Halal infrastructure, and Halal facilities that have been inaugurated in Halal industry supply chain. Despite the industry's limited actual capacity, Malaysian Halal manufacturers can strive to be competitive by focusing on value-added products and quality assurance adaptiveness that are essential to winning the competition in the halal market. The Halal companies' competitive advantage can be secured from the different palate of Halal knowledge, which is hard to emulate and the specialty of sustainability concept can be transformed as Halal brand image and Halal brand identity that need to be preserved for Halal business sustenance locally and globally (Noorliza, 2020).

The Halal brand as an element to retain competitive ingrains can be gained from the Halal good practices resources namely warehousing management, transportation and freight management, shipping management, and production management. Those competitive edge resources as mentioned by Norazlina et al (2021), are important to be driven by Halal manufacturer business propensity, gradual revenue to be grown, consistency of business net worth, consideration of socio-economic and environmental deprivation impact to Halal stakeholders within the business in the halal industry. Furthermore, for Malaysian Halal manufacturers to be successful, they must have a strong competitive advantage, which is typically based on their capacity to generate a reliable Halal product that contributes to the Halal consumer experience and retain it as Halal products that are difficult to imitate.

On the further pointer, Malaysian Halal manufacturer competitiveness should become as main element to build up the confidence among halal consumers as quoted by Rahmatina et al. (2023), that is substantial to the Halal business profitability, socially responsible activities and environmental stewardship practicality. In other words, it has shown that Halal consumers are self-assured towards Halal products and Halal activities as a source of competitiveness that Malaysian Halal manufacturers have provided. However, pursuing competitiveness in the Halal industry also involves navigating various challenges, such as the complexity of global supply chains, varying Halal certification standards across different regions, and the need for continuous innovation to meet evolving consumer expectations. Companies that can effectively address these challenges are more likely to achieve sustained competitive advantage in the Halal market (Mohamed & Hassan, 2020).

Halal Organizational Sustainability

Organizational sustainability refers to a company's ability to operate in a manner that ensures long-term viability while considering environmental, social, and governance (ESG) factors. In the context of the halal industry, sustainability is closely linked to the ethical principles that underpin halal practices, including fair trade, animal welfare, and environmental stewardship (Othman *et al.,* 2019). Halal organizational sustainability performance has been articulated as a value structure envisioned at the direction of management to transfigure their responsibility for the organization's economic propensity, social responsibly, and environmental stewardship as main elements of Halal organizational achievement (Bux, Rehman & Mohammad, 2022).

Nowadays, it is important to ensure that Halal products are visible for purchasing repetition among Halal consumers (Ngah et al., 2021). Fundamentals of halal activities that suit social obligation such as extra financial contribution to the employee, job opportunities to the locality, a donation to society development, education development programs, and safe and secure working place are playing a vital role as a source of Malaysian Halal manufacturer sustainability development in Halal industry. Moreover, incorporating Halal business with sustainability elements can improve a Halal business's standing and draw in more Halal customers, especially those who value an ethical business approach. Halal businesses can stand out in the market and create a sustained competitive advantage by establishing themselves as leaders in Halal sustainability activities.

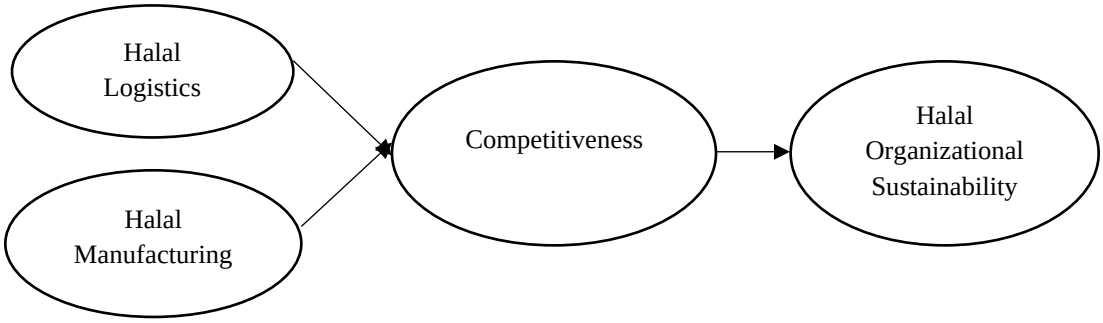
Additionally, Halal products and Halal activities that link with environmental concerns are also important as a source of business sustainability development, particularly in environmental Halal material, eco-design Halal

products, reusable Halal material and products, green Halal warehousing, environmental Halal transportation, and eco Halal terminal. The environmental fundamentals are value-added in Halal services and Halal products and important to ensure repetitive Halal consumers procuring and possibly to increase the Malaysian Halal manufacturer business productivity and possess the business to be more robust, strong, energetic, and vibrant in the long run (Nurul & Nur, 2022). For instance, Malaysian Halal process food manufacturers have enthusiastically veiled locally grown agriculture from local farmers in countryside areas that apply organic farming to manufacture Halal process food and export to the international market and it supports inculcating the notion of Halal economy flow.

3. Theoretical Framework and Hypothesis Development

This paper proposes a theoretical framework that links Halal logistics and Halal manufacturing to organizational competitiveness and sustainability. The framework is based on the premise that Halal practices are not only compliance mechanisms but also strategic tools that can enhance a company's competitive position and long-term sustainability. RDT provides a theoretical foundation in explaining how halal logistics and halal manufacturing will result in competitiveness and successful halal organizational sustainability performance. Competitiveness argues that effective halal logistics is a strong weapon and a crucial element for establishing a unique competitive advantage. Halal producers need a unique approach to achieve better results, which relies on management's backing and employees' participation in halal logistics (Tieman, 2013; Borzooei & Asgari, 2013). According to RDT perspectives, a collaboration between management and employees is necessary for implementing halal logistics to achieve business uniqueness (Mukherje & Romi, 2014). Halal organizations may possess the necessary expertise and skills to address halal logistics challenges in areas like warehousing, storage, transportation, packaging, and retailing. This enables companies to obtain the essential resources to promote sustainable halal organizational performance, including customer satisfaction, operational efficiency, and organizational strengths (Talib et al., 2020; Damit et al., 2018).

Figure 1: Theoretical Framework



As illustrated in Figure 1, the theoretical framework is segmented into three components: halal logistics, halal manufacturing as the independent variables, competitiveness as the independent variable, and halal organizational sustainability performance as the dependent variable. These elements collectively influence organizational performance within the halal industry.

The concept of halal logistics is grounded in Syariah compliance within logistics activities and serves as a source of competitiveness for halal organizations (Abdullah & Oseni, 2017; Talib, Hamid & Zulfakar, 2015; Tieman, 2013). The adoption of halal logistics practices helps firms develop strategies that sustain the brand reputation and enhance competitiveness (Latif et al., 2014). Similarly, halal organizations can leverage organizational synergy to strengthen halal practices, such as halal logistics, to achieve a competitive advantage (Tan, Razali & Husny, 2012). Therefore, the following hypothesis is proposed:
H1: *There is a positive relationship between halal logistics and competitiveness.*

Talib, Chin and Fischer (2017) argued that resources such as halal manufacturing standards, procedures, technologies, Syariah-compliant material sourcing, and adherence to halal supplier Syariah provisions are crucial for fully realizing competitive advantages in the halal industry. Additionally, resources from halal suppliers, regulators, and manufacturing associations can be strategically utilized to sustain competitiveness

among halal manufacturing organizations (Talib, 2020). The effectiveness and efficiency of halal manufacturing management are essential for these organizations to maintain their competitive edge (Suhartanto et al., 2020). Hence, the following hypothesis is proposed:
H2: *There is a positive relationship between halal manufacturing and competitiveness.*

Competitiveness is influenced by the unique resources and capabilities of an organization, making it difficult to replicate, as elaborated in Resource Dependence Theory (RDT) (Talib, Ali, & Idris, 2014; Peng et al., 2011). Halal organizational sustainability performance is critical in the competitive halal market and is considered a fundamental principle for halal organizations (Bux et al., 2022). Furthermore, Tan et al. (2020) argued that competitiveness plays a key role in determining the effectiveness of halal organizational sustainability performance. According to Budi and Dika (2017), resources in halal organizations must be competitive in terms of knowledge, skills, education, technology, and innovation to achieve halal organizational sustainability performance. Based on this literature, the following hypothesis is proposed:
H3: *Competitiveness has a positive effect on halal organizational sustainability performance.*

Assessing the competitive edge of the halal supply chain and integrating sustainability dimensions for future growth is pivotal amidst the ongoing global economic downturn and international trade tensions (Shariff et al., 2024). In this case, halal logistics are vital drivers for halal manufacturers, focusing on product segregation in line with Syariah compliance, enhancing consumer confidence, and achieving success in the halal business (Tieman, 2015; Manzouri et al., 2013). They also noted that halal logistics can be an effective tool to increase customer value. Additionally, Ab Talib et al. (2019) argued that Institutional Theory (IT) provides a theoretical foundation to explain how institutional pressure drives halal organizations. For instance, effective cleanliness and high standards of hygiene during storage and transportation, as guided by JAKIM, can lead to better halal business practices and positively impact halal organizational sustainability performance (Latif et al., 2014). Therefore, the study hypothesizes as follows:
H4*: There is a positive relationship between halal logistics and halal organizational sustainability performance.*

Samson and Terziovski (1999) postulated that quality practices have a significant direct impact on operational performance. Shahin (2011) found evidence that good manufacturing practices significantly influence financial performance. Similarly, Vanichchinchai and Igel (2011) found that manufacturing practices positively impact organizational performance. Consistent research by Hsu et al. (2009) and Lee (2004) also demonstrated that good manufacturing capabilities have a strong positive relationship with organizational performance. Likewise, Lee and Lee (2013) confirmed that quality has a significant positive effect on business performance. Thus, the following hypothesis is proposed:
H5: *There is a positive relationship between halal manufacturing and halal organizational sustainability performance.*

Fantazy, Kumar and Kumar (2009) examined the relationship between strategy, flexibility, and organizational performance. Information exchange and responsiveness contribute to an organization's market performance in terms of sales growth, product development, and market expansion (Stank, Crum & Arango, 1999). Tummala, Phillips and Johnson (2006) emphasized that improving competitiveness and performance is crucial for successful organizational planning. Competitiveness or competitive advantage as a mediating variable toward organizational performance has been utilized in previous research, such as Graziano et al. (1997). Additionally, Noorliza (2020) and Lestari et al. (2020) stated that strong logistics management and sustainable halal logistics can support the development of sustainable strategies and enhance competitiveness, thereby contributing to halal organizational sustainability performance. Hence, the hypothesis is proposed as follows:
H6: *Competitiveness mediates the relationship between halal logistics and halal organizational sustainability performance.*

Mega (2019) and Chuah et al. (2016) indicated that competitiveness can be managed through sustainable halal manufacturing practices that emphasize societal engagement, local talent employment, technology transfer, waste management, product recycling, eco-design, and environmental stewardship, all of which contribute to halal organizational sustainability performance. Similarly, Damit et al. (2018) argued that sustainable halal manufacturing, although challenging, is expected to provide a competitive advantage for halal organizational sustainability performance (Fajar, 2017). Thus, the following hypothesis is proposed:

H7: *Competitiveness mediates the relationship between halal manufacturing and halal organizational sustainability performance.*

4. Implications for Practice

The conceptual framework outlined in this paper carries significant implications for businesses operating within the Halal industry. The integration of Halal logistics and manufacturing practices into business operations is not merely a matter of compliance with religious standards; it also offers strategic advantages that can enhance competitiveness and sustainability. The following implications provide practical insights for industry practitioners and policymakers.

Businesses in the Halal industry must recognize that Halal logistics and manufacturing practices are strategic assets that can drive both competitiveness and sustainability. These practices should not be treated as separate or ancillary to core business operations but should be fully integrated into the company's overall strategy. For instance, companies should align their Halal practices with their broader business goals, ensuring that Halal compliance supports and enhances their market positioning, brand reputation, and customer relationships A food manufacturing company could integrate Halal compliance into its entire supply chain, from sourcing raw materials to delivering finished products. This would involve working closely with suppliers to ensure that all materials are Halal-certified and implementing robust monitoring and auditing processes to maintain Halal integrity throughout the supply chain. By embedding Halal practices into its operations, the company can position itself as a trusted provider of Halal products, thereby gaining a competitive edge in both Muslim-majority and non-Muslim markets.

To fully capitalize on the benefits of Halal practices, companies should be prepared to invest in the necessary infrastructure, technology, and human resources to maintain rigorous Halal compliance. This includes investing in Halal-certified facilities, training employees on Halal standards, and developing partnerships with credible Halal certification bodies. Such investments, while potentially costly upfront, can lead to long-term benefits, including enhanced market access, increased consumer trust, and improved operational efficiency. A logistics company specializing in the transportation of Halal goods could invest in dedicated Halal-compliant vehicles and storage facilities. Additionally, the company could train its staff on the specific requirements of Halal logistics, ensuring that they understand the importance of maintaining Halal integrity throughout the transportation process. These investments would allow the company to offer premium Halal logistics services, attracting clients who prioritize Halal compliance and are willing to pay a premium for such services.

Halal-certified companies should align their Halal practices with broader sustainability goals, such as reducing waste, promoting ethical sourcing, and minimizing environmental impact. This alignment not only enhances the company's reputation among ethically conscious consumers but also ensures long-term operational viability. By adopting sustainable Halal practices, companies can differentiate themselves in the marketplace and build a loyal customer base that values both religious compliance and environmental stewardship. A Halal cosmetics manufacturer could adopt sustainable sourcing practices by using eco-friendly, Halal-certified ingredients. The company could also implement waste reduction initiatives in its manufacturing processes, such as recycling packaging materials and reducing water consumption. By communicating these sustainability efforts to consumers, the company can strengthen its brand identity as a provider of ethical and environmentally responsible Halal products, appealing to a broader demographic that includes both Muslim and non-Muslim consumers.

Innovation is critical for maintaining competitiveness in the rapidly evolving Halal industry. Companies should continuously seek innovative ways to improve their Halal logistics and manufacturing processes, such as adopting new technologies, enhancing supply chain transparency, and implementing advanced traceability systems. Innovation in Halal practices not only improves operational efficiency but also positions the company as a leader in the Halal market, capable of responding to changing consumer demands and regulatory requirements. A food processing company could implement blockchain technology to enhance the traceability of its Halal products. By using blockchain, the company can provide consumers with real-time information about the origin, processing, and transportation of their products, ensuring transparency and building trust.

This innovation would not only improve the company's operational efficiency but also offer a unique value proposition to consumers who prioritize transparency and accountability in their purchasing decisions.

Halal practices can be leveraged to create market differentiation by offering unique value propositions that resonate with consumers. Companies that excel in Halal logistics and manufacturing can position themselves as premium brands, offering products that meet the highest standards of quality, safety, and religious compliance. This differentiation can be particularly effective in competitive markets where consumers are willing to pay a premium for products that align with their ethical and religious values. A Halal food brand could differentiate itself by not only adhering to strict Halal standards but also by offering products that are organic, non-GMO, and ethically sourced. By marketing these attributes, the company can appeal to a niche segment of consumers who are looking for products that meet both Halal and broader ethical criteria. This strategy could allow the company to command higher prices and build a loyal customer base that values the unique combination of Halal compliance and ethical production.

Policymakers and industry stakeholders must recognize the importance of Halal logistics and manufacturing in driving the competitiveness and sustainability of the Halal industry. Governments and industry bodies should support companies in their efforts to adopt and innovate in Halal practices by providing incentives, resources, and guidelines. Collaboration among industry players, such as forming Halal industry clusters or associations, can also facilitate the sharing of best practices, the development of standardized Halal certification processes, and the promotion of Halal products in global markets. A national government could introduce tax incentives for companies that invest in Halal-certified facilities and technologies. Additionally, industry associations could organize training programs and workshops to help companies understand the latest developments in Halal standards and sustainability practices. By fostering a supportive environment for Halal businesses, policymakers and industry leaders can help drive the growth and global competitiveness of the Halal industry.

5. Conclusion

This conceptual paper has explored the interconnectedness of Halal logistics, Halal manufacturing, competitiveness, and organizational sustainability. The literature review highlights the critical roles of Halal logistics, Halal manufacturing, competitiveness, and organizational sustainability in driving the success of organizations within the Halal industry. The proposed framework suggests that effective Halal practices can drive both competitiveness and sustainability, creating a virtuous cycle that enhances long-term organizational success. Halal logistics and manufacturing are not only essential for religious compliance but also serve as strategic tools that can enhance competitiveness and sustainability. Companies that effectively integrate these practices into their operations are better positioned to achieve long-term success in the rapidly growing global Halal market. As the Halal industry continues to grow, businesses that strategically integrate Halal practices into their operations are likely to achieve sustained competitive advantage and contribute positively to global sustainability goals. Future research should continue to explore the dynamic interplay between these variables and their impact on organizational performance.

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Profiling Geoguides at Stong Geopark: Enhancing Local Expertise for Sustainable Ecotourism

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Abstract: Stong Geopark is a prominent natural attraction site in Kelantan, characterized by its rich biodiversity and variety of plant and animal species, catering to diverse visitor interests such as wildlife enthusiasts, explorers, and tourists. Geoguides play a vital role in helping visitors comprehend the significance of the geopark's geological features, the interconnectedness of the ecosystem, and the knowledge of indigenous communities. However, the tourism industry faces challenges in meeting the requirements for various forms of tourism services, including geoguiding. This study aims to profile the geo guides at Stong Geopark and better understand their areas of expertise. The research employs a quantitative approach, surveying 39 geoguides, to provide a comprehensive profile encompassing their age, English proficiency, income distribution, tour frequency, and identified areas of expertise. The findings reveal three distinct clusters of geoguides' areas of expertise: Cluster 1 - Nature and Adventure, Cluster 2 - Nature, and Cluster 3 - Adventure. The study also highlights the need for the majority of geo guides to receive additional training in English communication skills and continuous professional development courses. Overall, this study offers valuable insights into the profiles of geoguides at Stong Geopark, emphasizing the importance of supporting and developing local geoguides' expertise to enhance the effectiveness of geopark management and visitor satisfaction. Furthermore, the study provides a spatial understanding of Stong Geopark by highlighting the locations of active geo guides about the distribution of geosites. This offers a comprehensive overview of the geopark's geography. The findings can inform policymakers, tourism authorities, and geopark management in developing targeted strategies for capacity building and professionalization of geo guides, ultimately contributing to the sustainable development of Stong Geopark as a thriving ecotourism destination.

Keyword: *Stong Geopark, Geoguides, Profiling, Expertise, Tourism Management*

1. Introduction

Malaysia's domestic tourism resources have profoundly impacted the growth of ecotourism, making it one of the country's most rapidly expanding sectors. As mentioned by Abdullah et al. (2022), ecotourism is a form of sustainable tourism involving trips primarily in natural environments, which has attracted substantial attention from both domestic and foreign tourists. This has manifested as nature tourism, educational tourism, and sustainable tourism, where travellers enjoy new experiences that are beneficial to their health, environment, and host communities. In the context of ecotourism, the key areas of interaction include social, economic, and environmental interests, while international travel also considers arts, culture, and historical interests (Pinheiro, Triest & Lopes, 2021). Within the framework of ecotourism, it is a natural resources-based tourism activity aimed at learning and exploring nature. Additionally, Fennell and Grosbois (2023) identified ecosystem conservation, minimal interference, sustainability, community participation, and education as the core components of ecotourism. However, as studied by Alauddin, Kamal, and Chowdhury (2021) on environmental learning, the primary focus has been on the tourists who have visited ecotourism sites. Environmental learning can help in the management of the physical environment and the scope of the earth's natural resources.

Stong Geopark was recognized as a National Geopark in Malaysia on November 14, 2022. The designation acknowledges the park's significant geological, biological, and cultural heritage, and it aims to promote sustainable development, scientific research, and education in the region. The park covers an area of 2,131.99 square kilometers and includes 25 geosites, 7 biosites, and 16 cultural sites, with artifacts dating back 1,000 to

5,000 years. Stong Geopark, located in Kelantan, is a prominent example of a protected natural area that has gained significant attention as an ecotourism destination. The geopark features a diverse range of geological formations, biodiversity, and cultural heritage, attracting a wide array of visitors. Ancient metamorphic rocks, intrusive igneous formations, and diverse landforms, including towering waterfalls, deep gorges, and rugged mountains (Maying et al., 2021). The park's remote location and the relatively undeveloped nature of its surroundings have helped maintain its pristine environment, making it a prime location for ecotourism. The recognition of Stong Geopark as a national geopark not only enhances its visibility and conservation efforts but also provides economic opportunities for local communities through sustainable tourism practices.

The development and recognition of Stong Geopark involve local communities, ensuring that the benefits of geotourism and conservation are shared. As emphasized by Fennell and Grosbois (2023), community involvement is a core element of ecotourism, and geoguides are residents who can provide valuable insights into the region's natural and cultural heritage. These local experts can help visitors better understand the significance of the geopark's geological features, the interconnectedness of the ecosystem, and the traditional practices of the indigenous communities (Jaini et al., 2012). Henceforth, one of the critical components of the Stong Geopark's ecotourism experience is the role of geoguides. The presence of trained and knowledgeable geoguides plays a crucial role in enhancing visitors' understanding and appreciation of the geopark's unique features and significance. Moreover, effective geo guides can contribute to the sustainability of ecotourism in the region by promoting environmental stewardship, fostering cultural appreciation, and encouraging responsible behavior among visitors. In the context of ecotourism, geo guides not only serve as interpreters of the natural and cultural environment but also play a crucial role in shaping the overall experience and fostering a deeper connection between visitors and the destination (Marzuki, Mohammad & Abdullah, 2014). Thus, the study aims to profile the geo guides at Stong Geopark to better understand their areas of expertise and demographic characteristics, to enhance the effectiveness of geopark management and visitor satisfaction. By profiling these local guides, the study seeks to gain a comprehensive understanding of the knowledge, skills, and competencies required to effectively interpret and showcase the geopark's unique geological, ecological, and cultural features to visitors. This exploration of geoguide expertise is crucial for enhancing the overall ecotourism experience and promoting the sustainable management of Stong Geopark.

2. Related Works

Geoguiding in Ecotourism

Recently, the development of the gig economy has received increasing attention, which further attracted attention to the welfare of the gig workers in the tourism industry. Even so, they have not translated this focus to examine the experiences of geoguide, which employs the gig work of the tourism sector (Yi & Yun, 2024). A geo guide is an expert who accompanies individuals or a group of travellers and accompanies them on trips acquaints them with the visited places, explains the features of local culture and customs, and helps with organizational matters. According to The World Federation of Tourist Guides Associations (2023), a geo guide is “a person who guides visitors in the language of their choice and interprets the cultural and natural heritage of an area which person normally possesses an area-specific qualification usually issued and recognized by the appropriate authority”. This definition focuses on the dual functions of a geo guide, that is, to interpret and explain the cultural and natural attractions of an area to the visitors as well as to arrange the tourist's geo guide with the role of making sure that a tourist has the best experience that he/she could wish for during the time that he/she is on his/her trip. This is because they act as historians, translators, encouragers of understanding and discovery of cultures, and even policemen since they are supposed to ensure that their tourists are safe (Wong et al., 2024). They also involve themselves in communicating with the tourists, which entails aspects such as knowledge of the history of the region, good interpersonal skills, and the ability to passionately convey the history in a form that would entertain the targeted clients.

Enrolment of technology in geoguiding is an area that has received lots of research attention in the last decade. Zaifri et al. (2023) explored the entrepreneurial application of digital technologies by geoguide and the use of AR and VR applications which bring a unique and detailed perception of the tourists. The study showed that while these technologies are efficient tools in the delivery of information, they have a negative side in that they demand guides to learn new technical skills in their communication. Ly et al. (2022) wrote an article exploring the increasing use of “virtual tour guides”, wherein the guides give tours virtually using live streaming or

recording and posting the video to the internet. This new mode of guiding has made it possible for various guides to cover the entire globe; hence, increasing the market for such services, though there has been an emergence of some challenges as to how to capture the attention of the people and how to ensure that the visitors have had the true experience of the sites. The study has also pointed out that there is a challenge in training specifically in the area of digital communication as well as the creation of exciting virtual content.

Recent studies have also concentrated on the shifts in tourist perception as it concerns cultural impact and originality. Leong et al. (2024) also pointed out how tourists demand more culture, including access to genuine cultural interpreters and their personal stories. The results of this study also stressed the concept of cultural sensitivity and the extent to which the guides can engage with the tourists. Gomes and Lopes (2023) focused on the mediating influence of the geo guide on behavioral intention to practice responsible tourism. The paper revealed that guides are expected to inform tourists about the right behavior regarding sustainable practices and to practice the behavior themselves. This change in expectations means that guides ought to have some understanding of the matters of sustainability and should consider this knowledge within their guided tours.

Tourism in Kelantan

Kelantan is one of the states located in the northern region of Malaysia and is commonly dubbed as the Cradle of Malay Culture (King, 2018). The state contains a wealth of original arts, crafts, and devotional exercises and therefore forms a part of the tourism package in Malaysia but is marketed differently. Although it is not as culturally rich as some other states in Malaysia such as Penang or Kuala Lumpur, Kelantan is gradually starting to appeal to travellers as an interesting place to visit to plunge into the Malay culture (Zukri et al, 2024). Tourism especially cultural tourism is popular in Kelantan since it has close relations with traditional Malay culture. Previous research has pointed out that tourists are drawn to genuine nature and the possibility of immersing themselves in Malay culture that is fast disappearing elsewhere in Malaysia (Tan, Lee & Choy, 2020). Local products like batik, songket, and native silverware are also regarded as important boosters of the tourism industry. Craft villages such as Craft Village or Kampung Kraftangan and Kota Bharu's Central Market are usual spots for tourists to visit to purchase handicrafts. The artworks produced are not only means of production but are also ways of patronizing their respective people's cultures (Ahmad, Khairi & Kamarudin, 2023).

Kelantan is mostly an Islamic state and thus its Islamic appeal is a major attraction for tourists for religious purposes. As pointed out by Erasiah et al. (2023), there are many more mosques in the state including the most popular mosques such as the Sultan Ismail Petra Mosque and the Kampung Laut Mosque; the latter is one of the oldest mosques in Malaysia. The features that attract many tourists to these mosques include the fusion of local, Islamic, and even Siam's architectural styles. Apart from mosques, there are religious celebrations including Maulidur Rasul and Ramadhan bazaars which are major draws that attract Muslim visitors to the state. The activities allow one to learn about the religious culture and social aspects of the community in Kelantan.

Kelantan can also be described as having a natural beauty which is slowly being promoted as a tourist attraction, particularly for eco-tourism. The state also houses the Gunung Stong State Park which has one of the highest waterfalls of Southeast Asia, the Jelawang Waterfalls. It is a place that is frequently visited by hikers, bird lovers, and anyone who has an interest in nature. There is also literature on the strategies to develop eco-tourism in Kelantan to support the process of tourism while respecting the environment and benefiting the local people (Hassin et al., 2020). The state has a beautiful coastline stretch including the Cahaya Bulan Beach and Irama Beach. While the sands are not as rich as those in the other regions of Malaysia, these sections provide tourists with relatively more tranquil, unspoiled coasts. It has also been realized there is an increasing desire of people to opt for interests that involve the rivers, mostly the Kelantan River, with activities such as rafting and fishing.

Geoguides and their Role in Ecotourism

The geo guides in Gunung Stong Geopark play a critical role in shaping the visitor experience and promoting the understanding of the geopark's geological and natural heritage. Geoguides serve as the primary interpreters of the geopark's features, providing visitors with an in-depth explanation of the geological processes, the significance of the landforms, and the interconnected ecosystems (Sera et al., 2020, Thong et al., 2019). Through their engaging and informative interpretations, geo guides help visitors develop a deeper appreciation for the geopark's unique features and the importance of their conservation. Geoguides also play a crucial role in

fostering environmental awareness and promoting sustainable behaviors among visitors. They educate visitors on the fragility of the geopark's ecosystems, the impact of human activities, and the importance of responsible tourism practices.

Geoguides, or tour guides within geoparks, are responsible for providing visitors with comprehensive information about the geological, ecological, and cultural aspects of the protected area (Yani et al., 2021, Wijaya et al., 2019). As stated by Farsani et al. (2014), geo guides act as intermediaries between the geopark and its visitors, interpreting the geopark's resources and facilitating meaningful interactions with the environment and local communities. Geoguides play a crucial role in promoting the conservation and sustainable management of geoparks by fostering environmental awareness and educational experiences for visitors.

According to Samodra (2018), geo guides in Indonesia's Batur Geopark have been recognized for their contributions to visitor education and the protection of the geopark's natural resources. Geoguides raise awareness about the geological and ecological significance of the area, create job opportunities promote sustainable economic development through geotourism, and foster public understanding of geological heritage and pro-environmental attitudes among the visitors. Similarly, research in other geoparks, such as the study conducted by Zafeiropoulos et al. (2021), has underscored the critical role of geoguides in enhancing visitor satisfaction and promoting the sustainable development of geoparks. Geoguides are essential in enhancing visitor education, satisfaction, and sustainable practices in geoparks by providing interpretive services that deepen understanding of geological features, fostering cultural connections, tailoring educational content to diverse visitor motivations, supporting community involvement, and serving as a feedback mechanism for continuous improvement in park management.

One of the key characteristics of effective geoguides is their deep knowledge of the geopark's geology, ecology, and cultural heritage (Jia, Wu & Hou, 2022). They exhibit a strong understanding of the geological processes that have shaped the unique landforms, rock formations, and ecosystems within the geopark. This comprehensive knowledge allows them to provide visitors with in-depth and engaging explanations of the geopark's features, fostering a deeper level of appreciation and awareness.

In addition to their geological expertise, geologists often possess excellent communication and interpretation skills (Yani et al., 2021, Weiler & Walker, 2014). They can effectively convey complex scientific concepts in a manner that is accessible and captivating to visitors from diverse backgrounds. Geoguides demonstrate the ability to tailor their interpretations to the specific needs and interests of their audience, ensuring that the information is relevant and engaging for each group.

3. Methodology

Study Area

Stong Geopark is situated in the northeastern state of Kelantan, Malaysia, and covers the entire Jeli Colony and Dabong District within the Kuala Krai Colony with an area of 2131.99 square kilometers. The uniqueness of Stong Geopark lies in the Stong Migmatite Complex which is the youngest igneous body in Peninsular Malaysia. The geopark is renowned for its diverse and captivating geological features, including ancient rock formations, unique landforms, and breathtaking waterfalls (Sera et al., 2020, Fauzi & Misni, 2016, Ibrahim et al., 2021, Matshusa, Leonard & Thomas, 2021). In 2021, Gunung Stong Geopark was designated as a UNESCO Global Geopark, a prestigious recognition that underscores its international geological significance and its commitment to sustainable development. Table 1 below provides a list of the various sites within the Stong Geopark, along with their respective areas and coordinates in the RSO (Rectified Skew Orthomorphic) system, which can later be transformed into longitude and latitude. Based on previous reports and studies, five geosites have been identified without respective coordinates, and these will be exempted from this study.

Table 1: Stong Geological Heritage Sites

ID	Geosite Name	Area	Coordinate (RSO)	
			Northing	Easting
1	Air Terjun Jelawang	Dabong Kuala Krai	590825.00	441882.00
2	Kars Gua Ikan	Dabong Kuala Krai	592396.00	448699.00
3	Syis Taku Sungai Galas	Dabong Kuala Krai	463858.81	603414.08
4	Batu Kapur Kemubu	Dabong Kuala Krai	not available	not available
5	Migmatit Stong Lata Kertas	Dabong Kuala Krai	441224.15	580126.33
6	Landskap Puncak Pergunungan Stong	Dabong Kuala Krai	not available	not available
7	Marmar Gunung Reng	Jeli	632211.00	417478.00
8	Mata Air Panas Sg Helang	Jeli	626789.00	413993.00
9	Batu Kapur Kompleks Gua Setir	Jeli	437401.65	626150.56
10	Batuan Klastik Kampong Biak	Jeli	not available	not available
11	Lata Renyok	Jeli	617189.00	431697.00
12	Mata Air Sejuk Batu Hitam Kampong Belimbing	Jeli	414383.33	628773.29
13	Lombong Emas Kampong Kalai	Jeli	not available	not available
14	Granit Kemahang Lata Keding	Jeli	428889.03	635673.52
15	Lata Chenai	Jeli	606263.00	432082.00
16	Rejahan Granit Noring Lata Turbur	Jeli	411438.00	626244.00
17	Migmatit Stong Sungai Ruai	Jeli	422744.84	625364.45
18	Lata Janggut	Jeli	627299.00	420215.00
19	Tasik Pergau	Jeli	411439.62	622936.52
20	Ngarai Sungai Pergau	Jeli	412422.63	627218.75
21	Alluvial Sungai Pergau	Jeli	412340.31	627274.25
22	Bongkah Sungai Long	Jeli	419113.49	624875.77
23	Terowong Emas Kampong Kalai	Jeli	not available	not available
24	Granit Kemahang Politeknik	Jeli	429027.65	631490.35
25	Marmar Gunung Reng	Jeli	417299.58	632373.05

Data Collection and Analysis

This study employed quantitative research methodology, utilizing a comprehensive survey questionnaire to collect detailed data from the geoguides of Stong Geopark. The population surveyed in this study comprised registered geoguides mainly from Dabong and Jeli under the Ministry of Tourism, Arts and Culture (MOTAC), Malaysia. The target population for this study consisted of all registered geoguides under MOTAC, specifically those operating in the Stong Geopark region, including Dabong and Jeli. This group is chosen because they are directly involved in guiding and educating visitors about the geopark's natural and cultural heritage. The sample was selected using a purposive sampling method, targeting geoguides who are actively involved in guiding

activities within Stong Geopark. This approach ensures that the participants have relevant experience and knowledge to provide meaningful insights for the study. The survey instrument captured a wide range of information about the geo guides, including their demographics such as age, gender, and educational background, as well as their professional experience and expertise in guiding visitors through the geopark. The survey also gathered data on the typical size and composition of the tourist groups they guide, and their language proficiency, which enables them to effectively communicate with diverse visitors. A total of 39 geoguides participated in the survey, providing valuable insights into their backgrounds and capabilities. The collected data are then thoroughly analyzed and visualized using the Tableau Desktop software, enabling the researchers to generate detailed descriptive statistics and other relevant findings that shed light on the characteristics and capabilities of the geo guides within Stong Geopark.

In addition to the primary survey data, the study also incorporated relevant secondary sources, such as academic publications, reports, and official documents, to contextualize the findings and explore the broader implications for geopark management and sustainable tourism development. These secondary sources provide valuable background information, expert insights, and best practices from similar geoparks or natural heritage sites. By integrating both primary and secondary data, the researchers can develop a more well-rounded understanding of the challenges and opportunities faced by the geoguides in Stong Geopark. The survey instrument was developed specifically for this study, drawing on existing literature and best practices in survey design. It was reviewed and validated by experts in the field to ensure its reliability and relevance. The instrument included both closed and open-ended questions to capture a comprehensive range of data from the geo guides. Additionally, the study utilized ArcGIS software to map the geosites within the geopark, providing a comprehensive visual representation of the area's diverse geological assets. The spatial analysis through mapping reveals the diverse and abundant geological assets within the geopark. Additionally, it helps to pinpoint the locations where geoguides are situated. This geographic information can inform strategies for the sustainable stewardship and interpretation of the geopark's resources.

4. Results and Discussion

The study findings reveal several key insights into the characteristics, expertise, and role of the geoguides, as well as the diverse geological features and resources that comprise the Stong Geopark.

Demographic Profiles of Geoguides

Figure 1: Age Distribution of Geoguides according to Gender

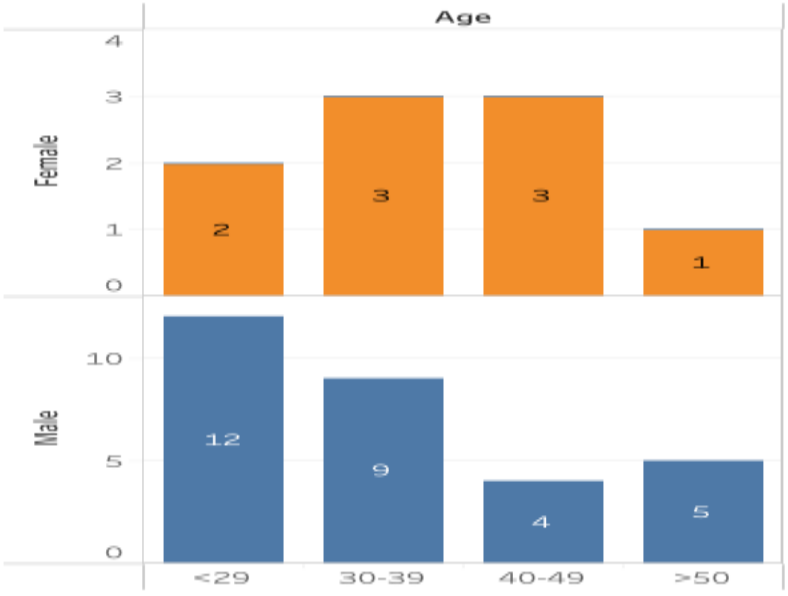


Figure 1 illustrates the age distribution of male and female geoguides at Stong Geopark, Kelantan. The data are segmented into four age groups: less than 29 years, 30-39 years, 40-49 years, and greater than 50 years. For male geoguides, the largest group is the under 29 years category, with 12 individuals. The next largest is the 30-39 years group, which includes 9 males. The 40-49 years category has a smaller representation with 4 males, and the over 50 years group includes 5 males.

In contrast, female geoguides have their highest representation in both groups of under 29 years and 30-39 years categories, with 3 individuals each. The 40-49 years group also has 3 females, while the over 50 years category has only 1 female. This distribution indicates that younger male geoguides are more prevalent compared to their female counterparts, particularly in the under 29 years and 30-39 years age groups. The data also suggest a relatively balanced representation of females across most age groups, except for the over 50 years category, where there is a notable drop. This chart provides valuable insights into the age and gender dynamics among geo guides at Stong Geopark, revealing a younger male-dominated workforce with a more evenly distributed female presence across most age groups.

Figure 2: English Proficiency Among Geoguides

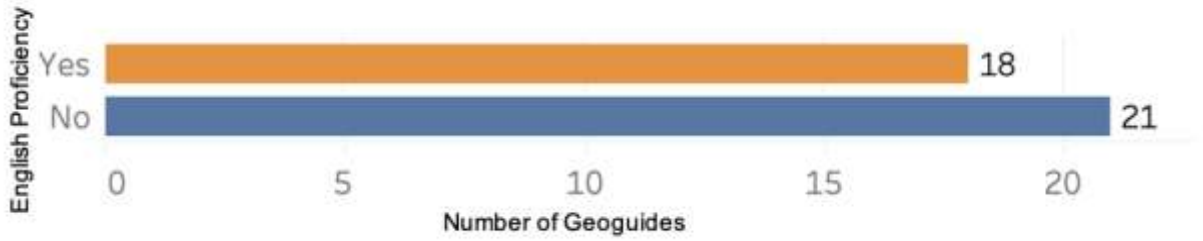


Figure 2 illustrates the English proficiency of geoguides at Stong Geopark, Kelantan. The x-axis represents the number of geo guides, ranging from 0 to 20, while the y-axis categorizes English proficiency into two groups: "Yes" and "No." The data presented in Figure 2 indicates the English proficiency of geoguides at Stong Geopark. The chart is divided into two bars: the top bar colored in orange represents geo guides who are proficient in English and labelled as "Yes", while the bottom bar colored in blue represents those who are not proficient and labelled as "No". The x-axis, labelled as "Number of Geoguides," ranges from 0 to 20 in increments of 5.

The findings revealed that out of the 39 geoguides surveyed, 18 geoguides (approximately 46%) have English proficiency, while 21 geoguides (approximately 54%) do not. This visual representation highlights a significant portion of geo guides lacking in English proficiency, which could impact their ability to effectively communicate with international visitors. This insight could be crucial for understanding potential communication barriers and identifying areas where additional language training might be beneficial for the geo guides to improve the overall visitor experience at Stong Geopark.

Figure 3: Income Distribution by Years of Experience Among Geoguides

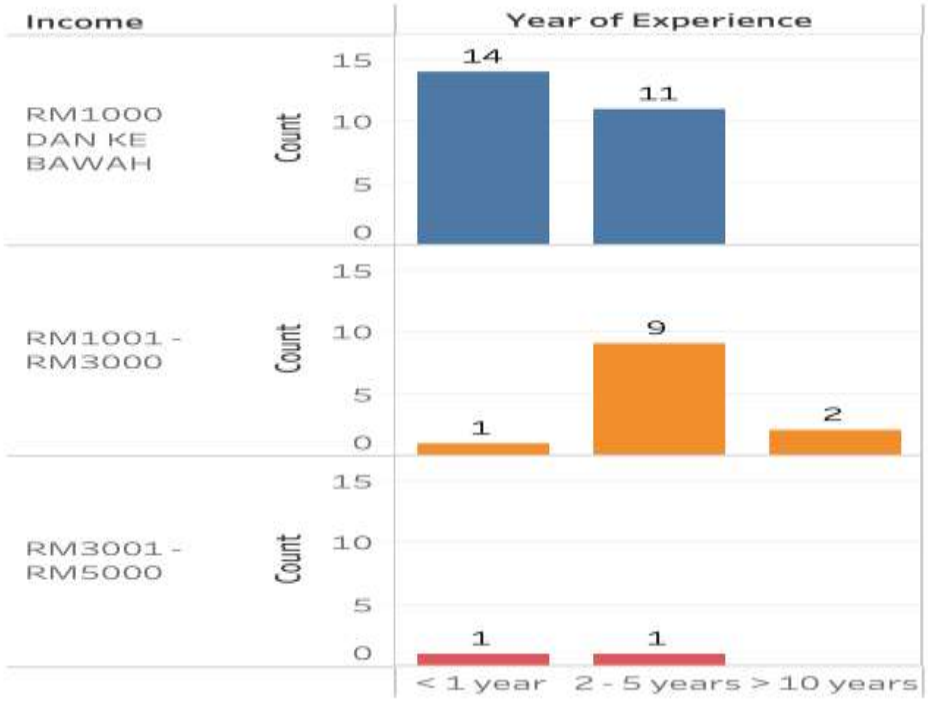


Figure 3 provides a detailed breakdown of the income distribution among geoguides at Stong Geopark, Kelantan, categorized by their years of experience. The income ranges are divided into three categories: RM1000 and below, RM1001 - RM3000, and RM3001 - RM5000. The majority of geoguides, regardless of their experience level, fall into the RM1000 and below income category. This includes 15 geoguides with less than 1 year of experience, 14 with 2-5 years of experience, and 11 with more than 10 years of experience. This indicates that a significant portion of geoguides earn within the lower income bracket.

The RM1001 - RM3000 category shows a notable decrease in numbers. Only one geo guide with less than 1 year of experience falls into this middle-income range, while 9 geo guides have 2 5 years of experience, and 2 have more than 10 years of experience. This suggests that as geo guides gain more experience, some can move into the middle-income bracket, but the numbers remain relatively low compared to the lowest-income category. In the highest income category of RM3001 - RM5000, the numbers are the lowest across all experience levels. There is one geoguide with less than 1 year of experience and one with more than 10 years of experience, but none with 2-5 years of experience. This indicates that very few geo guides achieve this higher income level, regardless of their years of experience.

Overall, the findings suggest that most geoguides at Stong Geopark earn relatively low incomes, with the majority earning RM1000 or less per month. A smaller number earn between RM1001 and RM3000, while very few geoguides reach the higher income range of RM3001 to RM5000. This distribution highlights the need for potential income growth opportunities and improved compensation for geoguides, especially as they gain more experience and expertise in their roles. Addressing the financial challenges faced by geo guides is crucial to ensuring their professional development, improving the overall visitor experience, and promoting the long-term sustainability of the geopark.

Figure 4: Monthly Visit Frequencies of Geoguides

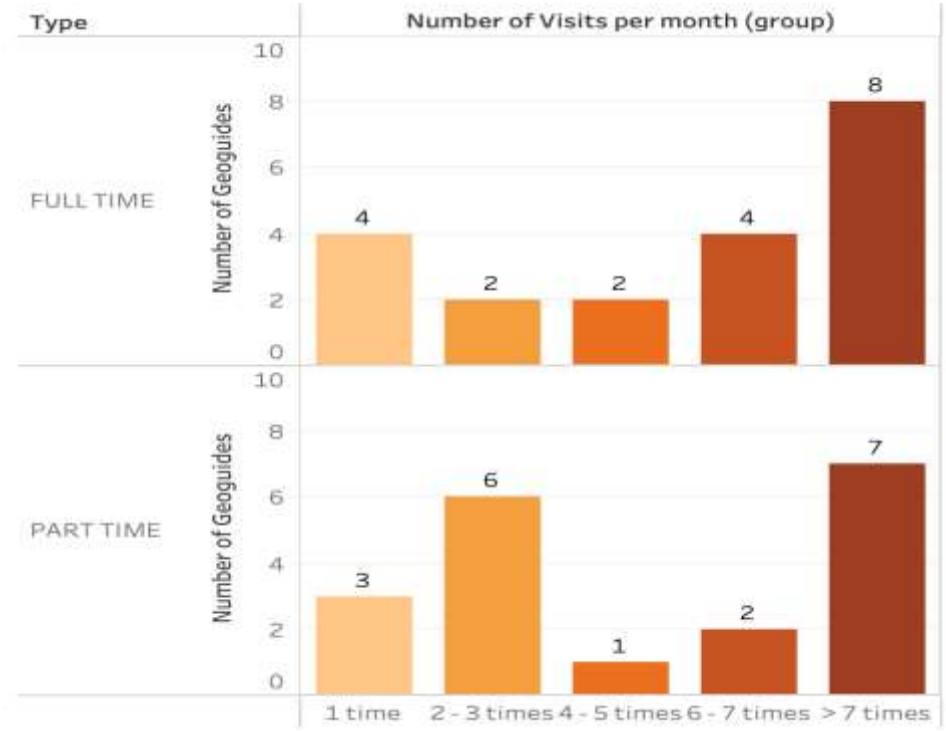


Figure 4 provides a detailed comparison of the visit frequencies of full-time and part-time geoguides at Stong Geopark. It categorizes the geo guides based on the number of tours they conduct per month, divided into four intervals: '1 time', '2-3 times', '4-5 times', '6-7 times' and '> 7 times'. For full-time geoguides, the data showed that the majority of them (8) conduct more than 7 tours per month. This is followed by 4 geo guides who lead tours 4-5 times per month. Additionally, 2 geoguides conduct tours either once or 2-3 times a month. This indicates that full-time geoguides are highly active, with most leading tours very frequently.

In contrast, part-time geoguides showed a broader distribution in their tour visit frequencies. The highest number of part-time geo guides (7) also conduct more than 7 hours per month. However, a significant number of part-time geoguides (6) conduct tours only once a month. 3 part-time geo guides lead tours 2-3 times monthly, 2 part-timers who guide tours 6-7 times monthly, and 1 part-timer who conducts tours 4-5 times monthly. This suggests that part-time geo guides have a more varied and lower frequency of tours compared to their full-time counterparts. These findings highlight the differences in responsibilities and commitment between full-time and part-time geoguides at Stong Geopark. This information is valuable for understanding the operational dynamics and staffing requirements in managing tours at the geopark. The higher frequency of tours conducted by full-time geo guides suggests they play a more central role in the park's visitor experience, while part-time geo guides provide supplementary support with more varied schedules. This insight can help geopark managers optimize staffing and tour scheduling to ensure a consistently high-quality visitor experience.

Table 5: Cluster of Geoguides at Stong Geopark by Gender and Areas of Expertise

Gender	Nature	Adventure	Nature and Adventure	Total
Male	11	1	18	30
Female	3	2	4	9

Lastly, based on Crosstabs analysis, Table 5 illustrates the distribution of geo guides at Stong Geopark based on gender and areas of expertise. It categorizes the geo guides into three clusters:

Cluster 1: Nature & Adventure - This is the largest cluster, comprising 22 geoguides whereby 18 are male and 4 are female. These guides are proficient in both nature and trekking, indicating a strong capability to lead tours that involve natural exploration and physical activities.
Cluster 2: Nature - This cluster includes 14 geoguides who specialize exclusively in nature and the majority are male. These guides focus on the natural aspects of the geopark, likely providing in-depth knowledge about the local flora and fauna.
Cluster 3: Adventure - The smallest cluster, with only 3 geo guides, focuses on adventure activities. These guides are specialized in leading more physically demanding and adventurous tours.

The overlap between these clusters suggests that many geoguides possess a combination of skills, particularly in nature and trekking. This diversity in expertise allows the geopark to cater to a wide range of tourist preferences, from those interested in leisurely nature walks to those seeking more adventurous trekking experiences. The presence of these clusters highlights the varied skill sets among the geo guides, which is beneficial for providing comprehensive and engaging tours at Stong Geopark. This diverse range of expertise among the geo guides enables the geopark to offer a versatile and adaptable visitor experience, catering to the needs and interests of a wide spectrum of tourists. By having guides skilled in both nature appreciation and physically demanding activities, the geopark can accommodate visitors with varying levels of fitness and interests, ensuring that everyone can find an engaging and fulfilling tour that aligns with their preferences.

Spatial Distribution of Geological Sites and Geoguides in Stong Geopark

Figure 6: Map of Key Geological Sites and Geoguides' Locations



The geographical information system map of Stong Geopark, Kelantan, presented in Figure 6, highlights the distribution of key geological sites and the locations of active geoguides within the park. The map illustrates the geographical distribution of geosites referenced in Table 1. A red circle marks the location of the geogrid address in Kuala Krai and Jeli, which serves as a central point for guiding visitors to various geosites. Surrounding this central point are several numbered black circles, each corresponding to specific geosites listed in Table 1.

For example, the black circle labelled "1" represents Air Terjun Jelawang, a prominent waterfall located in Dabong, Kuala Krai, and the black circle numbered "2" corresponds to Kars Gua Ikan, another significant geosite

in the same area. The diagram also includes other notable geosites, such as Syis Taku Sungai Galas, Batu Kapur Kemubu, and Migmatit Stong Lata Kertas, each marked with their respective RSO system coordinates. This visual representation helps in understanding the spatial arrangement of these geosites about the central guiding location in Kuala Krai. It highlights the accessibility and proximity of various geological attractions within the geopark, making it easier for visitors and researchers to plan their visits and studies. The map also includes other notable locations in the region, providing a broader geographic context. By integrating the locations of the active geo guides with the distribution of the geosites, this map offers a comprehensive spatial understanding of Stong Geopark. This information can be useful for geopark management, tour planning, and visitor orientation, facilitating the efficient organization and coordination of guided tours to the various geological attractions within the park.

5. Conclusion

This study aims to develop a profile of geoguides and their expertise, to contribute to a better understanding of this group. The information generated could assist tourism companies and visitors in identifying qualified geoguides who meet their preferences. The results indicate that the majority of geoguides are young to middle-aged men, which raises concerns about a potential shortage of experienced professionals in this field. Additionally, the findings suggest that a notable proportion of geoguides are not proficient in English. This insight highlights the need to recognize possible communication barriers and identify areas where additional language training could benefit the geo guides at Stong Geopark. Furthermore, the majority of geoguides at Stong Geopark earn relatively low incomes, with most earning RM1000 or less per month, which is comparatively low pay. Few geoguides make between RM1001 and RM5000. This income distribution highlights the need for potential growth opportunities and improved compensation, especially as geoguides gain more experience and expertise in their roles. It is imperative to address the financial challenges faced by geo guides to ensure their professional development, improve the overall visitor experience, and promote the long-term sustainability of the geopark. Additionally, it was found that full-time geo guides at Stong Geopark are likely to conduct tours, with the majority leading tours more than seven times per month. This information is valuable for understanding the operational dynamics and staffing requirements in managing tours at the geopark.

This study makes several contributions to the existing literature. First, by developing a profile of the geoguides, it provides empirical evidence on the categorization of the geoguides based on their areas of expertise. The geoguides are classified into three clusters. Cluster 1 is the largest which comprises 22 geoguides who specialize in both nature and adventure activities. Cluster 2 involves 14 geo guides who focus exclusively on the natural aspects of the geopark. Cluster 3, the smallest with only 3 geo guides, specializes in adventure activities. The overlap between these clusters suggests that many geoguides possess a combination of skills, particularly in nature and trekking. This spectrum of experience enables the geopark to accommodate a wide range of visitors' needs, from those seeking bold trekking excursions to those interested in peaceful nature hikes. Second, by highlighting the distribution of key geological sites and the locations of active geo guides within the park, the study provides insights into the accessibility and proximity of various geosite attractions, making it easier for visitors and researchers to plan their visits and studies. Third, the study contributes to the literature by focusing on the profiling of geo guides at one of the UNESCO Global Geoparks, which are the key drivers of tourism growth and ecosystem development in Malaysia. The study acknowledges a limitation that should be considered when interpreting the results. The sample size of 39 registered geo guides from Stong Geopark in Kelantan may limit the generalizability of the findings to other geoparks or regions. Future research could address these limitations by using a larger and more diverse sample of participants.

The findings of this study have several important policy implications. Firstly, there is a clear need for targeted recruitment and training programs to attract and retain experienced geoguides. The study highlights that most geoguides are young to middle-aged geoguides, suggesting a potential shortage of seasoned professionals. By implementing targeted recruitment strategies, such as outreach programs and partnerships with educational institutions, and developing comprehensive training programs, the industry can ensure a steady pipeline of qualified geoguides who can meet the demands of the tourism sector. Secondly, the study revealed that a significant number of geo guides are not proficient in English, which can create communication barriers with international visitors. Enhancing language training programs can mitigate these barriers, improving the overall

visitor experience. This can be achieved through language courses, workshops, and immersive learning experiences, enabling geoguides to communicate more effectively with visitors and enhance their satisfaction. Lastly, the study underscores the importance of continuous professional development and support for geo guides to ensure the sustainability and quality of guided tours. Providing ongoing training and development opportunities can help geo guides stay updated with the latest knowledge and skills. This could include advanced training in geology, ecology, and tour management, as well as soft skills like customer service and leadership. Establishing support systems, such as mentorship programs and professional networks, can also help geoguides navigate their careers and address challenges they may face.

Since the study focused primarily on Stong Geopark in Kelantan, it is recommended that future research investigate other geopark areas in Malaysia as well. Comparative studies between different geoparks and regions are encouraged to be explored, as this could provide valuable insights into the contextual factors that may influence the geoguides' areas of expertise and the tourism industry. Additionally, qualitative research could be applied to gain a deeper understanding of the geoguides' skills and areas of expertise according to the different clusters. By integrating the locations of the active geo guides with the distribution of the geosites, this map offers a comprehensive spatial understanding of Stong Geopark. This information can be useful for geopark management, tour planning, and visitor orientation, facilitating the efficient organization and coordination of guided tours to the various geological attractions within the park.

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The Influence of Zakat Assistance on Academic Achievement Among University Students in Malaysia and Indonesia: A Pilot Study

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Abstract: It is well known that knowledge and education are the best solutions to abolish the *Asnaf* people from poverty. As a result, zakat institutions actively play an essential role in distributing zakat funds through educational assistance to the *asnaf* groups in Malaysia and Indonesia. This measure ensures that the *asnaf* groups receive educational opportunities and succeed like others. Dropping out of studies due to failure to pay tuition fees is among the issues that are often reported in most past studies. Therefore, this study was conducted to identify and analyze the influence of zakat assistance on the academic achievement of students at Universiti Teknologi MARA Terengganu Branch, Malaysia (UiTMCT) and Universitas Sains Al-Qur'an, Indonesia (UNSIQ). This study also provides recommendations to empower zakat assistance at UiTMCT and UNSIQ. This study used a quantitative research method involving data collection by distributing questionnaires to 54 students at UiTMCT and UNSIQ. The findings were analyzed using the Statistical Package for Social Science (SPSS) software (version 24). The t-test results showed a significant difference in academic performance and governance between UiTMCT and UNSIQ, with a p-value of less than 0.05. This study is anticipated to provide insight to the community on the efforts to empower zakat institutions to assist *asnaf fisabilillah* in higher education institutions (IPTs) in Malaysia and Indonesia.

Keywords: *Zakat, Asnaf Fisabilillah, Academic Performance, University Students, Influence of Zakat*

1. Introduction

Assistance from zakat institutions is necessary for students in the *asnaf* category to continue their studies more comfortably. In addition to supporting tools such as devices and the internet, zakat institutions at higher education institutions (IPTs) also hold various programs that can improve the self-esteem and motivation of students to achieve academic excellence. This can indirectly increase the effectiveness of zakat distribution in the IPT concerned (Jalil, Wahid & Ahmad, 2017). The proceeds of the zakat collection at UiTM are distributed through the Zakat Trust Fund, which considers students' living and academic needs. UiTM students apply through a manual application form or online and attend an interview screening. In Indonesia, according to Bashori (2021), this educational assistance program aims to provide students with access to education in both urban and rural areas. This academic program is an effort to improve human development through high-performing students.

In Indonesia, various programs have also been developed by the Zakat Collection Unit at UNSIQ in collaboration with the National Amil Zakat Agency (BAZNAS). UNSIQ has given its total commitment by working together to improve the quality of students. UNSIQ allows students to apply for zakat assistance on the condition that 1) they are in semester 5, 2) they are active in campus activities, and 3) they have an Academic Performance Index minimum of 3.30. After that, the students followed the interview process held by the UNSIQ Student Affairs Division. Programs offered for students who receive zakat assistance include strengthening academic foundations and constitutional management skills and holding zakat webinars monitored by senior lecturers and BAZNAS.

The zakat institution is essential in helping the *snaf*, categorized as *fisabilillah*. *Asnaf fisabilillah* involves university students who are struggling to complete their studies. Among the issues that arise from these students is dropping out of studies due to failure to pay tuition fees (Haznan, 2017). Zakat institutions have implemented various initiatives to offer educational zakat assistance. According to Jalil, Wahid, and Ahmad (2017), students' perception level of the role played by the zakat unit in IPT is still low, especially in the role of

amil zakat in IPT who distributes zakat. In addition, it is difficult to identify how students use the zakat money, as stated in the study by Hamzah et al. (2021).

Therefore, the effect of zakat assistance on improving students' academic performance should be studied. The best method to empower educational zakat assistance and collaboration between UiTMCT and UNSIQ was formulated. Malaysia and Indonesia are countries dominated by Muslims. As a result, these two countries must fully utilize and improve their zakat institutions' operations. Therefore, this study focuses on distributing zakat assistance to *snap* students in two universities: UiTM Terengganu branch (UiTMCT), Malaysia, and UNSIQ, Central Java, Wonosobo, Indonesia.

2. Literature Review

Comparison of Zakat Assistance in Indonesia and Malaysia

Ironically, previous studies have reported a comparative analysis of zakat development in Malaysia and Indonesia. According to Suprayitno (2017), zakat in Malaysia is more developed than in Indonesia, as Malaysia has a more explicit and structured zakat administration method. In Indonesia, tax credits have not yet been implemented, and there is no national standard for calculating zakat as implemented in Malaysia (Nugraha, Refmansari & Akhbar, 2021). In terms of implementation, there are some notable differences. According to Aminuddin et al. (2020), in Malaysia, a tax deduction is given if the *muzakki* pays zakat, but it is different in Indonesia when the zakat deduction is only given if the zakat is deposited by the *muzakki* through BAZNAS and Lembaga Amil Zakat (LAZ) only. A study by Suprayitno (2017) also examined the influence of zakat on economic growth and its effect on the receipt of tax revenue in Malaysia and Indonesia. This study examined zakat's influence on students' academic performance in these two Muslim-majority countries.

University students as Asnaf Fisabilillah

University students are included in the *asnaf fisabilillah* group, and some studies have discussed it. For example, a study by Hamzah et al. (2021) found that the *asnaf* students use their zakat money on food and drink expenses, daily needs, and helping the family. Shaharin et al. (2021) stated that the number of students eligible for zakat is increasing due to the COVID-19 pandemic. As a result, zakat assistance to underprivileged students can help ease their burden when studying at university and increase focus on their studies (Aziz et al., 2020).

Zakat has been proven to help *asnaf fisabilillah* in public universities, especially in the Universiti Teknologi MARA Kedah Branch (Ayub et al., 2022). Zakat assistance has successfully met the needs of students, such as internet, smartphones, books, stationery, and food and drink needs. However, several studies have suggested that zakat assistance to *asnaf fisabilillah* students should be diversified to suit current needs. Mohd Aris, Mohamed @ Daud, and Abas (2021) suggested the distribution of zakat assistance to *asnaf* as food aid to ensure that they get healthy food with sufficient nutrition, which is very important for life needs. This is because many university students still consume food that lacks nutrition due to financial problems.

Students' Perceptions of Zakat Assistance Received

Several studies have discussed students' perceptions of the zakat assistance received. Saud and Abd. Khafidz (2018) examined the perception of *Baitulmal* professional students towards applications for educational zakat assistance from the Federal Territory Islamic Religious Council (MAIWP). They also found that the effectiveness of the application procedure affects the level of *asnaf* satisfaction with zakat distribution and indirectly affects the *asnaf*'s quality of life significantly. The Zakat management also plays a role in managing zakat well to increase students' awareness and zakat collection further so that more students can continue their studies to a higher level (Abd Rahim et al., 2023). Abd Rahim et al. (2023) stated that 90.1% of students agreed that Selangor's Zakat and Sadaqah Unit had performed well in helping needy students.

Issues and Challenges of Zakat Assistance Management for Students

Several studies have debated the issues and challenges in managing zakat distribution to students. Among the challenges students face is going through the application process through an interview and an investigation process that is too thorough with complicated procedures (Saud & Abd. Khafidz, 2018). Many students are also unaware of zakat units and do not understand the unit's function established in their respective institutions

(Abd Rahim et al., 2023). This challenge shows that there are still weaknesses in the promotion or distribution of information by the zakat management.

According to Mohamad Zaki and Abdul Rahman (2019), many poor and needy students still do not receive zakat assistance due to an inefficient recording system. Ayub et al. (2023) perceived that zakat institutions should reduce bureaucracy so that zakat applications can be processed quickly and approved. The management of zakat distribution at UiTM also faces the issue of management weaknesses such as missing application forms, taking a long time, lack of information dissemination, and difficulty in screening the qualifications of students who need zakat assistance (Tuan Mohd Zamli, 2019).

Influence of Zakat Assistance on Student Academic Performance

A study on the influence of zakat assistance on students' academic performance has been conducted by Ahmad Ahmad Mustaffa, Wahid, and Ahmed (2015). They claimed that localization is influential in managing zakat distribution to students. It includes the mosque's strategic position to launch the zakat distribution process to *Asnaf* students. Md Rosdi (2014) agreed that zakat assistance by the MAIWP's Baitulmal has increased students' academic excellence at IPTs around Kuala Lumpur, Selangor, and Negeri Sembilan.

In Indonesia, a study by Rohmawaty and Ima Mutammima (2018) showed that zakat's influence on university students' academic performance was only 45.6%. On the other hand, Nur Eviyati (2015) found that the success of students in academics is not entirely driven by zakat distribution; family motivation and the environment also affect academic achievement. Nevertheless, the study showed that the role of zakat also contributes to students' academic achievement. Similarly, a study by Wulandari (2017) shows that zakat also significantly influences students' academic performance. The study shows that the influence of zakat distribution to students in educational institutions in Indonesia also has significant implications on students' academic performance.

Based on previous studies, several issues and problems in managing zakat distribution require in-depth research. Similarly, there are still not many studies on the influence of zakat assistance on students. No study has focused on comparing zakat distribution practices between the two universities, UiTMCT and UNSIQ.

3. Methodology

Study Design

This study used quantitative research, with questionnaires distributed to UiTMCT and UNSIQ students who received Zakat assistance. Empirical research was conducted to answer all research objectives. The results were analyzed using the Statistical Package for Social Science (SPSS) software (version 24.0), with descriptive and inferential statistics (t-test) used to analyze the primary data.

Population and Sample

This study's selected population consisted of UiTMCT and UNSIQ students who received zakat assistance. As a preliminary study, only 54 students were respondents. The 54 sets of questionnaires distributed were sufficient for the pilot study. According to Tiun (1995), a sample size of 30 is generally accepted as the minimum number of cases if specific statistical methods are used to analyze the data.

The selection of study locations at UiTMCT and UNSIQ considered the memorandum of understanding that these two universities have signed. This agreement included collaboration agreements for research involving zakat. Therefore, these two universities are suitable for studying the implementation of zakat, which can further strengthen the zakat operations at UiTMCT and UNSIQ.

Sampling Techniques

This study selected UiTMCT and UNSIQ students who received zakat as respondents. Purposive sampling was employed as it is the easiest method to obtain information from a certain group (Sekaran, 2006).

Several factors also influenced the selection of this respondent. Apart from the memorandum of understanding between UiTMCT and UNSIQ, this selection was also due to the performance of the two universities, which are

among the top universities in the two countries. In addition, UiTMCT and UNSIQ are universities that conduct zakat operations by distributing educational funds to needy students. This selection was also influenced by the majority of students at these two universities are Muslim students, and zakat is an Islamic financial instrument that must be paid and distributed to Muslims. This study was suitable for UiTMCT and UNSIQ to study the influence of zakat aid on students' academic performance.

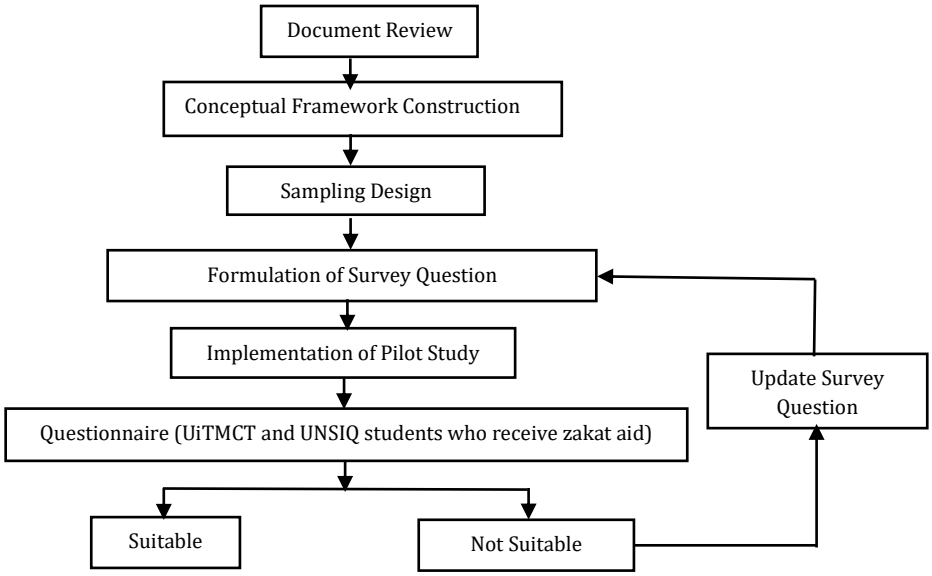
Questionnaire Design

Several dependent and independent variables were studied to achieve the research objectives and questions. The independent variable was gender, while the dependent variables were academic performance (Performance), student need for zakat (Factor), influence of zakat assistance to students (Influence), and governance of zakat institutions (Governance). The questions addressed to the respondents are summarized in Table 4.

Study Procedures

Figure 1 illustrates the flowchart of the procedures involved in this study, which began with the review of reference materials and documents. Document review assisted in developing the conceptual framework for this study. After establishing the conceptual framework, the study's sampling was designed. This led to the design of a questionnaire distributed to respondents (UiTMCT and UNSIQ students who received Zakat assistance) through a pilot study. Any unsuitable questionnaire questions after implementing the pilot study were updated before the actual field study was conducted.

Figure 1: Study Procedures



4. Findings and Discussion

Descriptive statistics were used to determine the characteristics of the respondents' profiles. The demographic profile of students is tabulated in Table 1. It was divided into gender, age, educational institution, study program level, zakat contributing agency, and level of current examination results.

Respondents Background Information

Table 1: Respondent Background Information (N=54)

Num	Respondent Profile	Number (N)	Percent (%)
1	**Gender**		
	Male	13	24.1
	Female	41	75.9
	Total	54	100
2	**Age**		
	18 – 19 years	7	13
	20 – 21 years	28	51.9
	22 – 23 years	14	25.9
	24 years and above	5	9.3
	Total	54	100
3	**Institution of Study**		
	UiTMCT	29	53.7
	UNSIQ	25	46.3
	Total	54	100
4	**Study Program Level**		
	Diploma	21	38.9
	Bachelor Degree	33	61.1
	Total	54	100
5	**Zakat Contributing Agency**		
	Majlis / Jabatan Agama Islam Negeri / BAZNAZ / LAZ	22	40.7
	University	28	51.9
	Others	4	7.4
	Total	54	100
6	**Current Exam Result Level**		
	CGPA 2.00 - 2.49 / Cumulative Performance Index (GPA) 2.00 - 2.49	1	1.9
	CGPA 2.50 – 2.99 / Cumulative Performance Index (GPA) 2.50 – 2.99	7	13
	CGPA 3.00 – 3.49 / Cumulative Performance Index (GPA) 3.00 – 3.49	22	40.7
	CGPA 3.50 – 4.00 / Cumulative Performance Index (GPA) 3.50 – 4.00	24	44.4
	Total	54	100

Source: Prepared from Primary Data (2024)

Based on Table 1, the number of respondents was 54 people, namely 13 males (24.1%) and 41 females (75.9%). The majority of respondents (51.9%) were 20-21 years old, followed by 22-23 years old (25.9%), 18-19 years old (13.0%), and 24 years old and above (9.3%). A total of 29 students (53.7%) were from UiTMCT, while 25 students (46.3%) were from UNSIQ. Based on Table 1, the majority of students received zakat assistance from the university zakat unit/division (51.9%), followed by state/provincial religious councils (40.7%) and individuals (7.4%). In addition, seven people (13.0%) had a current GCPA of 2.50-2.99, while 23 people (42.6%) were in the 3.00-3.49 CGPA group. Most students were in the 3.50-4.00 CGPA group, with 24 people or 44.4%.

Influence of Zakat Assistance on UiTMCT and UNSIQ Students

The influence of zakat assistance on the academic achievement of *asnaf* students at UiTMCT and UNSIQ is discussed based on each variable. There were four variables studied: 1) academic performance (Performance), 2) student needs for zakat (Factor), 3) influence of zakat assistance on students (Influence), and 4) governance of zakat institutions (Governance). This research can answer the objective of the first study, which is to identify the influence of zakat assistance on the academic achievement of students who received educational zakat assistance at UiTMCT and UNSIQ. The findings are explained using descriptive statistics, such as the percentage for each scale and the mean and mean average of the items for each variable. A 5-point Likert scale was used in this study to evaluate the influence of Zakat assistance on students. The details of the scale are shown in Table 2.

Table 2: Likert Scale

Meaning	Scale
Strongly disagree	1
Disagree	2
Neutral	3
Agree	4
Strongly Agree	5

Based on Table 2, scales 1 and 2 represented the negative interpretation of *Asnaf* students towards zakat. Scale 3 represented an uncertain interpretation, while scales 4 and 5 represented a positive interpretation of zakat. The interpretation level of perception for the mean value is shown in Table 3.

Table 3: Mean Value and Interpretation Perception

Mean Value	Interpretation Perception
1.0 to 2.49	Low
2.5 to 3.49	Medium
3.5 to 5.00	High

Table 3 shows the relationship between the mean value and interpretation of *Asnaf* students' perception of zakat. The interpretation of this perception is adopted from Oxford (1990). Interpretation of perception is at a low level for the mean value of 1.00 to 2.49, while the mean value is at a moderate level for the mean value of 2.5 to 3.49. A high and good perception interpretation shows a mean value between 3.5 and 5.00.

Subsequently, the consideration of UiTMCT and UNSIQ *asnaf* students on the Performance, Factor, Influence, and Governance variables was identified. Table 4 presents the relevant respondents' answers.

Table 4: The Influence of Zakat Assistance on UiTMCT and UNSIQ Students

No	Question	1	2	3	4	5	Mean
	Student Academic Performance (Performance)						
1	My academic performance improved every semester	1.9	1.9	29.6	38.9	27.8	3.89
2	I know the minimum academic qualification requirements to apply for Zakat	0	1.9	25.9	27.8	44.4	4.15
3	I will make sure to get the minimum academic result to get zakat	0	3.7	20.4	38.9	37	4.09
4	Zakat assistance has enhanced my academic achievement	0	1.9	20.4	33.3	44.4	4.20
5	I am satisfied with my academic achievements	1.9	7.4	14.8	44.4	31.5	3.96
6	I have received an award for my academic excellence (for example, a dean's award)	14.8	9.3	24.1	25.9	25.9	3.39
7	I often receive academic excellence awards	11.1	20.4	33.3	20.4	14.8	3.07
	The Factor of Student Needs for Zakat Assistance (Factor)						
1	I need Zakat assistance because I do not receive any financial help	3.7	16.7	11.1	31.5	37	3.81
2	I need zakat assistance because I do not have parents or guardians.	48.1	29.6	7.4	7.4	7.4	1.96
3	I need zakat assistance because my parents have a small income	1.9	5.6	13	38.9	40.7	4.11

4	I need Zakat's assistance because my parents have many dependents.	7.4	11.1	16.7	25.9	38.9	3.94
5	I need zakat assistance because of my high lifestyle	44.1	25.9	20.4	5.6	3.7	1.98
6	I need Zakat's assistance to cover the cost of buying books, courses, activities, etc.	5.6	5.6	9.3	18.5	61.1	4.24
7	I need Zakat's help to cover my daily expenses	18.5	13	11.1	13	44.4	3.52
8	I need Zakat help because I need to cover family expenses	37	14.8	24.1	13	11.1	2.46
	Influence of Zakat Assistance on Students (Influence)						
1	Zakat assistance can provide initial preparation for studies	1.9	1.9	9.3	29.6	57.4	4.39
2	The zakat assistance received was able to reduce my education expenses while at university	1.9	0	14.8	27.8	55.6	4.35
3	I am no longer depressed because of financial problems during my studies	0	1.9	22.2	27.8	48.1	4.22
4	Zakat assistance increases my motivation to study hard	0	1.9	13	29.6	55.6	4.39
5	Zakat assistance has caused me to manage my time well for learning	0	3.7	16.7	29.6	50	4.26
6	Zakat assistance has made me able to focus more on learning	0	3.7	14.8	29.6	51.9	4.30
	Governance of Zakat Institutions (Governance)						
1	In my view, the Zakat application process is simple	3.7	5.6	33.3	24.1	33.3	3.78
2	I was involved in an interview before getting Zakat assistance	9.3	18.5	31.5	9.3	31.5	3.35
3	Educational zakat assistance to students is essential	0	0	11.1	22.2	66.7	4.55
4	The assistance provided is accurate to the target group	1.9	1.9	11.1	29.6	55.6	4.35
5	I feel the existence of bureaucracy that affects this zakat application	0	1.9	38.9	25.9	33.3	3.91
6	The transparency provided by the Zakat institution is very satisfactory	1.9	1.9	14.8	33.3	48.1	4.24

Source: Prepared from Primary Data (2024)

Based on Table 4, there were four variables studied. For the first variable, student academic performance (Performance), seven items were asked of the respondents. Of the seven items, the choice of "zakat assistance has enhanced my academic achievement" showed the highest mean value of 4.20, which the respondents mostly considered. The choice of "I often receive academic excellence awards" exhibited the lowest mean value of 3.07. Respondents showed a positive influence on zakat based on high mean score values for all items in the student academic performance variable, except for the items "I have received an award for my academic excellence (example, dean's award)" and also "I often receive academic excellence awards", indicating the mean score with a simple interpretation.

For the second variable, the factor of student need for zakat (Factor), eight items were asked of the respondents. Of the eight items, "I need zakat assistance to cover the cost of buying books, courses, activities, etc." showed the highest mean value of 4.24. In addition, the lowest mean value was shown by the item "I need zakat help because I do not have parents or guardians," with a mean value of 1.96.

Furthermore, the third variable studied was the influence of zakat assistance on students (Influence), which involved six items. The results found that the item "zakat assistance can provide initial preparation for studies" exhibited the highest mean value of 4.39. Simultaneously, the item "zakat assistance increases my motivation to study hard" also showed the highest mean with the same value. All six items exhibited a high interpretive value of perception by the respondents. This implied that respondents positively perceived zakat assistance based on the high mean score value for all items in the Influence variable.

Finally, the Governance variable also listed six questions. The item "educational zakat assistance to students is essential" became the primary consideration of respondents, with a mean value of 4.55. The majority of respondents (66.7%) strongly agreed, while 22.2% chose to agree. Meanwhile, the item "I was involved in an interview before receiving zakat assistance" exhibited the lowest mean value of 3.35. This situation demonstrated that some *Asnaf* students received Zakat assistance without going through the interview process.

Differences in the Influence of Zakat Assistance between Two Educational Institutions

Before conducting the pilot study, the demographic profiles of *Asnaf* students and their influence on the variables of Performance, Factors, Influence, and Governance were analyzed. Descriptive analysis was used to determine the mean value and standard deviation difference for UiTMCT and UNSIQ, as presented in Table 5.

Table 5: Analysis Based on Institutional Differences

Group Statistics

	Institution	N	Mean	Std. Deviation	Std. Error Mean
Performance	UiTMCT	29	3.4729	.69892	.12979
	UNSIQ	25	4.2286	.53293	.10659
Factor	UiTMCT	29	3.2672	.70531	.13097
	UNSIQ	25	3.1950	.69511	.13902
Influence	UiTMCT	29	4.1897	.75557	.14031
	UNSIQ	25	4.4667	.70547	.14109
Governance	UiTMCT	29	3.7471	.61660	.11450
	UNSIQ	25	4.3600	.65737	.13147

Source: Prepared from Primary Data (2024)

Overall, the mean comparison between UNSIQ and UiTMCT showed that UNSIQ has a higher mean in the Performance, Influence, and Governance variables. In contrast, UiTMCT has a higher mean in the Factor variable.

The academic performance of UNSIQ students was better than that of UiTMCT students, with an average mean of 4.22, compared to UiTMCT students, with a mean of 3.47. This difference showed that *Asnaf* students in UNSIQ have outstanding academic performance due to the motivation obtained from the Zakat institution. Students who receive zakat must pass the minimum academic qualification requirements. This encourages *Asnaf* students to maintain their excellence so that they are not exempted from receiving Zakat assistance every semester.

UNSIQ also exhibited a higher average mean than UiTMCT for the Influence variable. The mean average for UNSIQ was 4.46, while UiTMCT was 4.18. This finding showed that zakat greatly influenced the education of *Asnaf* students, especially in terms of expenses throughout their studies and overcoming financial problems.

Through descriptive analysis, this study's findings also showed that zakat governance by UNSIQ was better than UiTMCT based on the high mean shown by UNSIQ, which was 4.36, while UiTMCT was 3.75. Governance by UNSIQ was better when most respondents agreed that the zakat application at UNSIQ was easy, less bureaucratic, and transparent.

However, only the Factor variable of student need for zakat showed a higher mean of 3.26 by UiTMCT compared to UNSIQ of 3.19. Most students agreed that several factors elevated their need for zakat. Among those factors included covering daily expenses, the cost of buying books and tuition fees, and helping to supplement parents' low income.

The t-test analysis compared the mean between the studied sample groups, namely UiTMCT and UNSIQ. The results could answer the objective of the second study, which is to analyze the influence of zakat assistance on UiTMCT and UNSIQ students' academic achievement.

Table 6: T-Test Analysis Based on Institutional Differences

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Performance	Equal variances assumed	3.012	.089	-4.411	52	.000	-.75567	.17133	-1.09947	-.41186
	Equal variances are not assumed.			-4.500	51.288	.000	-.75567	.16794	-1.09278	-.41855
Factor	Equal variances assumed	.001	.971	.378	52	.707	.07224	.19121	-.31145	.45593
	Equal variances are not assumed.			.378	51.043	.707	.07224	.19100	-.31120	.45568
Influence	Equal variances assumed	.012	.915	-1.385	52	.172	-.27701	.20001	-.67836	.12434
	Equal variances are not assumed.			-1.392	51.646	.170	-.27701	.19898	-.67636	.12234
Governance	Equal variances assumed	.888	.350	-3.532	52	.001	-.61287	.17350	-.96103	-.26471
	Equal variances are not assumed.			-3.515	49.704	.001	-.61287	.17434	-.96310	-.26264

Source: Prepared from Primary Data (2024)

Table 6 shows the t-test results based on the difference between the study institutions: UiTMCT and UNSIQ. The t-test found that Performance and Governance showed a statistically significant difference between UNSIQ and UiTMCT. This was proven when the p-value was less than 0.05 for the Performance variable with Sig. (2tailed) 0.000 > 0.05 and Governance variable with Sig. (2-tailed) 0.001 > 0.05. This finding showed that UNSIQ students receiving zakat assistance had better academic performance than UiTMCT students. One of the obvious reasons is that the UNSIQ students who received the zakat are undergraduate students compared to UITMCT students who are still at the diploma level. Therefore, the academic performance of students with bachelor's degrees was better than that of students with diplomas.

The significant difference in the governance of zakat institutions in UiTMCT and UNSIQ showed that the governance of zakat institutions in UNSIQ was better than that of UiTMCT. This clearly showed that UNSIQ students were satisfied with zakat governance at UNSIQ, while UiTMCT students were less satisfied with zakat governance at UiTMCT. This satisfaction aspect includes the ease of applying for zakat, less bureaucracy, and the transparency of zakat institutions.
Meanwhile, the Factor and Influence variables did not show significant differences between UiTMCT and UNSIQ. This was evidenced when the Factor indicated the value of Sig. (2tailed) 0.707 > 0.05, and Influence showed the value of Sig. (2-tailed) 0.172 > 0.05.

5. Recommendations to Empower Zakat Assistance at UiTMCT and UNSIQ

This section discusses the third objective of this study, which is to formulate some recommendations to empower zakat assistance at UiTMCT and UNSIQ. The academic performance of UNSIQ students was more outstanding than that of UiTMCT. This indicated that UNSIQ students who received zakat assistance worked hard to obtain excellent academic results so that their names would not be dropped from receiving zakat assistance in the subsequent academic session. Every student who receives zakat assistance must meet the minimum educational qualification requirements for every semester. This proved that zakat assistance encouraged UNSIQ students to achieve outstanding academic results.

As a recommendation, the zakat institution at UiTMCT should increase motivation for students by assisting financially and in non-financial forms, such as providing motivational talks periodically, nutritious food, and devices such as laptops, tablets, stationery, or books. It may further increase the motivation of students to excel in their respective studies. This suggestion has been agreed upon by Mohd Aris, Mohamed @ Daud, & Abas (2021) and S et al., (2022) that zakat should be distributed through nutritious food, internet facilities, smartphones, books, and stationery.

The governance of zakat institutions at UiTMCT has weaknesses in terms of application procedures, various bureaucracies, and transparency. These weaknesses must be improved by using the experience managed by the Zakat institution at UNSIQ as an example to manage Zakat assistance to university students in a better manner. UiTMCT needs to simplify application procedures, eliminate bureaucracy, and increase transparency in distributing zakat assistance. This will increase applications among needy students who could receive education zakat assistance but dropped out due to bureaucracy. Ayub et al., (2023) also suggested that the bureaucracy in zakat applications must be reduced to expedite approval for applicants.

After identifying weaknesses in zakat management in their respective institutions, UiTMCT and UNSIQ must increase collaboration, improve weaknesses, and find solutions together to ensure that zakat funds in IPTs can develop the education field in their respective countries. This collaboration includes exchanging ideas and experiences in distributing zakat assistance to students at IPTs.

Conclusion

From the results of the t-test analysis, there was a significant difference in academic performance and governance between UiTMCT and UNSIQ, with a p-value of less than 0.05. The encouraging academic performance of UNSIQ students resulted from their high satisfaction with the governance performed by the zakat institution at UNSIQ. Therefore, the experience played by UNSIQ needs to be emulated by UiTMCT to improve the existing weaknesses. In addition, planning to strengthen management and further enhance student achievement through the potential of zakat needs to be well planned.

In addition, UiTMCT and UNSIQ have proactively ensured that needy students receive appropriate educational assistance. This helps to solve the problem of learning dropouts, and students can continue their studies until completion. In the future, they can become figures capable of developing the country. To open more significant opportunities for its citizens to continue their studies to a higher level, UiTMCT and UNSIQ need to enhance cooperation by joining forces to contribute to financial assistance that enables students to complete their studies. In the end, financial constraints will not be an obstacle for *Asnaf* students to get an education and then succeed in the future.

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Assessing Financial Literacy of Female Entrepreneurs in Informal Economy: Empirical Evidence from Micro Business in Malaysia

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Abstract: Financial management in business ensures that the goals of an organization are achieved. It has become a priority for every business to have good financial resources to ensure sustainability. However, many entrepreneurs are found to need help managing their finances well and are used to supporting a lavish lifestyle. As an outcome, they had to take a personal loan from a financial institution, and this personal loan is a big commitment because they must pay it back with a high loan rate. This situation puts an additional burden on entrepreneurs, which eventually becomes the cause of business failure. Employing a mixed method, this study's objectives are to evaluate the financial literacy of female entrepreneurs of micro-businesses in Malaysia and to determine the causes of financial illiteracy. This study involved 100 female entrepreneurs in the survey study and 20 female entrepreneurs of micro business in the interview study. The survey data were examined using descriptive and inferential statistics, and interview data were examined using thematic analysis. The survey findings have revealed that most female entrepreneurs have a low level of financial literacy, and financial literacy significantly influences business success. Interview data revealed that most informants still need to adopt the systematic accounting system, are unable to organize financial and personal accounts, do not have proper financial savings, and cannot calculate product costing and selling price. Therefore, this study will help female entrepreneurs manage their future financial practices.

Keywords: *Female, entrepreneurs, financial literacy, business management, mixed method*

1. Introduction

Entrepreneurship is a concept and practice that contributes to economic growth and profoundly impacts society's social and economic aspects. Entrepreneurship is related to business creation, innovation, new product development, and job creation (Sajjad et al., 2020). Economist studies show that countries focusing on entrepreneurship development tend to have more dynamic and robust economies (Jones & Sakong, 2020). Entrepreneurship opens doors to new opportunities, stimulates business sector growth, and creates an ecosystem conducive to overall economic development (Mohd Noor et al., 2023). Many women nowadays have entered the field of entrepreneurship. Names like Datuk Maznah Hamid (Securiforce (M) Sdn. Bhd.), Noor Hijerah Hanafiah (Noor Arfa Batik), Faiza Bayumi Syed Ahmad (Beras Faiza) and Rozita Ibrahim (Sendayu Tinggi) are a role model for women entrepreneurs since they have achieved success in the field of entrepreneurship. Women are more likely to face challenges than male entrepreneurs (Mohd Noor & Omar, 2024; Noor & Omar, 2024a; Singla & Mallik, 2021; Thabet et al., 2019). Therefore, they need to strive to help each other in business. Women often face obstacles in obtaining financial resources to start a business. Lack of capital is an obstacle when they plan to start a business. Mohd Noor and Omar (2024) found that female entrepreneurs are seen as having less entrepreneurial spirit and are less successful compared to male entrepreneurs by loan officers at the banks.

Moreover, female entrepreneurs face financial illiteracy problems (Baporikar & Akino, 2020). Most entrepreneurs do not care about managing financial documents because they think it could be more convenient and challenging. They need to find out where the money is going in and out, and financial management becomes

multifaceted. Sales are high, but they suffered a loss at the end of the month, and the business is stuck at the same level. Most small entrepreneurs do not have a background or extensive knowledge related to finance or accounting. Many entrepreneurs do not separate personal and business money (Andriamahery & Qamruzzaman, 2022; Mohd Noor & Omar, 2024). Business money should not be placed in the same account as personal savings because this business money should be used for business purposes only, such as capital turnover, cost payment, investment, and others. With a particular bank account for the business, financial matters related to expenses, sales, and tax management can be carried out more smoothly.

It should be emphasized that financial literacy is essential not only for a specific part of society but also for the whole society, regardless of the stage of life (Hasan et al., 2021). At the height of the COVID-19 pandemic, Malaysians with high incomes from sectors such as the aviation industry, oil and gas, and tourism were affected financially. This situation shows the importance of being financially prepared in unexpected situations. Emergency savings that can cover at least six months of expenses and basic insurance coverage that can protect oneself from unwanted events such as accidents, health problems, floods, and other disasters should be a priority for Malaysians. Financial literacy is a skill that can complement the knowledge and confidence of an individual to make wise financial decisions at every stage of life (Ingale & Paluri, 2022).

According to Meressa (2023), small businesses need a unique financial management style. Managing business finance is the process of planning, organizing, controlling, and monitoring the financial resources to achieve business goals efficiently and effectively. This covers all aspects related to the management of enterprise funds, including decision-making about investments, financing, cash management, and risk management. Good financial management is critical to maintaining the business's financial health, optimizing profits, and ensuring long-term survival (Jha & Alam, 2022). These factors will affect an entrepreneur's level of financial management. Mismanagement of finances will cause the business to experience financial risks. This risk can be in the form of market fluctuations, interest rate changes, or liquidity problems (Graña-Alvarez et al., 2024). Entrepreneurs should prepare themselves with the applicable knowledge of financial management to manage financial resources systematically and plan to achieve short-term and long-term financial goals. Research findings by Susan (2020) have discovered that most of the participants need to update the purchase and sale records and use the services of an auditor. According to Graña-Alvarez et al. (2024), entrepreneurs should emphasize record keeping, which is vital to business integrity.

Many entrepreneurs refrain from paying taxes to the authorities because they need to make financial records (Susan, 2020). Usually, many entrepreneurs who start their small businesses need formal training or awareness of record keeping (Noor & Omar, 2024). Past studies have discovered that financial management leads to business performance (Dewi et al., 2020; Hasan et al., 2021). Entrepreneurs with this experience are very advantageous in managing a business, especially those involving financial management, to avoid financial leakage. Moreover, when applying for a loan or credit facility from a financial institution, businesses must submit complete and audited financial records, such as income statements, balance sheets, and cash flow statements (Gopal & Schnabl, 2022). This record allows lenders to assess the ability to generate cash flow, repay loans, and adhere to established financial ratios. Complete and consistent financial records increase lenders' confidence and reduce perceived credit risk (Gopal & Schnabl, 2022).

To understand the financial management of female micro-business entrepreneurs more clearly, the researchers studied the level of financial literacy among female entrepreneurs and how it influences business success, and the data were validated through a semi-structured interview. This study is significant since it can deliver new insights into the current study when there are many inconsistencies in research evidence. For example, few studies have found that financial literacy among female entrepreneurs is moderate (e.g., Hossain et al., 2023). The nature of medium and micro business operations is different. This gap occurs because a limited and different number of objects being studied will affect the research results. The impact of COVID-19 and post-pandemic create an unfavorable business environment and cause the research results to have gaps. This needs to be more consistent with research results and factual data in the field. This research is needed to overcome the inconsistencies that occur. Moreover, limited methods will then cause the research results to be inconsistent. Thus, it is giving rise to current research that needs to be re-examined with a more accurate method for more complete research results. This study employed a mixed-method approach that provided accurate findings on the topic.

2. Literature Review

Female Entrepreneurship

Sustainable Development Goal 5: Gender Equality (SDG 5) is the fifth of the 17 Sustainable Development Goals formed by the United Nations in 2015. The SDGs acknowledge that measures in one area will impact outcomes in others, and the growth must balance social, economic, and environmental sustainability. One of SDG 5 targets is to implement reforms to develop the potential and empower women from various walks of life and in all sectors as agents of change to society and contributors to the country's economic and social development (Eden & Wagstaff, 2021). Gender equality is often debated in the mainstream media and forums organized by various parties. Unfortunately, after almost 67 years of independence, Malaysia has not reached the expected level of gender equality. The Global Gender Gap Report (GGGP) 2021, released by the World Economic Forum, reports that Malaysia's position is deteriorating to 112th compared to 104th in 2020, with a total of 156 countries (World Economic Forum, 2021). Gender equality in this country is still far from being achieved. It requires a fundamental reform and the determination of various parties. Women have the right to receive equitable sharing in acquiring and controlling resources, participation opportunities, and enjoying the benefits of development, including entrepreneurship. The women entrepreneurs community still needs to catch up in entrepreneurship and economics. However, the government's continuous efforts can minimize the gap.

Women are a large part of the Malaysian population and have the capacity and ability to contribute to the economic and social development of the country. They are the central pillar shaping the future of the Malaysian generation. The increase in women's contribution to the labor force shows that women's participation in national development activities is becoming more glaring and progressive (Mohd Noor et al., 2024). One of Malaysia's top influencers, Datin Vivy Sofinas Yusof, is a Malaysian entrepreneur, TV personality, and fashion icon, and she is the co-founder of FashionValet and the founder of dUCk. She has won several awards, including the Bella Business Award 2013, Prestige Magazine's 2015 List of Top 40 Under 40, Women's Weekly Malaysia's Finance and Commerce Nominee for the Great Women of Time Awards 2015, and many more. The business setting in Malaysia continues to flourish, and women have asserted their rightful place in small and medium-sized enterprises (SMEs).

For the manufacturing sector, SMEs are defined as firms with annual sales not exceeding Ringgit Malaysia (RM) 50 million or full-time employees not exceeding 200 people. For the service sector and other sectors, SMEs are defined as firms with annual sales not exceeding RM20 million or the number of full-time employees not exceeding 75 people (Ramdan et al., 2022). Micro business in Malaysia could be defined as business with annual sales not exceeding RM300,000 or the number of full-time employees not exceeding five people. All SMEs must be registered under the Company Commission of Malaysia (CCM). Most micro-business entrepreneurs choose to unregister and operate within the informal economy. This study focuses on female micro-business entrepreneurs within the informal economy, such as street hawkers and home-based entrepreneurs. The business group does not use formal facilities or institutions. Generally, the technology used in production activities is still traditional or straightforward (Etim & Daramola, 2020). Because capital and business turnover tends to be minimal, formal education is optional for business activities. The capital comes from savings or informal financial institutions. Most informal entrepreneurs in Malaysia are from B40 groups (Othman et al., 2020). B40 represents the bottom-tier households that have an income of below RM 4,850.

There are still many barriers for entrepreneurial women in the country (Franzke et al., 2022). Difficulties faced by women in the business field are more stressful than those faced by men (Corrêa et al., 2022). The main obstacles for women entrepreneurs are the lack of confidence in the financial sector to provide loans and the negative stigma from society (Mashapure et al., 2022). They often face challenges in building the confidence of various institutions to accept their presence in the business world (Mohd Noor & Omar, 2024). Although the importance of entrepreneurs in the country is well recognized, the study of women entrepreneurs has yet to be done in detail. Female entrepreneurs should be given equal recognition to male entrepreneurs as valuable resources contributing to the country's progress. Failure to get capital aid or convince the party that can provide financial assistance can cause female entrepreneurs to be stuck in the middle of the road (Noor & Omar, 2024a). In society, it is difficult for women to get the community's trust because of their imbalanced roles as businesswomen and in managing household and family matters. Moreover, there are different evaluations from the angle of perception of their ability as women who give impressions as emotional, challenging to make long-

term decisions, and more dependent on the husband, finally creating one stigma that women are difficult to manage business (Umar et al., 2022).

Financial Literacy and Business Success

Management is the art of implementing a work process that is planned and implemented systematically and orderly and has specific guidelines for achieving the goal (Jha & Alam, 2022). There are two critical concepts in evaluating an organization's achievement: efficiency and effectiveness. Efficiency refers to the efforts to do a task correctly by matching the output or results of the organization with several inputs that have been used in carrying out an effort. On the other hand, effectiveness means making the right choice of action. Ideally, both concepts need to exist simultaneously to evaluate the achievements of the owners of an organization. A good entrepreneur should achieve both performance criteria simultaneously. Business usually has various levels of differentiation, from the simple to the complex level (Pennetta et al., 2024). In an organization with a low level of differentiation, all work is usually done by one or several individuals only. Thus, most micro businesses practice differentiation at the lowest level, where most owners play various roles, including entrepreneur, owner, manager, and day-to-day workers in various operational activities and tasks. According to Jardim (2021), most small business owners have technical skills. However, they often have good management skills. Management skills are critical in determining a business's ability to grow and survive. Small entrepreneurs usually need to practice better management practices. Therefore, they often ignore certain management functions, especially those related to financial management (Basit et al., 2020).

Past studies performed in Malaysia have broadly focused on the context of youth and the public. However, research covering female entrepreneurs still needs to be conducted. As far as the researchers observe, more scientific studies have been conducted to measure the financial literacy among female microbusiness entrepreneurs. Therefore, the current study is significant. Financial literacy is essential for individuals of all ages and backgrounds as it can equip them with the knowledge and understanding needed to make wise financial decisions. Financial management means understanding and managing personal finances wisely (Desiyanti & Kassim, 2020; Hasan et al., 2021). Financial literacy empowers people to set and achieve financial goals, providing the tools needed to create a roadmap to success. Understanding concepts like budgeting, investing, and debt management allows individuals to make informed decisions (Goyal & Kumar, 2021; Yakob et al., 2021). Dewi et al. (2020) also stated that financial literacy empowers individuals to make good financial decisions by equipping them with knowledge about personal finance concepts, importance, and strategies. Financial literacy can improve business performance in several ways, namely, increase sales volume by increasing output units, reduce the cost of sales and operating expenses through control and savings, and increase investment to increase business capital (Ingale & Paluri, 2022; Usama & Yusoff, 2019). Dorfleitner and Nguyen (2024) stated that financial literacy helps entrepreneurs act efficiently at work because they can evaluate the information needed to make decisions that affect the business's finances. Financial education disclosed to entrepreneurs must cover financial knowledge such as literacy, behavior, and attitudes toward financial matters (Kappal & Rastogi, 2020). Therefore, to increase the intensity of entrepreneurs' financial literacy, the focus should be on financial knowledge and awareness and the assessment of financial behavior.

The basis of every business is to record every business transaction in a particular book or cash book (Ren, 2022). Recorded data is critical to assess the financial performance of a business accurately. A cash book allows entrepreneurs to do financial analysis and planning (Graña-Alvarez et al., 2024). This ensures that the business finances remain solid and stable. Additionally, the entrepreneurs can track whether the business is making a profit or a loss and monitor the flow of outgoing and incoming money transactions to avoid business losses (Kimmel et al., 2020). They always need to monitor cash flow and be careful in spending money to avoid the business facing any financial problems, especially for purchasing raw materials, transportation, and maintenance costs (Mang'ana et al., 2023).

Reviewing internal audits and financial reports helps detect account errors, prevent fraud, and improve (Iramani et al., 2018). Inventory stock control can minimize storage costs and avoid damage and leakage, affecting the company's profits (Graña-Alvarez et al., 2024). Moreover, they must look for cost-saving opportunities by obtaining very reasonable prices and negotiating with suppliers to reduce operational costs. They must also seek advice from a certified public accountant, financial planner, or advisor to develop and implement a sound financial strategy (Finkler et al., 2022). Entrepreneurs also need to develop sources of

income by diversifying revenue streams, creating new products or services, and exploring new markets that can increase profits (Ren, 2022).

Business financial management strategy is the planning and control of financial resources aimed at helping entrepreneurs plan financial resources effectively, minimize risk, and increase profits and financial performance of the business (Usama & Yusoff, 2018). Good entrepreneurs are open about seeking help to overcome their financial difficulties. Entrepreneurs must also rise and stand back up to continue business affected by the pandemic or any unforeseen challenges. Because of that, the knowledge of financial management is essential in achieving business success. With financial management that supports good investment, individuals can maximize their wealth and achieve financial freedom (Kimmel et al., 2020). Financial management is an essential foundation for achieving financial stability and achieving financial goals (Yakob et al., 2021). From avoiding excessive debt to planning finances, sound financial management provides protection and opportunities for individuals to achieve a better life. Individuals can develop a stable and sustainable financial base by investing in intelligent financial management (Iramani et al., 2018).

3. Methodology

Mixed method research plans have several models or designs, and this study employed a sequential explanatory strategy. Mixed methods refer to research methodologies that involve quantitative and qualitative data collection. The combined method provides a complete integration and synergy of data, and one method supports the findings of another method (Creswell & Plano Clark, 2023). The population of the survey study is female micro-business entrepreneurs in the informal economy who live in Klang Valley, Malaysia. Roscoe (1975) suggests that a sample size greater than 30 and less than 500 is appropriate for most behavioral studies. Therefore, 100 respondents are selected for the survey study. The set of questionnaires is divided into two parts. Part A measures the respondent's profile, and part B measures the financial literacy. Answers to the questions prepared in part B are in the form of a Likert scale. Research instruments to measure financial literacy are adopted from Chepngetich (2016), Pavković et al. (2018), and Fessler et al. (2019). On the other hand, the items used to measure business success are adopted from Hasan and Almubarak (2016).

The data are analyzed using descriptive and inferential statistics. To interpret the mean level, the level is divided into three as follows: 1) a score value that is more than zero but less and equal to 2.99 ($0 < \text{score} \leq 2.99$) refers to weak level financial literacy, 2) the moderate level of financial literacy takes a score value that lies between 3 and more and equal to 3.99 ($3 < \text{score} \leq 3.99$), and 3) the high level of financial literacy refers to a score value more than four and less and equal to 5 ($4 < \text{score} \leq 5$). A reliability test of the survey questions was carried out. According to Pallant (2007), the internal reliability index is most satisfactory if the value exceeds 0.70. The reliability values for financial literacy and business success are 0.811 and 0.789, respectively, which meets the acceptable requirement. The normality test also has been conducted. It considers the skewness and kurtosis values to confirm that the data distribution for the variable is normal. For this test, skewness and kurtosis values ranging between -3 to +3 and -10 to +10 are acceptable, while values outside the range indicate that the data is outside the normal distribution (Kline, 2005). The skewness value obtained is 0.637 (financial literacy) and 0.346 (business success), and the kurtosis value is 0.445 (financial literacy) and 0.211 (business success), indicating the data are normally distributed. Next, a correlational analysis is conducted to examine the impact of financial literacy on business success. The correlation coefficient is used to determine the degree of relationship between variables. The correlation coefficient value is between $-1<0<1$ where $r=-1$ perfect negative correlation, meaning the significance level of influence variable X against variable Y is very weak, and when $r=1$ perfect positive correlation, meaning the significance of influence variable X to variable Y powerful. If the correlation coefficient shows 0, there is no relationship between the two variables studied.

In the second phase, semi-structured interviews have been carried out. According to Creswell (1998), five to 25 is an appropriate sample for the interview data collection. The basic principle of sampling in qualitative research is data saturation; that is, sampling reaches a point of saturation where no new information is obtained. The sample of this study also takes into consideration the data saturation principle. This study involved 20 female business entrepreneurs in the informal economy who live in Klang Valley, Malaysia. The study respondents were selected purposefully, where the researchers determined the respondents based on several criteria such as micro business, unregistered business (informal business), and they have operated the

business for more than three years. Before the interview, the interviewer distributed a consent form to the study informants. Informants can withdraw anytime; all information is only used for research purposes. Semi-structured interviews were conducted in Malay. All interviews were recorded using a digital audio recorder and transcribed into a Microsoft Word document. All data transcriptions were analyzed using a thematic analysis approach, as suggested by Braun and Clarke (2022). Thematic analysis is a qualitative method used to understand the meaning hidden in the data. Researchers look for patterns or themes related to the analyzed data in this analysis. Thematic analysis can analyze data from various sources such as interviews, field notes, and written documents. Table 1 shows the information on the study's key informants.

Table 1: Key Informants Information

No.	Key Informant Code	Age	Business Product	Business Orientation
1	A1	40	Chocolate Lollipop	Full-time
2	A2	45	Rempeyek	Full-time
3	A3	39	Maruku	Full-time
4	A4	35	Dessert (Tart and Pudding)	Full-time
5	A5	42	Batik cake	Full-time
6	A6	40	Popia and Popcorn	Part-time
7	A7	37	Chicken rice	Full-time
8	A8	38	Takoyaki and Lunch set	Full-time
9	A9	40	Cookies and Fried Spring Roll	Full-time
10	B1	41	Kerepek	Full-time
11	B2	45	Popcorn	Full-time
12	B3	35	Baby pancake	Full-time
13	B4	33	Chocolate muffin	Full-time
14	B5	31	Fruit Cocktail	Full-time
15	B6	40	Pudding caramel	Full-time
16	B7	44	Packed food	Part-time
17	B8	42	Cake and desserts	Full-time
18	B9	38	Pudding and desserts	Full-time
19	C1	40	Lunch set	Full-time
20	C2	42	Cookies	Full-time

4. Findings

Demographic Profile

The researchers obtained feedback from 100 respondents. Based on Table 2, most of the respondents are between the age range of 18–30 years, with a total of 39 people (39%), followed by 31–39 years, with a total of 34 people (34%), 40–49 years with a total of 25 people (25%), and two respondents aged between 50–59 years. Next, regarding the business operation period, most have been operating their businesses within 4–6 years (n=86, 86%), and the rest are within 7–10 years (n=14, 14%). Of the respondents, 98 are married (98%), and two respondents are in the widowed/divorced category. A total of 97 people (97%) respondents had the academic qualification of secondary level, followed by the Diploma certificate of two people (2%), while the respondents qualified with a bachelor's degree one respondent (1%).

Table 2: Demographic Profile (n=100)

No.	Profile	Frequency (n)	Percentage (%)
1	Age		
	18–30	39	39
	31–39	34	54
	40–49	25	5
	50–59	2	2
	60 and above	0	0

2	Period of Business Operation		
	1–3 years	0	0
	4–6 years	86	86
	7–10 years	14	14
	11–20 years	0	0
3	Status		
	Married	98	98
	Widowed/Divorced	2	2
	Single	0	0
4	Highest Educational Level		
	Secondary Level (SPM)	97	97
	Diploma/Foundation	2	2
	Bachelor's degree	1	1
	Graduate degree (MA or PhD)	0	0
	Other	0	0

Financial Literacy Level

To analyze the level, the researchers used mean score interpretation. To interpret the mean level, the level is divided into three follows: 1) a score value that is more than zero but less and equal to 2.99 ($0 < \text{score} \leq 2.99$) refers to weak level financial literacy, 2) the moderate level of financial literacy takes a score value that lies between 3 and more and equal to 3.99 ($3 < \text{score} \leq 3.99$), and 3) the high level of financial literacy refers to a score value more than four and less and equal to 5 ($4 < \text{score} \leq 5$). Table 3 shows that most respondents have weak knowledge of the time value of money (M=1.434, SD=0.506). Moreover, they are also unable to know the current interest rate on loans (M=1.179, SD=0.386), not aware of the inflation rate in the country (M=1.478, SD=0.510), and understand the conditions of the financial market (M=1.391, SD=0.499). Then, most of the respondents had insufficient knowledge of cash needs (M=1.607, SD=0.498) and were not willing to seek information on savings and investments (M=1.876, SD=0.398). Next, many of them were unwilling to consult experts to know the trend in the money/financial market (M=1.577, SD=0.467), did not keep track of their spending (M=1.456, SD=0.440) as well as a written record of my income as it comes in(M=2.100, SD=0.580). Finally, the respondents cannot make financial records (M=1.980, SD=0.430) and do not understand the balance sheet, profit and loss statement, and cash flow (M=1.236, SD=0.347). Overall, the level of financial literacy among female entrepreneurs is low.

Table 3: Mean Analysis for Financial Literacy

Item	Mean	Std. Deviation	Min	Max	Level
1. I have sufficient knowledge of the time value of money.	1.434	0.506	1	2	Weak
2. I recognize the current interest rate on loans.	1.179	0.386	1	2	Weak
3. I am knowledgeable of the country's inflation rate.	1.478	0.510	1	2	Weak
4. I am informed about the current financial market.	1.391	0.499	1	2	Weak
5. I have ample knowledge of my cash needs.	1.607	0.498	1	2	Weak
6. I continuously search for information on savings and investments.	1.876	0.398	1	2	Weak
7. I often look up experts to know the money/financial market trends.	1.577	0.467	1	2	Weak
8. I do keep track of my spending.	1.456	0.440	1	2	Weak
9. I retain a written record of my income as it comes in.	2.100	0.580	1	2	Weak
10. I can make financial documents.	1.980	0.430	1	2	Weak

11. I know the balance sheet, profit and loss statement, and cash flow.	1.236	0.347	1	2

Assessing the Influence of Financial Literacy on Business Success

Table 4: Pearson Correlation Results

		Business Success
Financial Literacy	Pearson Correlation	0.316**
	Sig. (1-tailed)	0.000
	N	100

Based on the study's results, financial literacy has a significant relationship with female entrepreneurs' business success (r=0.316, p<0.001). For good reason: financial literacy is an essential component of entrepreneurial success. For entrepreneurs, understanding and managing finances effectively can make the difference between business success and failure. Financial planning, for instance, outlines income projections, expenditure estimates, and cash flow management. A mature financial plan provides a road map for achieving financial goals and guides strategic decision-making (Goyal & Kumar, 2021; Yakob et al., 2021). Many businesses fail not because they need to have profitability but because they run out of cash. Entrepreneurs must understand the timing of cash inflows and outflows, ensuring enough liquidity to cover operational costs, debt obligations, and unforeseen circumstances. Financial literacy is the foundation of entrepreneurial success, which includes a variety of skills ranging from budgeting to succession planning (Ingale & Paluri, 2022; Usama & Yusoff, 2019). Entrepreneurs who actively develop these skills position themselves as skilled financial managers and adaptable leaders. Financial literacy is a sustainable journey that empowers entrepreneurs to make the right decisions, reduce risk, and lay the foundation for sustainable success in a competitive business landscape (Desiyanti & Kassim, 2020; Hasan et al., 2021).

Assessing Financial Literacy Skills

Theme 1: Lack of Competencies in Managing Business Finance

Financial literacy will help entrepreneurs know the difference between income and net income, assets and liabilities, income and cash flow, earned and passive income, investment and trading, capital gains and cash flow, and others. However, some entrepreneurs have been in business for many years but still need a proper accounting system. All incoming and outgoing money is only recorded manually. Purchase or payment receipts should be kept neatly. Most female entrepreneurs fail to manage their businesses because they need to learn and understand how important it is to manage business finances. Accounting is essential for entrepreneurs, whether the business is small or big. Entrepreneurs can know a business's financial profit and loss with the account. Many informants do not record all transactions and will only estimate the profit or loss of a business. Most entrepreneurs need to use systematic business management and documentation. The verbatim quote is as follows:

"I realize that many small entrepreneurs always take financial matters for granted. For them, it is not important. The important thing is to be able to make sales and profit. Accounting systems are only used for large businesses" (A5).

The study also revealed that most informants still need to issue receipts. Receipts play an essential role in buying and selling transactions. This document provides valid proof of payment and helps avoid disputes between the seller and the buyer. In some cases, the receipt can also be used as proof of payment for the buyer. This document allows the buyer to have valid proof of payment and helps the seller track payments that have been received and those that have not. The verbatim quote is as follows:

"My business is run on a small scale, and I do not use any record system. For example, no receipt will be given to the customer. I only use the WhatsApp platform to manage orders. However, I admit that managing many bookings without a record is quite difficult, especially during the festival" (B1).

Theme 2: Unable to Differentiate between Business Account and Personal Account

The business entity concept states that a business stands independently of its owner, and therefore, the two should be treated as separate entities when recording transactions. Therefore, all business transactions, such as income, expenses, assets, liabilities, and equity, must be kept separate from the owner's accounts to ensure accurate accounting records. Managing the finances associated with the business will be one of the most essential tasks of the business owner. To keep track of everything related to income and expenses, the entrepreneurs should have a separate bank account designed specifically for business. This helps separate it from the expenses and makes reporting more accessible in the long run. The ability to present a check, card, or account in the company's name gives the business a sense of legitimacy, as it means the bank has vetted the business. Having a business account with a history of timely payments, responsible usage, and good communication can help entrepreneurs when they need financial support. However, most informants need their business accounts, causing them to be unable to see their business's 'health " level. One informant admitted she could not monitor her business performance because WhatsApp only recorded her order and did not include utility and raw material costs. Thus, she cannot identify early signals if her business has financial or other management problems. Moreover, another informant stated that since most small businesses operate in the informal sector, which is not required by law to record business transactions, bookkeeping is optional to show business transparency.

Theme 3: Poor Financial Saving

Every business can avoid going through various challenges, especially businesses run in big cities like Kuala Lumpur. Among the challenges is money for rolling capital. Entrepreneurs experienced in business must be used to situations where capital money is higher than sales revenue. This happens when the product is not sold well, and the entrepreneurs suffer loss. Various costs need to be considered, such as the cost of raw materials, petrol, site rent, shop rent, and employee wages, and when a count is made, more than monthly sales results are needed to make capital turnover. Most informants admitted that they needed help saving their money because the sales revenue was like the capital, and they often suffered more losses than income generation. This issue might occur due to limited market segmentation and underutilization of the social media platform.

For example, A8 mentions that she is a street hawker and is opening a stall at PPR Kerinchi. She does need more staff to help her, so she only focuses on offline selling marketing. Her income could have been more impressive, and she only obtained a gross monthly income of RM2000. Moreover, due to poor financial savings, she needed help to recruit more staff to help her. She is also not eligible for business or personal loans because of her poor track record and lack of cash flow. If the borrower defaults, business loans often require guaranteed value such as property, cars, or equipment to protect the lender or bank. She cannot offer any collateral to the bank and is not eligible for an unsecured personal loan due to her poor CCRIS/ CTOS record. The verbatim quotes are as follows:

" I never use bookkeeping to maintain records of all financial activities in my business. As a result, I do not know whether my business obtained profit or not. My business also does not generate much income for business capital. That is why I cannot expand my business; I cannot buy stalls, proper equipment, and machines. My emergency savings are only last for at least two months. Due to large debt, I am also not qualified for bank loans or capital assistance" (B7).

"In 2020, I realized that building an emergency fund is the safest way to weather an economic downturn. An emergency fund provides a safety net to cover living costs, including all daily needs and financial commitments, personal loans and housing, child support, and business matters. Before joining the business, I never made any savings because my income was insufficient. The salary received will often run out or leave enough to eat after being used to pay bills or buy kitchen items. Then, I started to motivate myself to at least save RM100 per month, and at the beginning, it is hard, but we need to be disciplined" (A7).

Theme 4: Incompetent in Calculating Product Costing and Selling Price

Calculating a product's selling price is essential in running a business. The correct selling price helps the entrepreneurs profit and ensures the product is attractive to customers. The correct selling price ensures they get enough profit to cover costs and make a profit. Competitive pricing helps the product to attract customers

over competitors. The right price also reflects the product's value to the customer and ensures they feel it is worth their purchase. Calculating the selling price of a product requires careful consideration of cost, profit margin, and market price. Most informants need help providing valid selling prices for several reasons, such as fear of losing existing and potential customers, inability to compete in the market, increased raw material costs, and incompetence in calculating the cost price. The verbatim quotes are as follows:

"Small and Medium Enterprises (SMEs), especially in the food processing sector, began to face pressure when the price of raw materials for the products rose sharply. Not only that, the price of plastic containers and food packaging paper also increased, causing us to be burdened. Previously, the price of carrots was RM24 for 10 kilograms (kg), compared to now, which is RM35. This sudden price increase causes the profit margin to decrease and the operating cost to increase, and we are afraid to raise our sales since our customers are only part of the B40 group" (A9).

"The problem with F&B business in Malaysia is the incorrect calculation of food costs. For me, it is not easy to calculate the exact cost price because the price of raw materials in the market is unstable. Sometimes, it reduces, and sometimes, it increases, and I do not want customers to argue why my selling price is changing. No one could have predicted the increase in 2025" (C1).

"*Food packaging paper, which was previously sold at RM2 per carton, has now increased to RM4.20, as well as plastic containers. The price increase causes the cost of operations to continue to increase if not properly controlled. As a small business, I feel dizzy with the significant price increase of ingredients for making pastries, and it is not easy to convince customers because we are always increasing our product price. Among the most significant price increases were chocolate and margarine. The price of the chocolate used in the product's ingredients has increased from RM219 to RM250 for 25kg. If we want cheaper ingredients, we must buy further away, and it will involve high costs while the profit or sales are not that much. So it is not worth it. The price of eggs, the main ingredient in cake making, constantly changes and increases"(B8).*

Therefore, based on the interviews, most informants need better financial management in their business. As a result, they continue within B40 groups due to poor business management and tight competition. With the ability to compete, they can stay caught up by competitors and gain market share. Female entrepreneurs need to improve their financial well-being through financial competencies. Entrepreneurial competence refers to the skills of entrepreneurs that induce business functioning. In the context of business performance, it refers to the total sales, cash flow, profit, and productivity.

Discussion

The survey findings have revealed that most female entrepreneurs need a higher level of financial literacy. Financial literacy is an essential indicator of business success. Interview data revealed that many informants have not adopted the systematic accounting system, are unable to organize financial and personal accounts, do not have proper financial savings, and cannot calculate product costing and selling prices. These outcomes are consistent with previous studies such as Mohd Noor and Omar (2024), Singla and Mallik (2021), and Thabet et al. (2019). Financial management is often considered an issue, especially when female entrepreneurs are involved in a business. Through previous studies, many issues were discussed to see the level of financial management among entrepreneurs. Incorrect financial management will cause the business to experience bankruptcy or loss (Graña-Alvarez et al., 2024). Financial management is considered an essential basic skill, and a business cannot survive for an extended period if it has poor finances. Usually, entrepreneurs who start their small businesses do not get any education or knowledge about financial management. For example, they do not record the financial activities of a business, including the inflow and outflow of money, debts, payments, investments, and others (Hossain et al., 2023; Noor & Omar, 2024b).

Micro-entrepreneurs must develop individual capabilities in the field of business through the effective use and combination of knowledge and skills acquired from external training and business experience (Ingale & Paluri, 2022). Therefore, the researchers would like to make some suggestions. The results of this study are projected to assist the governing bodies in organizing entrepreneurship programs and strategies. First, financial literacy awareness should be promoted among Malaysians. Financial literacy can be fostered through financial management campaigns and workshops. Financial literacy programs can increase knowledge in financial

management, thus providing a person with a good money management attitude (Iramani et al., 2018). At the same time, various measures are taken to create a financially literate generation, including introducing financial issues in the study syllabus at secondary schools and universities. However, knowledge not put into practice will be lethargic until the desire to create a financially literate society will not become a reality. Therefore, more programs such as financial literacy seminars should be introduced. This is because investment knowledge cannot be acquired and practiced by just attending one or two financial seminars; it takes time to master financial skills (Ingale & Paluri, 2022). Among the subjects that can be highlighted to students is the foundation of personal finance. The integration of financial literacy elements is implemented according to the theme or field of study to enable students to improve their knowledge and manage finances (Mang'ana et al., 2023). Implementation of related campaigns on financial management through organized programs could be done.

Second, the Credit Counselling and Debt Management Agency (AKPK), Bank Negara Malaysia, and other agencies must hold a motivational session to finance the entrepreneurs. It should enable them to make prudent and responsible financial decisions. At the same time, counselling sessions carried out by parties skilled in financial literacy can instil a higher awareness about financial literacy, further making them resilient, adaptable, and prepared to face any challenge. There are many calculation methods for selling prices, but no one-size-fits-all method exists (Kimmel et al., 2020). It varies depending on several factors, such as competitive price comparison and the type of target market. To ensure business continuity, entrepreneurs must identify a more accurate product pricing strategy and reduce business risk, especially in cost calculation and pricing (Meressa, 2023). Cost calculation can provide advantages to improve further profit margins and enable them to give a more attractive price than competitors' prices. Product prices that are too expensive can affect purchasing, but if the price of food is too low, it can also affect the business finances (Mang'ana et al., 2023). Thus, determining a reasonable selling price using the available free template and software helps ensure they provide the best service.

When conducting daily operations, sales money must be segregated into one account and recorded in the daily sales record book. The money must be deposited into a bank account, preferably separately. Every entrepreneur needs basic knowledge about a business account to get consistent financial reports. All transaction records should be recorded, even if only in Excel or manually written. A simple business account can help the entrepreneur better understand how to manage business records. Running a small business in Malaysia requires effort, patience, and efficiency to achieve continued success. There are many challenges that small business owners must face, but with the right strategy and strong commitment, success can be achieved (Noor et al., 2024). Entrepreneurs must understand their market and customers well, identify unique products or services, and offer customers good value.

Moreover, female entrepreneurs are encouraged to start investing at a young age. Inflation is an increase in the price of goods that occurs when purchasing power increases. Due to inflation, every year, the value of the money we hold will decrease in value in the future. This is where the importance of an investment can be seen because it can produce a return of twice as much as the result of the investment, even though it takes a long time to add to the savings. Making investments can give a better rate of return. In addition, entrepreneurs must have good management qualities to manage the business effectively. Financial literacy will enable entrepreneurs to read and understand financial statements, allowing them to go beyond the business's physical structures (Meressa, 2023). Financial literacy will help them distinguish between good and bad investment advice or excellent and bad planners or advisors, and financially literate people will be less vulnerable to fraud (Susan, 2020). Financial literacy will make entrepreneurs less vulnerable to economic downturns and the consequences of tight government budgets. An excellent financial literacy education will allow them to use debt as leverage to build their personal investment portfolio (Ren, 2022).

5. Conclusion

Women entrepreneurs have an enormous influence on the economic expansion of the country. Even though various efforts have been made, these women entrepreneurs must still deal with various obstacles to prove their ability to compete and be accepted in this field (Mohd Noor & Omar, 2024; Singla & Mallik, 2021; Thabet et al., 2019). They also need various parties' encouragement, guidance, and training to stand equally with the competitors. Although most entrepreneurs know the need to prepare annual financial statements, many do not

focus on creating processes and information such as cost of goods, calculation of capital return points, and performance analysis. Keeping complete and accurate business records enables an informed decision-making process (Usama & Yusoff, 2019). This information assists in the preparation of budgets, financial forecasts, and the identification of areas in need of increased efficiency or cost reduction. In an increasingly dense and vigorous business environment, making quick and accurate decisions is essential to remain competitive. Systematic and accessible business record-keeping facilitates decision-making by providing the necessary data at the fingertips (Singla & Mallik, 2021). Therefore, female entrepreneurs must acquire relevant, up-to-date financial and business management skills. Several limitations of the study have been identified. First, this study only limits the scope of female entrepreneurs in micro business. Second, this study was only done at a specific time. This study only focuses on respondents in the Klang Valley area as it makes it easier for researchers to examine and collect the data. Therefore, future studies are encouraged to widen the study's sample area and employ a longitudinal study. Future studies are also encouraged to expand the study context by examining the direct or indirect effects of the study variables. Examples are financial literacy's impact on business performance or success or comparing the differences between informal and formal businesses.

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Collaborative Models for Community-Driven Industrial Education: Enhancing Workforce Development Through Partnership Programs in Malaysia

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Abstract: This study analyses the value of collaborative education strategies for improving workforce development in Malaysia, focusing on collaborations between educational institutions and industry. In recent years, the Malaysian job market has experienced major challenges, especially in terms of graduate preparation for employment. Many graduates struggle due to inadequate skills and limited employment opportunities, emphasizing the critical need for comprehensive educational changes. These coordinated activities aim to bridge the education-industry divide by developing connections between academia and the business sector. Moreover, the study uses a qualitative approach, conducting in-depth interviews with industry managers to understand better the impact of partnership programs, government support, and community participation on workforce readiness. Through these interviews, the study emphasizes the importance of collaborative education in providing graduates with the skills and competencies they need to succeed in a competitive work market. The findings show that, while these collaborations significantly boost graduates' employability and skill sets, issues such as unequal access to opportunities and an overreliance on government assistance remain. Furthermore, the analysis discovers gaps in the available literature, particularly in the context of Malaysia, emphasizing the need for further research targeted to this environment. Future research directions will include empirical investigations to quantify the impact of collaborative education initiatives, quantitative analyses to evaluate the efficacy of various programs, and policy recommendations to improve Malaysia's workforce development and foster long-term economic growth. By addressing these issues, the study hopes to contribute to a more comprehensive understanding of how collaborative education may effectively bridge Malaysia's skills gap.

Keywords: *Collaborative Education, Workforce Development, Skill Enhancement, Industry Partnership, Community Engagement.*

1. Introduction

In today's uncertain and dynamic business market, organizations must prioritize human capital to maintain competitiveness and financial stability. An organization's success is determined not just by its survival but also by the productivity of its workforce—employees who are effective and efficient. Organizations increasingly recognize that the intangible aspects of human capital, such as knowledge, skills, and drive, are critical for market distinction and sustainability. Adaptable personnel who can navigate rapidly changing company settings are considered critical (Valle & Castillo, 2008). Furthermore, US organizations allocate more than $126 billion every year to staff training and development. In an uncertain world, having business expertise and market insight gives you an established competitive advantage. As a result, knowledge is increasingly regarded as a vital capital that promotes progress. Organizational success depends on a competent, skilled, and experienced workforce (Parween, 2024).

According to Bray et al. (2011), there has been a split between the business community, which produces jobs, and the education community, which provides secondary school students and others with the information and skills they need to succeed in the workforce. For the most part, business leaders and educators live and work in very different worlds. For instance, the Department of Labour refers to "industries," but the Department of Education refers to "career clusters." They communicate in separate languages. They bear various levels of responsibility and have different success criteria. Teachers are evaluated based on their students' success on exams, not how well they do in the future. According to Kumar et al. (2000), entrepreneurs are graded on how creatively and profitably they manage their enterprises, with a focus on producing and advertising their goods

and services, increasing their customers, guaranteeing employee satisfaction, and generating a profit. Facilitating driven by the community's educational institutions through collaborative approaches is critical for enhancing Malaysia's job prospects. The purpose of these commitments between academic institutions and industry is to produce graduates with advanced capabilities that match market demands. Setting goals, building partnerships, and managing a team are the three essential elements of successful collaboration (Rashidi, 2013).

According to Sohimi et al. (2019), in the context of the current Fourth Industrial Revolution, business participation in curriculum development should be developed, and resource sharing should be prioritized. Malaysian vocational colleges foster collaboration through expert sharing, human capital growth and development, quality inspection, and job-based education programs (Sappar et al., 2024). Although some logistical issues must be handled, work-based educational projects in local educational institutions have been shown effective in increasing students' understanding of technological improvements and boosting their talents (Kamin et al., 2010). These collaborative activities are critical to preparing Malaysia's rapidly changing industrial landscape for a globally competitive workforce.

However, we live in an era of growing responsibility, which affects higher education. The need for society to realize the benefits of investing in college or university and how it benefits people both economically and socially is growing. Despite this, it is critical to ensure that higher education is relevant to the community, corporate sector, government bodies, industry groupings, and non-profit organizations (Palliam et al., 2010). According to Gill (2009), universities must recognize that the emphasis has changed away from increasing population educational opportunities and scientific production to using higher education training and study to achieve specific economic and social objectives. These projects can be conducted in collaboration with corporations, non-governmental organizations, and community groups to benefit both parties.

Research Objectives

- To identify how collaboration structure influences workforce development.
- To identify the partnership program influences workforce development.
- To study the government's role in influencing workforce development.
- To study how community engagement influences workforce development.

Research Questions

- Does collaboration structure influence workforce development?
- Does the partnership program influence workforce development?
- Does the government's role influence workforce development?
- Does community engagement influence workforce development?

Problem Statement

The competencies offered by traditional schools and universities in Malaysia have become significantly out of step with the changing needs of business. Graduates' lack of technical knowledge and crucial soft skills limit their job opportunities and slow economic growth. To generate a workforce that meets industrial objectives, this gap must be closed by focusing on community education efforts (Gill, 2009).

In Malaysia, current types of collaboration between universities, corporations, and charitable organizations are frequently unstructured, resulting in unplanned projects that do not fully capitalize on the potential. This misunderstanding makes it more difficult for institutions to tailor their curricula to the needs of industry and society. Establishing effective cooperation mechanisms is critical to the relevance and efficacy of workforce development activities (Gill, 2009).

2. Literature Review

Collaborative Structures Between Education and Industry in Malaysia

In Malaysia, effective collaboration between educational institutions and industries is built on several foundational elements. Key among these is the establishment of mutual trust, open communication, and a

strong commitment from both parties' management (Yee et al., 2015). These collaborations are not solely dependent on the willingness of universities and industries to engage but also on the pivotal role of government support in terms of funding and policy facilitation (Ramli & Senin, 2021). The effective integration of education, technology, and work environments is crucial for fostering collaborations that significantly impact learning outcomes and skill development. Rashidi (2013) highlights that successful integration hinges on three primary components: the establishment of partnerships, the efficient management of cooperative efforts, and the influence these collaborations exert on the learning process.

Incentive schemes play a crucial role in these collaborative efforts, particularly in influencing both process and outcome-related criteria. For instance, while incentives can positively drive outcomes, they may also inadvertently affect procedural norms if not managed correctly (Ramli & Senin, 2021). A nuanced understanding of these dynamics is essential for managing future collaborative relationships, especially in the context of enhancing the quality of instruction in Malaysian Technical and Vocational Education and Training (TVET) programs (Yee et al., 2015).

An illustrative example of effective collaboration is a university partnering with a technology company to develop a cybersecurity program. In this scenario, the corporation provides internships and hands-on training opportunities, while the educational institution offers academic expertise. Government funding supports the establishment of training facilities, and an awards program recognizes the contributions from both sides. This example underscores the importance of integrating support from government, industry, and educational institutions to enhance student learning experiences and better prepare them for the workforce (Kamaruddin et al., 2017).

Partnerships Programs Between Education and Industry in Malaysia

Community-driven industry-academia alliances have been increasingly popular in Malaysia in recent times. Universities are becoming more and more acknowledged as essential parts of the country's innovation system, contributing significantly to the progress of technology and knowledge transfer. For instance, the University-Industry Innovation Exchange (UNIX) internship program blends industrial training with research projects to improve students' practical skills and fortify the links between academia and industry. To empower students, Universiti Teknologi Malaysia (UTM) demonstrates this strategy by cultivating enduring partnerships with corporations, the government, and the community. The UTM-Industry Innovation Exchange (UNIX), an inventive approach at UTM, allows for the integration of up to 50% of work-based learning into the curriculum. This method combines transdisciplinary research and design projects with industry training to tackle real-world problems, especially those posed by the Fourth Industrial Revolution. The program aims to equip graduates with the skills needed for both professional life and societal contribution, thereby reinforcing the relationships between industry, academia, and the community (Sánchez-García & Alwi, 2020).

By providing graduates with the necessary skills for both professional life and social engagement, the program hopes to strengthen the bonds that exist between academics, industry, and the community (Sánchez-García & Alwi, 2020). In addition, research findings are efficiently utilized in real-world situations thanks to the Knowledge Transfer Program (KTP), which fosters partnerships between academics and community partners (Firdaus et al., 2020). However, when weighing the proportion of industry-driven and society-driven approaches in higher education, a critical assessment is required. A society-driven approach addresses larger social requirements and encourages holistic development, whereas industry-driven education concentrates on developing skilled individuals customized to fulfill the demands of the economy (Nathan et al., 2013). Partnership programs need to be updated to suit the expectations of Industry 4.0 as Malaysia navigates these new obstacles. This entails developing in students the ability to tackle social issues in addition to providing them with the technical skills needed by contemporary companies. This results in a more sustainable and well-rounded approach to workforce development and education.

Government's Role in Collaborative Models

According to Sohimi et al. (2019), In Malaysia, collaborative approaches to industrial education and workforce development are mostly determined by strategic collaborations between the government, industry, educational institutions, and non-governmental organizations (NGOs). The government plays an important role in training the workforce for the Fourth Industrial Revolution, especially by providing financial assistance,

establishing regulatory frameworks, and implementing strategic initiatives. While government intervention is required, overreliance on it can unintentionally impede innovation and change the organic dynamics that promote successful collaborations. This reliance risk may eventually endanger the sustainability and adaptability of these partnerships, necessitating a different approach to government participation.

Corporate-NGO partnerships are an essential aspect of cross-sector collaborations, particularly when solving complex societal concerns. These partnerships are a component of a larger network of interactions between businesses, nonprofits, and governments. The efficiency of such cooperation relies on an in-depth understanding of each community's particular points of view, interests, and dangers. Bigger companies often supply the financial resources required for social impact projects, which are then carried out by non-governmental organizations (NGOs). Smaller non-governmental organizations (NGOs), despite their deep community connections and competence, may struggle due to resource limitations. Stakeholder theory emphasizes the vital need to integrate NGO missions with business objectives to ensure financial viability through CSR operations. For example, Malaysia's first green childcare center was built by the Women's Aid Organisation (WAO) with funding from the Real Estate and Housing Developers' Association (REHDA) and other partners. This initiative demonstrates how NGOs can improve business credibility and trust by changing potentially hostile partnerships into collaborative efforts focused on long-term sustainability and shared value generation (Ahmad et al., 2024).

Community Engagement in Education

Community engagement is critical to improving vocational education in Malaysia, with a considerable impact on students' academic performance and skill development (Lim & Mustafa, 2013). While the quality of vocational training varies by industry, it generally helps students improve their overall talents, notably their interaction skills and English fluency. Furthermore, problem-based learning approaches, such as industry-specific final-year projects, have been demonstrated to improve students' competencies, independence, and academic engagement. Community-based initiatives enhance students' academic achievements, life skills, civic participation, and personal growth by displaying a comprehensive approach to educational development (Selvaratnam, 2013).

Addressing the problems of Industry 4.0 necessitates novel approaches, such as the Communities of Educational Engagement (CEE) program, which promotes institutional-community interactions through research into emerging technologies such as the Web and the Internet of Things. For example, the CEE program at a Malaysian educational institution provides hands-on experience in robotics, drone technology, and Japanese language studies. These projects highlight the vital need to incorporate real-world, industry-focused activities into university curricula. This integration not only aligns educational programs with changing economic demands, but it also improves community relationships, preparing students for future industrial requirements and improving their entire educational experience (Shabdin et al., 2020).

Industrial Education and Workforce Development in Malaysia

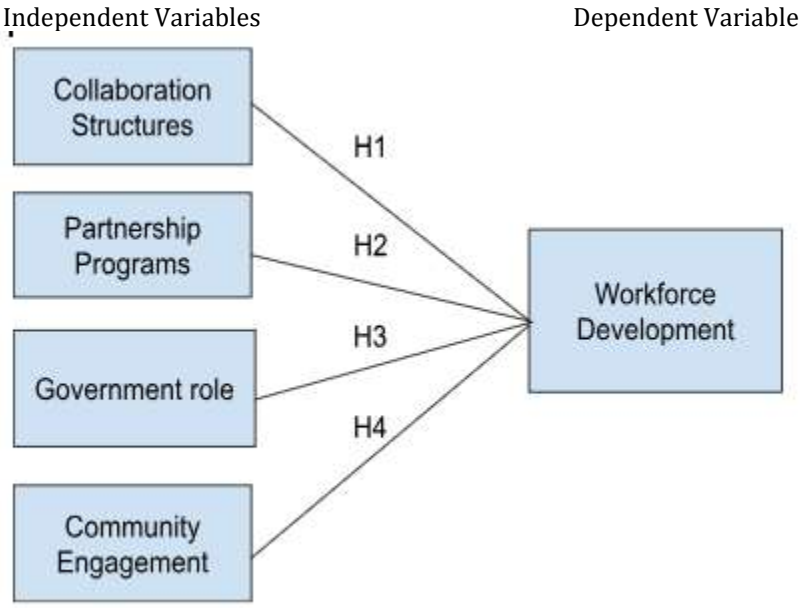
Industrial education and workforce development are essential components of Malaysia's plan for preparing workers to meet the demands of a rapidly evolving economy. The Malaysian education system provides an extensive selection of training programs through higher education institutions, Technical and Vocational Education and Training (TVET) schools, and community colleges, all designed to provide individuals with the practical and technical skills needed in a variety of industries. For example, vocational education programs in automotive technology, culinary arts, and electrical engineering provide hands-on training that closely matches industry standards and expectations (Ismail & Abiddin, 2014).

In addition, the National Dual Training System (NDTS) is an important part of this strategy, as it effectively integrates classroom learning with business experience, promoting strong connections between educational institutions and the corporate sector. This collaboration guarantees that training programs remain relevant and effective, meeting the industry's particular demands. Despite these achievements, Malaysia's workforce continues to face challenges, such as a significant skills mismatch in which graduates' qualifications do not fully align with industry needs, low participation rates in training programs, and the ongoing need for continuous learning as technology advances at a rapid pace. This skills gap is a huge danger to industries, limiting their ability to innovate and compete on a global scale. To address these concerns, the Malaysian government has

launched various strategic programs. The Third Outline Perspective Plan emphasizes lifelong learning and the integration of job-based education into the national curriculum, whilst the Human Resource Development Fund (HRDF) encourages firms to invest in their employees' ongoing training (Rashidi, 2011). According to Leong et al. (2010), these activities are vital for bolstering workforce skill sets and ensuring Malaysia's viability in an increasingly complex economic context.

Conceptual Framework

The conceptual framework for this study will include the following components:



Hypotheses Development and Research Module

Based on the conceptual framework, the following hypotheses are proposed:

Hypothesis 1 (H1)

Positive Hypothesis (H1a): Collaborative structural education positively affects workforce development in Malaysia.

Industry-Academia Collaboration: Research shows that businesses that partner with academic institutions experience greater productivity and innovation. Collaborative models allow the curriculum to be tailored to industry needs, resulting in graduates who are better prepared for the workforce (Salleh & Omar, 2013).

Government Policies: Since the 1990s, the Malaysian government has promoted university-industry collaborations to boost research and development (R&D) at the firm level, directly impacting workforce readiness (Dali et al., 2023).

Negative Hypothesis (H1b): Collaborative structural education does not significantly affect workforce development in Malaysia. Limited Impact: Some studies suggest that despite efforts to align education with industry needs, the impact on workforce development may be minimal due to bureaucratic inefficiencies, mismatches in expectations between industry and academia, and a lack of sustained collaboration (Nadarajah, 2021).

Limited Impact: Some studies suggest that despite efforts to align education with industry needs, the impact on workforce development may be minimal due to bureaucratic inefficiencies, mismatches in expectations between industry and academia, and a lack of sustained collaboration (Nadarajah, 2021).

Skills Mismatch: There are cases where graduates still face a skills mismatch even in collaborative education

models, indicating that these initiatives alone may not be sufficient to meet the diverse and evolving needs of the job market (Sala, 2011).

Hypothesis 2 (H2)
Positive Hypothesis (H2a): Partnership programs which is involve industrial education programs significantly improve graduates' workforce development in Malaysia.

Practical Experience: Partnership Programs involving community and business collaborations offer practical skills and experiences that are crucial for improving employability. Internships, apprenticeships, and hands-on training are shown to align graduates' skills with market demands (Shah et al., 2023).

Higher Employability: Graduates from partnership programs with strong industry involvement show higher employability rates and job readiness compared to those from traditional academic programs (Nadarajah, 2021).

Negative Hypothesis (H2b): Partnership program industrial education programs do not significantly improve graduates' workforce development in Malaysia.

Lack of Long-Term Impact: Some studies argue that the benefits of Partnership program programs may be short-lived, with graduates failing to maintain long-term employment or advance in their careers due to an overemphasis on practical skills and underdevelopment of theoretical knowledge (Karim et al., 2020).

Unequal Access: According to Lindsay et al. (2012), these Partnership programs may also suffer from unequal access, where only certain communities or industries benefit, leaving others behind and thus not contributing to overall workforce development.

Hypothesis 3 (H3)
Positive Hypothesis (H3a): Government role interventions are critical for the success of collaborative education models in Malaysia.

Policy and Funding: Effective government policies and funding are essential for sustaining collaborations between educational institutions and industries. Initiatives like PENJANA KPT-CAP and PENJANA KPT-PACE have been crucial in making graduates more marketable (Shah et al., 2023).

Alignment with National Goals: Government interventions ensure that educational programs align with national manpower growth objectives, thereby directly contributing to workforce development (Salleh & Omar, 2013).

Negative Hypothesis (H3b): Government role interventions are not critical for the success of collaborative education models in Malaysia.

Overreliance on Government: Some researchers argue that an overreliance on government support can stifle innovation and lead to a dependency culture among educational institutions and industries, ultimately hindering the success of collaborative models (Yusof & Rahman, 2019). Private Sector Independence: There is also evidence that the private sector can successfully drive collaboration independently of government interventions, particularly in more dynamic and competitive industries (Tan & Tee, 2020).

Hypothesis 4 (H4)
Positive Hypothesis (H4a): There is a significant relationship between community engagement in education and workforce development of essential soft skills.

Development of Soft Skills: Community engagement activities have been shown to significantly enhance students' soft skills, such as communication, problem-solving, and teamwork, which are highly valued by employers (Asefer & Abidin, 2021).

Workplace Readiness: Studies highlight that graduates who participate in community-driven programs are better equipped with the soft skills necessary for workplace success, leading to higher employability and job satisfaction (Feraco et al., 2023).

Negative Hypothesis (H4b): There is no significant relationship between community engagement in education and workforce development of essential soft skills.

Inconsistent Outcomes: Some research indicates that community engagement only sometimes leads to developing soft skills, with outcomes varying significantly based on the nature of the activities and the level of student participation (Shabdin & Sulaiman, 2020).

Alternative Methods: Other studies suggest that soft skills can be equally or more effectively developed through other means, such as targeted soft skills training programs, rather than relying solely on community engagement (Thakur, 2023).

3. Methodology

Research Design and Approach

The intended research strategy for this study is the qualitative research methodology that seeks to understand the various ideas, perceptions, and experiences that industry managers hold concerning collaborative models of training the workforce in Malaysia. Unlike other studies that hypothesize some assumptions, this work aims to discover how the collaboration of schools/ universities and firms impacts skills development within the workforce. The actual investigation is based on extensive research questions that are formulated given developing knowledge regarding the nature and consequences of such collaborations.

Data Collection

In-Depth Semi-structured Interviews:

The major research data for this study was obtained from the semi-structured interviews conducted with the managers of four companies involved in educational partnerships with Malaysian institutions. The interviews were therefore structured in a way that focused on the participants' participation and perceptions of the collaboration models.

Interview Protocol: The interview schedule consisted of a list of broad questions that aimed at getting rich information on the participant's participation in educational partnerships, perceived benefits and drawbacks of partnerships, and participant perceptions of governmental and communal involvement in workforce development. Examples of questions included:

- How does your company currently engage with educational institutions for workforce development?
- What are the key benefits you have observed from participating in collaborative education programs?
- Can you describe any specific partnership initiatives your company has with educational institutions or community organizations?
- How do these collaborations impact the skill development and job readiness of graduates?
- What challenges have you encountered in forming and maintaining partnerships with educational institutions?
- How does your company contribute to the curriculum development or training programs of educational institutions?
- What role does government policy play in facilitating or hindering your collaborative efforts with educational institutions?
- How do you assess the effectiveness of these collaborative programs in meeting your workforce needs?
- What types of skills or competencies do you find most lacking in graduates entering the workforce?
- How can educational institutions better align their programs with the evolving needs of your industry?

Sampling Method: To target the participants who have a direct link with the context of interest, the purposive sampling technique was applied. The various industries are depicted by the selected companies with the expectation that there will be a variation in the information delivered. This approach enables the researchers

to draw substantial investigation of the research questions within the Malaysian Workforce Development context.

Interview Process: It is important to note that the interviews were conducted in three rounds, which involved face-to-face, audio-online, and written interviews depending on the availability of the participants. Every interview took me roughly between 25 and 30 minutes to complete a single interview. The interviews were conducted in a face-to-face manner with the permission of the participants, and the interviews and notes were taped.

Data Analysis

Thematic Analysis:

The data that was obtained from the interviews was written down and analyzed using thematic analysis, which is a widely used procedure in qualitative research for identifying, analyzing, and reporting themes from the collected data.

Coding Process: The first step was simply to read the transcripts more than once to get a general picture of what has been said. To develop first-level initial codes, the researchers relied on significant phrases and concepts that were common with other interviews. These codes were then clustered into the bigger categories that were exercising or dealing with collaboration models, partnership programs, government roles and participation, and community engagement.

Use of Software: This allowed the data to be sorted and analyzed using NVivo software that was adopted for the study. This software was used in managing the coding aspects and in successive ways in relations between themes.

Triangulation and Member Checking: To increase rigor, triangulation was used by comparing data obtained from different subjects and using different modes of interviews; face-to-face interviews, audio online interviews, and written interviews. Furthermore, to increase credibility, participants were allowed to review the interview transcripts (member checking).

Reporting of Findings

Integration of Participant Voices:

To support the research, interview responses are incorporated in the report in the form of quotations from the interviewees. These quotes are to substantiate the identified themes of the present study and to present examples for conclusions. For example, when discussing the impact of partnership programs, a participant noted: For example, when discussing the impact of partnership programs, a participant noted:

“In our experience with the local university, the effectiveness of graduates that they produce has recently enhanced their job readiness as they are experienced when they come to us because of these programs we have nurtured.”

Lots of such quotes enrich the analysis and link the results and the respondents’ stories more straightforwardly.

Theoretical Framework

Thus, even though the present study is considered in a way first and primary, the discussion of its results will proceed within the smaller framework that can be associated with current theoretical discourses on workforce development, industry-education partnerships, and community upliftment initiatives. The study brings additional learning that aligns with the existing theory and research findings in another socio-economic and cultural setting such as Malaysian businesses.

Ethical Considerations

The necessary clearances from the institutional review board for conducting the research were sought before the start of the study. Potential participants of the study were explained the purpose of the study and their rights; this was followed by their right to withdraw from the study at any instance. Written consent was sought from all the women before interviewing them. It has been made certain that participants were not readily identifiable to preserve their confidentiality and the anonymous nature of the study.

Limitations

One major limitation of this study is that it is qualitative and had a purposive sampling method; therefore, the findings may not be generalizable. Nevertheless, the abundance and richness of data yield useful information about the Malaysian context of industry-education collaboration. For future research, the conclusions presented in this study could serve as the basis for investigation with increased use of a mixed research approach due to a precise assessment of the identified impacts.

4. Results

Collaboration Structure

- 50% (2 respondents) emphasized the importance of a well-structured collaboration model for workforce development.
- 25% (1 respondent) highlighted challenges such as bureaucratic inefficiencies.
- 25% (1 respondent) did not express a clear opinion.

The findings provide partial support for H1a, suggesting that collaboration structures positively impact workforce development, despite some challenges.

Partnership Programs

- 75% (3 respondents) believe that partnership programs are crucial for improving workforce development.
- 25% (1 respondent) did not consider partnership programs significantly impactful.

The findings strongly support H2a, indicating that partnership programs play a vital role in workforce development.

Government Role

- 25% (1 respondent) emphasized the critical role of government interventions.
- 50% (2 respondents) noted government involvement as important but not critical.
- 25% (1 respondent) did not see government intervention as necessary.

The findings provide limited support for H3a, suggesting government interventions are recognized but not the most critical factor.

Community Engagement

- 50% (2 respondents) emphasized the importance of community engagement in developing essential soft skills.
- 25% (1 respondent) acknowledged the value of community engagement but did not see it as critical.
- 25% (1 respondent) did not emphasize its significance.

The findings provide partial support for H4a, showing that community engagement plays a significant role in developing essential soft skills.

Aspects	Support for Positive Hypothesis	Percentage	Support for Negative Hypothesis	Percentage	Key Insights
1 Collaboration Structure	2 respondents	50%	1 respondent	25%	Partial support for H1a. Collaboration structures are crucial but face challenges such as bureaucratic inefficiencies and mismatches between

					industry and academia.
2 Partnership Programs	3 respondents	75%	1 respondent	25%	Strong support for H2a. Partnership programs are vital for aligning academic training with industry needs and improving job readiness and skills.
3 Government Role	1 respondent	25%	2 respondent	50%	Limited support for H3a. Government interventions are important but not viewed as the most critical factor.
4 Community Engagement	2 respondents	50%	1 respondent	25%	Partial support for H4a. Community engagement is significant in developing essential soft skills, though its criticality is debated among respondents.

Discussion

The conceptual framework identifies several critical elements that influence Malaysian collaborative education models' ability to grow the workforce. These consist of collaboration structures, partnership programs, government involvement, and community engagement.

According to the framework, industry-academia collaboration is essential for producing workforce skills that meet changing market expectations, especially considering the fourth industrial revolution (Sohimi et al, 2019). Through this relationship, academic institutions enhance the relevance of their curricula and produce graduates who are ready for the workforce, while businesses can access young talent and support advances in technology (Suparno et al., 2023). Industry participation in curriculum creation, resource pooling, and the establishment of precise evaluation standards for industrial training are all examples of successful collaboration techniques (Sohimi et al, 2019). On the other hand, Malaysia's National Dual Training System (NDTS) is an excellent example of how governmental institutions, businesses, and universities collaborate to improve worker preparedness (Rashidi, 2013). Employers are requesting more practical skills than knowledge from academia, and our partnership approach fills that need by combining classroom instruction with real-world industrial experience (Angolia et al., 2014). Setting goals, forming partnerships, managing collaborations, and assessing achievement are all essential components of a successful team effort (Rashidi, 2011). These collaborations make it possible to share resources and expertise, which raises the learning programs' practical significance (Rawlinson & Dewhurst, 2013). Gaining "work-ready" graduates, including the transfer of knowledge into curriculum design, and satisfying industry demands for skilled labor are some advantages (Rawlinson & Dewhurst, 2013).

Moreover, several programs and assistance systems by the Malaysian government play a critical role in fostering collaborations between the academic sector and business. These include financial resources, regulatory structures, and acknowledgment initiatives that promote cooperation (Seow et al., 2015). To promote entrepreneurial education and university-industry collaboration, the government has put plans like the National Higher Education Action Plan and the Education Blueprint of Malaysia into place (Kamaruddin et al., 2017). Furthermore, through focused programs, the government promotes technology transfer and the industrialization of academic research (Mohd et al., 2014). Apart from this, student learning is improved and social needs have been addressed by community engagement in higher education. It's regarded as a high-impact approach that helps children understand civics and gets them ready for employment (Noel, 2014). According to Olson (2017), the comprehensive program design method provides a framework for engaging

students through educational activities that foster community emergence as well as capacity building. Academic: Universities are under growing pressure to address community demands and guarantee that graduates are prepared for the workforce. Collaborations have been demonstrated to produce novel insights and improve student experiences (Brewer & Jones, 2014).

Therefore, the conceptual framework emphasizes how Malaysian recruitment and retention is effective because it is varied and collaborative. Strong collaborations between academics, companies, the government, and community members enable colleges and universities to create curricula that are appropriate for the industry and provide students with the hard and soft skills necessary to prosper in an economy that is shifting. Maintaining Malaysia's talent flow for the future will need sustained investment and collaboration among these significant partners.

5. Conclusion

To summarise, this study emphasizes the importance of partnership between educational institutions and companies in Malaysian workforce development. Partnership programs play an important role in training graduates for today's labor environment. While there are some drawbacks, such as unequal access to these programs and the possibility of short-term advantages, the overall impact is good. The government also plays a significant role in facilitating and covering these collaborations. However, it is critical to avoid becoming excessively reliant on government help, as this could hinder innovation. A balanced approach that supports public and private sector collaboration is required for long-term success. Furthermore, participation in the community helps students develop crucial soft skills such as communication and cooperation, which employers respect greatly. Overall, a successful workforce development strategy in Malaysia must include strong partnerships, government assistance, and community involvement. Working together allows us to better educate graduates for the workforce and contribute to the country's economic prosperity.

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Socioeconomic Profiling and Dynamics: Insights from a Rural Community Study in Kedah

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Abstract: This study provides a socio-economic profile of Mahang and Nagalilit, two sub-districts in Kulim, Kedah, Malaysia. Residents of Mahang primarily rely on rubber tapping and oil palm cultivation, industries vulnerable to monsoon weather. In Desa Keda Nagalilit, locals are employed in the nearby hi-tech industrial area, oil palm plantations, or as shop assistants. Many households earn below the minimum wage, compelling residents to take on multiple jobs for financial stability. Data was systematically collected through questionnaires focusing on household demographics, socio-economic conditions, and lifestyle patterns. The analysis offers valuable insights into the living conditions and challenges these communities face, especially in light of the COVID-19 pandemic. The research revealed income disparities and variations in living standards between sub-districts, underscoring the socio-economic impact of the pandemic. It further examined how variables such as age, income, employment status, and education correlate with financial strain, mental health issues, and disruptions to daily life. Findings demonstrate significant relationships between socioeconomic factors and the pandemic's effects, emphasizing the need for targeted measures to alleviate poverty, improve education, and enhance residents' overall quality of life while addressing financial and mental health challenges.

Keywords: *Socioeconomic profiling, community dynamics, rural livelihood, Kedah*

1. Background and Historical Context of the Kulim District

Kulim is one of the 12 districts in Kedah, covering an area of 774 km^2 in the northern region of Malaysia. It is bordered by Sungai Muda to the west, Sungai Sedim and Sungai Kerian to the north and east, and the state of Perak to the south. The district's name is derived from the 'kulim' fruit trees that once densely populated the town (Thow, 1995). Historically, Kulim began as a small settlement in the 1950s, characterized by traditional agricultural practices. Kulim is believed to have been settled in the 18th century by 100 individuals of Pattani Malay descent. It is thought that the town may have been founded by a Chinese artisan named Chin Ah Cheoh (Jaffar, 2007). During the early years, the local economy was primarily based on rubber tapping and small-scale agriculture (Abidin et al., 2013). Over time, significant changes have reshaped Kulim's socio-economic landscape. The establishment of the Kulim Hi-Tech Park (KHTP) in the early 1990s marked a pivotal moment in the district's development. The KHTP, Malaysia's first high-tech industrial park, was inaugurated in 1996 and has since attracted numerous multinational corporations and high-tech industries, thereby transforming Kulim into a key industrial hub in the northern region of Malaysia (Leh, 2016; Abidin et al., 2013).

The district is administratively divided into 15 sub-districts, including Mahang and Nagalilit, which are the focus of this socio-economic study (Department of Statistics Malaysia [DOSM], 2024). Mahang, situated approximately 35 km east of Kulim town, remains largely dependent on traditional economic activities such as rubber tapping and oil palm cultivation. Adverse weather conditions, particularly during the monsoon season, significantly impact the income of rubber tappers, exacerbating economic vulnerabilities. In contrast, Desa Keda Nagalilit, another sub-district, has a more diverse economic base. Residents work in the nearby hi-tech industrial area, oil palm plantations, or as shop assistants in local eateries and grocery stores.

Despite the proximity to industrial development, many residents still earn below the minimum wage level, leading to financial constraints and necessitating multiple simultaneous jobs to sustain their livelihoods (DOSM, 2024). The transformation from a small agricultural settlement to an industrialized district has brought both opportunities and challenges. While industrialization has spurred economic growth and job creation, it has also highlighted disparities in income and living standards among different sub-districts. This socio-economic study aims to provide a comprehensive analysis of the demographic and socio-economic conditions in Mahang and Nagalilit.

This study evaluates the demographic and socio-economic conditions of residents in Mahang and Nagalilit to understand how these factors shape their daily lives. Through systematic data collection on household demographics, socio-economic status, and lifestyle patterns, the research provides valuable insights into the influences affecting these communities. The analysis sheds light on the challenges faced by residents, particularly in the wake of the COVID-19 pandemic, which has disrupted socio-economic stability worldwide and impacted individuals' financial and psychological well-being. Focusing on the Kulim District in Kedah, Malaysia, the research examines how socio-economic variables—such as age, education, employment status, and income—correlate with the pandemic's effects on financial strain, mental health, and disruptions to daily life. By understanding these relationships, the study aims to inform the development of policies that can effectively mitigate the negative socio-economic impacts of the pandemic and improve residents' quality of life.

Figure 1: Kulim District Map



Source: Official Portal of the Local Authorities of Kedah Darul Aman, 2022

Mahang Sub-District

Mahang is a small town situated approximately 35 km east of Kulim District. The town is led by a community leader known as Penghulu, alongside various Village Development and Security Committees (MPKK) appointed by local representatives to oversee administration and management (Official Portal of the Local Authorities of Kedah Darul Aman, 2022). Residential areas within this subdistrict include Pekan Mahang, Kampung Baru Mahang, Kampung Ulu Mahang, Kampung Dingin, Kampung Lobak, Kampung Bukit Kabu, and several surrounding villages. Mukim Mahang also shares a border with the State of Perak Darul Ridzuan, and its terrain is characterized by hilly landscapes. According to the 2020 census, the population of the area is 593 residents. The total land area measures 1.249 km^2, resulting in a population density of 475 individuals per square kilometer as of 2020 (DOSM, 2023). Over the decade from 2010 to 2020, the area experienced an annual population growth rate of 6.9%.

The majority of the population is ethnically Malay, comprising 80%, while Indian and Chinese ethnicities account for 20% and 15%, respectively, with a small percentage identifying as Sikh (Izani, 2023). The local economy primarily revolves around rubber tapping and oil palm cultivation. Seasonal monsoons and erratic weather patterns adversely affect the livelihoods of those dependent on rubber tapping, often leading to financial struggles. Additionally, the high cost of goods and raw materials in this rural area, situated far from Kulim Town Center, compels some residents to seek supplementary income through other village work or employment in hi-tech industrial areas, small businesses, or private sector jobs. In terms of infrastructure, Mahang is equipped with primary, secondary, and higher educational institutions, alongside essential services such as a police station and the Mahang Health Clinic. Most residents have constructed homes on inherited family land and maintain close-knit relationships with neighbors (Jaafar, 2023).

Nagalilit Sub-District

Mukim Nagalilit covers an area of 30.37 km^2 and has a population of nearly 23,103 individuals. Located in Padang Serai, Kedah, Nagalilit is led by a community leader known as Penghulu (Official Portal of the Local Authorities of Kedah Darul Aman, 2022). The name "Nagalilit" is derived from local folklore, referring to a hill that once featured a stream resembling a dragon coiling around it (Ibrahim, 2023). The socio-economic focus

of the study in Nagalilit centers on Keda Nagalilit Village. This village is part of the Poor People's Development Program (PPRT) under the Kedah Regional Development Authority (KEDA), which has established various infrastructures, including multipurpose halls and kindergartens. KEDA's initiatives, initiated to foster human capital development, have enabled organized settlements, facilitated aid distribution and promoted community cohesion. Keda Nagalilit Village comprises 165 houses, housing approximately 950 residents (Hashim, 2023). The average resident of Keda Nagalilit Village typically works in the hi-tech industrial area, is employed in nearby palm oil plantations, or serves as a shop assistant in local establishments. Most residents face economic challenges, earning less than RM1,500.00 monthly. As a result, many engage in additional jobs to support their families amidst financial constraints.

2. Socio-Economic Background

Livestock farming, predominantly poultry, constitutes a significant pillar of Kulim's economy, generating a substantial RM 64.8 million in income. This sector, however, is contrasted by a minimal aquaculture industry, occupying a mere 10 hectares. While agriculture remains a fundamental pillar of Malaysia's rural economy, particularly in regions like Kedah, challenges such as a weak marketing infrastructure and a declining interest in agriculture among the youth are impeding its growth potential. This trend is not unique to Malaysia but is reflected across Southeast Asia, where the agricultural sector encounters similar hurdles in attracting young talent. The restriction of movement during the post-Movement Control Order (MCO) period significantly impacted the agricultural sectors, as farmers faced difficulties in managing their farms and selling their products regularly (Shah et al., 2022).

Kulim's development trajectory is marked by disparities. Uneven development across the district has resulted in suboptimal land use, with abandoned plots worsening economic strain. This issue is compounded by Kulim's struggle to compete with neighboring regions for investment and economic growth. A similar pattern of uneven development can be observed in other parts of Malaysia and Southeast Asia, where rapid urbanization and industrialization often leave rural areas lagging (Huang & Song, 2021; Abdul Aziz et al., 2023).

The quality of life in Kulim varies significantly, with rural Mukims such as Mahang, Nagalilit, Karangan, and Sungai Kob experiencing slower development compared to urban centers. This rural-urban divide is a common challenge faced by many ASEAN nations (Li, 2016; Sun et al., 2023). Furthermore, Kulim's proximity to Penang has created a development gradient, with areas like Lunas, Sungai Seluang, Padang Serai, and Padang Meiha benefiting from spillover effects. The construction of the Butterworth Kulim Expressway (BKE) was expected to accelerate this trend, attracting housing and industrial projects to the region. This phenomenon of infrastructure-driven development is a familiar pattern across Southeast Asia, as countries invest in transportation networks to stimulate economic growth (Shatkin, 2022).

COVID-19's Impact

The COVID-19 pandemic significantly impacted the socio-economic well-being of Mahang and Nagalilit residents. The pandemic exposed and exacerbated existing vulnerabilities, as disruptions in supply chains and market access led to increased unemployment and underemployment, particularly among the youth (Rasul et al., 2021). Many residents turned to informal work or small-scale businesses to diversify their income; however, challenges such as a weak marketing system and limited financial resources hindered the establishment of sustainable livelihoods (Bezbora, 2021), (Trotskovskiy & Sabyna, 2021). The uneven development within Kulim and the low population density in remote Mukim areas limit access to essential services and prevent residents from fully benefiting from regional economic growth. Geographic isolation worsens these issues for communities like Mahang and Nagalilit compared to those closer to urban centers. While the development along the BKE offers opportunities, equitable distribution of benefits remains a challenge. Kulim's future development needs to address these disparities to foster a more inclusive and prosperous district.

3. Methodology

Data collection for this study was conducted through the administration of questionnaires specifically designed for residents in the study area. In addition, secondary data was sourced from library studies, printed materials,

public reports, and relevant journal articles. The sample comprised 50 households from Pekan Mahang and Desa Keda Nagalilit in the Kulim District, Kedah, selected via purposive sampling to ensure representation across key demographic groups. The structured questionnaire was developed to assess a range of socio-economic variables, including demographic characteristics, financial well-being, stress levels, financial literacy, and mental health, particularly in the context of the COVID-19 pandemic. The study spanned six months, from June 1, 2023, to December 31, 2023, with field data collection commencing on June 10, 2023. Quantitative data analysis was conducted using the Statistical Package for the Social Sciences (SPSS) Version 24.0, allowing for both correlational and descriptive statistical analysis. This approach provided an examination of variables such as age, marital status, educational attainment, and income, as well as the pandemic's impact on financial stability, stress, and mental health.

4. Results and Findings

Table 1 outlines the demographic profile of the survey participants. The age range spans from 20 to over 80 years old, with the highest concentration falling between 60 and 69 years old. All respondents identified as Malay and Muslim. The marital status breakdown reveals a majority are married (64%), followed by widowed/widowers (16%) and singles (14%). Interestingly, the state of origin shows Kedah as the dominant source (72%), with a smaller mix of respondents from Perak, Penang, and other unspecified locations.

Table 1: Demographic Information

Category	Frequency	Percentage (%)
Age		
20 - 29 years	1	2
30 - 39 years	5	10
40 - 49 years	5	10
50 - 59 years	11	22
60 - 69 years	16	32
70 - 79 years	5	10
80 years and above	7	14
Religion		
Islam	50	100
Ethnicity		
Malay	50	100
Marital Status		
Single	7	14
Married	32	64
Divorced	3	6
Widower/Widow	8	16
State of Origin		
Kedah	36	72
Perak	3	6
Penang	1	2
Others	10	20

Source: Researcher

Table 2 illustrates the educational background and employment status of the survey participants. Educational attainment varies, with a significant portion (44%) lacking formal education beyond primary school (UPSR, SRP/PMR). The majority are unemployed (54%), while the employed population is split between informal

sectors (22%) and private companies (16%). Government jobs and other formal employment categories represent a smaller portion.

Table 2: Education and Employment

Category	Frequency	Percentage (%)
Education Level		
UPSR	11	22
SRP/PMR	13	26
SPM	9	18
Matriculation/STPM/STAM	1	2
Diploma	1	2
Bachelor's Degree	1	2
Postgraduate	1	2
No formal education	8	16
Other types of education	5	10
Employment Sector		
Government	1	2
Private Sector	8	16
Informal Sector	11	22
Unemployed	27	54
Other types of unemployment	3	6

Source: Researcher

The survey provides a glimpse into the financial well-being and living conditions of the residents. While a significant portion (26%) reported no debt, a substantial group (36%) struggled with monthly debt exceeding RM 1,000. Family income reflects this disparity, with 30% earning between RM 1,000 and RM 1,499 and 16% earning even less. Household size varies, with most families having 4-6 members (44%). Notably, home and land ownership are high, with 80% and 64% owning their residences and land, respectively. This suggests potential long-term financial security for some residents. The data also reveals reliance on social safety nets, with 20% receiving assistance from the Department of Social Welfare, primarily in the form of food aid (36%). Necessities seem well-covered, with high ownership rates for refrigerators (84%) and washing machines (82%). While car ownership sits at 54%, motorcycles (66%) remain the dominant mode of personal transportation. Food remains the primary expense, with over half (56%) spending more than RM 500 monthly. Table 4 illustrates the socio-economic data summary for the study.

Table 3: Socio-Economic Data Summary

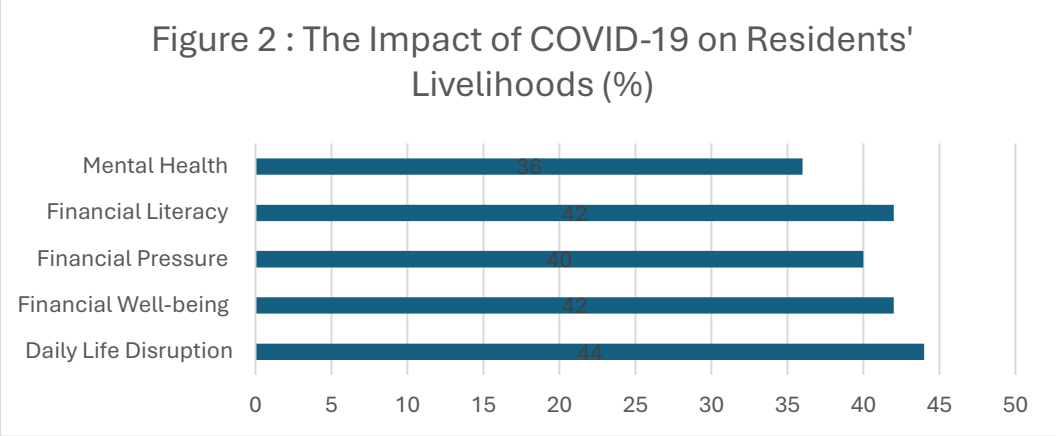
Category	Description	Percentage
Debt	No Debt	26%
	Monthly Debt > RM 1,000	36%
Family Income	RM 1,000 - RM 1,499	30%
	Below RM 499	16%
Household Size	4-6 Members	44%
Home Ownership	Owns Home	80%
Land Ownership	Owns Land	64%

Social Welfare	Receives Assistance	20%
	Type of Aid (Most Common)	Food Items (36%)
Household Possessions	Refrigerator Ownership	84%
	Washing Machine Ownership	82%
	Car Ownership	54%
	Motorcycle Ownership	66%
Average Family Expenditure	Food (> RM500)	56%

Source: Researcher

The study also investigated the impact of COVID-19 on residents' livelihoods. Nearly half (44%) experienced slight to moderate disruptions to their daily lives, while a significant portion (20%) faced substantial challenges. Financially, the impact was also evident. Over two-fifths (42%) felt their financial situation often mirrored their overall well-being, and a similar proportion (40%) reported frequent financial pressure. Financial literacy levels were mixed, with 42% indicating some knowledge or skills, but 32% feeling they lacked sufficient means to manage finances effectively. Mental health was also affected, as 36% reported occasional negative impacts and 16% experienced frequent struggles. Figure 2 replicates the data.

Figure 2: The Impact of COVID-19 on Residents' Livelihoods (%)



Source: Researcher

Correlation Analysis Between Socio-Economic Factors and COVID-19 Impact

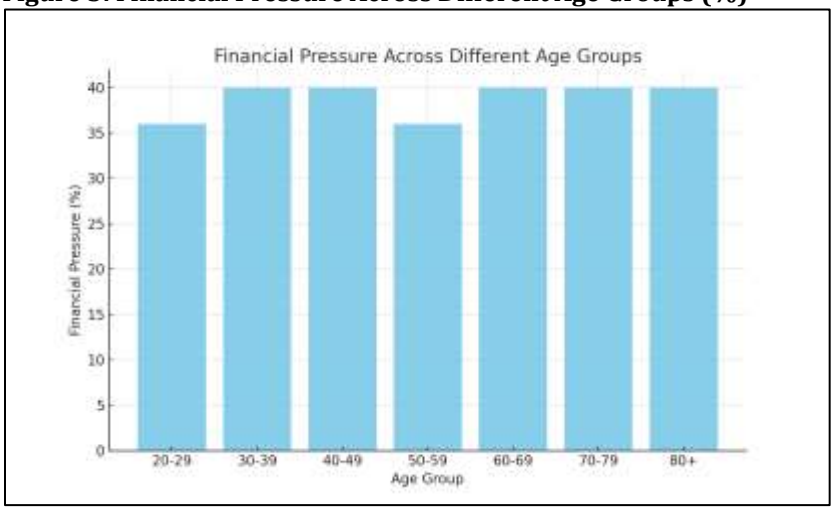
A moderate positive relationship was identified between age group and financial pressure, with a correlation coefficient of r=0.47. This suggests that older individuals experience greater financial stress compared to their younger counterparts. The findings indicate that older populations may face more significant financial challenges, likely due to limited income opportunities and the rising medical and living costs associated with aging. Consequently, targeted support for this demographic could be essential in alleviating their financial burdens and enhancing overall well-being. Additionally, the analysis uncovered a strong negative correlation between debt level and financial well-being, represented by a correlation coefficient of r=−1.0. This highlights the substantial impact of debt on individuals' perceived financial stability, where increasing debt levels are associated with a marked decline in financial well-being. A strong positive correlation of r=0.55 was also observed between debt levels and financial pressure, reinforcing the conclusion that higher debt is directly linked to increased financial stress. These insights underscore the necessity for effective debt management strategies to bolster financial resilience. Furthermore, the data demonstrated a strong positive correlation between life disruption and mental health impact, with a correlation coefficient of r=0.73. This finding illustrates the significant connection between disruptions in daily life due to COVID-19 and the deterioration of mental health. The psychological toll inflicted by lifestyle changes—such as job loss and alterations in daily

routines—highlights the importance of mental health support services to address the repercussions of these disruptions. The analysis also revealed a moderate positive correlation of r=0.55 between income level and debt. This suggests that individuals with higher incomes tend to carry more debt, possibly reflecting their capacity to access credit or loans. However, this relationship also indicates that increased earnings do not necessarily equate to reduced financial pressure, necessitating a broader understanding of financial health that considers both income and debt levels. In terms of education, a moderate negative correlation of r=−0.44 was found between education level and financial pressure. Individuals with higher education levels are likely to experience less financial stress, potentially due to better employment opportunities and higher earning potential associated with advanced education. This finding underscores the critical role of educational attainment in mitigating financial pressure, highlighting the importance of accessible education and training programs.

Trend Analysis of Age Demographics and Financial Pressure

Figure 3 shows that financial pressure remains fairly consistent across age groups, with a slight decrease among the youngest cohort. The analysis reveals a clear correlation between age and financial pressure. While younger individuals (20-29) experience minimal financial strain, this burden escalates with age, culminating in the most significant financial pressures among those aged 60-79. Although the 80+ age group reports a marginal decrease in financial stress compared to the preceding decades, it remains notably higher than the younger cohorts.

Figure 3: Financial Pressure Across Different Age Groups (%)

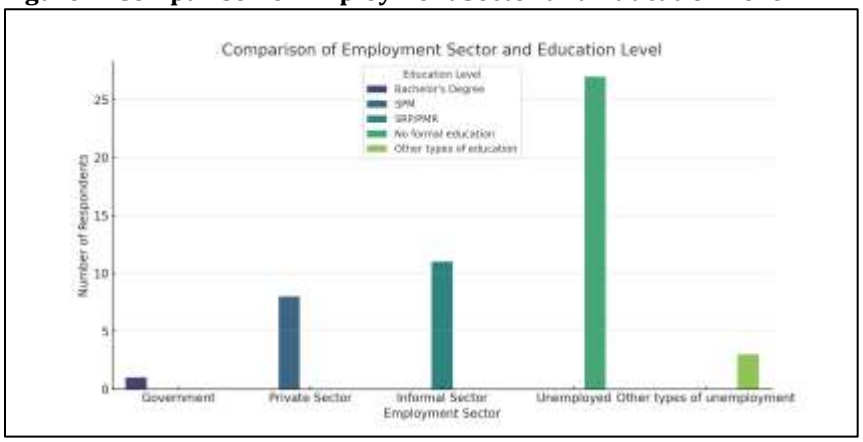


Source: Researcher

Comparative Analysis of Employment Sector and Education Level

Figure 4 reveals significant disparities in educational attainment among various employment sectors. A larger proportion of individuals with bachelor's degrees are employed in the government sector, reflecting a preference for higher education in this field. In contrast, the private sector tends to have a higher prevalence of employees with SPM-level education. The informal sector is predominantly made up of individuals with SRP/PMR qualifications or those lacking formal education entirely. Among the unemployed, there is a diverse range of educational backgrounds, with many individuals holding SPM or SRP/PMR qualifications. Interestingly, the "other types of unemployment" category, which may encompass part-time or temporary work, shows a notably higher representation of individuals without any formal education. This pattern underscores the need for targeted educational initiatives to address these disparities across employment sectors.

Figure 4: Comparison of Employment Sector and Education Level

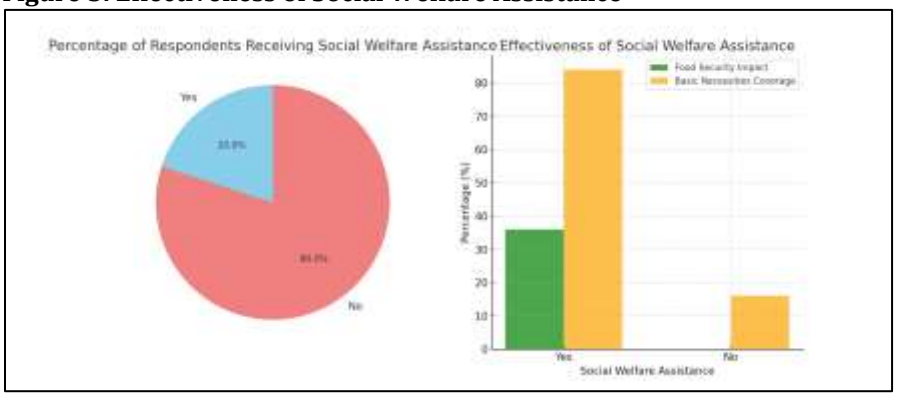


Source: Researcher

Evaluation of Social Welfare Assistance and Its Effectiveness

Figure 5 reveals that a significant portion of respondents (80%) did not receive social welfare assistance. Among those who did, a majority (80%) reported that the assistance positively impacted their food security, while a smaller proportion (30%) indicated that it helped cover necessities. These findings suggest that while social welfare assistance can be effective in addressing immediate needs like food security, its impact on covering broader necessities may be more limited.

Figure 5: Effectiveness of Social Welfare Assistance



Source: Researcher

Discussion

This study provides valuable insights into the socio-economic conditions of residents in Mahang and Nagalilit, particularly in light of recent challenges such as the COVID-19 pandemic. The demographic profile reveals a predominantly older population, which may require targeted interventions to address their specific socio-economic needs. Given that all respondents identify as Malay and Muslim, this homogeneity suggests that cultural and religious factors could play a significant role in shaping community dynamics and support systems. The high percentage of married individuals (64%) may also influence household structures and the availability of social support networks, which are crucial for coping with economic stressors. The analysis of educational attainment highlights a concerning trend: a significant portion of respondents possess limited formal education, which correlates strongly with the high unemployment rate observed in the sample. This suggests that enhancing educational opportunities could be a vital strategy for improving employability and economic stability in the region. The prevalence of informal sector employment (22%) underscores the need for policies that promote job security and formalize existing non-standard work arrangements. Financial well-being and living conditions paint a mixed picture. While a considerable number of households own their homes and land, indicating some level of long-term financial security, the reliance on social safety nets reveals vulnerabilities. The high percentage of respondents reporting monthly debts exceeding RM 1,000 indicates substantial

financial pressure, reinforcing the necessity for effective debt management strategies and financial literacy programs.

The impact of COVID-19 has been profound, with many respondents experiencing disruptions to their daily lives and financial stability. The pandemic has emphasized the interconnectedness of financial health and overall well-being, suggesting that interventions aimed at enhancing financial literacy and management skills could be beneficial. Furthermore, the mental health implications of these disruptions warrant attention, as a significant portion of the population reports negative effects on their mental well-being. Access to mental health resources and support systems should be prioritized to help residents navigate these challenges. Addressing these challenges will require a multifaceted approach, including enhancing educational opportunities, promoting formal employment, and providing comprehensive financial and mental health support. By focusing on these areas, stakeholders can work towards improving the overall well-being of this community in the face of ongoing and future challenges.

5. Conclusion and Recommendations

This study provides a comprehensive examination of the demographic, socio-economic, and educational profiles of residents in Mahang and Nagalilit, highlighting their current challenges and needs. The analysis reveals a predominantly older population with a significant proportion lacking formal education and facing high levels of unemployment. Despite considerable home and land ownership, many residents experience financial difficulties, including substantial debt and low-income levels. The COVID-19 pandemic has further intensified these issues, impacting financial stability and mental health, consistent with broader regional and global trends. Additionally, the study evaluates the specific impacts of the COVID-19 pandemic on these communities, providing timely data. The findings offer valuable insights for targeted policy interventions, emphasizing the need for diversified economic opportunities, education, vocational training, and financial literacy programs.

To address the findings from this study, several recommendations are proposed. First, there is a clear need for enhanced educational programs targeting adults with limited formal education. Implementing adult education and vocational training initiatives can significantly improve literacy and employability, which are essential for fostering economic stability. Additionally, high levels of unemployment and a reliance on informal sector jobs underline the importance of creating new job opportunities and diversifying the economy. Supporting entrepreneurship and small and medium-sized enterprises (SMEs) could help mitigate economic vulnerabilities and stimulate local job growth. Furthermore, the mixed levels of financial literacy among residents highlight the necessity for comprehensive financial education programs. Such initiatives should aim to improve residents' financial management skills, help address debt issues, and promote long-term financial stability. Strengthening social safety nets is also crucial, given the observed reliance on welfare; expanding food aid and other support mechanisms could alleviate financial pressures on low-income households. Lastly, addressing mental health impacts requires accessible services to help residents manage stress and adapt to socio-economic challenges.

Future research should extend beyond Mahang and Nagalilit to include other sub-districts within the Kulim District for a more comprehensive regional analysis of the Kedah state. Longitudinal studies are needed to track changes over time, offering insights into the long-term effects of industrialization, economic shifts, and policy interventions. Detailed studies on specific sectors like agriculture and small businesses could identify unique challenges and opportunities. Investigating the impact of educational and vocational training programs is essential for understanding their effectiveness. Exploring social and cultural dynamics, health and well-being, technological integration, policy impacts, youth employment, and climate change will provide a richer understanding and more actionable insights for the socio-economic development of these communities.

Acknowledgement: This study was made possible through the funding provided by the Malaysian Relief Agency (MRA). We extend our sincere gratitude for their support, which has been instrumental in facilitating this research. Additionally, we would like to acknowledge Universiti Teknologi MARA for the support and resources throughout the research process.

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CSR-Driven STEM Education: Case Study on PolyDuino Arduino Kits Implementation in Secondary Schools, Kedah

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Abstract: The persistent challenge in STEM education is the gap between theoretical knowledge and practical application, particularly in underserved communities with limited access to advanced educational tools. This study, conducted as part of a Corporate Social Responsibility (CSR) program, aims to address this issue by evaluating the effectiveness of the PolyDuino Arduino Kit in enhancing STEM education among secondary school students. The study specifically targeted Form 2 and Form 3 students from four selected schools in Kuala Muda and Yan, Kedah districts. An experimental research design was employed, involving approximately 120 students who participated in a series of hands-on workshops facilitated by trained educators. Data were collected through observational assessments and self-reported surveys, focusing on students' engagement, conceptual understanding, problem-solving skills, and collaborative behavior. The findings revealed that 70% of the students demonstrated a strong understanding of the PolyDuino Arduino concepts, with 50% frequently applying their knowledge to create functional projects. Additionally, the study observed significant improvements in student engagement and collaboration, although variations in problem-solving effectiveness were noted. The implications of this study highlight the potential of CSR programs to make substantial contributions to education by providing valuable resources and opportunities for practical learning, particularly in regions with limited access to educational tools. Despite its promising outcomes, the study's limitations include a geographically constrained sample and the short-term nature of the data collection, suggesting the need for future research to explore long-term impacts and broader applicability.

Keywords: *STEM Education, PolyDuino Arduino Kit, Corporate Social Responsibility (CSR), Hands-on Learning, Student Engagement*

1. Introduction and Background

In today's rapidly evolving world, characterized by technological advancements and complex global challenges, the enhancement of Science, Technology, Engineering, and Mathematics (STEM) education has become increasingly crucial. STEM education is vital not only for addressing critical issues such as sustainable development, economic growth, and technological innovation but also for preparing future generations to meet the demands of a digital and knowledge-driven economy. Despite its significance, there are considerable disparities in access to quality STEM education, particularly in developing regions where resources are scarce, and educational infrastructure is often inadequate.

Developing STEM skills is essential for driving innovation, economic growth, and addressing global challenges such as climate change, healthcare, and sustainable energy solutions (Tulivuori, 2021). In Malaysia, this growing emphasis on STEM education is reflected in recent statistics showing increased student interest. According to the Ministry of Education, enrollment in STEM-related courses has risen significantly, with approximately 45% of secondary school students expressing a preference for STEM subjects in 2023 (The Sun, 2023). This rise in interest is driven by various initiatives, including government policies and private sector involvement (Ministry of Science, Technology and Innovation [MOSTI], 2020; Economic Planning Unit, [EPU] 2021). However, challenges remain, particularly in addressing disparities in access to quality STEM education across different regions.

Integrating innovative tools like the PolyDuino Arduino Kits into school curricula represents a progressive step toward bridging this educational gap. These kits offer hands-on experience in robotics and programming,

effectively bridging theoretical knowledge with practical skills, enhancing student engagement, and fostering problem-solving abilities. Additionally, Corporate Social Responsibility (CSR) initiatives play a pivotal role in supporting these educational advancements by providing resources and funding to enhance STEM education in underserved communities.

To further support the integration of PolyDuino Arduino Kits in STEM education, past studies offer valuable insights into the impact of robotics kits, particularly within the Arduino cluster. The integration of Arduino kits and robotics into secondary school curricula represents a powerful synergy that enhances STEM education more tangible and accessible to students. This approach not only boosts students' interest in STEM careers but also improves their motivation, achievement, and attitudes toward technology and engineering (Durak, Bilici, & Baran 2023; Ragusa, 2023).

CSR initiatives have emerged as a vital strategy to address these disparities by providing additional resources and support to educational institutions. By leveraging CSR, companies can significantly enhance STEM education, fostering greater student engagement and improving educational outcomes. This case study investigates how CSR initiatives can be effectively employed to advance STEM education, particularly in areas where access to quality education is limited. These initiatives are crucial in preparing students for the demands of the Fourth Industrial Revolution (4IR).

Despite the growing importance of STEM education and the integration of hands-on learning tools like Arduino kits, a noticeable research gap remains in understanding their specific impact within the Malaysian secondary school context. While existing studies have explored the general benefits of educational robotics, limited research exists on how PolyDuino Arduino Kits influence student engagement and learning outcomes in Malaysia.

This study aims to address these gaps by investigating the effectiveness of PolyDuino Arduino Kits in enhancing STEM education and evaluating the contribution of CSR efforts in this context. The primary objectives are: (1) to assess the impact of PolyDuino Arduino Kits on students' STEM skills and engagement, (2) to explore how CSR initiatives support the implementation of these kits, and (3) to provide recommendations for improving STEM education through such collaborations.

2. Literature Review

Stem Education: STEM education, encompassing Science, Technology, Engineering, and Mathematics, is vital for developing a workforce capable of addressing global challenges. Its primary objectives include equipping students with the necessary skills to navigate and contribute to a technology-driven world, addressing complex global issues, and enhancing economic competitiveness. In the modern educational landscape, STEM is essential for cultivating a skilled workforce proficient in leveraging technological advancements and scientific knowledge (Atibuni, Manyiraho & Nabitula 2022; Feng & Hou, 2023).

Globally, trends in STEM education emphasize increasing accessibility and engagement through innovative teaching methods and technology integration. Robotics, coding, and project-based learning are becoming more prevalent, highlighting the practical applications of STEM concepts. Many countries are investing in educational reforms to improve STEM outcomes and address skill shortages in critical industries (Kelley & Knowles, 2016; EPU, 2021; Zhan et al., 2024).

In Malaysia, STEM education is gaining momentum as part of a national strategy to enhance workforce skills and drive economic growth. There is an increasing interest in STEM fields among students, supported by government policies promoting STEM initiatives (MOSTI, 2020; EPU, 2021). However, disparities in access to quality STEM education remain, particularly in rural and underserved areas (Aspin et al., 2022; Idris et al., 2023).

Arduino Robotics Kits: To address these challenges, innovative approaches are essential. Integrating technology like Arduino robotics kits into the curriculum can offer hands-on learning experiences that bridge theoretical knowledge with practical skills. Such tools can enhance student engagement, foster problem-solving

abilities, and better prepare students for future careers in STEM fields (Plaza et al., 2018; Karaahmetoğlu & Korkmaz, 2019; Güven, et al., 2022).

Arduino kits, open-source electronics platforms (Darnita, Discrise, & Toyib, 2021; Kondaveeti et al., 2021), enable students to create interactive projects that blend hardware and software, bridging the gap between theoretical knowledge and practical application. Robotics, an interdisciplinary branch of STEM, involves designing, constructing, and operating robots, often utilizing Arduino as a key component. Programming acts as the glue that binds these elements, allowing students to control and automate their projects, thereby fostering computational thinking and problem-solving skills (Edward, 2023).

In Malaysia, this synergy is particularly relevant due to the country's growing emphasis on preparing students for the Fourth Industrial Revolution (4IR) (EPU, 2021). Integrating Arduino kits and robotics into STEM education enables students to engage in hands-on learning, develop critical thinking skills, and gain practical experience in technology-driven fields. These tools can enhance student engagement, foster problem-solving abilities, and better prepare students for future careers in STEM fields (Plaza et al., 2018; Karaahmetoğlu & Korkmaz, 2019; Güven, et al., 2022). Research shows that these experiential learning tools improve engagement and retention of STEM concepts among secondary school students (Arpaci, Kaya, & Bahari, 2023; Selcuk, Kucuk, & Sisman, 2024).

Relevant Theories in STEM Education: The integration of Arduino kits, robotics, and programming in STEM education is supported by several educational theories, including Constructivist Theory, Experiential Learning Theory, Constructionism, and Social Learning Theory. Constructivist theory, championed by Piaget and Vygotsky, emphasizes that learners construct knowledge through experiences and interactions with the world. This theory is applied in STEM education through hands-on activities, such as Arduino projects and robotics, where students actively engage in problem-solving and experimentation. Research by Martínez and Stager (2019) highlights how constructivist principles are utilized in maker education, where tools like Arduino kits facilitate learning through creating, designing, and making.

Experiential Learning Theory, developed by David Kolb, posits that learning is a process where knowledge is created through the transformation of experience. This theory supports the use of Arduino kits and robotics in STEM education, as these tools offer students opportunities to learn through direct experience and reflection. Few studies have demonstrated that students engaged in robotics projects exhibited improved problem-solving skills and a deeper understanding of STEM concepts, aligning with Kolb's model of learning by doing (Papas et al., 2020; Long, Yen, & Hanh, 2020; Zainal et al., 2018).

Constructionism, introduced by Seymour Papert, is closely related to constructivism but emphasizes the creation of tangible artifacts as a way of learning. This theory is particularly relevant to STEM education involving Arduino kits and robotics, as students not only engage in learning but also produce functional projects, solidifying their understanding. A study by Blikstein (2018) explored the effectiveness of constructionist approaches in education and found that students who engaged in Arduino-based projects showed enhanced creativity and critical thinking skills.

Bandura's Social Learning Theory suggests that people learn from one another through observation, imitation, and modelling (Nabavi, 2012). In the context of STEM education, robotics and programming activities can foster collaborative learning environments where students learn from peers and mentors. Research by Barker and Ansorge (2017) showed that when students worked together on robotics projects, they developed not only technical skills but also social and communication skills, highlighting the value of collaborative learning in STEM education.

PolyDuino Arduino Kits: In addition to these established theories, the introduction of PolyDuino Arduino Kits represents a significant advancement in educational technology. PolyDuino Arduino Kits are designed to be more accessible and user-friendly, making them ideal tools for secondary school students. They offer enhanced features such as modular components and simplified programming interfaces, which lower the barrier to entry for beginners while still providing advanced functionalities for more experienced users. This development aligns with Malaysia's educational goals by making STEM education more inclusive and effective.

Despite the recognized benefits of integrating Arduino kits, robotics, and programming into STEM education, there is a noticeable gap in research specifically focusing on their impact within the Malaysian secondary school context. While international studies have demonstrated improved engagement, retention, and understanding of STEM concepts through these tools, there is limited empirical evidence on how these technologies influence Malaysian students' learning outcomes. Moreover, the effectiveness of newer innovations like PolyDuino kits has not been thoroughly explored.

To address these gaps, future research should focus on comprehensive studies within Malaysian schools to evaluate the specific impacts of these tools on student engagement and achievement. Additionally, research should explore how CSR initiatives can further support the implementation of such technologies, particularly in underserved regions. By filling these gaps, educators and policymakers can better understand how to leverage these synergies to enhance STEM education in Malaysia, ultimately preparing students for the challenges and opportunities of the 4IR.

3. Methodology

This study adopts a quasi-experimental research design to comprehensively evaluate the effectiveness of the PolyDuino Arduino Kit in enhancing STEM education among secondary school students. The research targets Form 2 and Form 3 students from four selected secondary schools in the districts of Kuala Muda and Yan, Kedah. The study includes approximately 120 students and 10 trainers and facilitators. These trainers and facilitators are lecturers from Politeknik Tuanku Sultanah Bahiyah Kulim, Kedah.

The CSR program was carried out over two months, from July to August 2023. Data collection was primarily conducted through questionnaires administered to trainers and facilitators. The questionnaires were designed to capture various dimensions of the student's experiences with the PolyDuino Arduino Kit, including their engagement, perceived effectiveness of the kit, and programming skills.

The descriptive statistics applied to the collected data offered a comprehensive overview of student performance across these critical dimensions, guiding further instructional strategies and interventions.

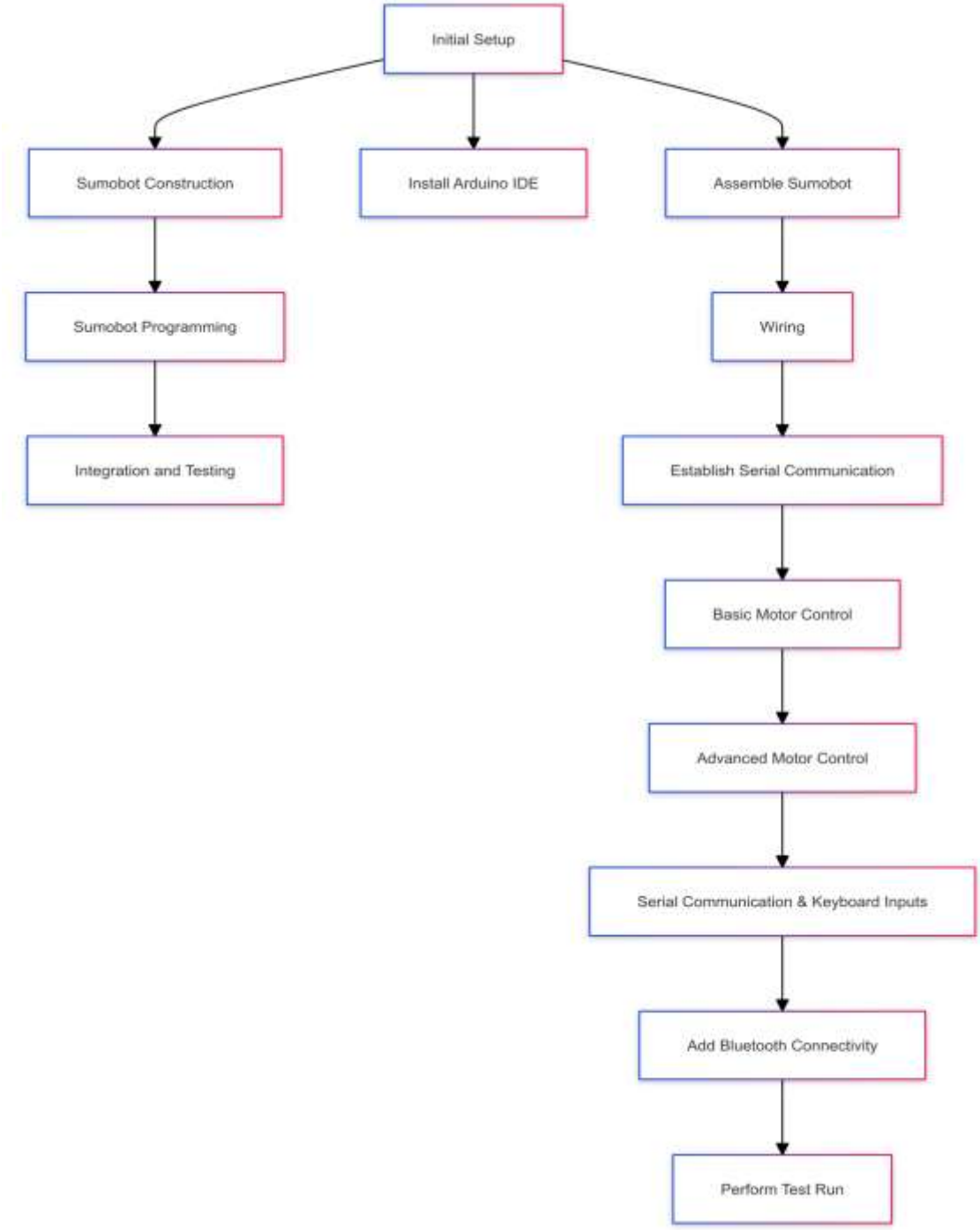
Module: The methodology for this community service program, which utilizes the PolyDuino Arduino Kit, involves a structured approach to introducing and guiding students through the construction and programming of an ESP32-based Sumobot. The module is designed to serve as a practical reference for students, enabling them to gain hands-on experience with robotics and programming within the context of 4IR-focused TVET training. Further details on the PolyDuino Arduino Kit can be seen in Jamiaan and Mohd Adam (2023).

The process begins with setting up the necessary tools, which involves installing the Arduino software and assembling the Sumobot. This assembly phase is broken down into several essential tasks: physically constructing the Sumobot, establishing wiring and connections, and using the Arduino Serial Function to display data on a computer through serial communication.

Once the Sumobot is built, the focus shifts to programming. Students start by learning motor control, which includes managing the direction and speed of the motors. They then advance to integrating motor control with keyboard inputs, allowing them to manipulate motor functions through serial communication.

The final phase combines programming with hardware and introduces Bluetooth connectivity. Students are tasked with integrating their code with the physical robot, ensuring that the programming effectively controls the hardware. This stage culminates in a test run where students assess the performance of their robot and make necessary adjustments to optimize its functionality.

Figure 1: Flow process constructing and programming the ESP32-based Sumobot using the PolyDuino Arduino Kit



Data Analysis: This study employed a primarily descriptive approach, focusing on qualitative observations gathered from a sample of 10 facilitators. These facilitators provided insights regarding student engagement during the Polyduino Arduino robotic project. Due to the small sample size (n=10), the use of inferential statistical tests was not deemed appropriate, as smaller datasets tend to exhibit higher variability, which can compromise the reliability of statistical results. As discussed by Field (2013) and Maxwell & Delaney (2004), such variability can increase the risk of drawing inaccurate conclusions from inferential analyses.

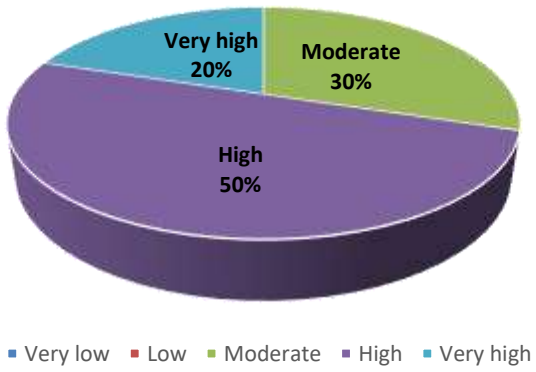
In alignment with previous research by Kim et al. (2017) and Aggarwal & Ranganathan (2019), descriptive studies are often utilized to capture real-world phenomena where qualitative understanding is prioritized over inferential statistical outcomes. Descriptive research, as highlighted by Bulbulia et al. (2019), allows for a deep exploration of specific contexts without overstating findings through inferential methods. For this study, descriptive analysis was chosen to sufficiently capture the nuances of the facilitators' observations regarding student engagement, thereby providing valuable insights into the learning environment without the need for inferential generalizations.

4. Results and Findings

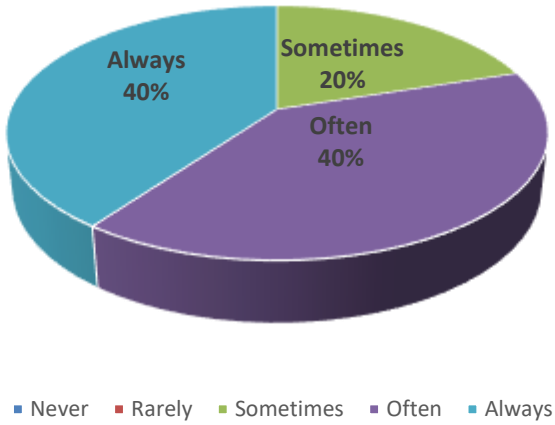
The assessment of student performance was categorized into three key evaluation levels: Engagement Level, Interest and Motivation, and Understanding and Application. Data were collected through observations noted by trainers and facilitators and analyzed using descriptive statistical methods derived from respondent survey forms.

Student Engagement of the PolyDuino Arduino projects: Figure 2 displays the observation from trainers and facilitators on student engagement toward PolyDuino Arduino projects. The engagement involved students' ability to maintain focus during the construction of robotic activities, students' ability to follow instructions without getting easily distracted, students' participation in discussions and problem-solving during the sessions, and student initiative in exploring additional features or functionalities in their PolyDuino Arduino projects.

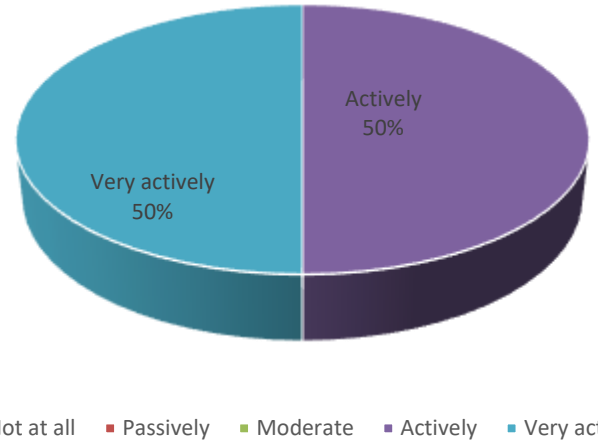
Figure 2: Observation of student engagement toward PolyDuino Arduino projects.



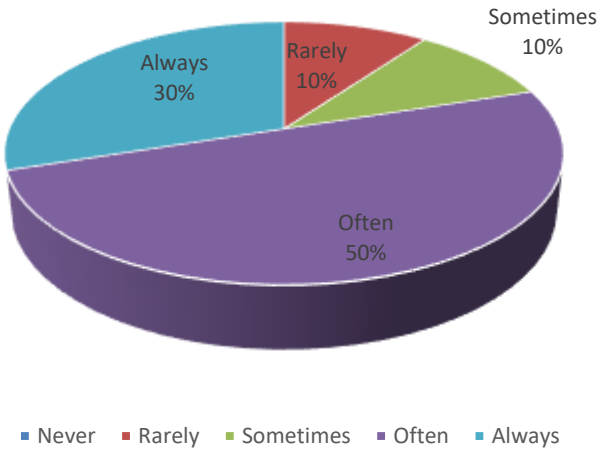
(a) students' ability to maintain focus during the construction activities



(b) Ability to follow instructions without getting distracted



(c) Actively participate in discussions and problem-solving session



(d) Initiative to explore additional features or functionalities

The data in **Figure 2(a)** reveals that a significant majority of students demonstrated a high level of focus during the Arduino construction activities. Specifically, 50% of the participants were rated as having a "High" focus, while 20% exhibited a "Very High" level of concentration. Conversely, 30% of the students were rated as having a "Moderate" focus level. This suggests that while most students were deeply engaged during the construction tasks, a small portion displayed only moderate engagement.

According to **Figure 2(b)**, the ability of students to follow instructions without getting distracted varied, with 40% of students frequently ("Often") adhering to the instructions without distraction, and another 40% consistently doing so ("Always"). However, 20% of the students were observed to "Sometimes" follow instructions effectively. These results highlight that while the majority of students were successful in following the guidance provided, a minority still faced challenges in maintaining focus on the instructions.

Figure 2(c) illustrates that half of the students participated actively in discussions and problem-solving sessions, with 50% categorized as "Very Actively" engaged. The remaining 50% were classified as "Actively" participating. This even distribution indicates that all students were engaged in these collaborative activities, though to varying degrees.

Further observation of the engagement criteria dives into the frequency of students taking the initiative in exploring additional features or functionalities in PolyDuino Arduino projects. The results are shown graphically in **Figure 2(d)**. Specifically, 50% of the students "Often" took the initiative, indicating a strong tendency among half of the participants to engage further with the project beyond the basic requirements. These results suggest that while the majority of students were highly proactive in exploring additional features, there remains a small group that could benefit from further encouragement and support to fully engage with the potential of the PolyDuino Arduino platform.

Students' Interest and Motivation for the Project: In this study, the data on student enthusiasm and persistence during project construction was analyzed to gauge their engagement and problem-solving skills. The results are displayed in **Table 1**. Observational data from trainers and facilitators reveal that all participants demonstrated notable enthusiasm: 50% frequently showed excitement, and the remaining 50% consistently displayed very high levels of excitement throughout the project.

Table 1: Levels of Student Enthusiasm in Project Completion

Did you notice any students expressing excitement or enthusiasm about completing their projects?	Never	Rarely	Occasionally	Often	Very often
Percentage (%)	0	0	0	50.0	50.0

The assessment of student persistence in overcoming challenges during project construction was obtained from observations by trainers and facilitators with the findings quantitatively summarized in **Table 2**. The data revealed that 40% of the students demonstrated moderate persistence, occasionally engaging with the problem-solving required. A majority, 50%, showed a very high level of persistence, frequently tackling project challenges effectively. Additionally, 10% of the students consistently displayed extreme persistence, underscoring their exceptional dedication to overcoming obstacles. The data indicate that a significant majority of students displayed a robust level of determination and commitment, crucial for the successful completion of projects and the development of practical skills in an academic setting.

Table 2: Levels of Student Persistence in Overcoming Project Construction Challenges

How persistent were the students in overcoming challenges or difficulties encountered during the construction?	Not persistent	Slightly persistent	Moderately persistent	Very persistent	Extremely persistent
Percentage (%)	0	0	40.0	50.0	10.0

From this CSR program, we intend to evaluate collaborative behaviors among students during project activities, with a specific emphasis on their propensity to seek assistance or collaborate when faced with challenges. The analysis displayed in **Table 3** reveals that the majority of students consistently collaborated with their peers or sought assistance (60%). Meanwhile, 40% of students frequently sought help or engaged in collaborative efforts during challenging tasks. The results demonstrate significant peer interaction and cooperation, with most students exhibiting strong collaborative skills. Such active engagement indicates that students are eager and proactive in seeking assistance, underscoring the effectiveness of the CSR program in creating a dynamic and supportive educational environment.

Table 3: Frequency of Student Collaboration with Peers During Challenges

Did students seek help or collaborate with **peers** when facing difficulties?	Never	Rarely	Sometimes	Often	Always
Percentage (%)	0	0	0	40.0	60.0

Table 4 assesses the frequency with which students sought assistance from trainers during challenging scenarios. The data reveal that all students engaged with trainers to overcome difficulties, with no instances of students neglecting to seek help. Specifically, 50% of the students often sought help, while the other 50% always sought assistance during challenges.

This shows that the students consistently relied on trainers' support and the other half frequently sought guidance, highlighting the critical role of trainer availability and responsiveness in educational settings. The absence of categories such as 'Never,' 'Rarely,' and 'Sometimes' may reflect a culture of proactive engagement within the learning environment, suggesting that students feel fully supported in seeking help as needed.

Table 4: Frequency of Students Seek Help from Trainers During Challenges

Did students seek help or collaborate with **trainers** when facing difficulties?	Never	Rarely	Sometimes	Often	Always
Percentage (%)	0	0	0	50.0	50.0

The evaluation of student interest in the PolyDuino Arduino construction process, process revealed pronounced enthusiasm. According to trainers and facilitators, which are detailed in **Table 5**, 80% of students displayed very high interest, while 20% showed extreme interest in the construction activities. This distribution underscores a robust engagement across the cohort, highlighting the success of the educational initiative in captivating student interest effectively.

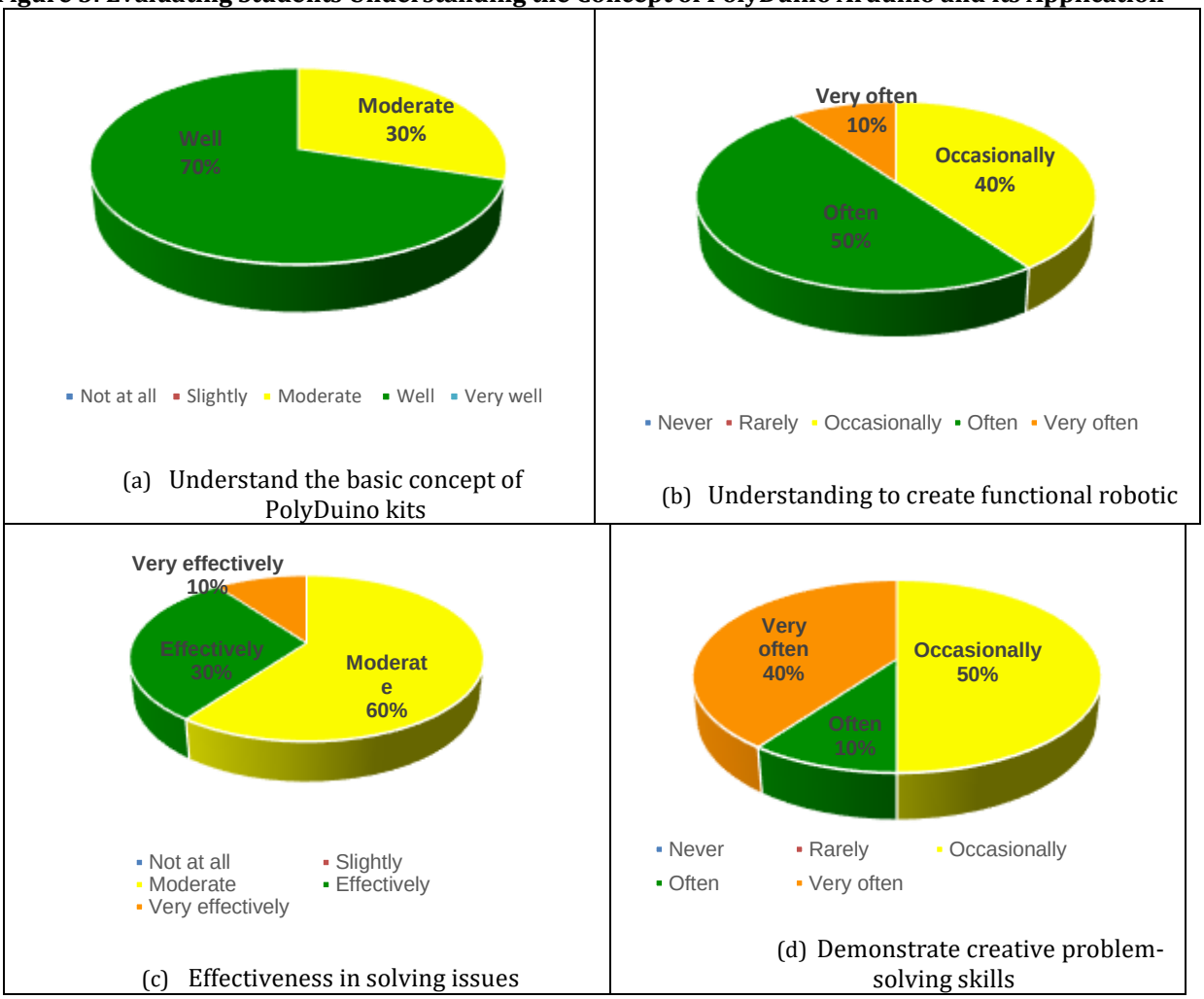
Table 5: Levels of Student Interest in PolyDuino Arduino Construction Process

How interested did the students appear in the overall PolyDuino Arduino construction process?	Not interested	Slightly interested	Moderately interested	Very interested	Extremely interested
Percentage (%)	0	0	0	80.0	20.0

Students Understanding of the Project

Results illustrated in **Figure 3** show descriptive statistics on understanding the concept of PolyDuino Arduino and its application among students.

Figure 3: Evaluating Students Understanding the Concept of PolyDuino Arduino and its Application



(a) Understand the basic concept of PolyDuino kits

(b) Understanding to create functional robotic

(c) Effectiveness in solving issues

(d) Demonstrate creative problem-solving skills

The evaluation of student's understanding of the basic concepts of PolyDuino Arduino reveals that the majority of the students have a strong grasp of the material. Based on the pie chart in **Figure 3(a)**, 70% of the students indicated that they understood the concepts well, while 30% reported a moderate understanding. This suggests that the instructional approach, which likely involved a combination of hands-on learning and theoretical instruction, was effective for the majority of the students. However, students who only achieved a moderate understanding highlight the need for differentiated instruction. These students might benefit from additional resources, such as more practical exercises, peer-assisted learning, or supplemental tutorials, to reinforce their comprehension.

The evaluation of student's ability to apply their understanding to create functional robotic projects indicates a diverse level of engagement and success. **Figure 3(b)** illustrated in the attached pie chart indicates that 50% of the students were able to apply their knowledge often to create functional robotic projects, while 40% did so occasionally. Additionally, 10% of the students reported that they were very often able to create functional projects. The results demonstrate that the majority of students were able to effectively apply their theoretical knowledge to practical, hands-on robotic projects.

The assessment of how effectively students were able to troubleshoot and solve issues during their projects indicates varying levels of success as displayed in **Figure 3(c)**. According to the pie chart, 60% of the students reported that they were able to troubleshoot and solve issues moderately effectively. Meanwhile, 30% of the students indicated that they could troubleshoot effectively, and 10% noted that they were very effective in

resolving problems. These results may indicate that students reporting with moderate effectiveness are somewhat capable of handling problems as they arise. The students who reported effective troubleshooting skills likely benefited from a strong understanding of the project materials, which enabled them to address issues more efficiently.

The assessment of students' demonstration of creative problem-solving skills during their projects reveals varying degrees of frequency in applying these skills are shown in **Figure 3(d)**. From the pie chart, 50% of students occasionally demonstrated creative problem-solving abilities, while 40% did so very often. A smaller percentage, 10%, often applied creative problem-solving techniques. This distribution suggests that while a majority of students did engage in creative problem-solving, the frequency of its application varied significantly among them.

The finding may indicate students engaged in creative problem-solving at least occasionally or more frequently suggesting that the projects provided adequate opportunities for students to think critically and innovate. Students who very often utilized creative problem-solving likely benefitted from either a stronger background in project-based learning or from an environment that encouraged experimentation.

5. Conclusion and Recommendations

This study examined the effectiveness of the Polyduino Arduino Kit in enhancing stem education among secondary school students. The results revealed that most students demonstrated a strong understanding of the concepts, with 70% of students showing a high level of comprehension. Additionally, the study highlighted students' ability to apply theoretical knowledge in practical settings, with 50% frequently creating functional robotic projects. The analysis also indicated that while most students were capable of troubleshooting and solving issues, there was variability in their effectiveness, suggesting room for improvement in problem-solving skills.

The findings contribute to the growing body of research on the integration of hands-on learning tools in stem education. The successful application of theoretical knowledge to practical tasks reinforces the constructivist theory, which posits that learners construct knowledge through experience. Moreover, the study supports the notion that problem-based and project-based learning can effectively enhance students' engagement and understanding in STEM fields.

From a practical perspective, the study demonstrates the value of incorporating tools like the Polyduino Arduino Kit in secondary education. These tools not only enhance student engagement but also improve their practical skills, which are crucial for success in STEM careers. Educators are encouraged to adopt similar hands-on learning approaches to bridge the gap between theoretical concepts and real-world applications. While the study provides valuable insights, it is not without limitations. The research was conducted in a limited number of schools within a specific region, which may affect the generalizability of the findings. Additionally, the reliance on self-reported data from students could introduce bias, as students might overestimate or underestimate their understanding and abilities. The study also focused primarily on short-term outcomes, leaving long-term impacts unexplored.

Future research should aim to expand the scope of the study by including a more diverse sample of schools from different regions. Longitudinal studies could also be conducted to assess the long-term effects of using tools like the PolyDuino Arduino Kit on students' academic performance and career choices. Additionally, exploring the impact of differentiated instruction and additional support for students with moderate understanding could provide further insights into improving STEM education outcomes.

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Pathways to Sustainability: Empowering Indigenous Communities through Recycling Education

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Abstract: Recycling is a critical component of sustainable waste management, helping to conserve resources, reduce pollution, and mitigate climate change. Despite its importance, awareness, and participation in recycling activities remain low, particularly among indigenous populations who often have limited exposure to modern environmental practices. This study investigates the impact of a recycling awareness program conducted within an indigenous community in Cameron Highlands, Pahang, Malaysia. The program included a pre-program survey to assess participants' awareness, understanding, and participation in recycling activities, followed by an educational session on general recycling practices and e-waste management. A post-program survey was conducted to measure the effectiveness of the program. Using paired sample t-tests reveals significant improvements in participants' knowledge and attitudes toward recycling. The findings provide compelling evidence that targeted educational programs can significantly enhance recycling awareness and participation within Indigenous communities, contributing to broader environmental sustainability goals. The study underscores the need for implementing similar programs in other less exposed communities and continuous engagement and collaboration with local authorities to sustain and expand recycling initiatives.

Keywords: *Indigenous community, recycling awareness, e-waste management, environmental education, sustainability*

1. Introduction

Recycling plays a pivotal role in sustainable waste management, offering substantial environmental, social, and economic benefits. It not only conserves natural resources but also mitigates pollution and reduces greenhouse gas emissions, contributing significantly to environmental protection and climate change mitigation (Liu, 2009). As global environmental issues such as climate change become more pressing, increasing recycling participation across all communities has become paramount. However, the adoption of recycling practices remains uneven across various regions, particularly among marginalized communities (Sanchez, 2023).

Urban areas benefit from well-developed recycling infrastructure and awareness programs, which promote higher rates of participation. In contrast, rural and indigenous communities often lack access to recycling facilities and educational resources, resulting in significantly lower recycling participation (Elmosaad et al., 2023; Mulindwa, 2024). This disparity is concerning, as these underserved communities represent a key segment of the population that can contribute to a circular economy, where waste is minimized, and materials are reused and recycled effectively. Bridging this gap is essential to achieving broader environmental sustainability goals.

Indigenous communities, in particular, face unique challenges. Many indigenous populations rely on traditional ecological knowledge that has sustained them for generations, emphasizing conservation and sustainable resource use (Senekane et al., 2022; Madonsela, 2024). However, the rapid pace of modernization and environmental degradation necessitates the integration of these traditional practices with modern sustainability efforts to address complex waste management challenges. The intersection of indigenous wisdom and modern environmental practices presents an opportunity to develop culturally sensitive and effective solutions to enhance recycling behaviors in these communities.

Given the critical role that rural and indigenous communities play in global sustainability efforts, it is imperative to design recycling programs that address their specific needs and contexts. Hence, this study aims to evaluate the impact of a recycling awareness program on an indigenous community in Malaysia. By focusing on this community, the research provides valuable insights into how tailored environmental education programs can foster sustainable practices in populations that have traditionally been less exposed to modern recycling initiatives. The findings from this study will contribute to the broader body of knowledge on community-based environmental interventions and offer practical recommendations for increasing recycling participation among marginalized groups.

2. Literature Review

Recycling is a sustainable effort that significantly aids in reducing human impacts on the environment and plays a critical role in waste management (Wan et al., 2017). Recycling activities promote environmental sustainability as they contribute to resource conservation, waste reduction, and minimizing environmental impacts across various sectors. By turning waste materials into reusable resources, recycling reduces the need for raw material extraction, decreases energy consumption, and lowers greenhouse gas emissions, thereby mitigating climate change.

Communities are at the heart of successful recycling initiatives, and their active involvement can drive significant improvements in recycling rates, waste segregation, and environmental stewardship. Zhuo et al. (2023) emphasize that community engagement is essential for effective waste management and fostering a culture of environmental responsibility. Moreover, community engagement is essential in managing household waste effectively and fostering organized waste disposal practices (Brotosusilo & Nabila, 2020). Hence, engaging communities in recycling activities empowers individuals to make environmentally conscious decisions, creating a ripple effect that can lead to broader societal changes.

The social dimension of recycling is particularly noteworthy. Lounsbury et al. (2003) demonstrate how recycling can unify communities, strengthening social bonds and collective action. This social aspect is further reinforced by Tong et al. (2018), who found that social norms play a significant role in initiating recycling behaviors. These findings align with Schwartz's altruism model, as discussed by Hopper and Nielsen (1991), which posits that recycling behavior is shaped by social and personal norms, as well as an awareness of environmental consequences. Studies by Kawai & Tasaki (2015) and Vicente & Reis (2008) further underscore the importance of community participation, noting that successful recycling initiatives depend on active and sustained citizen involvement.

Educational interventions have also been shown to be powerful drivers of recycling behavior. Sun et al. (2018) highlight that increased recycling knowledge is positively associated with recycling practices. Therefore, integrating recycling education programs, community engagement initiatives, and effective communication strategies is essential for fostering a recycling culture and promoting environmental sustainability (Lee & Krieger, 2020).

However, despite the critical role of recycling, research on these practices within indigenous communities remains limited. Indigenous communities often face unique challenges in adopting recycling practices, including limited awareness, infrastructure, and access to recycling facilities and educational programs, particularly in remote areas. These barriers highlight a significant gap in the literature and underscore the need for tailored approaches to recycling in Indigenous contexts.

This study seeks to address this gap by implementing a tailored recycling awareness program within an indigenous community in Cameron Highlands, Pahang, Malaysia. By assessing the impact of this program, the study aims to contribute to the limited body of knowledge on recycling practices in Indigenous communities and provide actionable recommendations for future initiatives.

3. Methodology

This study employed a quantitative methodology to evaluate the impact of a recycling awareness program on an Indigenous community. The focus was on assessing changes in participants' recycling knowledge, attitudes, and behaviors through structured surveys and statistical analysis. It included informational sessions, practical activities, and interactive discussions aimed at enhancing participants' understanding of recycling, its benefits, and its practical application in their daily lives.

The study involved 30 participants from the indigenous community in Cameron Highlands, Pahang, Malaysia, Data were collected using pre- and post-program surveys that assessed participants' knowledge, attitudes, and behaviors related to recycling. These surveys utilized a 5-point Likert scale, allowing participants to express their level of agreement or disagreement with statements regarding their awareness of recycling campaigns, understanding of recycling benefits, knowledge of recyclable materials, and practices related to recycling.

Following the pre-survey, a knowledge transfer session was conducted. This session covered the importance of recycling, recyclable materials, and e-waste management practices aimed to enhance participants' knowledge and encourage active participation in recycling. Besides the talk on recycling and waste management, various interactive methods, such as the distribution of infographic flyers, question, and answer (Q&A) sessions, and quizzes were employed to ensure active participation and retention of information.

After the knowledge transfer session, a follow-up survey was administered to evaluate changes in participants' knowledge, attitudes, and intentions regarding recycling. The post-survey included questions similar to those in the pre-survey, also using the 5-point Likert scale, to facilitate direct comparison and measure the program's effectiveness.

Quantitative data analysis was conducted using descriptive statistics to summarize participants' responses before and after the program. Inferential statistics, specifically, paired sample t-test was employed to determine statistically significant differences between the pre-and post-program survey results.

The null hypothesis of the paired sample t-test indicates that there is no significant difference in participants' recycling knowledge, attitudes, and behaviors before and after the program. In other words, the mean scores of the pre-program and post-program surveys are equal. This analysis provided insights into the effectiveness of the program in improving participants' recycling-related knowledge and behaviors. This study adhered to ethical standards, ensuring informed consent from all participants and maintaining their privacy.

4. Findings and Discussion

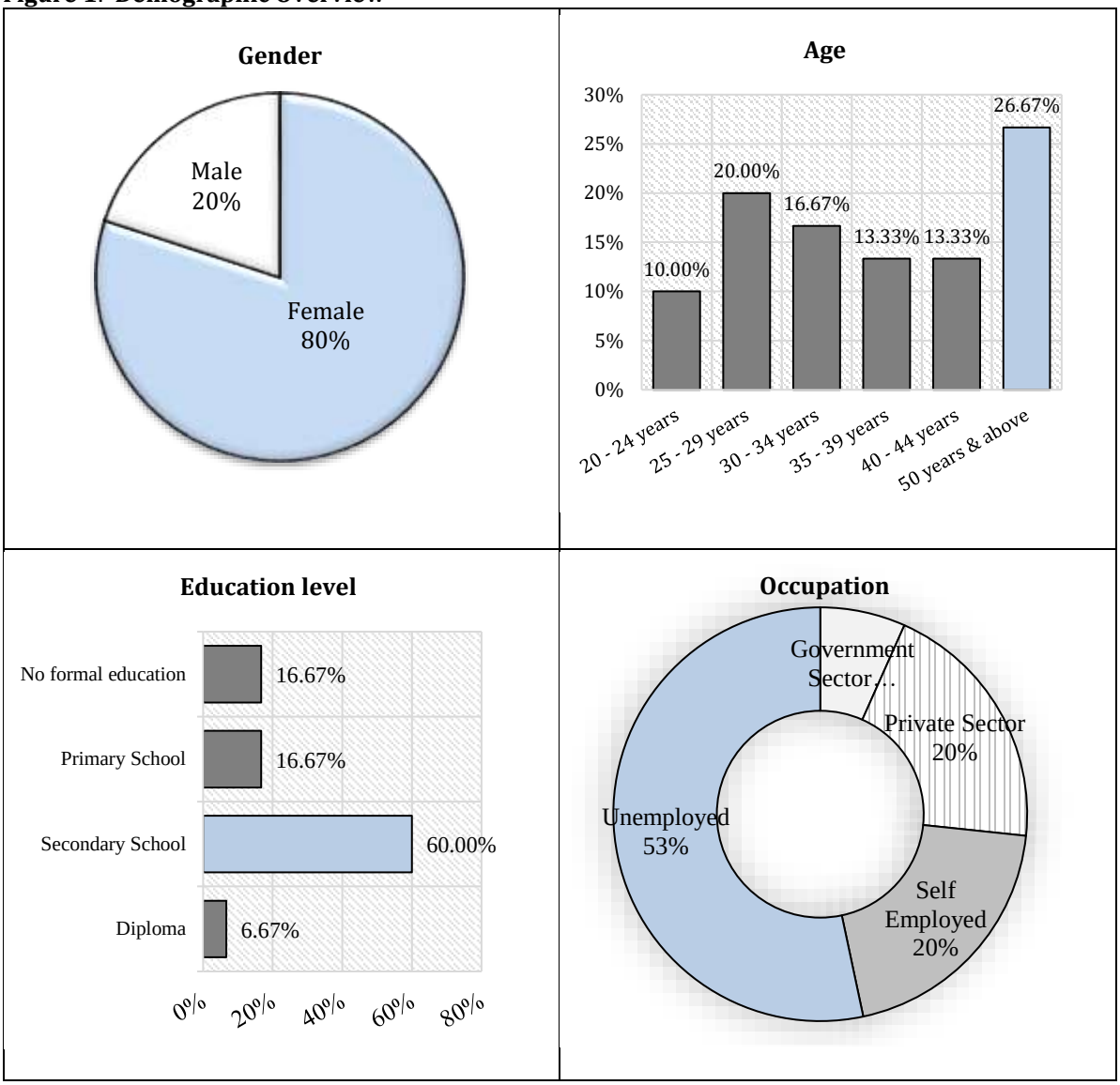
This section presents and discusses the results of the study, beginning with an overview of the participant's demographic characteristics and their initial recycling behaviors. Understanding these factors is crucial for evaluating the effectiveness of the recycling awareness program and its impact on different population segments. The subsequent analysis explores the feedback received from participants regarding the program and assesses the program's overall success in enhancing recycling knowledge and practices within the community.

Demographic Overview

This section presents an overview of the demographic characteristics of the participants involved in the recycling awareness program, alongside their reported recycling behaviors. Understanding the demographic profile of the participants is crucial in contextualizing the findings of the study and in evaluating the program's reach and effectiveness across different population segments.

As reported in Figure 1, the majority of participants were female, comprising 80 percent of the total sample, while males represented 20 percent. The age distribution of the participants was diverse, with the largest group being those aged 50 years and above, accounting for 26.67 percent. Participants in the 25-29 year age group made up 20 percent, followed by those aged 30-34 years at 16.67 percent, 35-39 years at 13.33 percent, and 40-44 years at 13.33 percent. The youngest group, aged 20-24 years, constituted 10 percent of the participants.

Figure 1: **Demographic Overview**



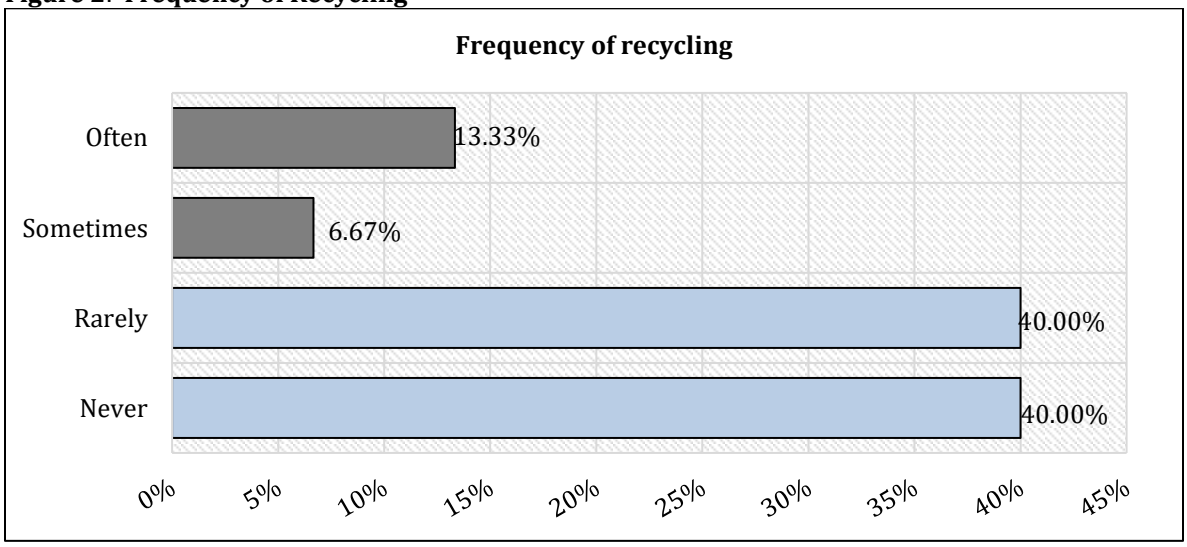
In terms of education, 60 percent of the participants had completed secondary school, making it the most common level of education within the group. This was followed by participants with primary school education and those with no formal education, both representing 16.67 percent each. Only 6.67 percent of the participants had attained a diploma. In terms of occupation, over half of the participants (53.33 %) were unemployed, while 20 percent each were employed in the private sector and self-employed. A smaller proportion, 6.67 percent, worked in the government sector.

Given the diverse demographic background of the participants, the varying levels of education, age, and employment status suggest that participants may have different levels of awareness, motivation, and opportunities to engage in recycling. For instance, those with higher education might have more exposure to environmental information, while older participants or those without formal education might rely on traditional practices. Similarly, employment status could influence the time and resources available for recycling, as well as the perceived importance of such activities.

Looking further at the recycling behavior, the data on recycling frequency, as presented in Figure 2, provides insight into the participants' engagement with recycling behavior before the program. The data reveals that a

significant proportion of the respondents rarely or never engage in recycling activities, with both categories comprising 40% of the total responses. This indicates that 80% of the participants have minimal to no involvement in recycling efforts.

Figure 2: **Frequency of Recycling**



On the other hand, a smaller segment of the population recycles more frequently; 13.33% of participants reported recycling often, while 6.67% indicated that they sometimes participate in recycling activities. This data provides a foundational understanding of the participants' baseline characteristics and their initial engagement with recycling, which is essential for interpreting the subsequent analysis of program outcomes.

Program Evaluation

The evaluation of the recycling awareness program, as reflected in Table 1, indicates a high level of participant satisfaction across multiple key indicators. The program's objectives were rated with a mean value of 4.6, suggesting that the goals of the program were clearly defined and well-aligned with the expectations of the participants. The content of the program received a slightly higher mean value of 4.7, which highlights the relevance and quality of the information provided to the community.

Table 1: Program evaluation

Indicator	Mean value
Objectives of the program	4.6
Content	4.7
Speaker	4.9
Activities conducted	4.7
Overall evaluation	4.8

Besides that, the speaker's effectiveness was particularly notable, achieving the highest mean value of 4.9, implying that the delivery of the material was both engaging and informative, significantly contributing to the overall success of the program. Additionally, the activities conducted during the program were rated at 4.7, indicating that these practical components were well-received and likely enhanced the participants' learning experience.

The overall evaluation of the program, with a mean value of 4.8, underscores the program's success in fulfilling its objectives and delivering a valuable educational experience to the Indigenous community. These results suggest that the program was not only effective in raising awareness about recycling but also well-executed in terms of content delivery and participant engagement.

Effectiveness of the Recycling Awareness Program

To further elucidate the impact of the recycling awareness program, a detailed analysis of participants' knowledge and understanding both before and after the program is conducted. This involves examining the mean values of participants' responses to pre- and post-program assessments to quantify the extent of knowledge enhancement. Additionally, a paired sample t-test was conducted to whether the changes observed in participants' knowledge and understanding of recycling are both meaningful, thereby offering insights into the program's impact on participants' understanding and attitudes toward recycling.

Table 2 presents the mean values for participants' knowledge levels before and after the program, alongside the results of a paired sample t-test. The findings demonstrate a significant positive impact of the recycling awareness program on the Indigenous community's knowledge, attitudes, and behaviors related to recycling. The paired sample t-test results reveal substantial improvements across all measured indicators from the pre-survey to the post-survey, with highly significant p-values ($p = 0.000$) for each indicator.

In particular, awareness of recycling campaigns increased notably, with the mean value rising from 2.4 before the program to 4.5 after, as evidenced by a t-statistic of -9.479. Similarly, participants' understanding of the benefits and importance of recycling showed a substantial increase, with the mean value moving from 2.4 to 4.6, supported by a t-statistic of -9.289. Knowledge of recyclable materials also saw a significant boost, with the mean value increasing from 2.2 to 4.3, and a t-statistic of -11.217, emphasizing the program's effectiveness in enhancing participants' knowledge in this area.

One of the most significant improvements was observed in participants' knowledge of e-waste recycling, where the mean value rose from 1.3 to 3.8, as reflected by a t-statistic of -13.403. This result highlights the program's success in raising awareness about e-waste management. The ability of participants to share recycling information also improved markedly, with the mean value increasing from 1.6 to 4.0, supported by a t-statistic of -12.815, indicating a significant enhancement in their confidence and ability to communicate recycling practices to others.

Table 2: Comparison of Mean Values and Paired Sample t-test

Indicator	Mean value (Pre)	Mean value (Post)	t-statistic	p-value
Awareness of recycling campaigns	2.4	4.5	-9.479	0.000
Understanding of recycling benefits & importance	2.4	4.6	-9.289	0.000
Knowledge of recyclable materials	2.2	4.3	-11.217	0.000
Knowledge of e-waste recycling	1.3	3.8	-13.403	0.000
Ability to share recycling information	1.6	4	-12.815	0.000
Willingness to segregate waste	1.6	4.1	-12.970	0.000
Awareness of income opportunities through recycling	1.3	4	-15.059	0.000
Interest in recycling activities	3	4.8	-8.762	0.000

Furthermore, the willingness to segregate waste saw a substantial positive shift, with the mean value increasing from 1.6 to 4.1, and a t-statistic of -12.970. This change reflects the participants' greater intention to engage in proper waste segregation practices following the program. Additionally, awareness of potential income opportunities through recycling showed the largest increase, with the mean value rising from 1.3 to 4.0, supported by a t-statistic of -15.059. This result demonstrates the program's success in highlighting the economic benefits of recycling to the community.

Lastly, participants' interest in recycling activities increased from a mean value of 3.0 to 4.8, with a t-statistic of -8.762, reflecting the program's effectiveness in fostering genuine interest in recycling within the community. Overall, these statistical results indicate that the recycling awareness program was highly effective in improving the participants' knowledge, attitudes, and behaviors related to recycling, with significant positive

changes observed across all indicators. Hence, it can be concluded that the program conducted has successfully motivated participants to adopt and promote recycling behaviors, demonstrating the effectiveness of culturally tailored environmental education initiatives.

5. Conclusion

The recycling awareness program demonstrated a significant positive impact on the Indigenous community's knowledge, attitudes, and behaviors related to recycling. The findings reveal that the program was successful in enhancing awareness and understanding across a range of indicators, including awareness of recycling campaigns, understanding the benefits of recycling, knowledge of recyclable materials, and the importance of e-waste recycling.

The significant increases in mean values before and after the program, as shown by the paired sample t-test results, underscore the effectiveness of the program in fostering meaningful behavioral changes. Notably, the most substantial improvements were seen in participants' knowledge of e-waste recycling and their awareness of income opportunities through recycling, indicating that these areas were particularly resonant with the community's needs.

The effectiveness of the program underscores the importance of culturally relevant environmental education in promoting sustainable practices among less exposed communities. Therefore, future initiatives should consider continuous engagement and collaboration with local authorities, as well as tailored approaches to maintain and build on these positive outcomes.

The study has several limitations that should be considered. The relatively small sample size restricts the generalizability of the findings. Additionally, the study primarily evaluates the short-term impact of the program, without assessing long-term behavior changes. Addressing these limitations in future research will enhance the robustness and applicability of the findings, offering more comprehensive insights into the effectiveness of recycling awareness programs.

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Exploring Halal Nyonya Food Consumption Intention Among Tourists

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Abstract: The topic of tourists' intention to consume Halal Nyonya food in Malaysia has garnered increasing attention in recent years. Nyonya cuisine, a unique blend of Malay and Chinese culinary traditions, has long been a hallmark of Melaka's vibrant food scene. However, as Malaysia grapples with the diverse dietary needs of its growing tourism sector, the challenge lies in ensuring that Nyonya food offerings cater to the preferences of Muslim tourists seeking Halal-certified options. The main goal of this research is to explore and comprehend the preferences of tourists regarding the intention to consume Halal Nyonya's ethnic food in Melaka. The study focuses on tourists' gastronomic choices, particularly as it relates to their intake of Halal Nyonya food. The study involves local and international tourists who have experienced Halal Nyonya food in Melaka in 2024. Data was collected through surveys, on-site observations, and interviews to understand factors affecting Halal Nyonya's food consumption intention behavior. This research examines the association between independent and dependent factors that influence tourists from various geographical locations who visit Melaka to consume Halal Nyonya Nyonya food. It adds to the database of information already in existence by illuminating how tourists in Melaka from various locations approach and engage with Halal Nyonya's food. This deepens our comprehension of the dynamics of tourist preferences, cultural preservation, and culinary tourism. In conclusion, our research confirmed attitude, subjective norms, and perceived control will lead a tourist to have the intention to consume Halal Nyonya food.

Keywords: *Baba Nyonya, Halal, Melaka, Ethnic food, Gastronomy*

1. Introduction

The cuisine of various ethnicities has increasingly become a key attraction for tourists when visiting specific destinations. It represents a unique gastronomic identity distinct from national cuisines, often reflecting the cultural practices and heritage of ethnic or tribal communities (Shi et al., 2022). For many migrants in multicultural societies, cooking and eating are not merely symbolic acts but concrete means of preserving ethnic identities (Reddy & Dam, 2020). The Peranakan, also known as Baba Nyonya, serves as a significant example of a minority mixed-race community that has cultivated a culturally unique identity through the intermarriage of Malay and Chinese cultures (Mohd Fikri et al., 2021). This community is primarily found in Melaka, Singapore, and Penang (Zanzaizman et al., 2023), where tourists can experience the distinctive flavors of Baba Nyonya ethnic cuisine (Mohd Fikri et al., 2021). Halal Nyonya cuisine, a variation of Nyonya food that complies with Islamic dietary laws, is meticulously prepared according to Islamic principles, using permissible (halal) ingredients while avoiding forbidden (haram) ones.

In Melaka's gastronomic landscape, there is concern about the declining demand and popularity of halal Nyonya cuisine among tourists, largely due to a lack of understanding about this distinct and culturally significant food (Kamaruzaman et al., 2022). Indigenous cooking techniques and the organoleptic qualities of traditional foods are invaluable aspects of culture that should be preserved as intangible heritage (Mora et al., 2020). Given the importance of traditional food in preserving cultural heritage, it is crucial to explore the factors contributing to this decline.

Baba Nyonya cuisine is an integral part of the community's cultural heritage, combining unique culinary methods and ingredients that reflect their hybrid identity. This cuisine includes Ayam Pongteh, Udang Masak Lemak Nenas, Ayam Buah Keluak, Nyonya Mee Siam, and Nyonya Cendol (Zanzaizman et al., 2023). However, like many indigenous cuisines, it faces the risk of losing its authenticity over time. Understanding how visitors engage with Baba Nyonya food is essential for preserving this vibrant cultural heritage, as food choices are influenced by various behavioral factors (Heidari et al., 2023).

The lack of global and local attention, coupled with diminishing awareness among tourists, raises concerns about the potential fading of this culinary heritage. Therefore, this study aims to investigate tourists' attitudes towards consuming halal Nyonya cuisine in Melaka, analyze how subjective norms influence their intentions, and examine how perceived behavioral control affects their decision to consume this food. The research is focused on exploring the historical significance of halal Nyonya cuisine to raise awareness, foster admiration, and deepen comprehension of this culinary tradition. This will facilitate the long-term conservation and advancement of this culinary tradition.

2. Literature Review

Tourist Intention to Consume Halal Nyonya Food

Tourists, in particular, are known to be picky, and their exploration or analysis of offerings, particularly Halal options, can considerably influence their acceptability and eventual resonance in their consuming behavior. This study seeks to illuminate the multifaceted factors that influence tourists' decisions regarding the consumption of Halal Nyonya cuisine (Elfrida et al., 2020). Tourists' intention to consume Halal Nyonya cuisine reflects a psychological state that encompasses their willingness and readiness to engage in this particular consumption behavior. The intention to consume Halal Nyonya food is a psychological construct that reflects an individual's mental state regarding their willingness to do or react to a particular consumption-related behavior (Fadzil & Sawari, 2021).

Meanwhile, attitudes toward consuming food refer to the feelings, beliefs, and evaluations that individuals have regarding the act of eating and the food choices they make. Individual attitudes toward consuming Halal Nyonya food can vary, such as personal preferences, cultural background, and dietary preferences. Attitudes play a crucial role in influencing consumer behavior and are considered an integral component of consumer behavior (Puhad et al., 2023).

People's attitudes towards consuming Halal Nyonya food are generally positive and enthusiastic. In terms of cultural appreciation, some individuals may have a positive attitude towards consuming Halal Nyonya food as a way to appreciate and experience the rich cultural heritage of the Nyonya food while adhering to Halal dietary restrictions. However, an attitude is the nature of human behavior to react not only positively but also negatively to food. The perception of Halal Nyonya food may be associated with a negative attitude, leading to a lack of positive reception among consumers. This unfavorable perception has consequently resulted in reduced consumption of Halal Nyonya cuisine (Rahmat et al., 2021).
H1: *There is a relationship between attitude and the intention to consume Halal Nyonya Food in Melaka*.

Subjective Norm Towards Consuming Halal Nyonya Food

Subjective norms are concepts in psychology that play an important role when determining the behavior and decisions made by an individual in a social context (Gross & Vostroknutov, 2022). In the context of consuming Halal Nyonya food, subjective norms refer to perceived social pressure or influence from other people who are important to themselves in making a decision. It is affected by the perceptions and beliefs of people in one's social circle, which represent the general expectations about acceptance and preference for Halal-certified Nyonya dishes (Maidah et al., 2021). The development of subjective norms surrounding the consumption of Halal food is influenced by social factors such as cultural traditions and communal norms that collectively contribute to the decision-making process regarding Halal food choices within Nyonya food.
H2: *There is a relationship between subjective norms and the intention to consume Halal Nyonya Food in Melaka.*

Perceived Control Towards Consuming Halal Nyonya Food

Perceived control is a basic psychological construct that has a great impact on consumer behavior. This cognitive element is the foundation upon which many studies on individual attitudes and behaviors of consumers have been conducted. Prior research has frequently employed perceived behavioral control as a precursor to diverse dietary and environmental behaviors (Yuriev et al., 2020). Perceived behavioral control is used to describe whether the behavior is complex and whether it is under their control (Lei et al., 2022). Perceived control is very relevant in Halal Nyonya food consumption and thus greatly impacts customers' very diverse decisions.

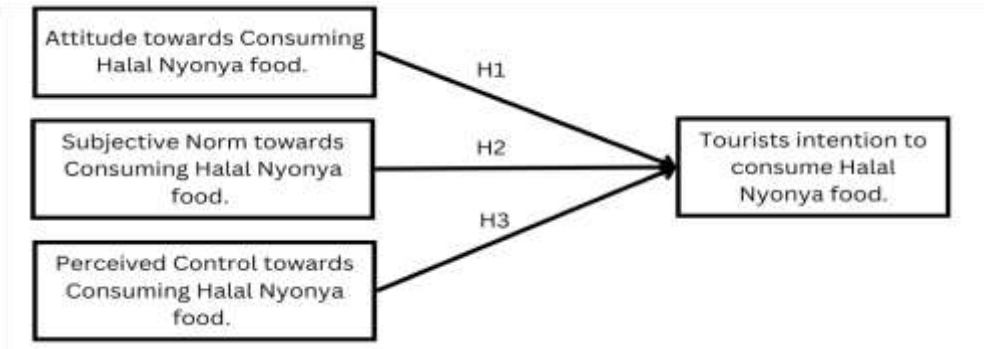
In the context of Halal Nyonya consumption, personal beliefs about capacity (PBC) refer to the idea that one has what it takes to go past the obstacles or hurdles involved in selecting and eating Halal Nyonya food. The PBC concept shares similarities with self-efficacy. Subsequent studies have highlighted the distinction between PBC and self-efficacy (Flores et al., 2023). It proved that perceived behavioral control improves intention about positive attitudes and subjective norms. However, the actual significance of PBC adapts according to the situation, and it could reduce the impact of attitudes on behavior.

H3: *There is a relationship between perceived behavioral control and the intention to consume Halal Nyonya Food in Melaka.*

Research Framework

A framework is a model that provides a logical sense to understand the relationships between the various aspects that have been determined to be significant to the problem. The plan, design, and organization that direct a research project make up a research framework. It facilitates the organization of ideas, the definition of important variables, and the establishment of connections between those variables for researchers.

Figure 1: Conceptual framework adapted from Ting et al., 2019.



Theoretical Underpinning

The theory of planned behavior (TPB) expands upon the theory of reasoned action (TRA) (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975) to address the original model's inadequacy in managing behaviors where individuals possess limited volitional control (Ajzen, 1991). The study uses the Theory of Planned Behavior (TPB) to investigate tourists' intentions to consume Halal Nyonya food when they visit Melaka. The Theory of Planned Behavior (TPB) is a widely recognized psychological framework that offers insight into and enables the prediction of human behavior. TPB provides a theoretical underpinning for assessing the impact of attitude, subjective norm, and perceived behavior (Gansser & Reich, 2023).

The main factors that influence intention to consume Halal Nyonya food include individual attitudes toward the behavior which this factor refers to an individual overall evaluation of a particular behavior. It would involve understanding individuals' attitudes towards consuming Halal Nyonya food, such as positive and negative feelings and beliefs associated with the behavior. Moreover, subjective norms are a component of TPB that could influence the tourists to consume Halal Nyonya food. Subjective norms involve perceptions of social pressure and influence. It considers the influence of other people's opinions, expectations, and the perceived social norms related to the behavior.

Moreover, perceived behavioral control is a factor that indicates an individual's assessment of their capability to execute the behavior. It considers factors such as resources, skills, and opportunities that might facilitate or hinder the execution of the behavior. In summary, the Theory of Planned Behavior suggests that individuals are more likely to engage in a specific behavior if they have a positive attitude toward it, perceive social approval, and believe they have the necessary control over the behavior.

3. Methodology

A quantitative research methodology was utilized to examine the data collected for this study. The study employed purposive sampling to identify individuals who have had exposure to the distinctive cuisine, with a total of 234 participants. The surveys were conducted at key tourist sites identified as the most suitable locations for this study (Hair et al., 2017; Pelletier et al., 2016). The sample size was determined using the G*Power method, which ensured the robustness of the findings by considering key statistical parameters such as effect size and power (Faul et al., 2007).

The questionnaire was carefully designed to capture relevant data, including attitudes, subjective norms, and perceived behavioral control, which are essential for understanding tourists' culinary preferences. Data analysis was conducted using SPSS (Version 29.0), focusing on descriptive statistics to summarize the central tendencies and variability within the dataset. The primary analyses encompassed a descriptive study to scrutinize the demographic profile, a reliability assessment to gauge the consistency of the measurement tools and a regression analysis to appraise the relationships between the independent and dependent variables.

4. Research Findings

The Cronbach's Alpha coefficient for all variables in this research surpasses 0.6. The score related to attitudes is affected by an independent variable with a value of 0.66. The values for subjective norms and perceived control are 0.67 and 0.75, respectively, while the intention to consume stands at 0.60. The Cronbach's alpha coefficients for every section are above the 0.6 benchmark, showcasing an acceptable reliability level. The outcomes displayed in the preceding table align with Raharjanti et al. (2022) work, supporting the reliability and validity of the measurement items used in this research. As per Sekaran and Bougie (2013), a Cronbach's alpha coefficient above 0.6 is considered sufficient for reliability.

Table 1: Reliability Analysis

Variable	No of Item	Cronbach's Alpha
Attitude	4	0.66
Subjective Norms	4	0.67
Perceived Control	4	0.75
Intention to Consume	3	0.60

Demographic Analysis

Table 2 contains the demographic details of those surveyed in this research. Out of the 234 individuals surveyed, there was a gender split of 32.9% male and 67.1% female participants. The age distribution was notably skewed towards the 18-26 age bracket, which made up 63.7% of the respondents, primarily consisting of undergraduate students. The next significant age category, 27-39 years, comprised 15.4% of the participants. The older age brackets of 40-55 and 56-69 years made up 16.2% and 1.3% of the sample, respectively, with those aged 70 and above accounting for 3.4%. A vast majority, 82.5%, of those surveyed were of Malaysian nationality, with 67.9% identifying as Malay in terms of ethnicity. Regarding occupation, nearly half of the surveyed population, 47.4%, were students. The income level of the majority was below RM1,500, representing 56.4% of the sample. When visiting Melaka, the preferred travel companions for the majority were friends, cited by 31.6% of respondents. Moreover, 44.4%, or 104 individuals, discovered Halal Nyonya food through social media platforms.

Table 2: Demographic Analysis

Category	Demographic	Frequency	Percentage
Gender	Male	77	32.9
	Female	157	67.1
Age	18 - 26	149	63.7
	27 - 39	36	15.4
	40 - 55	38	16.2
	56 - 69	3	1.3
	70 and above	8	3.4
Nationality	Malaysian	193	82.5
	Non-Malaysian	41	17.5
Ethnic	Malay	159	67.9
	Chinese	40	17.1
	Indian	22	9.3
	Others	13	5.6
Occupation	Employed	100	42.7
	Unemployed	19	8.1
	Student	111	47.4
	Others	4	1.7
Income	Below RM 1,500	132	56.4
	RM 1,500 - RM 3,500	42	17.9
	RM 3,600 - RM 5,500	43	18.4
	Above RM5,600	17	7.3
Travel Companion	Alone	38	16.2
	Partner	50	21.4
	Family	72	30.8
	Friends	74	31.6
How do you Know about Halal Nyonya Food?	Social Media	104	44.4
	Relatives	45	19.2
	Knowledge	51	21.8
	Advertisement	34	14.5

Correlation Analysis

The research framework analyzed the variables using Pearson's correlation coefficient to determine the linear relationship between two continuous variables. This was depicted through a correlation matrix, showcasing the coefficients and their significance levels for variables such as intention, attitude, subjective norm, and perceived control, drawing on data from 234 participants. Each matrix cell above the diagonal line reveals the relationship's strength and direction between variable pairs. A strong positive correlation was noted between intention and attitude ($r = 0.659$, $p < 0.000$), suggesting that an increase in attitude is likely to lead to an increase in intention. Similarly, a strong positive relationship was observed between intention and subjective norm ($r = 0.636$, $p < 0.000$), indicating that higher subjective norms correlate with increased intention. The relationship between intention and perceived control ($r = 0.663$, $p < 0.000$) was also solid and positive, implying that intention is likely to increase with perceived control. With p-values less than <0.000, these correlations are statistically significant, strongly advocating for rejecting the null hypothesis, which posits no correlation exists, affirming solid connections among the variables.

The findings highlight a positive correlation between increasing attitude, subjective norms, and perceived control. Moreover, these three factors are positively linked with the Intention variable. These outcomes offer critical insights into the interrelations between these essential variables, setting a foundation for future analysis and interpretation of the study's dataset.

Table 3: Correlations Analysis

		Intention	Attitude	Subjective Norm	Perceived Control
Intention	Pearson Correlation	1	0.659	0.636	0,663
	Sig. (2-tailed)		0.000	0.000	0.000
	N	234	234	234	234
Attitude	Pearson Correlation	0.659	1	0.653	0.617
	Sig. (2-tailed)	0.000		0.000	0.000
	N	234	234	234	234
Subjective Norm	Pearson Correlation	0.636	0.653	1	0.718
	Sig. (2-tailed)	0.000	0.000		0.000
	N	234	234	234	234
Subjective Norm	Pearson Correlation	0.663	0.617	0.718	1
	Sig. (2-tailed)	0.000	0.000	0.000	
	N	234	234	234	234

Regression Analysis

The multiple regression analysis focuses on how attitude, subjective norms, and perceived behavioral control influence the outcome variable, intention. A summary of the model sheds light on the dynamics between these factors. This summary evaluates how well the regression model predicts outcomes and its fit to the data. In this study, the variables of interest as predictors include attitude, subjective norms, and perceived control regarding the consumption of Halal Nyonya cuisine, to understand tourists' intentions towards consuming such food. By applying regression analysis, the investigation delves into how these three predictor variables such as attitude, subjective norms, and perceived control affect the outcome variable and intention. The analysis results, including the coefficients, are detailed in the preceding table. The coefficient of determination, R2, stands at 0.554, indicating that the predictors such as attitude, subjective norms, and perceived control related to consuming Halal Nyonya food explain approximately 55.4% of the variance in the outcome, satisfaction. This denotes a relatively strong correlation between the predictors and the outcome. The adjusted R2 value is 0.548, slightly lower than R2, offering a more cautious estimate of the model's explanatory power by accounting for the number of predictors used. This suggests that the regression model closely aligns with the observed data.

The significance of the model is underscored by an F-test score of 95.131 with a p-value of less than 0.001, pointing to a meaningful relationship among the studied variables. The unstandardized coefficients reveal a positive linkage between the independent and dependent variables. As depicted in Table 4, the analysis uncovers the impact of the independent variables on the dependent one. Specifically, attitude (B= 0.342, t= 5.642, p=0.000) was found to have a significant predictive relationship with intention. Similarly, the subjective norm (B= 0.183, t= 2.672, p=0.008) was also a significant predictor of intention. Lastly, perceived control (B= 0.320, t= 4.859, p=0.000) significantly predicted intention. In summary, the regression analysis underlines that all three factors significantly contribute to predicting intention.

Table 4: Regression Analysis

Independent Variables	Unstandardized Coefficients (B)	Standardized Coefficients (Beta)	t-stat	p-value
Constant	0.701	-	3.272	0.001
Attitude	0.369	0.342	5.642	0.000
Subjective Norm	0.176	0.066	2.672	0.008
Perceived Control	0.313	0.320	4.859	0.000

R	0.744
R^2	0.554
Adjusted R^2	0.548
F-test	95.131
Sig.	0.000

Dependent variable: Intention

Discussion

This study sheds light on the dynamics influencing tourists' desire to partake in Halal Nyonya cuisine in Melaka. A vital link was observed through correlation analysis among attitudes, social influences, and the control individuals feel over their actions. It was found that tourists are more inclined to try Halal Nyonya food as they develop positive perceptions, feel a more robust social push, and believe they have adequate control over making such decisions. This echoes the findings of Altekreeti and Daud (2020), noting that tourists' eagerness to try Halal Nyonya food grows with more favorable views, societal pressures, and a sense of empowerment over their choices. Moreover, the influence of societal expectations and the belief in having the means to obtain Halal Nyonya food also play a pivotal role in reinforcing this intention, a sentiment supported by Rodya (2023). Through regression analysis, it was confirmed that these variables are critical predictors of the willingness to consume Halal Nyonya cuisine, underscoring the importance of positive attitudes, societal norms, and perceived control over one's actions. According to Puhad et al. (2023), maintaining a positive outlook towards an activity significantly elevates the likelihood of participating, with the converse also holding. The concept of perceived control is also vital, denoting an individual's belief in their ability to execute an action. This belief, when vital, enhances the intent to act; however, perceived obstacles can weaken this resolve (Lei et al., 2022). Gaining a deeper understanding of the Baba and Nyonya culture contributes to the advancement of theoretical frameworks like the Theory of Planned Behavior (TPB). This also addresses a significant gap in the literature concerning the food preferences of Muslim tourists, while simultaneously supporting the preservation of the culinary heritage of the Baba Nyonya ethnic group. The study also underscores the economic and cultural significance of promoting Halal Nyonya food, which could help position Melaka as a distinctive culinary destination. These findings suggest important policy implications for the tourism industry, including the development of targeted marketing strategies, enhancing the culinary experience through food festivals or tours, and increasing the visibility of Halal Nyonya cuisine. Additionally, policymakers should support initiatives that promote cultural preservation and encourage local food operators to adopt Halal certification, which would attract more visitors, strengthen the local economy, and preserve the unique culinary traditions of the Baba Nyonya community.

5. Conclusion and Recommendations

In conclusion, the findings demonstrate a positive correlation between attitudes, subjective norms, and perceived control, with all three variables showing a positive relationship with intention. These results offer important insights into the interactions among these key factors, providing a foundation for further analysis and interpretation within the context of the study's dataset. This research contributes valuable knowledge regarding tourists' intentions to consume Halal Nyonya cuisine in Melaka. The limitations related to time constraints, sample size, diversity of respondents, and reliance on self-reported data should be considered when interpreting the findings. As researchers deepened their understanding of the dynamics of this culinary phenomenon, a critical gap emerged in understanding the important role played by individual attitudes towards Nyonya's halal food in influencing their actual consumption during a visit to Melaka.

Further research utilizing longer timeframes, larger and more diverse samples, and potentially integrating objective behavioral measures could mitigate these limitations and offer a more thorough understanding of the subject.

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Natural Language Processing (NLP) Application For Classifying and Managing Tacit Knowledge in Revolutionizing AI-Driven Library

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Abstract: The rapid evolution of technology has transformed library systems, with Natural Language Processing (NLP) emerging as a pivotal tool for enhancing knowledge management. This study aims to examine how NLP can improve the classification and management of tacit knowledge within AI-driven libraries, addressing the challenge of handling large volumes of unstructured data. The objective is to explore how NLP can optimize the retrieval, organization, and access to tacit knowledge, thus enhancing decision-making processes in libraries. The research adopts a conceptual design, synthesizing existing literature and theoretical models, including Information Processing Theory and Constructivist Theory, to propose a framework that integrates NLP with traditional knowledge management practices. Methodologies include a thorough review of recent advancements in NLP technologies and their applications within knowledge management systems. The study's findings demonstrate that NLP significantly improves the accuracy and efficiency of knowledge retrieval by automating the processing of natural language data. This allows better access to tacit knowledge, supporting more informed decision-making. The outcomes of the study are twofold: it enhances existing knowledge management frameworks theoretically, and it provides practical insights for libraries to leverage NLP for greater operational efficiency and improved user experience. The study also underscores the need for future research on the real-world application of NLP and its ethical implications, such as data privacy and algorithmic bias.

Keywords: *Industry Revolution 5.0 (IR5.0), Knowledge Management, Natural Language Processing (NLP), Tacit Knowledge, Technology Integration*

1. Introduction and Background

AI-Driven Library denotes a library system that incorporates Artificial Intelligence (AI) technologies to improve its operations, services, and user experiences. This concept encompasses the use of AI tools such as Natural Language Processing (NLP), machine learning, and data analytics to automate and optimize various aspects of library management, including the cataloging process, information retrieval, user engagement, and resource management. AI technologies in such libraries enable the automation of repetitive tasks like cataloging and classification, thereby improving the accuracy and efficiency of these processes. For instance, NLP can analyze and categorize large volumes of textual data, enhancing the accessibility and organization of information. Additionally, AI-driven libraries employ machine learning algorithms to personalize user experiences by recommending resources based on individual preferences and past behaviors, like how e-commerce platforms suggest products to users (Xu et al., 2024). Furthermore, AI-driven libraries enhance knowledge discovery by analyzing data patterns and uncovering relationships and insights that might not be apparent through manual analysis. This ability to process and interpret vast amounts of data not only improves information retrieval but also supports advanced research activities, making the library a more powerful resource for scholars and professionals (Semeler et al., 2019).

NLP is a crucial technique in the field of AI, specifically concerning the interaction between computers and human language. It empowers machines to understand, analyze, and generate human language, bridging the gap between unprocessed data and significant knowledge (Fanni et al., 2023). By automating processes like text classification, information retrieval, and sentiment analysis, NLP improves the efficiency and effectiveness of managing explicit and tacit knowledge (Jin & Zhou, 2022). In libraries and knowledge management, NLP enables the efficient organization and categorization of large amounts of unstructured data, significantly transforming traditional information management procedures (Sanchez-Segura et al., 2022). Through AI-

driven metadata generation and content tagging, digital libraries are systematically organized and enriched, thereby amplifying search accuracy. These innovations not only preserve the past but also illuminate a future where knowledge is universally accessible, fostering curiosity, learning, and exploration (Panda et al., 2023). Globally, the need to effectively manage and classify vast amounts of data is more critical than ever. AI-driven libraries, leveraging advanced NLP techniques, offer innovative solutions to address the challenges associated with managing tacit knowledge—information that is not easily documented or codified but is essential for decision-making and organizational success. The growing volume of unstructured data, coupled with the increasing complexity of knowledge environments, underscores the urgency for advanced technologies to enhance information retrieval, classification, and utilization (Tahri, 2023). Recent studies highlight that AI and NLP can significantly improve the efficiency and accuracy of knowledge management systems. For instance, advancements in NLP enable better extraction and understanding of context from textual data, which is crucial for classifying tacit knowledge and facilitating its transfer within organizations. Additionally, AI-driven libraries can leverage these technologies to revolutionize traditional information management practices, making knowledge more accessible and actionable.

Tacit knowledge refers to the unspoken, internalized knowledge that individuals accumulate through personal experiences, intuition, and skills. It is inherently difficult to formalize or document, presenting a significant challenge for libraries, especially in capturing and managing this knowledge effectively. Tacit knowledge, often considered intangible knowledge that is difficult to formalize or express, remains a critical yet underutilized resource in libraries. It encompasses the experiences, insights, and intuitions that individuals acquire over time but rarely document. Libraries worldwide are facing challenges in capturing and managing this form of knowledge, particularly due to the vast amount of unstructured data, which makes it difficult to classify and retrieve useful information. In Malaysia, libraries are undergoing a digital transformation to meet the needs of modern users. However, they struggle to harness tacit knowledge effectively due to the lack of sophisticated tools to process and classify unstructured data, such as user queries, expert discussions, and academic documents (Von Krogh et al., 2000).

However, despite these advancements, challenges remain in fully harnessing the potential of NLP for managing tacit knowledge, necessitating further research and development in this area. The integration of NLP in AI-driven libraries is significantly transforming how tacit knowledge is managed and classified. As of 2024, the global market for NLP technologies in knowledge management is expected to reach USD 20.3 billion, growing at a compound annual growth rate (CAGR) of 22.5% (Fortune Business Insight, 2024). This surge is driven by the increasing need for sophisticated systems to handle unstructured data and enhance information retrieval processes. Recent advancements show that NLP is crucial in revolutionizing libraries by improving the classification and management of tacit knowledge. For example, NLP technologies are now being used to analyze and extract insights from large volumes of unstructured text, such as academic papers and organizational documents, thereby facilitating better knowledge sharing and decision-making (Dash, 2022). Furthermore, Pauzi & Capiluppi (2023) highlight that NLP applications have been instrumental in reducing the time required for knowledge retrieval by up to 40%, demonstrating the technology's impact on enhancing library systems globally.

The integration of AI, specifically NLP, offers a promising solution to these challenges. NLP can analyze and convert unstructured data into structured, searchable formats, automating the classification process and improving information retrieval. In Malaysia, where libraries are key knowledge hubs, the application of NLP could significantly enhance how tacit knowledge is managed, facilitating better decision-making and knowledge sharing (IBM, 2024). As of 2024, the Malaysian government has recognized this potential, projecting that AI can improve data classification efficiency by 30% over the next five years, underscoring the transformative impact of these technologies (BERNAMA, 2024).

In the context of Malaysian libraries, the issue becomes more pronounced due to the growing need to digitize and modernize library services, making this tacit knowledge accessible to wider audiences. With libraries facing increased demand for more efficient knowledge management, the integration of Artificial Intelligence (AI) and Natural Language Processing (NLP) offers a solution to address the challenges of managing tacit knowledge. Malaysian libraries, like their global counterparts, are experiencing a transition toward digital transformation, but they struggle with classifying and making use of unstructured and tacit knowledge. NLP can play a key role by analyzing unstructured data such as user queries, research articles, and expert

conversations, and converting it into structured, searchable knowledge. NLP and AI systems could revolutionize Malaysian libraries by automating classification, enhancing search capabilities, and facilitating better decision-making. This study will focus on how these technologies can be leveraged to improve tacit knowledge management in the context of Malaysia's push toward digitization, thus positioning libraries as critical nodes in national knowledge management strategies. In Malaysia, the adoption of NLP in libraries and knowledge management systems is gaining momentum. As of 2024, the Malaysian government has increasingly recognized the potential of AI technologies, including NLP, to enhance knowledge management and information retrieval within libraries. According to the latest report by the Malaysian Digital Economy Corporation (MDEC), the integration of AI-driven solutions, including NLP, is projected to improve the efficiency of data classification and knowledge management in Malaysian organizations by 30% over the next five years (MDEC, 2023).

Natural Language Processing (NLP) in Malaysian libraries is emerging but shows significant potential for managing and classifying tacit knowledge, critical for innovation and decision-making across sectors. NLP tools automate document processing, extracting key information and summarizing content efficiently (IBM,2024). This capability enhances knowledge management systems by improving search accuracy and facilitating faster access to information (Manousaridis, 2024). NLP's ability to analyze and comprehend human language aids in categorizing and retrieving tacit knowledge, thereby supporting innovation initiatives and strategic decision-making processes (Kang et al., 2020). As Malaysian libraries integrate NLP, they can potentially foster a more dynamic and responsive information environment conducive to innovation and informed decision-making.

Despite the promising advancements in NLP for managing tacit knowledge, there remain significant research gaps that need addressing. Existing studies primarily focus on the technical capabilities of NLP and its applications in structured data environments, leaving a gap in understanding its effectiveness in real-world, dynamic library settings where tacit knowledge is prevalent. Additionally, there is limited research on the integration of NLP with traditional library systems and its impact on knowledge-sharing practices. To bridge these gaps, this paper aims to:

- Investigate the effectiveness of NLP in classifying and managing tacit knowledge within AI-driven libraries.
- Explore the challenges and limitations associated with the implementation of NLP technologies in different library environments.
- Assess the impact of NLP-driven systems on improving knowledge management practices and decision-making processes in libraries.

The significance of this study stems from its efforts to understand how enhanced Knowledge Management (KM) using AI, especially Natural Language Processing (NLP), can transform libraries. Many challenges are experienced especially in Malaysia when it comes to managing large volumes of unstructured and tacit knowledge, which is hard to organize and to find. The study fills this gap by examining the possibility of applying AI solutions for automating knowledge categorization and improving information search and use of the ingrained knowledge that is the backbone of decision-making and idea creation. This paper contributes to the body of literature on knowledge management where improving the processes in this case will help in the digital transformation of libraries thereby helping to fill the gap in the literature on the use of AI in library processes. The results thus have significant administrative relevance for increasing the efficiency of the library systems thus enabling informed decision-making driving innovations. In the case of Malaysia, it offers direction on how libraries can adapt to new service delivery models, increase user demands, and improve the sharing of organizational knowledge. In addition, the study has theoretical implications because there are gaps in the literature regarding the practical application of NLP for dealing with unstructured content in organizations, and the disciplines of both artificial intelligence and library science will benefit from the research.

This research study will focus on the following sections. The first section introduces the global context of NLP and its relevance to managing tacit knowledge in AI-driven libraries. The second section provides a comprehensive review of past studies and current statistics to establish the foundation for the research. The third section identifies the research gaps and outlines the objectives of the study. The fourth section presents the methodology employed in the research, including data collection and analysis techniques. The fifth section discusses the findings and their implications for knowledge management practices. Finally, the article

concludes with a summary of the key insights and recommendations for future research.

2. Literature Review

Natural Language Processing (NLP) harnesses AI to interpret and manipulate human language. It facilitates communication between humans and machines by enabling computers to understand, interpret, and generate human language. NLP utilizes statistical, machine learning, and deep learning models to extract meaning from text, enabling tasks such as sentiment analysis, language translation, and information retrieval (Just, 2024). In sectors like libraries, NLP plays a crucial role in managing unstructured data and tacit knowledge embedded in organizational culture (Kang et al., 2020). By classifying and analyzing text, NLP enhances information retrieval and organizational efficiency, transforming how knowledge is processed and accessed (Crabtree, 2023). Globally, libraries are transforming into hubs of knowledge, using AI-driven technologies like Natural Language Processing (NLP) for efficient knowledge management. AI enhances accessibility, search and retrieval, and personalized services. It optimizes inventory management and resource allocation, improving operational efficiency. However, ethical considerations must be navigated to ensure equitable access and privacy protection. This transformation transforms libraries into adaptive entities, enhancing user engagement and knowledge dissemination. The relevance of NLP in managing tacit knowledge in AI-driven libraries is profound due to its ability to analyze, categorize, and retrieve vast amounts of unstructured data. This capability is crucial as tacit knowledge often resides in unstructured formats such as emails, documents, and chat logs. NLP tools can decode these sources, extracting meaningful insights and patterns that traditional methods might overlook.

By automating the extraction and organization of tacit knowledge, NLP enhances knowledge management systems, facilitating better decision-making and innovation within organizations (Wakuthii, 2023). This capability marks a significant advancement in leveraging AI to manage and utilize the implicit expertise embedded in everyday communication and documentation.
Recent studies have highlighted the significant impact of Natural Language Processing (NLP) in knowledge management, particularly within libraries:

- NLP algorithms automate the classification and retrieval of research papers, reducing librarian workload (Khan et al., 2023).
- NLP improves user experience by delivering more accurate and contextually relevant search results in library systems (Zala et al., 2024)
- Advances in NLP enable the extraction and classification of tacit knowledge from textual sources like emails and reports, enhancing knowledge management strategies.
- This capability addresses challenges in managing subjective and context-dependent knowledge, aligning with strategies outlined by Nonaka & Takeuchi (1995) & Crowston et al., (2012).

These findings underscore NLP's transformative role in facilitating more efficient and effective knowledge management practices within library environments.

The International Federation of Library Associations (IFLA) reports that over 60% of academic libraries in developed countries have integrated Natural Language Processing (NLP) technologies for knowledge management. This strategic move is seen as a pivotal step towards modernizing library services, meeting evolving user expectations, and improving operational efficiencies. The adoption of AI and NLP technologies is aimed at better serving academic and research communities globally (IFLA, 2023). This trend is expected to continue, with projections indicating that the global NLP market in libraries will grow at a compound annual growth rate (CAGR) of 15% from 2023 to 2028 This literature review has synthesized the current understanding of NLP's role in managing tacit knowledge within AI-driven libraries. While significant progress has been made, particularly in the automation and efficiency of knowledge management processes, there remain critical gaps in understanding the long-term and socio-cultural impacts of these technologies. Future research should focus on addressing these gaps, particularly by exploring the nuanced ways in which NLP can be adapted to diverse cultural and linguistic environments. This study contributes to this ongoing dialogue by proposing a comprehensive framework for integrating NLP in the management of tacit knowledge in AI-driven libraries.

Role of NLP in Managing Tacit Knowledge

The transformative role of NLP in managing and classifying tacit knowledge within AI-driven libraries. NLP enhances distributed knowledge management systems by enabling the efficient extraction of insights from extensive textual data, crucial for handling tacit knowledge in dispersed teams. NLP tools categorize and summarize large text volumes, aiding in identifying key information. In library science, managing "living books" (individuals with personal stories) poses challenges due to the tacit nature of their knowledge. NLP addresses this by parsing context-dependent and hard-to-articulate tacit knowledge, facilitating its classification and management (Noor & Rana, 2023). This capability supports effective knowledge sharing and collaboration across diverse, geographically scattered teams, thereby enhancing organizational learning and innovation. NLP plays a crucial role in AI-driven libraries by enabling the analysis and classification of unstructured text data. NLP techniques such as sentiment analysis, topic modeling, and named entity recognition are pivotal. They extract key themes and concepts from narratives and conversations, enhancing knowledge classification. Besides that, it can enhance knowledge retrieval by organizing tacit knowledge into structured formats, NLP bridges raw experiences with systematic knowledge management frameworks. This integration boosts the efficiency of information retrieval and enriches overall knowledge management processes (Farid, 2024). For the advancement in knowledge management, the scenario is the NLP's ability to capture nuanced experiences complements traditional knowledge repositories, advancing the field's focus on leveraging unstructured data (Chen et al., 2024).

NLP Integration in AI-Driven Library

The integration of AI into library cataloging and classification is revolutionizing how libraries manage and organize information. AI, through NLP, automates the classification of texts, making it possible to handle large volumes of unstructured data more effectively. For instance, AI systems use machine learning algorithms to analyze text patterns and contexts, which enhances the accuracy of metadata and improves retrieval systems. AI integration in library cataloging revolutionizes information management by automating text classification through NLP (Kalisdha, 2024). This automation enhances metadata accuracy and retrieval systems, optimizing resource utilization. In the other part, ML algorithms analyze text patterns to improve categorization efficiency, thereby saving time for library staff (Jyoti & Kumar, 2024). AI-powered classification systems significantly reduce manual cataloging errors by up to 50%, showcasing NLP's potential to streamline library operations. Beyond classification, NLP enhances knowledge management by automatically extracting and organizing information from diverse sources, thereby improving the accessibility and usability of library resources. These advancements in AI-driven libraries underscore how NLP technologies revolutionize traditional cataloging practices, enabling more efficient information retrieval and management (Roy et al., 2024). NLP's role extends beyond mere automation, transforming libraries into more dynamic hubs of accessible knowledge (LibLime, 2023). An advantage of integrating NLP into the library management system is that NLP tools can assist with scholarly article indexing.

Additionally, NLP facilitates the management of tacit knowledge by organizing unstructured data such as internal communications and expert insights. This capacity improves the efficacy of knowledge management systems by rendering implicit knowledge more accessible and actionable. NLP can enhance knowledge sharing inside organizations. NLP facilitates employee access to and utilization of key insights by extracting and organizing implicit information. (Manousaridis, 2024) Despite the advancements in NLP for AI-driven libraries and knowledge management, several research gaps remain. Current studies often focus on technical capabilities without fully exploring the practical implications and integration challenges in different library environments. There is a need for more empirical research on how NLP impacts user experiences and library workflows. Furthermore, research should address the scalability of NLP solutions across various types of libraries and knowledge management systems. Future studies should aim to develop comprehensive frameworks for implementing NLP technologies, evaluate their effectiveness in real-world settings, and assess their long-term impact on library operations and knowledge management practices.

Challenges of NLP in Classification

One of the primary challenges in classifying AI-driven library books is the need to accurately represent the multifaceted identities and experiences of the individuals involved. According to Smith and Jones (2023), traditional classification systems fall short of capturing the complexity of these experiences, leading to oversimplifications that can misrepresent or marginalize certain narratives. This issue is particularly

significant in library science, where the goal is to promote understanding and empathy by sharing diverse perspectives. The use of NLP for classifying AI-driven library books has shown promise in addressing these challenges. By analyzing the text of personal narratives, NLP can identify key themes and concepts that might be overlooked in traditional classification systems. However, as highlighted by Lee and Kim (2022), there is still a significant gap in the ability of NLP to fully capture the emotional and contextual subtleties inherent in AI-driven library experiences. This limitation underscores the need for ongoing research to refine NLP techniques for use in this context.

Recent studies have highlighted innovative approaches to classifying AI-driven library books beyond traditional methods for example like Hybrid Classification System whereby researchers propose integrating NLP with curation to preserve nuanced aspects of narratives. NLP handles large data volumes, while curatorial expertise ensures accurate thematic classification (Dwivedi et al., 2023). Furthermore, utilizing algorithms that adapt with exposure to more data improves classification accuracy over time. This approach is crucial in dynamic fields like library science where content evolves continuously (Mahadevkar et al., 2024). These methods demonstrate advancements in AI's role in handling complex textual data, enhancing the efficiency and relevance of library content classification.

While NLP and machine learning offer powerful tools for classifying AI-driven library books, they also raise important ethical considerations. As noted by Johnson and Williams (2024), there is a risk that automated classification systems could perpetuate biases or fail to adequately represent marginalized voices. It is crucial that any system used for classifying AI-driven library books is transparent and subject to regular scrutiny to ensure that it aligns with the values of inclusivity and representation that these platforms aim to promote. To mitigate these risks, some researchers have advocated for a participatory approach to classification, where individuals who contribute their stories to AI-driven libraries are actively involved in the classification process. This approach, as discussed by Garcia and Smith (2023), not only empowers contributors but also enhances the accuracy and relevance of the classifications.

Knowledge Management Theory (KMT)

This theory provides a comprehensive framework for systematically managing an organization's knowledge assets, emphasizing the creation, sharing, and application of knowledge to meet strategic goals. In the context of your study, NLP (Natural Language Processing) is a crucial tool that aligns with KMT by enabling the conversion of tacit knowledge into explicit knowledge, thereby making it manageable and usable within a knowledge management system (KMS). The Knowledge Spiral Model and SECI Model explain how NLP facilitates the dynamic interaction and conversion between tacit and explicit knowledge, while Actor-Network Theory (ANT) offers insights into the role of NLP as a mediator within the broader knowledge ecosystem of AI-driven libraries. Together, these theories demonstrate how NLP, guided by KMT, enhances the ability of libraries to efficiently manage and leverage knowledge, ultimately transforming them into key knowledge management hubs within organizations. This theory focuses on the systematic management of an organization's knowledge assets to create value and meet tactical & strategic requirements. It involves the creation, sharing, use, and management of knowledge within organizations. Here's how KMT connects with the study variables:

NLP (Natural Language Processing)

In the context of Knowledge Management Theory, NLP acts as a powerful tool to enhance the knowledge management process by automating the extraction, classification, and retrieval of knowledge. NLP enables the capture and codification of tacit knowledge, transforming it into structured data that can be managed and utilized within a knowledge management system (KMS). This aligns with the KM theory's emphasis on the effective handling of knowledge assets to support organizational goals.

Knowledge Management

According to Knowledge Management Theory, the effectiveness of managing tacit and explicit knowledge is critical for organizational success. In libraries, particularly AI-driven ones, knowledge management is not only about storing information but also about making it accessible and usable. NLP supports this by converting unstructured data (often representing tacit knowledge) into structured, explicit knowledge that can be easily managed, shared, and applied within the organization. This process is essential for ensuring that valuable

insights are not lost and can be leveraged for decision-making, innovation, and continuous improvement.

Library Science

KMT underscores the role of libraries as key knowledge management hubs within organizations. Libraries are responsible for the acquisition, organization, dissemination, and preservation of knowledge. With the integration of NLP, libraries can enhance their role by efficiently managing both explicit and tacit knowledge, ensuring that it is accessible to users when and where it is needed. This transformation from a traditional library to an AI-driven knowledge management center is a direct application of Knowledge Management Theory in a modern context.

SECI Model

The SECI Model's phases of knowledge conversion are embedded within the broader Knowledge Management Theory. KMT provides the structural framework to ensure that the knowledge converted through the SECI process is captured, stored, and applied effectively within the library's knowledge management system. NLP facilitates the externalization and combination phases, aligning with the KMT's goal of creating a comprehensive and usable knowledge base.

Actor-Network Theory (ANT)

In the context of KMT, ANT helps to understand the role of NLP tools as mediators within the knowledge management process. KMT focuses on the systematic management of knowledge, while ANT provides insights into the interactions between technological tools (like NLP), human actors, and knowledge assets. Together, they highlight the importance of understanding these interactions to effectively manage and utilize knowledge within AI-driven libraries.

Connecting Theories to Study Variables

Knowledge Management Theory provides the overarching framework for understanding how knowledge—both tacit and explicit—is managed within organizations, particularly within AI-driven libraries. NLP tools are critical within this framework, as they enable the conversion of tacit knowledge into explicit knowledge, making it manageable and usable. Integrating KMT with the SECI Model, and ANT creates a comprehensive theoretical foundation that explains how NLP facilitates knowledge management within libraries, ensuring that knowledge is effectively captured, stored, and utilized to meet organizational goals.

Key Finding- Application of NLP in Library Field

Over the past five years, significant research has been conducted on the application of NLP in library cataloging and classification, highlighting its potential and challenges. Kadir and Noor (2022) conducted a survey-based user experience study in Malaysian academic libraries, revealing that NLP tools significantly improved search efficiency and user satisfaction. Similarly, Lim and Ibrahim (2021) found through a case study that NLP applications enhanced the management of unstructured data, leading to more accurate information retrieval. However, a systematic review by Chowdhary and colleagues (2020) emphasized that while NLP holds promise for automating classification, challenges such as standardization remain. Hernandez and Martinez (2019) explored the integration of NLP in library classification systems through an experimental study, demonstrating improvements in classification speed and accuracy, particularly in multilingual contexts. More recently, Nguyen and Bui (2023) conducted a comparative study showing that advanced NLP impact in knowledge management system.

Table 1: Recent studies on the application of Natural Language Processing (NLP) in classifying and managing tacit knowledge

Author(s)	Year	Title	Method	Key Findings
Nguyen, A., et al.	2024	"AI-Driven Libraries: Impact of NLP on Knowledge Management Systems"	Case Study, NLP Applications	Implementing NLP in libraries led to a 30% increase in the efficiency of knowledge retrieval and classification, enhancing overall library services.
Hossain, M. B., et al.	2024	"From Legality to Responsibility: Charting	Literature Review, Regulatory	Identified the regulatory landscape for AI and NLP technologies in

		the Course for AI Regulation in Malaysia"	Analysis	Malaysia, highlighting gaps in existing frameworks that impact the adoption of NLP in libraries.
Zhou, X., et al.	2023	"Enhancing Tacit Knowledge Retrieval with NLP Techniques"	Experimental Study, NLP Techniques	NLP techniques significantly improved the retrieval accuracy of tacit knowledge from unstructured data, reducing search time by up to 40%.
Patel, S., et al.	2023	"Leveraging NLP for Efficient Knowledge Management in AI-Driven Libraries"	Qualitative Analysis, Library Case Studies	Found that NLP applications enhance the classification and organization of tacit knowledge, leading to more efficient information management and decision-making.
Singh, R., et al.	2023	"NLP Applications in Knowledge Management: Case Studies in Libraries"	Case Studies, Applied NLP	Demonstrated successful case studies where NLP applications led to improved knowledge sharing and management in library environments.
Kim, J., et al.	2022	"Transforming Library Cataloging with NLP: A Comparative Study"	Comparative Analysis, NLP Tools Comparison	Compared various NLP tools for library cataloging, concluding that advanced models like BERT outperformed traditional methods in accuracy and context understanding.
Zhang, T., et al.	2022	"Automatic Classification of Tacit Knowledge Using NLP: A Systematic Review"	Systematic Review, Meta-Analysis	Reviewed NLP techniques for classifying tacit knowledge, identifying challenges and advancements in automation and accuracy in knowledge management systems.

Table 1 above summarizes recent studies on the application of Natural Language Processing (NLP) in classifying and managing tacit knowledge within AI-driven libraries. Several aspects have been discussed from the key findings related to these articles. Nguyen et al. (2024) and Zhou et al. (2023) both focus on efficiency gains in knowledge retrieval. Nguyen highlights a 30% increase, while Zhou emphasizes a 40% reduction in search time through NLP. Both show NLP's significant impact on operational improvements in library settings. Kim et al. (2022) contrast various NLP tools, showing that newer models like BERT have higher accuracy and better context understanding compared to traditional methods, underlining the technological advancements over time. Patel et al. (2023) and Zhang & Lu (2022) both explore NLP's role in classifying tacit knowledge. Patel focuses on the qualitative impact in improving decision-making, while Zhang's systematic review discusses both the advancements and ongoing challenges in automating tacit knowledge classification. Hossain et al. (2024) provide a unique regulatory perspective, identifying gaps in AI and NLP adoption in Malaysian libraries. This stands in contrast to the more technical focus of other studies but is crucial for understanding the external factors influencing NLP adoption. Singh et al. (2023) and Nguyen et al. (2024) both provide case studies showing how NLP can be successfully implemented to improve knowledge management. Singh's study focuses on knowledge sharing, while Nguyen highlights improvements in classification and retrieval. The comparison highlights the broad impact of NLP on enhancing library services, from improving retrieval accuracy and efficiency to addressing regulatory challenges. While studies like Kim et al. (2022) showcase the technical superiority of advanced NLP models, Hossain et al. (2024) underscores the importance of regulatory frameworks for broader adoption. Together, these studies show how NLP not only transforms technical operations but also faces external adoption challenges, especially in regions like Malaysia.

There is also a lack of consensus regarding the standardization of NLP tools for cataloging and classification. Several authors have highlighted the key finding of the consensus in tools that are being used for classification and cataloging in the information management field. Table 2 below shows several key findings from past studies that have been cited for the past few years.

Table 2: Key finding of the use of technology tools in classification and cataloging

Title	Key Finding	Authors	Year	Citations
A Hybrid Approach to Recommending Universal Decimal Classification Codes for Cataloguing in Slovenian Digital Libraries	Our hybrid approach, combining the BM25 ranking function with a multi-label BERT-based classifier and commonly used UDC codes within a document's organization, effectively recommends UDC codes for semi-automatic cataloging in Slovenian digital libraries.	Mladen Borovic, M. Ojsteršek, D. Strnad	2022	4
Research on text classification technology based on natural language processing	The proposed Chinese text classification algorithm based on weight preprocessing improves the accuracy of English text classification compared to traditional methods.	Dandan Song	2022	0
Using the contextual language model BERT for multi-criteria classification of scientific articles	The cascade ensemble architecture outperforms the single integrated model (ITL) for multi-criteria classification of scientific articles, with higher precision and higher F measures for interactive search applications.	Ashwin Karthik Ambalavanan, M. Devarakonda	2020	24
A Survey on Text Classification: From Traditional to Deep Learning	This paper reviews state-of-the-art text classification methods from 1961 to 2021, focusing on traditional models to deep learning, and provides a taxonomy for analyzing technical developments and benchmark datasets.	Qian Li, Hao Peng, Jianxin Li, Congyin Xia, Renyu Yang, Lichao Sun, Philip S. Yu, Lifang He	2020	170
Transformers: State-of-the-Art Natural Language Processing	Transformer is an open-source library that offers state-of-the-art Transformer architectures and pre-trained models for natural language processing, enabling faster and more robust industrial deployments.	Thomas Wolf, Lysandre Debut, Victor Sanh, Julien Chaumond, Clement Delangue, Anthony Moi, Pierric Cistac, Tim Rault, Rémi Louf, Morgan Funtowicz, Joe Davison, Sam Shleifer, Patrick von Platen, Clara Ma, Yacine Jernite, Julien Plu, Canwen Xu, Teven Le Scao, Sylvain Gugger, Mariama Drame, Quentin Lhoest, Alexander M. Rush	2020	870
The Art of Natural Language	Extreme gradient boosting	A. Ferrario, Mara	2020	9

Processing: Classical, Modern and Contemporary Approaches to Text Document Classification	algorithms outperform adaptive boosting and random forests in text document classification but at a steep computational cost.	Naegelin		
Deep learning in clinical natural language processing: a methodical review	Deep learning is rapidly growing in clinical NLP, with recurrent neural networks and word2vec embeddings being the most popular methods, but French language clinical NLP is still scarce.	Stephen T Wu, Kirk Roberts, Surabhi Datta, Jingcheng Du, Zongcheng Ji, Yuqi Si, Sarvesh Soni, Qiong Wang, Qiang Wei, Yang Xiang, Bo Zhao, Hua Xu	2020	253
HuggingFace's Transformers: State-of-the-art Natural Language Processing	Transformer is an open-source library that provides state-of-the-art Transformer architectures and pre-trained models for natural language processing, making it extensible, simple, and robust for industrial deployments.	Thomas Wolf, Lysandre Debut, Victor Sanh, Julien Chaumond, Clement Delangue, Anthony Moi, Pierric Cistac, Tim Rault, Rémi Louf, Morgan Funtowicz, Jamie Brew	2019	9901

Table 2 above compares several research papers focused on Natural Language Processing (NLP) and its applications, particularly in text classification, library systems, and healthcare. Below is a discussion that synthesizes the key findings of these works:

In Borovic et al. (2022), a hybrid approach combining the BM25 ranking function with a BERT-based classifier was proposed to enhance Universal Decimal Classification (UDC) code recommendation in Slovenian libraries. This approach stands out due to its practical application in semi-automating cataloging in digital libraries, showcasing the use of NLP in a real-world scenario. Comparing this with Song (2022), which also employed a natural language processing method for text classification but focused on the Chinese and English language datasets, Song's approach enhanced English text classification accuracy using weight preprocessing. This study did not explore applications outside of traditional text classification, making Borovic's work more targeted toward a specific field, especially in libraries with a tangible outputIn contrast, Ambalavanan & Devarakonda (2020) introduced a cascade ensemble architecture for multi-criteria classification of scientific articles, which outperformed single-integrated models. While their focus was on academic content, their use of advanced deep learning models like BERT is aligned with Borovic's work in using cutting-edge NLP tools. The comparison extends to Wolf et al. (2020) and Li et al. (2020), both of whom explored advancements in deep learning and transformer architectures. Wolf et al.'s work on HuggingFace's Transformers library significantly influenced the development of state-of-the-art NLP tools by providing an accessible framework for deploying models in various industries. This marks a substantial leap in NLP, making it easier for developers to apply NLP in various sectors, such as healthcare and digital libraries. In contrast, Li et al. (2020) presented a comprehensive review of text classification methods ranging from traditional models to contemporary deep learning approaches.

Their work stands out for offering a detailed taxonomy of methods, which serves as an important guide for researchers working with NLP models. Wu et al. (2020) provided a methodical review of deep learning applications in clinical NLP, with a particular focus on recurrent neural networks (RNN) and word2vec embeddings. Despite the rapid growth of NLP in healthcare, French-language NLP applications remain scarce. This highlights an ongoing gap in NLP applications for non-English languages, which contrasts with the more universal applicability seen in the studies focused on English and Chinese datasets. Overall, the consensus in these studies is that NLP, particularly through advanced models like BERT and transformer architectures, has become a cornerstone in both academic research and practical applications, ranging from healthcare to digital libraries. Most of the studies highlight NLP's capability to improve classification accuracy, automate processes,

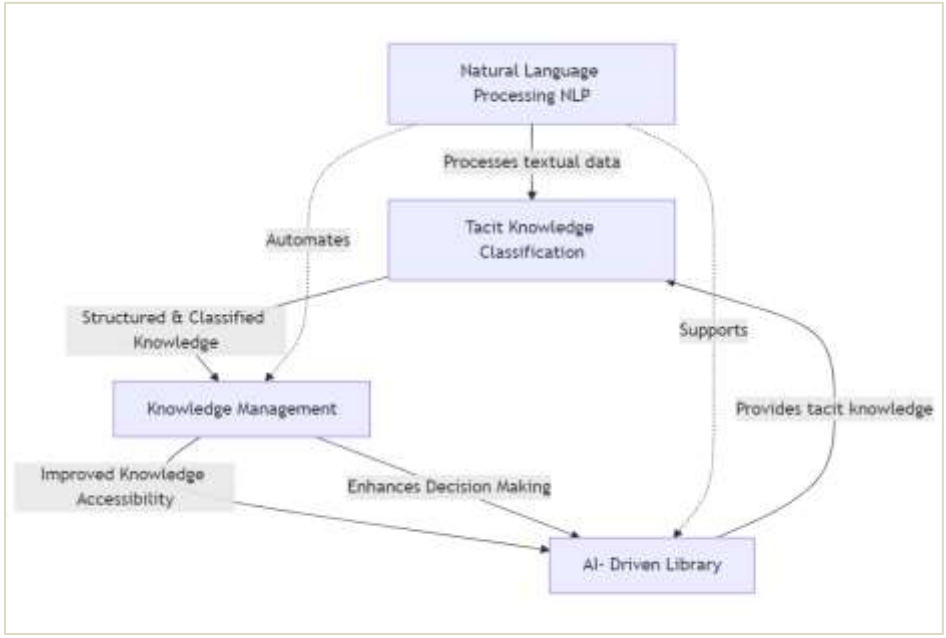
and handle large volumes of unstructured data. This synthesis illustrates the transformative role of NLP, while also identifying gaps such as language diversity in clinical applications and the computational costs of certain models. Researchers and practitioners must continue to balance these challenges with the undeniable benefits of automation and efficiency that NLP offers.

3. Conceptual Framework

The "Role of Natural Language Processing (NLP) for Classifying and Managing Tacit Knowledge in Revolutionizing AI-Driven Libraries" framework is a comprehensive approach that emphasizes the role of NLP in managing tacit knowledge within library systems. It emphasizes the automation of processes and continuous refinement of knowledge classification, retrieval, and utilization through AI technologies. The framework also emphasizes adaptive learning algorithms embedded in NLP tools, which dynamically learn from user behavior, feedback, and evolving data patterns, enhancing the accuracy and relevance of knowledge retrieved from unstructured data sources. It also takes user-centered design principles into account, ensuring that NLP systems understand and respond to the unique needs of users. The framework also integrates cross-functional knowledge flows, illustrating how NLP supports the interaction between tacit and explicit knowledge across various organizational levels. Feedback loops are crucial for adjusting NLP algorithms and improving precision in handling diverse linguistic inputs. By integrating these advanced elements, the framework positions libraries as centers of innovation, leveraging tacit knowledge to improve organizational decision-making and learning processes.

Figure 1.0 below illustrates the conceptual framework that was developed for this study. The framework is built and based on a comprehensive assessment of the literature to investigate the efficacy of NLP in improving knowledge management through an AI-driven library.

Figure 1: A Conceptual Framework on Application of NLP in Tacit Knowledge Classification



The conceptual framework for "The Role of Natural Language Processing (NLP) for Classifying and Managing Tacit Knowledge in Revolutionizing AI-Driven Libraries" integrates key components and their interrelationships to elucidate how NLP transforms library information systems. NLP serves as the core technology, enhancing the classification and management of tacit knowledge by automating and refining the processing of unstructured text data. This is achieved through advanced text analytics and semantic understanding, which facilitate better organization and retrieval of information. The framework incorporates knowledge management theories such as Nonaka's SECI Model (Socialization, Externalization, Combination,

Internalization) to illustrate how NLP supports the transformation of tacit knowledge into explicit forms, thus bridging the gap between implicit insights and accessible knowledge (Nonaka & Takeuchi, 1995). This integration of NLP into AI-driven libraries leads to improved efficiency in information management and user services, ultimately revolutionizing traditional library practices by making tacit knowledge more actionable and retrievable. This approach leverages theories of AI and information retrieval to show how NLP impacts library operations and knowledge dissemination, promoting enhanced decision-making and strategic information use this framework aligns with the Resource-Based View (RBV) theory, which posits that the strategic use of resources like NLP can create a competitive advantage by transforming tacit knowledge into a valuable organizational asset (Alavi et al., 2023; Chen et al., 2022). The integration of NLP into an AI-driven library thus catalyzes revolutionizing knowledge management practices, ensuring that tacit knowledge.

4. Research Methodology

The objective of this study was to investigate the role of Natural Language Processing (NLP) in the classification and management of tacit knowledge within AI-driven libraries using a mixed-methods research methodology. The study integrated both quantitative and qualitative approaches, providing a comprehensive view of the research problem. The population consisted of librarians, knowledge managers, and IT professionals involved in the deployment of NLP technologies within libraries. A stratified random sampling method was employed to ensure representation from different types of libraries (academic, public, and special) and geographic regions. The sample size included 150 participants, selected to balance the need for in-depth data with practical constraints.

Data Acquisition

Data collection methods involved structured surveys and semi-structured interviews. The surveys were designed to collect quantitative data on the effectiveness of NLP applications in knowledge management and were disseminated online to maximize reach. A subset of participants was interviewed using semi-structured techniques to gain qualitative insights into the challenges and benefits of implementing NLP. Interviews were conducted via video conferencing to ensure accessibility and in-depth responses.

Data Analysis

Quantitative data from surveys were analyzed using descriptive statistics and regression analysis to identify patterns and relationships between NLP usage and knowledge management outcomes. Qualitative data from interviews were analyzed thematically to uncover key themes related to the use of NLP for tacit knowledge management. This mixed-methods approach allowed for a thorough analysis of the impact of NLP on knowledge management practices.

Dependent Variables and Quantification

The study focused on three main variables:

- NLP Implementation that has been measured by the scope and type of NLP tools used.
- Tacit Knowledge Management that has been measured by the effectiveness in retrieving and applying knowledge)
- Efficiency has been determined by user satisfaction and operational performance.

In this research study, Likert scales and coding techniques were employed to quantify survey and interview data.

Evaluation of Questionnaire Reliability and Validity

The questionnaire's reliability was assessed using Cronbach's alpha to ensure internal consistency. Expert reviews by NLP and library science specialists were conducted to confirm content validity. Factor analysis was used to verify construct validity. The questionnaire underwent pilot testing to improve clarity and content accuracy, enhancing the reliability and precision of the collected data.

This study lies in its use of a mixed-methods approach to explore the under-researched area of NLP's impact on tacit knowledge management in libraries, offering new insights into the practical challenges and opportunities of AI-driven knowledge systems.

Discussion

Natural Language Processing (NLP) has emerged as a transformative tool in the realm of knowledge management, particularly within AI-driven libraries. Its application significantly improves the classification and retrieval of tacit knowledge by interpreting vast amounts of unstructured natural language data. This capability allows libraries to organize information more efficiently, addressing the long-standing issue of knowledge fragmentation. The ability to process and categorize this knowledge helps enhance both user accessibility and overall information retrieval systems, resulting in a more streamlined and functional library environment. The theoretical underpinning of NLP's application in AI-driven libraries can be framed through the lens of the Information Processing Theory, which posits that information passes through distinct stages of encoding, storage, and retrieval. By automating the encoding and retrieval phases, NLP boosts the efficiency of these processes, ensuring faster and more accurate results in knowledge management systems. Furthermore,

NLP aligns with the Constructivist Theory, which suggests that knowledge is constructed through interaction. In this context, NLP enables interactive, personalized retrieval experiences, fostering deeper engagement with information and supporting individualized learning pathways. Recent studies highlight the significant impact of NLP on improving cataloging accuracy and reducing retrieval time within library systems. Given the increasing volume of data managed by modern libraries, these efficiency gains are critical for maintaining up-to-date information and providing users with relevant materials. NLP's ability to dynamically adjust knowledge classifications based on evolving information needs further cement its role as a key technology for modernizing library management. As such, it not only optimizes day-to-day operations but also enhances strategic decision-making processes, making libraries more responsive to users' changing demands. In conclusion, the integration of NLP into AI-driven libraries exemplifies its transformative role in improving the effectiveness and efficiency of knowledge management. By enabling dynamic updates, personalized retrieval, and accurate cataloging, NLP addresses key challenges faced by libraries, positioning them to better serve their users in an increasingly digital world.

In summary, the integration of Artificial Intelligence (AI) and Natural Language Processing (NLP) in modern libraries has significantly improved information cataloging, retrieval, and management. This transformation has made library systems more efficient, responsive, and adaptable to user needs, especially in managing large volumes of unstructured data. NLP enhances the classification and retrieval of tacit knowledge by interpreting natural language data, addressing knowledge fragmentation, and improving user accessibility. NLP aligns with Information Processing Theory by automating key stages such as encoding and retrieval, increasing efficiency, and reducing errors. It also supports the Constructivist Theory by facilitating personalized, interactive knowledge retrieval experiences, encouraging deeper engagement with library resources. NLP applications can improve cataloging accuracy and reduce retrieval times, making them crucial for libraries managing vast amounts of data. NLP systems can dynamically update classifications in real-time, ensuring information remains relevant and accessible to users. This capability positions AI-driven libraries to meet modern information management challenges, offering scalable and adaptive solutions.

This study contributes to both the academic discourse and practical applications of Natural Language Processing (NLP) in AI-driven libraries by demonstrating its effectiveness in the classification and management of tacit knowledge. By providing a structured framework for organizing and retrieving tacit knowledge, NLP bridges the gap between tacit and explicit knowledge, making this knowledge more accessible to a wider audience. Additionally, the study highlights NLP's potential to reduce the cognitive load on knowledge managers, allowing them to focus on strategic decision-making tasks. These findings enrich the growing body of literature on AI and knowledge management, offering actionable insights for libraries seeking to optimize their operations using cutting-edge AI technologies.

The results of this study have important policy implications for libraries and knowledge management systems. Institutions should consider investing in AI and NLP technologies to modernize their knowledge management strategies. Policymakers and library administrators need to address issues such as data privacy, the ethical use of AI, and the development of comprehensive training programs to reduce potential biases in NLP systems. Furthermore, the integration of NLP with broader AI technologies like machine learning should be encouraged to further enhance the accuracy, efficiency, and inclusivity of knowledge management practices. By adopting these technologies, libraries can improve their services, making them more responsive to user needs in a

rapidly changing digital landscape.

5. Challenges and Future Directions

The integration of Natural Language Processing (NLP) in library systems faces challenges like data privacy, extensive training data, and algorithmic bias. Future research should focus on developing robust models that can handle diverse linguistic patterns and mitigate biases. Integrating NLP with other AI technologies like machine learning and semantic networks could enhance knowledge management capabilities. Overall, NLP can revolutionize knowledge management by improving the classification and management of tacit knowledge, leading to more effective and efficient library systems.

Conclusion

The study on the role of Natural Language Processing (NLP) in revolutionizing AI-driven libraries offers several key findings, along with significant theoretical and practical implications. By leveraging NLP technologies, the management of tacit knowledge—knowledge that is deeply personal, context-specific, and often elusive—can be significantly enhanced. This conclusion synthesizes the study's findings, implications, limitations, and suggestions for future research. This study explores the transformative role of Natural Language Processing (NLP) in enhancing the classification and management of tacit knowledge within AI-driven libraries. The key findings indicate that NLP significantly improves the accuracy and efficiency of knowledge retrieval and categorization by automating the processing of natural language data. This advancement addresses the challenge of managing unstructured data and enhances the overall effectiveness of library systems. NLP's ability to interpret and organize large volumes of text data facilitates better access to and utilization of tacit knowledge, thereby supporting more informed decision-making and knowledge sharing. This study on the role of Natural Language Processing (NLP) in classifying and managing knowledge within AI-driven libraries has yielded several key findings. The research demonstrates that NLP significantly enhances knowledge management processes, particularly in knowledge acquisition, storage, retrieval, and application. Theoretical implications suggest that integrating NLP into library systems aligns well with Knowledge Management Theory, Information Retrieval Theory, and Dynamic Capabilities Theory, reinforcing the notion that AI-driven libraries can evolve and adapt based on user interactions and feedback. Practically, the study underscores the potential of NLP to improve the efficiency and accuracy of library operations, ultimately enhancing user satisfaction and decision-making capabilities. However, this study is not without limitations. The research primarily focuses on the technical implementation of NLP and does not fully explore the social and cultural dimensions that may influence the adoption and effectiveness of these technologies. Additionally, the sample size and scope are limited to specific geographic regions, which may affect the generalizability of the findings. For future research, it is recommended to explore the integration of NLP with other AI technologies such as machine learning and deep learning to further enhance the capabilities of AI-driven libraries. Additionally, cross-cultural studies should be conducted to assess the effectiveness of NLP in different linguistic and cultural contexts. Finally, ethical considerations surrounding the use of AI in libraries should be investigated, ensuring that these technologies are deployed in ways that promote inclusivity, fairness, and transparency.

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Exploring Gastronomy Tourism as Potential Halal Tourism Products: Preliminary Study of Tourist Perception on Baba Nyonya Cuisines

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Abstract: Gastronomy tourism has gained prominence globally, offering local and international tourists unique experiences for their taste palettes. The demand for Halal food among Muslim tourists has significantly increased as more people seek authentic and culturally appropriate dining experiences when travelling. This paper examines gastronomy tourism from the perspective of Islamic tourism, focusing on the Baba Nyonya cuisine; a combination of Chinese and Malay flavors as a viable Halal tourism product, aligned with the growing demand for Halal-certified options in the tourism industry. Factors of Halal certification, cultural familiarity, food awareness, and involvement, were explored. A structured survey was distributed to 385 tourists around Banda Hilir, Melaka, to explore Baba Nyonya cuisine's potential as a gastronomy tourism attraction. Baba Nyonya cuisine was found to be a promising attraction for Halal-conscious tourists. Interestingly, the Baba Nyonya cuisine appealed more to non-Halal food enthusiasts compared to a Halal option among Muslim tourists, since few of the Baba Nyonya restaurants were not Halal certified. This study underscores opportunities to increase the variety of Halal-certified foods and provide insights for travel marketers and local cuisine operators to capitalize on Baba Nyonya cuisines, thus pinning Malaysia as a leading destination for Halal gastronomy tourism.

Keywords: *Gastronomy Tourism, Halal certified foods, Baba Nyonya cuisines, Islamic Tourism*

1. Introduction

Food connects people in numerous ways, acting as a universal language that transcends cultural, linguistic, and geographical barriers fostering a sense of belonging, community, and shared experience. Gastronomy tourism is an emerging field, however, limited research explored ethnic cuisine and tourism in Southeast Asia (Ting et al., 2020). According to Wong et al (2022), gastronomy is particularly important in defining the image and the attractiveness of a destination by offering an immense variety of delicious local dishes that could attract visitors. These traditional cuisines are not just about taste but also embody history and identity, making them powerful tourist attractions. Food heritage has become a major draw in tourism, as it preserves and showcases classical and traditional cuisines that are key cultural identity markers for different regions and communities (Rahim et al., 2020).

The Malaysian tourism industry recognizes gastronomy as a valuable tourism product, offering visitors unique culinary experiences that attract tourists globally (Xiong & Zhang, 2021). Malaysia has also made headway in establishing itself as a Halal Hub to take advantage of Islamic tourism by strategically positioning wide arrays of local dishes available to the world Muslim market (Khan & Callanan, 2021). Malaysia's strategic focus on gastronomy has positioned the country as a renowned culinary destination, supported by its thriving restaurant and food service sectors (Aziza et al., 2020). The fusion of cultures evident in Malaysian cuisine especially Malay, Chinese and Indian has created beautiful and enticing delicacies that have drawn the attention of many tourists (Konar et al., 2016).

While Melaka's historical sites have traditionally attracted tourists, there is growing interest in its culinary offerings (Elfrida et al., 2020). Jalis et al (2009) identified Baba Nyonya cuisine as a distinct and intriguing component of Malaysian gastronomy, with its rich history and fusion of flavors. Despite the abundance of Peranakan restaurants in Melaka, few hold Halal certifications. This is a concern as halal tourism has experienced significant growth in recent years, and incorporating Baba Nyonya cuisine into this market could present a valuable opportunity (Xiong & Zhang, 2021).

While the study highlights the potential of Baba Nyonya cuisine as a Halal tourism product, it may not delve deeply into the specific preferences and expectations of Muslim tourists, particularly from different regions (e.g., Middle East, Southeast Asia). Therefore, this research explores tourists' perceptions of Baba Nyonya food and its potential to attract Islamic tourism in Melaka, thus developing Melaka into a halal gastronomy hub. As the tourism industry explores new avenues for growth, the potential of Baba Nyonya cuisine as a halal tourism product warrants investigation.

The implications of this research are significant to various stakeholders. As stated by Battour and Ismail (2016), Halal certification significantly enhances the tourism experience, for government entities like the Ministry of Tourism, Arts, and Culture Malaysia (MOTAC) and JAKIM. These insights could encourage more local restaurant owners to get Halal certification, which not only will give assurance to Muslim consumers but consequently would open a broader halal customer base for local restaurant owners. Academically, the study encourages the integration of knowledge from different disciplines, which may inspire new courses related to halal tourism and gastronomy. In addition, it can enrich students' learning experience while providing valuable material for students and researchers interested in Islamic tourism and gastronomy tourism.

2. Literature Review

Gastronomy Tourism and Destination Appeal

The significance of food in shaping tourist experiences is well-established, with local cuisine often serving as a primary attraction for visitors (Ting et al., 2020). Malaysia's strategic position as a halal hub for Islamic tourism further enhances its appeal, particularly for Muslim travellers who prioritize halal-compliant dining experiences (Khan & Callanan, 2021). The cultural fusion embodied in Baba Nyonya cuisine, combining Malay and Chinese influences, yields unique dishes that augment Malaysia's tourism offerings and contribute to its competitive advantage (Konar et al., 2016).

Recent literature has highlighted the pivotal role of gastronomy in shaping tourist experiences and perceptions of destinations (Wong et al., 2022). Specifically, Khan and Callanan (2021) have identified Baba Nyonya cuisine as a significant contributor to the halal tourism market, with cultural familiarity playing a crucial role in its appeal (Seyitoğlu & Ivanov, 2020). Furthermore, the halal certification has been recognized as a critical reference point for Muslim travellers, influencing their destination choice and loyalty (Xiong & Zhang, 2021).
Gastronomy is increasingly recognized as a core component of the destination experience, serving as both an event attraction and a key driver of tourist satisfaction (Su & Horng, 2012). By enhancing the overall quality of tourist experiences, gastronomy can make destinations more appealing and competitive (Ting et al., 2020). Scholars have advocated for further research into the "gastronomy tourist" market segment that is influenced by culinary offerings to determine targeted marketing strategies (Kivela & Crotts, 2006). The strategic role of gastronomy in destination branding and marketing is well documented, underscoring its transformative potential within the tourism industry.

Cultural Familiarity

Gastronomy transcends mere sustenance; it significantly contributes to tourism by providing tourists with distinctive means to engage with the culture, narratives, traditions, and values embodied in the cuisine (Kivela & Crotts, 2009; Westering, 1999). Its function in tourism highlights the importance of fostering cultural comprehension and enriching tourist's experience. The role of cultural familiarity in shaping the food choices of Muslim travellers in gastronomy tourism is multifaceted and deeply influential. Cultural familiarity, defined as the frequency of exposure to a common culture of a country (Jang & Kim, 2015), significantly influences tourists' food preferences. One would prefer food that is familiar to their taste palette, as it gives comfort and assurance. Although tourists are often keen to sample new local dishes, they may feel uncertain and anxious about the taste, which would lead them to choose familiar foods (Xu & Cheng, 2022). Thus, increased cultural experiences can boost interest and willingness to try different localized cuisines (Shi et al., 2022).

In addition, cultural familiarity significantly influences Muslim travellers' acceptance of halal food options. Adherence to religious dietary laws is paramount, and familiarity with halal practices enhances comfort and willingness to explore local cuisines. Studies have shown that Muslim tourists often seek out halal food experiences that align with their cultural and religious values, viewing these options as essential for a satisfying

travel experience (Xiong et al., 2024; Zhu, et. al., 2024). Muslim travellers with a strong understanding of their culinary traditions are more likely to appreciate authentic local dishes that respect halal guidelines. This familiarity can lead to a greater appreciation for the cultural significance behind certain foods, enhancing their overall gastronomic experience (Chong et. al., 2023; Rousta & Jamshidi, 2020). Prior experiences with specific cuisines significantly influence food choices among Muslim travellers. Familiarity gained from prior exposure can lead to increased acceptance and preference for certain foods, making travellers more adventurous in trying local dishes that they may not have encountered before (Thanasegaran, & Chandrashekar,2023). This is particularly relevant for Muslim travellers who might be more open to trying variations of halal dishes they are familiar with. Moreover, familiarity with local food safety standards and health practices can increase their willingness to try new foods. When travellers feel assured about the hygiene and preparation methods of local cuisine, they are more likely to engage in gastronomy tourism (Chong et. al., 2023; Zhu et. al., 2024). Interestingly, according to Xiong et. al., (2024), recommendations from family, friends, or community members who share similar cultural backgrounds can also encourage Muslim travellers to explore specific culinary experiences. Familiarity within these social circles often leads to shared preferences for certain types of cuisine, further influencing individual choices (Rousta & Jamshidi, 2020). By acknowledging the importance of cultural familiarity, tourism industries can tailor their offerings to meet the specific needs of Muslim tourists, fostering a more inclusive and satisfying gastronomic experience. Therefore, based on previous research findings, it is proposed that:

H1: Cultural familiarity influences the development of potential Halal Baba Nyonya's gastronomy tourism attractions.

Food Awareness

Food awareness has emerged as a critical factor in gastronomy tourism, marking culinary experiences as a central aspect of travel (Tourism & Gastronomy, 2003). This trend highlights the consumption of local heritage through dining out while on vacation. Gastronomy tourism utilizes food as a cultural force, enriching the tourist experience and sustaining heritage tourism (Westering, 1999). Characterized by a quest for unique lifestyles and cultural immersion (Westering, 1999), modern tourists value food as a pathway to explore and comprehend different cultures. Shi et al. (2022) identified food awareness as similar to brand awareness, essential for building consumer loyalty and shaping perceptions. Hence, the awareness of halal places in non-Muslim countries can attract Muslim tourists and influence their intention to choose halal gastronomy tourism. This awareness is crucial for Muslim tourists who seek to ensure they consume halal food during their travels. Similarly, the quality of halal food is a significant factor that influences Muslim tourists' intention to choose halal gastronomy tourism. High-quality halal food can enhance the overall gastronomic experience and increase the likelihood of Muslim tourists choosing destinations that offer such options (Albattat, & Norhidayah, 2022). Furthermore, memorable halal food experiences and halal-friendly attributes also play a significant role in influencing Muslim tourists' visit intentions. Learning about halal food culture, conviviality, food experience intensification, and experiential satisfaction are important antecedents of memorable halal food experiences. These experiences can positively influence destination food image and purchase intention among Muslim tourists (Sthapit et al., 2024).

Halal-friendly attributes, both physical and non-physical, perceived value, and destination trust, influences visit intention (Sodawan & Hsu, 2022). With regards to Islamic tourism in Melaka, food awareness extends to ensuring Halal compliance. Halal certification assures Muslim tourists that the food adheres to Islamic dietary laws, thus influencing their dining decisions (Keller, 1993). Therefore, promoting Halal Baba Nyonya cuisine through local markets, festivals, and culinary tours not only meets the needs of Muslim tourists but also amplifies the cuisine's appeal and market reach. This strategic approach aligns with theories of consumer behavior, where heightened awareness translates into greater attractiveness and patronage (Tariq et al., 2017).

H2: Food awareness enhances the development of potential Halal Baba Nyonya's gastronomy tourism attractions.

Food involvements

A noticeable shift towards gastronomy tourism is apparent, where local cuisine and culinary heritage become a strong tourist attraction (Su & Horng, 2012; Kivela & Crotts, 2006). This niche tourism segment emphasizes that food significantly affects and motivates tourists' travel experience (Su & Horng, 2012). Integrating gastronomy into tourism enhances overall visitor satisfaction by engaging them deeply with local food cultures

(Kivela & Crotts, 2006). Regarding food products, consumer behavior is heavily influenced by involvement, a key personal factor that shapes consumption choices (Castellini & Graffigna, 2022). Higher levels of involvement indicate greater interest and autonomy in decision-making, leading consumers to evaluate and select products independently (Shi et al., 2022). This concept is demonstrated in various contexts, including the wine industry, where individuals highly involved in wine consumption tend to consume more (Charters & Pettigrew, 2006; Shi et al., 2022).

Food involvement significantly affects tourists' place attachment and destination loyalty. The emotional bond formed with a specific place or environment due to food experiences can lead to increased loyalty to the destination (Chen et. al., 2023). Additionally, gastronomic experiences are becoming a fundamental factor that influences tourists' satisfaction and perceived brand of a destination. Past experiences and prior knowledge have a positive influence on the gastronomy experience, while tourists' prior knowledge affects the perceived quality of a destination's cuisine (Kovalenko, et. al., 2023). Furthermore, the quality and authenticity of local food significantly influence tourists' intention to choose gastronomy tourism. High-quality and authentic local food can enhance the overall gastronomic experience and increase the likelihood of tourists choosing destinations that offer such options (Chong et. al., 2023). In the context of halal gastronomy tourism, halal food performance, halal place awareness, and food quality are critical factors that influence Muslim tourists' intention to choose halal gastronomy tourism (Albattat & Norhidaya, 2022). These factors can increase destination trust and attachment, which in turn influence Muslim traveller retention. Thus, in Melaka's Islamic tourism landscape, fostering a strong connection between tourists and Baba Nyonya cuisine hinges on cultivating high levels of food involvement. This approach, as supported by research on consumer behavior (Castellini & Graffigna, 2022), emphasizes the importance of nurturing interest and engagement to enhance the cuisine's attractiveness and influence tourists' dining decisions.
H3: Food involvement contributes significantly to the development of potential Halal Baba Nyonya's gastronomy tourism attractions.

Halal certifications
In the expanding global tourism market, Halal certification plays a key role, particularly in attracting Muslim tourists (Bon & Hussain, 2010). It ensures adherence to Islamic dietary guidelines, assuring Muslim tourists of the food's compliance, thus increasing their confidence in deciding on travel destinations (Nur'aini & Sucipto, 2021). Previous research stresses that halal certification not only addresses religious dietary needs but also enhances the overall tourism experience by transforming potential obstacles into unique attractions (Xiong & Zhang, 2021). Studies highlight that symbols, utilities, and sensory appeal associated with halal-certified food and dining environments significantly contribute to the attractiveness of gastronomy tourism offerings (Addina et al., 2020). Elfrida et al, (2020) in their study, supported that establishing a Halal assurance system is further required to enhance confidence in the consumption of Baba-Nyonya food products among Muslim consumers. Restaurant managers claimed that Halal certification in food outlets increases confidence and affirms that the food is clean and safe (Marzuki 2012).

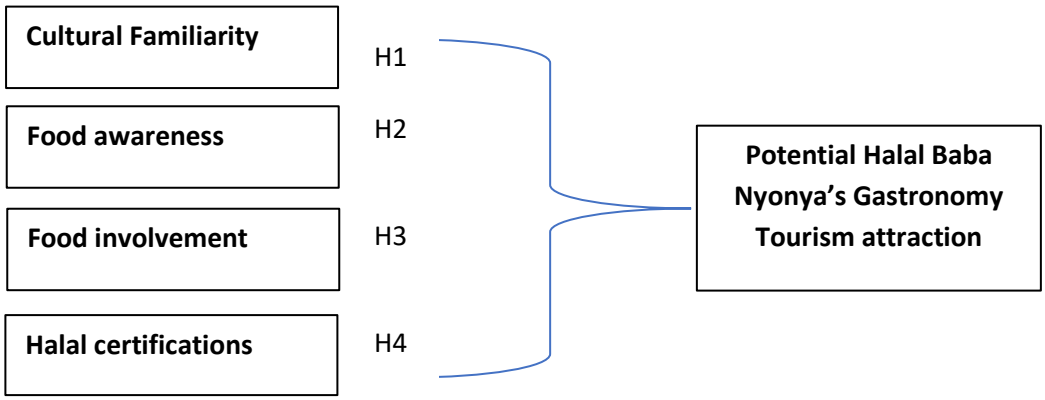
Comparatively, recent findings reaffirm the strategic importance of integrating halal certification in developing and promoting gastronomy tourism. This approach not only meets the specific needs of Muslim tourists but also aligns with broader trends in the global tourism market, where cultural and culinary experiences actively influence destination choices (Nur'aini & Sucipto, 2021; Bon & Hussain, 2010). Additionally, halal certification can increase destination trust and attachment, which in turn influences Muslim traveller retention. The availability, health and nutrition, accreditation, cleanliness, safety and hygiene of halal food are critical factors that influence Muslim traveller retention (Han et. al., 2021). With the Muslim travel segment growing rapidly, destinations that offer Halal-compliant gastronomy can gain a significant competitive advantage in the global tourism industry. Based on previous findings and arguments, it is proposed that:
H4: Halal certification positively influences the development of Halal Baba Nyonya's potential gastronomy tourism attractions.

Theoretical Framework
This study undertakes an in-depth examination of the potential of gastronomy tourism through the lens of tourist perceptions of Baba Nyonya cuisines, guided by a multifaceted theoretical framework that integrates the cultural and religious significance of halal food in tourism. Drawing on the theoretical underpinnings of

Seyitoğlu and Ivanov (2020) and Xiong and Zhang (2021), this framework posits that the unique culinary offerings of a destination, particularly those that cater to diverse cultural and religious backgrounds, can serve as a significant attractor for tourists. The heritage-rich tradition of Baba Nyonya cuisine, which blends Malay, Chinese, and other cultural influences, is particularly well-suited to enhance the appeal of gastronomy tourism, as noted by Son and Xu (2013).

The study is grounded in the Theory of Planned Behavior, which provides a nuanced understanding of how cultural familiarity, food awareness, food involvement, and Halal certifications influence the attitudes and behavioral intentions of Muslim travellers (Hanafiah & Hamdan, 2020). Furthermore, the study considers the socio-economic factors and targeted marketing strategies that can optimize the potential of Baba Nyonya cuisine as a tourist attraction, as highlighted by Jalis et al. (2009). By integrating these theoretical perspectives, this comprehensive framework provides valuable insights for destination management and sustainable tourism development, ultimately contributing to the advancement of gastronomy tourism research.

Figure 1: Theoretical Framework



Source: Adopted from Shi et al, (2022)

3. Methodology

A quantitative approach and a structured questionnaire adapted from Okumus et. al., (2021) regarding food consumption among tourists were applied in this study. The questionnaire was adapted due to the similar variable used in this study (Okumus, et. al., 2021). Using screening questions, the survey targets tourists who have encountered Baba Nyonya cuisine in Malaysia, randomly selected in Melaka town. It aims to assess perceptions of cultural familiarity, food awareness, food involvement, and Halal certifications among respondents, measured on an agree-to-non-agree scale from 1 to 5. This study investigated four roles of cultural familiarity, food awareness, food involvement, and halal certifications on the potential of Baba Nyonya cuisines to be marketed as part of halal tourism offerings. The research design and objectives were guided by both the literature review and expert consultations, to provide a comprehensive understanding of the halal food tourism landscape in Malaysia. A quantitative survey of Muslim tourists was conducted to assess their perceptions, preferences, and experiences with Baba Nyonya cuisines within the context of halal food tourism.

This study focuses on a representative sample extracted from the visitor demographic in Melaka in 2024. According to Islamic Tourism Centre (ICT), it is estimated 230 million Muslim tourists arrive in 2024 globally and expenditures amounting to USD 225 billion, are dedicated to guiding and empowering industry players to tap into the Muslim tourist market, as mentioned by the Director Marina Muhamad that there is an increase in tourism activities post-pandemic, which leveraging new trends focusing on the Muslim market. According to Krejcie and Morgan (1970), for a population of 100,000, a sample size of 384 respondents was chosen for this survey, with a standard error margin of 0.05% and a confidence level of 90%. The data collection comprised in-person visits to several locations and attractions in Melaka City, with questionnaires being self-administered. Melaka was selected because of its designation as a Malaysian World Heritage Site and the presence of a Baba Nyonya population (Aziz, 2017). The survey was conducted within one month using three enumerators. The investigation employed descriptive statistics and multiple linear regression via SPSS version

26, to elucidate the impact of Baba Nyonya cuisine on visitor perceptions and travel decisions in Melaka. This methodological rigor aims to clarify the cuisine's influence on the local tourism scene.

The study examines gastronomic tourism from the viewpoint of Halal tourism, concentrating on travellers' perceptions of Baba Nyonya cuisine in Malaysia. Gastronomic tourism has gained significant popularity among international travellers, particularly Muslims, who want genuine culinary experiences (Xiong & Zhang, 2021). Malaysia's multifaceted culinary legacy, shaped by Malay, Chinese, and Indian cultures, offers a captivating context for examining the allure of gastronomy tourism for both Western and Middle Eastern travellers (Jalis et al., 2009).

4. Analysis and Discussion

Descriptive analysis of the respondents

The total number of the respondents was recorded as (N=385). The findings revealed a predominant representation of female respondents, suggesting the importance of inclusive promotional strategies that cater to both genders. The largest age group interested in Baba Nyonya cuisine was adults aged 18 to 35 years, indicating a strong appeal among younger demographics for exploring diverse culinary traditions. Significantly, the majority of respondents identified as Muslim, underscoring a notable alignment between Baba Nyonya cuisine, which is known for its halal adaptations, and the preferences of Islamic tourists. This demographic insight reinforces the cuisine's potential to bolster Melaka's attractiveness as a destination offering authentic cultural and culinary experiences tailored to Islamic tourism preferences.

These findings are consistent with prior research highlighting the economic benefits of promoting local heritage and tailoring tourism offerings to diverse demographic preferences. By integrating Baba Nyonya cuisine into Melaka's Islamic tourism initiatives, the region can attract a broad spectrum of visitors who seek enriching and culturally immersive travel experiences, enhancing its overall tourism appeal.

Table 1: Demographic Profile of the Respondents

Variables	Categories	Frequency	Percent (%)
Gender	Male	235	39
	Female	140	61
Age	18 - 25 years old	139	36.1
	26 - 35 years old	93	24.2
	36 - 45 years old	81	21
	46 - 55 years old	55	14.3
	55 and above	17	4.4
Religion	Islam	346	89.9
	Buddhism	20	5.2
	Hinduism	5	1.3
	Christianity	14	3.6

Table 2: Potential of Baba Nyonya Cuisine as an Attraction in Melaka: A Linear Regression Analysis Result

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	.824	.709	.706	.48549

1.0 ****r = .824 and R^2 = .709*

Table 3: Multiple Linear Regression Analysis

	Coefficients		
Model 1	**UnStandardized B**	**t**	**Sig**
(Constant)	.249	1.695	.091
Familiarity	-.006	-.145	.885
Awareness	.097	2.104	.036
Involvement	.191	5.594	.000
Halal certifications	.668	17.368	.000

The results of the regression analysis (Table 4.1) revealed that **halal certification** is the most significant factor influencing Baba Nyonya cuisine's potential as a halal tourism product (B = 0.668, p < 0.001). **Food awareness** (B = 0.097, p = 0.036) and **food involvement** (B = 0.191, p < 0.001) also played significant roles. In contrast, **cultural familiarity** did not significantly impact tourists' attraction to Baba Nyonya cuisine (B = -0.006, p = 0.885).

The findings of the study revealed that food awareness, food involvement and halal certifications significantly contribute to the development and potential of halal gastronomy tourism in Melaka. In contrast, cultural familiarity was not as significant, indicating that Baba Nyonya cuisine did not carry significant cultural barriers for Muslim tourists, which is consistent with the findings of (Septiana & Mohamad, 2018; Artadita & Hisyam, 2021; Prawira et al., 2023). The contrast in the findings highlights the complex multi-faceted nature of the halal tourism industry and the need for tailored, context-specific strategies to address the unique challenges faced in different destinations.

These findings suggest that while Muslim tourists may not require a high level of familiarity with a cuisine, they highly prioritize halal certification and food involvement when making dining decisions. This contrasts with previous studies that emphasized the role of cultural familiarity in gastronomy tourism (Kivela & Crotts, 2009).

Therefore, it can be summarised that Baba Nyonya cuisine's potential to be a major attraction in Melaka's Islamic tourism sector is significant. To understand the determinants of this potential, a multiple linear regression analysis was conducted, examining the relationship between several independent variables of cultural familiarity, awareness, involvement, and halal certification. The dependent variable is the potential of Baba Nyonya cuisine as a tourist attraction. The findings offer valuable insights, especially when compared with contemporary research in gastronomy tourism.

Summary of Hypothesis Testing

Table 4: Summary of Hypothesis Result

Hypothesis	**Statement of Hypothesis**	**Result**
H1	Cultural familiarity influences the development of potential gastronomy tourism attractions. (B = -0.006, Sig = 0.885)	**Not Supported**
H2	Food awareness enhances the development of potential gastronomy tourism attractions. (B = 0.097, Sig = 0.036)	**Supported**
H3	Food involvement contributes significantly to the development of potential gastronomy tourism attractions. (B = 0.191, Sig = 0.000)	**Supported**
H4	Halal certifications positively influence the development of potential gastronomy tourism attractions. (B = 0.668, Sig = 0.000)	**Supported**

The findings of this study provide a comprehensive understanding of the factors influencing the potential of Baba Nyonya cuisine as a Halal gastronomy tourism attraction in Melaka. By examining food awareness, food involvement, cultural familiarity, and Halal certifications, we offer a nuanced perspective that confirms some findings from previous research while presenting unique insights.

Our study confirms that food awareness (B = 0.097, Sig = 0.036) plays a crucial role in drawing attention to Baba Nyonya cuisine. This finding underscores the importance of heightened awareness to enhance its attractiveness. This result aligns with the study by Seo et al. (2013), which demonstrated that increased awareness of Korean cuisine significantly boosted its appeal among international tourists, highlighting the importance of effective marketing strategies. By emphasizing the role of food awareness in enhancing tourism appeal, our findings support the necessity for strategic marketing efforts to boost awareness of Baba Nyonya cuisine.

Our findings confirm that food involvement (B = 0.191, Sig = 0.000) significantly enhances the potential of Baba Nyonya cuisine as a tourist attraction. This is consistent with Mak et al. (2012), who found that tourists with higher levels of food involvement are more likely to seek out unique culinary experiences and participate in food-related activities. Both studies highlight the importance of immersive culinary experiences in attracting tourists. Comparing this with our findings, it is strongly suggested that reinforcing immersive culinary activities is essential in promoting Baba Nyonya cuisine.

Interestingly, our study presents unique findings regarding cultural familiarity. Unlike previous research, our results show that cultural familiarity has an insignificant relationship (B = -0.006, Sig = 0.885) with tourists' gastronomic interests in Melaka, indicating that it does not significantly influence their attraction to Baba Nyonya cuisine. This contrasts with Kivela and Crotts (2009), who discovered that cultural familiarity significantly impacts tourists' food preferences and their willingness to try new cuisines. However, Cohen and Avieli (2004) found that tourists are drawn to cuisines perceived as authentic and reflective of the local culture, with cultural familiarity enhancing their overall dining experience. These contrasting findings suggest that the impact of cultural familiarity might vary across different cuisines and cultural contexts. The current study implies that factors such as marketing and education may be necessary to increase cultural familiarity's role in attracting tourists to Baba Nyonya cuisine.

Moreover, Malaysia is well known for its rich multicultural heritage. Muhamad et al. (2023) found that elements of Malaysian culture, such as architecture, clothing, art, food, and pastimes, significantly influence cultural identity. Sibal (2018) noted that food is frequently utilized by people to maintain their cultural identity, with dietary preferences shaped by cultural backgrounds and ancestral origins. The Malaysian menu evolved from the assimilation of diverse ethnic influences, creating a unique and flavorful diet (Naili et al., 2018). This multicultural context highlights the distinct storytelling and history embodied in traditional Malaysian foods.
Halal certification is crucial in attracting Muslim tourists by ensuring compliance with Islamic dietary laws. Our study confirms that Halal certification (B = 0.668, Sig = 0.000) is the most influential factor in the potential of Baba Nyonya cuisine as a tourism attraction. This aligns with findings by Bonne and Verbeke (2008), who found that Halal certification significantly influences Muslim consumers' purchase decisions, enhancing their trust and confidence in food products. Battour and Ismail (2016) also highlighted that Halal certification not only meets religious requirements but enhances the overall tourism experience through improved service quality and sensory appeal. These findings prove the critical role of Halal certification in improving gastronomy tourism experiences and attracting Muslim tourists.

The Challenges of Halal Foods Businesses in Malaysia

The emergence of halal tourism has presented both opportunities and challenges for destinations seeking to cater to the growing Muslim travel market. Malaysia, a nation celebrated for its diverse cultural tapestry and dynamic culinary scene, has made the incorporation of halal principles into its tourism industry a prominent priority (Sánchez & Moral, 2018; Sánchez & Moral, 2019; Artadita & Hisyam, 2021; Battour & Ismail, 2015). Yet, the successful integration of halal food into Malaysia's tourism offerings is hindered by a complex web of obstacles that warrant in-depth investigation.

One of the primary challenges lies in the realm of halal certification. While halal certification is a crucial aspect of ensuring the legitimacy and acceptability of halal food for Muslim tourists, the diversity of interpretations and standards has resulted in a lack of a single, unified system (Sánchez & Moral, 2018). This lack of cohesion can create confusion and uncertainty among both tourism providers and consumers, potentially undermining the confidence and trust that is essential for the growth of halal food tourism.

Beyond the certification quagmire, the issue of cultural familiarity also plays a significant role in shaping the halal food tourism landscape in Malaysia. Muslim tourists, particularly those from diverse cultural backgrounds, may encounter unfamiliar culinary traditions and preparations that can create a sense of unease or discomfort, potentially deterring them from fully engaging with the local food scene (Sánchez & Moral, 2019; Sánchez & Moral, 2018; Battour & Ismail, 2015).

Additionally, the level of food awareness and involvement among Muslim tourists can also influence their experiences and perceptions of halal food tourism in Malaysia. Tourists with a deeper understanding and appreciation of halal food principles may have higher expectations and more stringent criteria when evaluating the suitability of the available offerings (Artadita & Hisyam, 2021; Sánchez & Moral, 2019; Battour & Ismail, 2015). Conversely, those with limited food awareness may be more receptive to a wider range of halal food options, potentially broadening the appeal of halal food tourism in the country. (Prawira et al., 2023) (Sánchez & Moral, 2019) (Artadita & Hisyam, 2021) (Battour & Ismail, 2015)

To address these challenges and unlock the full potential of halal food tourism in Malaysia, a multifaceted approach is required. Strengthening the halal certification system, fostering greater cultural awareness and understanding among tourism providers, and enhancing food awareness and involvement among Muslim tourists can all contribute to the development of a thriving halal food tourism sector (Aziz & Sulaiman, 2014; Addina et al., 2020; Bon & Hussain, 2010; Sánchez & Moral, 2019; Addina et al., 2020; Aziz & Sulaiman, 2014)
The roles of accessibility and availability of halal food options, as well as tourist perceptions and preferences, are also critical factors in the success of halal tourism in Malaysia (Artadita & Hisyam, 2021; Sánchez & Moral, 2019). This study investigated four roles of cultural familiarity, food awareness, food involvement and halal certifications on the potential of Baba Nyonya cuisines to be marketed as part of halal tourism offerings. (Artadita & Hisyam, 2021; Sánchez & Moral, 2019.

The study gap remains in the lack of empirical studies examining the full range of factors influencing the success of halal food tourism in Malaysia, particularly with regard to the distinct cultural heritage and culinary traditions that contribute to the country's unique gastronomy offerings. The shift in demand for halal tourism offerings will alter the authenticity or diminish the heritage value of the Baba Nyonya cuisines. The development of halal food tourism in Malaysia requires a nuanced and multidimensional approach that addresses the interplay of halal certifications, cultural familiarity, food awareness, food involvement, and tourist perceptions (Prajasari, 2022; Prawira et al., 2023; Elfrida et al., 2020; Septiana & Mohamad, 2018). While the country boasts a rich culinary heritage and growing interest in halal tourism, the successful integration of halal principles into the tourism sector remains hindered by persistent challenges.

Limitations of the study

This study also has limitations in terms of generalizability, as it focused on a specific cuisine and destination within Malaysia. Further research is needed to explore the dynamics of halal food tourism in other Malaysian destinations and consider a wider range of culinary offerings. Additionally, qualitative insights from both tourism providers and Muslim tourists could provide a deeper understanding of the nuances and complexities involved. This paper is limited in terms of sample size, and scope of the study and only covers Melaka regional only (Septiana & Mohamad, 2018; Elfrida et al., 2020). The findings are thus limited and cannot be generalized to the whole of Malaysia.

Despite these limitations, this study contributes to the growing body of literature on halal food tourism by offering a multifaceted analysis of the key factors shaping the industry's development in Malaysia. Nevertheless, this study offers valuable insights into the critical factors shaping the halal food tourism landscape in Malaysia and provides a foundation for more comprehensive investigations into the opportunities and obstacles faced by destinations seeking to capitalize on the growing demand for halal tourism experiences.

5. Conclusion

This study highlights the importance of halal gastronomy as a new attraction that can encourage tourists to visit a destination. This study explores Baba Nyonya cuisine's potential to enhance Islamic tourism in Melaka. Insights suggest leveraging this culinary heritage to attract Muslim tourists and primarily promote its culture and heritage through food. Previous findings noted a shift in some Baba Nyonya restaurants towards pork-free menus, appealing to Muslim customers despite lacking halal certification. Atlantic Nyonya Restaurant Malim Jaya is Melaka's sole halal-certified option. Survey results indicated a widespread perception (212 respondents) that halal Baba Nyonya cuisine is easily accessible, possibly due to awareness or assumptions about non-pork, non-alcoholic venues. Clear communication about halal certification is crucial. Albattat et al. (2017) found limited awareness of Baba Nyonya culture among younger generations. While 81.9% of respondents were familiar with Baba Nyonya food, few visited Melaka specifically for it, suggesting untapped potential that requires improved marketing and education efforts.

The research has highlighted the crucial role of halal certification in developing and promoting gastronomy tourism, particularly in catering to the growing Muslim travel market. The authenticity of local food is able to attract Muslim travellers to a particular destination. The integration of halal certification into restaurant culinary offerings and marketing strategies can enhance the confidence, comfort, and overall satisfaction of Muslim tourists. Based on the findings, it can be seen that the potential of halal gastronomy tourism attractions in Malaysia is affected by several factors, such as halal certifications, food involvement, and food awareness. Meanwhile, cultural familiarity remains not a significant predictor for the development potential of halal gastronomy tourism products

According to the latest report from Global Muslim Travel Index (GMTI) 2023, Malaysia has ranked as the top destination for Muslim travellers. The annual report analyses data from 140 countries on which destination best suits the growing halal travel segment. Due to this encouraging trend, the Malaysian government is strengthening its focus on Muslim Friendly Tourism strategy. The Ministry of Tourism, Arts and Culture (MOTAC) through the Islamic Tourism Center (ITC) has initiated a comprehensive strategy to attract Muslim travellers. One of the strategies is to expand the relationship with Muslim communities in Malaysia and the untapped potential Muslim market which is China.

In summary, this study underscores the significant roles of food awareness, food involvement, and Halal certification in promoting Baba Nyonya cuisine as a Halal gastronomy tourism attraction. While the impact of cultural familiarity remains complex and context-dependent, the findings contribute valuable insights for destination managers and marketers aiming to leverage culinary heritage effectively. By aligning marketing strategies with these critical factors, Melaka can enhance its appeal as a leading destination for Halal gastronomy tourism. However, this research is geographically focused on Melaka, limiting its applicability to other regions, and relies on a potentially small and non-representative sample, which may not capture the broader tourist population's perceptions. Furthermore, the limited exploration of marketing strategies, particularly in the digital realm, leaves room for future research to better understand how Baba Nyonya cuisine can be effectively promoted to Halal-conscious tourists. Future research can explore other cuisines that are also being highlighted as part of Melaka tourist attractions, for example, the Chetty and Portuguese gastronomy. Future studies can also look at a more significant scope of tourists and consumers from domestic and international backgrounds, which will enhance the results for the generalization of the findings and provide a better understanding of halal Baba Nyonya cuisine consumption.

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Digital Supply Chain and Business Performance: The Case of the Oil and Gas Industry

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Abstract: A competitive global business competition requires a firm to formulate a competitive strategy in supply chain management. The transformation from manual to digital management is also necessary for the oil and gas industry. A digital supply chain is a management approach that uses technology to manage the flow of goods, information, and finance across the entire supply chain. This study attempts to evaluate the impact of the digital supply chain on business performance in the oil and gas industry. The study sample was 523 PETRONAS staff members who were involved in operating two main units, namely, a gas processing and oil refinery. The results of multiple regression analysis found that the digital supply chain significantly and positively influences firm performance across the three study samples, namely gas processing, oil refinery, and the overall sample. Technology-driven supply chain management has had a significant positive impact on every aspect of the supply chain. This can be observed in enhanced efficiency, improved visibility, time savings, and increased company competitiveness. Nonetheless, the influence of the digital supply chain is not absolute because other factors such as communication, competence, transparency, and training empirically affect the firm's performance. All of these factors are complementary to the effectiveness of digital supply chain implementation. In line with this, steps are being taken to optimize digital applications across all aspects of the supply chain, along with certain elements related to human capital, to create a unique resource capable of fostering competitive advantage and enhancing firm performance.

Keywords: *Digital supply chain, Firm performance, Human capital, Oil and gas industry*

1. Introduction and Background

In today's dynamic business landscape, achieving and sustaining high performance is a main goal for organizations across industries. Business performance involves various dimensions, including financial metrics, operational efficiency, customer satisfaction, and innovation capabilities. It is a critical benchmark for assessing an organization's effectiveness in delivering value to its stakeholders and achieving its strategic objectives.

The concept of business performance is particularly pertinent in sectors such as the oil and gas industry, where companies operate within a complex ecosystem characterized by volatile market dynamics, regulatory challenges, and technological advancements. Businesses globally are enhancing their operational performance by more effectively managing their supply networks. They are innovating internal processes to maintain competitiveness and ensure long-term sustainability in a global marketplace (The White House, 2021). The supply chain is a crucial factor influencing business performance, as it encompasses all organizations and activities involved in the entire process, from production to consumption of a product or service.

As global business competition intensifies, companies increasingly prioritize supply chain management as a strategy to boost performance. Nowadays, supply chain management (SCM) is an essential tool in navigating fierce global competition, aiding managers in enhancing production, profitability, and overall company performance. In enhancing organizational productivity, performance, and profitability, supply chain management (SCM) plays a role as a key component of competitive strategy. Data on incurred costs in all related operating activities must be reported accurately (Askarany, Yazdifar, & Askary, 2010). Kherbach and Mocan (2016) emphasized the importance of a company to operate at low or optimal costs. However, the information flow must contain accurate data, as management needs reliable feedback to make informed decisions.

In the digitalization era, inventory and purchases are primary concerns in supply chain management (Farahani, Meier, & Wilke, 2017). To leverage information technology and maintain performance, most businesses have made significant investments in their functional departments Information technology integration into supply

chain management systems might assist managers in making decisions. In the coming years, DSC management will be used. The DSC involves utilizing advanced digital technology to move beyond traditional methods. Achieving a mature level of digital SCM often necessitates an organizational transformation that encompasses both internal and external supply chains. An effective agenda is fundamental to any digital SCM strategy (Farahani et al., 2017).

The global financial crisis has impaired Malaysia's oil and gas industry on numerous occasions. Malaysia's economy thrives on the oil and gas sector, contributing 20 to 30 percent to Malaysia's Gross Domestic Product (GDP), one of the most important revenue streams. Financial performance has been a significant concern due to Malaysia's unstable economic climate and currency depreciation, which affects the company's ability to maintain profitability (Ismail, 2020). The supply chain for the oil and gas industry faces both supply chain and technology threats. It indicates that high-risk industry supply chain management must prevent technical risks in addition to supply risks, demand risks, process risks, control risks, and environmental risks to minimize supply chain disruption (Choonga, Hamidb, & Cheong, 2015). Therefore, this study attempts to evaluate the impact of the DSC on business performance in the case of the oil and gas industry.

2. Literature Review

Digital supply chain (DSC)

The DSC is the adoption of digital technologies, including artificial intelligence, blockchain, big data, cloud computing, and the Internet of things (IoTs) into various activities of the supply chain to establish an operational process characterized by decision-making backed by data (Karimi & Rivard, 2020; Holmstrom & Partanen (2014); Deepu & Ravi,2023; Büyüközkan & Göçer (2018). Adhiatma, Fachrunnisa, and Mustafa (2020) defined the DSC as a process of networking between individuals and organizations involved in commercial agreements established in a paperless environment using web-enabled capabilities. According to Bhargava et al. (2013), Digital Supply Chain (DSC) consists of a combination of systems that support communication and transaction processes between global distribution organizations and their partners' activities within the supply chain. Integrating advanced technologies into traditional supply chain operations generates a significant amount of data and information, which can enhance supply chain value. For example, digital technologies such as intelligent labels, smart contracts, and digital storage enable traceability throughout a product's entire life cycle, from raw material sourcing to final delivery (Zhou, Zhu, & Xu, 2023). Unlike closely related concepts such as digital technology adoption and transformation, supply chain digitalization specifically emphasizes how implementing digital technologies transforms supply chain processes and decision-making (Ageron, Bentahar, & Gunasekaran). DSCs can harness real-time data from multiple sources to facilitate demand stimulation, matching, sensing, and management, all of which contribute to improved performance and risk reduction.

Several theoretical perspectives have been proposed to elucidate the relationship between DSC and firm performance. One prominent framework is the Resource-Based View (RBV), which posits that firms can achieve sustainable competitive advantage by leveraging unique and valuable resources, including digital technologies, to create superior customer value. Kinnet (2015) highlighted that Digital Supply Chain (DSC) is defined by their speed, intelligence, and value. The introduction of new technologies and analytics is driving the creation of novel revenue streams, returns, and profits. Similarly, Schrauf and Berttram (2016) argued that digitalization not only enhances the value of supply chains but also makes them more accessible and cost-efficient. Their conclusions align with Israelit et al. (2018), who suggested that companies adopting digital technologies in their supply chains can quickly improve service levels. A fully integrated and digitalized supply chain network allows businesses to rapidly respond to customer demands, boosting effectiveness, efficiency, and productivity. Digital (2015) also noted that DSCs provide manufacturers with deep insights into customer behavior, helping them establish a unique position within a complex ecosystem of partners, suppliers, and customers. Motors (2017) suggested that Digital Supply Chains (DSC) address operational challenges by providing comprehensive visibility into a company’s needs, objectives, and obstacles. For a DSC to function effectively, companies must strategically plan to deliver valuable, real-time information across the entire network. In Europe, businesses are making substantial investments in digitalization as a key part of their business strategies (Kearney, 2015). Notable examples include companies like Amazon, Alibaba, Lufthansa, BMW, DHL, and DB Schenker, all of which are significantly investing in digitalization efforts.

In DSC, information is also easy to manage and record, which increases traceability. Updating product information could be a two-way process, either upstream or downstream. Information can be updated more precisely during monitoring thanks to the streamlined communication interface that a DSC can offer (Germani et al., 2015). Senior management must develop a broader perspective on how to leverage digital technologies to fully capitalize on their current potential. The intricacy of information flow made a lot of things possible by the digitization of demand and supply creates more opportunities for companies (Ardito et al., 2018). Therefore, it can be hypothesized that;
H1: There is a significant relationship between digital supply chain and business performance.

Trust
Trust is a crucial factor in the relationships between businesses and their stakeholders, influencing various business outcomes, including overall performance. It can be described as the willingness to be vulnerable to another party's actions, based on the expectation that the party will carry out an important action for the trustor, even without the ability to monitor or control them. In a business setting, trust extends to relationships between employees, business partners, and between businesses and their customers.

In recent years, there has been a significant increase in research highlighting the importance of trust within organizations. Trust plays a vital role in organizational environments, affecting various outcomes (Brühl et al., 2018; Fulmer, 2018). A lack of mutual support and trust between internal stakeholders, such as employees and managers, often leads to reduced productivity and weakened performance (Vanhala & Dietz, 2015; Zeffane & Connell, 2003). Organizational efficiency is believed to be attainable only when interdependent actors collaborate effectively in an atmosphere of positive trust (Zeffane & Connell, 2003). As a result, trust influences key organizational outcomes, such as innovation (Vanhala & Ritala, 2016) and overall performance (Koohang, Paliszkiewicz, & Goluchowski, 2017)

High levels of trust among team members can enhance collaboration, communication, and overall team performance. Research by Costa, Roe, and Taillieu (2001) suggests that trust within teams fosters a positive work environment that encourages information sharing and innovation. Dirks and Ferrin (2002) found that when employees trust their leaders, they are more likely to exhibit higher levels of organizational commitment, job satisfaction, and performance. Trust contributes to the psychological safety of employees, allowing them to take risks and be creative without fear of negative consequences. Edmondson (1999) showed that teams with high psychological safety are more likely to engage in learning behaviors, which can lead to improved performance.

Trust is a critical determinant of customer loyalty. Trust within an organization encourages risk-taking and experimentation, which are essential for innovation. For instance, studies by Hansen, Morrow, and Batista (2002) indicated that higher levels of trust correlate with better financial performance, customer satisfaction, and employee productivity. The literature consistently demonstrates that trust is a pivotal factor influencing various dimensions of business performance. Businesses that cultivate and maintain trust are better positioned to achieve sustained competitive advantage and superior performance outcomes.
H2: There is a significant relationship between trust and business performance.

Communication
Effective communication enhances organizational relationships and minimizes strikes and lockouts (Musheke & Phiri, 2021). Effective communication is vital in the oil and gas industry, where complex operations, high risks, and diverse stakeholders demand precise and efficient information exchange. This literature review explores the relationship between communication and business performance in the oil and gas industry, highlighting key areas such as safety, operational efficiency, stakeholder management, and crisis communication. In the high-risk environment of the oil and gas industry, effective communication is crucial for maintaining safety standards. Effective communication with local communities is essential for maintaining social license to operate. According to Musheke and Phiri, (2021), communication is a very crucial and significant element in an organization, and it is necessary for creating collaboration within the work environment that has effects on organizational performance and decision-making.
Jenkins and Yakovleva (2006) found that transparent and proactive communication strategies build trust and support from local communities, which is critical for project success. In the heavily regulated oil and gas

industry, maintaining good communication with government bodies is crucial. Kuria (2008) revealed that inadequate communication poses a significant challenge to organizational performance, particularly in providing effective customer service. When information is not thoroughly communicated between individuals, customers are less likely to receive quality service, which serves as a key indicator of both employee efficiency and overall organizational performance.

Pereira and Gonçalves (2022) confirm that organizations that prioritize clear communication channels experience higher employee satisfaction and performance levels. Engaged employees are more likely to be motivated, reducing turnover rates and enhancing overall organizational performance. Clear and consistent communication is key to improving operational processes. Amoah and Jibril (2021) demonstrate that effective communication practices lead to better coordination among teams, reducing errors and delays. This is especially important in industries like oil and gas, where operational complexities are high. Improved communication leads to more efficient workflows, optimized resource utilization, and ultimately better financial performance. Communication is also a key driver of innovation and change within organizations. Open and collaborative communication fosters a culture of innovation, where employees feel empowered to share ideas and take risks. According to Men (2014), leaders who communicate a clear vision and encourage open dialogue create an environment that supports innovation and continuous improvement, leading to better business performance. In conclusion, effective communication is a crucial driver of business performance in the oil and gas industry. It plays a vital role in ensuring safety, enhancing operational efficiency, managing stakeholder relationships, and handling crises. Therefore, it can be hypothesized that;
H3: There is a significant relationship between communication and business performance.

Competency
Competency is defined as the combination of skills, knowledge, and abilities required to perform a job effectively, and is a critical determinant of business performance. Competent employees contribute to organizational success through enhanced productivity, innovation, and customer satisfaction. Competency plays a crucial role in influencing business performance by improving efficiency, innovation, customer satisfaction, and strategic alignment. Organizations that effectively identify, develop, and manage competencies are better positioned to achieve their performance goals and maintain a competitive advantage. However, to maximize the benefits, organizations must address challenges related to measurement, evolution, and cultural integration. Dubois et al (2004) argued that strategic competency management ensures that organizations have the right skills in place to execute their strategies effectively, leading to better performance outcomes. Salas and Cannon-Bowers (2001) found that training programs that enhance employee competencies lead to improved job performance and overall productivity. In addition, Campion et al. (2011) found that competency-based selection methods are more predictive of job performance than traditional selection techniques. Finally, Bakker and Demerouti (2008) demonstrated that competency enhances employee engagement, which is linked to higher job satisfaction and performance. Employee competencies have become an increasingly important factor in driving a successful business in today's competitive environment. Competencies are considered to provide a competitive edge, as having highly skilled employees enables a company to navigate challenging situations problems as various difficulties in demanding situations.
H4: There is a significant relationship between competency and business performance.

Agility
The growing complexity and volatility of global markets demand supply chain agility and responsiveness. Digital technologies allow firms to detect and adapt to changes in demand, supply, and market conditions more quickly and effectively. Through advanced analytics, automation, and real-time monitoring, organizations can enhance their ability to detect disruptions, reroute supply chains, and adapt production schedules, thereby improving responsiveness and resilience to external shocks. With the rapid market changes and ongoing competition, managers frequently face pressure to keep pace and demonstrate supply chain agility. Supply chain agility has been identified as a crucial operational proficiency for establishing a competitive edge given the growing importance of timely and economical product delivery (Brusset, 2016). Management is still considering ways to increase the agility of the supply system when it decides to manage inventories digitally. This could aid the business in enhancing tracking, distribution, and reaction times in the supply chain (Bi et al., 2013).

Enterprise flexibility and supply chain system agility are key factors, and this flexibility is the most crucial component for enhancing supply chain agility and business productivity. There are many different ways to define and evaluate supply chain agility. The definition of "agile" when it first appeared in the business sector was "the act of an enterprise thriving in a rapidly changing and unpredictable climate" (Chan, Ngai, & Moon, 2017).

The attribute of agility illustrates how flexible the DSC is. It is the capacity to change strategy in response to market developments and customer demand. In comparison to their first purchase order, the needs of the customer could shift over time. The precise and timely management of resource changes must require the integration of knowledge sharing. If there is a delay in reacting to the modifications, the delivery time will be impacted (Zhao, Huo, Sun, & Zhao, 2013). Therefore, the hypothesis is as follows;
H5: There is a significant relationship between agility and business performance.

Transparency
Transparency is defined as the disclosure of information and knowledge (Egels-Zandén, Hulthen & Wulff, 2015). This includes the disclosure of information about suppliers' names, sustainability conditions at suppliers, and buyers' purchasing practices. Transparency can also enhance operational efficiency by promoting better decision-making, resource allocation, and risk management within organizations. Hammervoll and Bø (2010) stated that transparency is the amount of possession of on-hand information by the supply chain partners. Transparency is becoming more crucial in enabling many people to critically assess the firms' sustainability commitments (Egels-Zandén, Hulthén, & Wulff, 2015). If a technology-based strategy is implemented, there will be substantially greater transparency and visibility in all areas of the supply chain. Early technological adoption has difficulties from several perspectives, but if such technologies are well-planned and have the necessary framework and architecture in place, significant adoption barriers might be surmounted. To increase supply chain transparency, governance tools, which are an assortment of agreements and arrangements between supply chain players, are crucial. They create an organizational network for knowledge sharing.

The relationship between supply chain transparency and business performance has been studied by several authors (Nyamah et al, 2022, Ahmed & Omar, 2019; Bastian & Zentes, 2013). These studies in agricultural food firms found that supply chain transparency increases business performance. Besides that, in India traceability, transparency, and information flow are crucial components intended to ensure the quality of dairy products (Pant, Prakash, & Farooquie, 2015). This leads to an increase in performance. Therefore, the hypothesis can be concluded as follows;
H6: There is a significant relationship between transparency and business performance.

Training
As technology evolves more rapidly providing training is one of the most important aspects of increasing business performance. Human capital often encompasses training programs designed to enhance employees' knowledge, skills, social abilities, and ethics. These programs aim to improve employee performance and satisfaction, which in turn boosts the company's overall performance. Consequently, supply chain and logistics sectors should consistently be prepared for any necessary technical qualifications (Hashim & Shariff, 2016).

A well-designed training program and module could help employees with specialized abilities. According to Bienhaus and Haddud (2018), organizations must design a training program to move into digital transformation (Bienhaus & Haddud, 2018). The business should invest in DSC management training to increase the firm performance. This can develop into intellectual capital if given time to mature through training and work experience (Aziz, 2016). Therefore, organizational goals and supply chain sustainability initiatives are connected to departmental training and learning (Teixeira et al., 2016). It is supported by Kang and Na (2020) and Martins (2022) who revealed that the additional training led to economically and statistically significant improvements in several dimensions of firm performance. This can be hypothesized as;
H7: There is a significant relationship between training and business performance.

3. Research Methodology

Measures

This study involves one dependent variable and six independent variables. Firm performance is a dependent variable and is measured using subjective methods as suggested by Kotey and Meredith (1997). There are nine items used to measure the dependent variable, namely investment return, profit growth rate, asset-liability ratio, market share, customer satisfaction, partner trust, logistic services and work specialization, technology adaptation and new services, and better performance after implementation of digitization in the supply chain. The respondent's level of agreement with all the items is based on a five-point with a frequency of "1= strongly disagree" to "5= strongly agree". The independent variables consist of the DSC factor as the focus factor of the study in addition to six other factors identified as determinants of firm performance. The factors are trust, communication, competence, agility, transparency, and training. DSC variables are measured based on eight items, namely information acquisition, information flows within the company and partners, benefits of information exchange, financial transaction activities more efficiently, coordinating financial transactions with partners, reduction of financial coordination costs, insurance coverage from suppliers and successful implementation digital in company procurement management. Measurements are made using a five-point scale with a frequency of "1= strongly disagree" to "5= strongly agree".

The trust variable is also measured based on the respondent's level of agreement with a frequency of "1=strongly disagree" to "5=strongly agree" involving nine items that are used as measurement elements. The items are concerned with the welfare of the supplier in making decisions, responding with full understanding if there are problems with the supplier, depend on the supplier to make decisions, depend on the supplier in important matters, sources of information from the supplier, suppliers often keep their promises, give consideration to the supplier's advice in operations The company's business, the company's organization depends on the sincerity of the supplier and the company has confidence in the supplier in using a digital approach. The communication variable involves six items, which are often communicating with suppliers using digital methods, the company always interacting face-to-face with suppliers, always collaborating with suppliers, often interacting with suppliers online, often collaborating with suppliers using interactive communication, and the importance of communication in the chain system. Company supplies. The measurement of the variable is based on the level of agreement of the respondents based on a five-point Likert scale with a frequency of "1= strongly disagree" to "5= strongly agree".

The competence variable is measured based on staff competency using eight items, namely inventory management, communicating with suppliers and customers, delivery accuracy, finding solutions in the supply chain, reducing supply chain costs, increasing information sharing, increasing the supply chain through the exploration of new opportunities and purchasing and procurement management. The measurement of agility variables is made based on the respondent's ability to respond in various operational dimensions. There are nine items used for that purpose, namely, purchase order processing time, reduction of purchase order improvement process cycle time, increase in the frequency of introducing new purchase procedures, increase the level of purchase modification process, purchase process preparation, customer service, purchase process reliability, increase responsiveness, adaptation and modification of the purchasing process. All the items are measured using a five-point scale with a frequency of "1 = very low" to "5 = very high".

The transparency variable is measured based on seven items, namely the internet network in the supply chain ecosystem, the flow of information and materials, logistic operations, reducing operational complexity, enabling easier access to material information, obtaining detailed product life cycle information, and increasing transparency in the supply chain system. Company. The level of agreement for the variable is measured using a five-point scale between "1= strongly disagree" to "5= strongly agree". For the training variable, respondents are required to state their level of agreement about the information about training based on a five-point scale, which is "1- strongly disagree" to "5= strongly agree". There are nine items used to measure the variables, which are the training content according to the company's requirements, the trainee's responsibilities and duties are determined accurately, training is offered to all staff, infrastructure facilities meet the training program requirements, training locations inside and outside the company, performance evaluation after training, approach the topics used are appropriate and up-to-date for the company's activities and the effectiveness of the training program.

Sample

In the management of firm operations, the DSC approach is widely practiced in large firms including the oil and gas sector. The staff's ability to adapt the DSC in the work process is seen to have a positive effect on the firm's performance. The sample frame of the study involves two units that are important in Petronas operations, namely gas processing (1235 people) and oil refinery (532 people). Based on the total population it is divided according to strata (department). For the study analysis, the sample size for each stratum is determined based on the population ratio of each department and the total population. Based on the sample calculation suggested by Krejcie and Morgan (1970), the required sample is 523 people, each involving the staff of the gas processing unit (297) and the oil refinery (226).

Table 1: Sample distribution by department

Department	Gas processing		Oil refinery	
	n	*S*	*n*	*S*
Technical Services	211	51	20	8
Facilities and Administration	16	4	15	6
Operation 1	371	89	140	60
Operation 2	341	82	125	53
Health, safety, and environment	17	4	25	11
Human Resources Management	9	2	11	5
Operation Excellent and improvement	19	5	20	8
Production planning	12	3	41	17
Utilities	229	55	105	45
Others	10	2	30	13
Total	1235	297	532	226

Notes: n is population size; S is sample size Source:
Based on the sample survey

The data collection process was managed by the researcher by distributing questionnaires to respondents selected as a sample using Microsoft Forms (MS Form). The method is used following Petronas's information technology security policy. The distribution of the population and sample is shown in Table 1. Some data tests are done first to ensure the reliability of the data that will produce the study model. Table 2 shows the value of Cronbach alpha (α) for all the study variables is above 0.7, indicating that the study data are reliable as explained by Nunnally (1978). The Collinearity Statistics test was performed to ensure the reliability of the regression model formed in the study. The problem of multicollinearity will occur when there is a perfect linear relationship between the variables and it can be determined through the correlation coefficient. Based on the Tolerance value (> 0.1) and VIF (Variance inflation factor) (< 10) show that there is no problem of multicollinearity in the study data. Therefore, the research data can be analyzed through the multiple regression method and produce a good regression model.

Table 2: Reliability Test and Collinearity Statistics

Construct	Reliability Test		Collinearity Statistics	
	Items	Cronbach's α	Tolerance	VIF
Trust	9	0.904	0.295	3.391
Communication	6	0.850	0.525	1.903
Competency	8	0.895	0.594	1.683
Agility	9	0.955	0.336	2.979
Transparency	7	0.851	0.353	2.834
Training	9	0.898	0.494	2.026
DSC	8	0.918	0.564	1.772
Firm Performance	9	0.925		

Source: Based on the sample survey

4. Results

The results of the descriptive analysis involving the mean, standard deviation, and correlation between all the study variables are shown in Table 3. Overall the mean value for all the variables is high. The mean value for the DSC variable is 3.805, giving the impression that respondents agree with the importance of the DSC in the operations of petroleum-based firms. The analysis also indicates that the relationship between the variables is moderate, with values ranging from 0.215 to 0.760. This explains that there is no multicollinearity problem and allows the study data to be analyzed using the multiple regression method. Hierarchical multiple regression was used to evaluate the ability of DSC variables to predict firm performance after controlling for six other variables.

Table 3: Descriptive Statistics and Correlation.

Variable	Mean	SD	1	2	3	4	5	6	7
1. Trust	3.795	0.465	1.000						
2. Communication	4.033	0.516	0.647***	1.000					
3. Competency	3.839	0.466	0.548***	0.481***	1.000				
4. Agility	3.773	0.511	0.731***	0.568***	0.599***	1.000			
5. Transparency	3.879	0.481	0.760***	0.568***	0.528***	0.712***	1.000		
6. Training	3.783	0.496	0.649***	0.556***	0.427***	0.588***	0.603***	1.000	
7.DSC	3.805	0.492	0.552***	0.447***	0.357***	0.602***	0.553***	0.547***	1.000
8. Firm Performance	5.457	0.622	0.341***	0.215***	0.302***	0.361***	0.291***	0.405***	0.479***

Data analysis was analyzed according to two operational units, namely gas processing and oil refinery, in addition to the overall data. The results of the multiple regression analysis are shown in Table 4. Model 1 analyzes six factors that affect firm performance. The total variance explained for the six variables that can explain the firm's performance for the overall sample is 20.5 percent, $F(6, 192) = 15.939$, $p < 0.01$. As explained, the main objective of the study is to evaluate the influence of DSC and performance factors on firm performance. Accordingly, in Model 2, the analysis is made by considering the DSC variables in addition to the existing six variables. The separation of analysis according to two models can give a clear picture of the role of DSC factors on the firm's performance. Research analysis shows that there is a change in explanatory power (R^2 = 28.6 percent), $F(1, 273) = 21.186$, $p < 0.01$. The inclusion of DSC variables in Model 2 clearly shows that there is an increase in R^2 across all three data categories. This explains the variable's significant influence in explaining the variation in firm performance in the oil and gas sector operations.

In explaining all the research hypotheses, the analysis focuses on Model 2. Empirically, the study found that the DSC significantly and positively influenced the firm's performance in the management of gas processing ($\beta = 0.434$, $p < 0.01$), oil refinery ($\beta = 0.654$, $p < 0.01$) and the whole sample ($\beta = 0.480$, $p < 0.01$). This finding allows the study to confirm H1 which explains the importance of DSC factors in the operational management of petroleum-based firms. The significant finding is consistent with Ardito et al (2018) and Israelit et al. (2018). The use of DSC in the firms will significantly enhance the business performance. The assimilation of the DSC creates more opportunities for firms and can speedily enrich the service levels of the firms.

Table 4: Result of regression analysis

Variables	Model 1			Model 2		
	Gas Processing (n = 225)	Oil Refinery (n = 153)	Overall (n = 378)	Gas Processing (n = 225)	Oil Refinery (n = 153)	Overall (n = 378)
Digital supply chain Performance factors				0.434***	0.654***	0.480***
Trust	0.295	-0.025	0.124	0.193	0.015	0.096
Communication	-0.194*	-0.085	-0.153**	-0.145	-0.159	-0.172**
Competency	0.291**	0.038	0.163**	0.317**	0.085	0.200***

Agility	0.176	0.258**	0.197**	-0.029	0.136	0.037
Transparency	-0.181	-0.059	-0.100	-0.218	-0.121	-0.168*
Training	0.245*	0.505***	0.395***	0.147	0.344***	0.285***
Constant	3.094	3.098	3.128	2.855	1.845	2.629
R^2	0.196	0.247	0.205	0.253	0.395	0.286
Adjusted R^2	0.174	0.217	0.192	0.299	0.366	0.273
F Statistics	8.877***	8.003***	15.939***	10.522***	13.535***	21.186***

Notes: Significant at *p < 0.10, ** p < 0.05 and ***p < 0.01, Firm performance as dependent variable
Source: Based on the sample survey

Model 2 indicates that trust does not significantly impact firm performance across all three sample categories. Therefore, the study cannot confirm H2. As for the communication, the findings show that the variable only shows a significant value for the overall sample (β = - 0.172, p < 0.05), and is not significant for the gas processing and oil refinery operational units. Accordingly, the study cannot fully confirm H3. The analysis also shows that the competency variable has a significant influence on the performance of the firm in the petroleum sector for the gas processing operation unit (β = 0.317, p < 0.05) and the overall sample (β = 0.200, p < 0.01). While the variable is not significant for the oil refinery operation unit. Based on the findings, the study can only partially confirm H4 which relates to the positive influence of competence factor on the performance of petroleum firms.

The study also fails to confirm H5, as data across all categories show that agility does not significantly affect firm performance. Additionally, the analysis reveals that the transparency variable does not significantly impact firm performance in either data category related to the operating unit. Only the whole sample (β = - 0.168, p < 0.1) shows a relatively weak negative relationship with firm performance. Therefore, only H6 is partially confirmed. The negative sign is inconsistent with the findings of Nyamah et al, (2022), Ahmed and Omar (2019), and Bastian and Zentes (2013). These studies found that supply chain transparency significantly increases business performance.

The statistical analysis in Model 2 also shows that the influence of training on the performance of the firm in the petroleum sector for the gas processing operation unit is not significant. However, the influence of training on the firm's performance for the oil refinery unit sample (β = 0.344, p < 0.01) and the overall sample (β = 0.285, p < 0.01) shows that there is a significant positive relationship. Accordingly, the study can partially confirm H7. This finding is supported by Kang and Na (2020) and Martins (2021). Additional training can positively and significantly influence several dimensions of the firm performance. This is also consistent with the theory of RBV.

5. Discussion and Conclusion

The main objective of the study is to evaluate the influence of the DSC and some other factors on the firm's performance. A total of 523 PETRONAS staff involved in the operation of two main units, namely gas processing and oil refinery, were used as a study sample. The multiple regression analysis method was used to explain all the research hypotheses. The transformation of the supply chain process that took place from manual management to a technology use approach, became a catalyst for PETRONAS to make a large investment to adapt the use of digital in the company's supply chain management. The digitization of the supply chain process is an approach that involves the use of technology to manage the flow of goods, information, and finance across the entire supply chain in business operations. The digitization of supply chain management needs to be done not only to meet the needs of the technological transformation that occurs in the management of various sectors but also to create unique resources that the firm has compared to its competitors, especially in the same industry. The ability to create unique resources with characteristics such as being hard to obtain and imitated by competitors, having no substitute, and having value is a competitive advantage that can generate firm performance (Barney, 1991).

The findings empirically show that the DSC has a significant positive influence on firm performance across the three study samples, namely gas processing, oil refinery, and the overall sample. This explains that technology-driven supply chain management practices have had a positive impact on the processes that occur in business

operations. The impact of the adaptation of digital elements in the management of PETRONAS operations has shown a significant improvement, especially in terms of operational efficiency and increased company profits. Digital supply management can increase the visibility of the process that takes place and allows the company to make quick decisions, facilitating the tracking of any deviations that occur and further reducing the risk of operational failure. In addition, the digital system used can also reduce human error, avoid the occurrence of the price of non-conformance, make the flow of the work process more efficient, and lead to cost savings. The digitization of supply chain management also allows management to make more agile actions to any changes and market uncertainties that occur, especially concerning demand and supply.

However, the findings show that the influence of the DSC is not absolute because several other factors also show the ability to influence the firm's performance. This study provides empirical evidence that communication, competence, transparency, and training are significantly related to a firm's performance. Those internal factors related to human capital are seen as complementary to the effectiveness of DSC implementation in the firm's operations. The importance of human capital resources is consistent with the resource-based view theory that places these resources as the main element that can influence firm performance. The firm's ability to coordinate human resources with the digitization of material supply management will strategically increase business competitiveness and create comparative advantage.

In terms of policy implications, the findings highlight the importance of Digital Supply Chain (DSC) practices for industry players. The transition to digitizing operational processes has a significantly positive effect on a firm's performance. The ability of human resources also needs to be strengthened simultaneously with the digitization measures that are carried out. The skills of the staff involved can be improved through their exposure to appropriate training. The findings indicate that, alongside the competency element, training is the most critical requirement. The values of human capital need to be improved to ensure the effectiveness of DSC implementation at the maximum level. The effectiveness of human capital is crucial for addressing issues that frequently arise during the digitalization of supply chain management. Challenges that may arise include the ability to consolidate data from various sources such as suppliers, partners, and systems within the company. A key policy implication of using digital supply chains is the need for enhanced cybersecurity and data protection regulations. As supply chains become increasingly digitized, vast amounts of sensitive information, including transaction records, shipment tracking, inventory levels, and customer data, are transmitted and stored electronically. This creates vulnerabilities to cyberattacks, data breaches, and potential intellectual property theft. Therefore, governments can establish or enforce regulations requiring companies to adopt robust cybersecurity measures, such as encryption, multi-factor authentication, and continuous monitoring of digital systems.

Limitations and future research

This study focuses solely on evaluating the impact of the DSC approach and a few other factors on the performance of firms within the oil and gas sector. On a broader scale, different business sectors could be examined, offering more comprehensive insights and improving the ability to predict how the DSC approach influences firm performance. Additionally, this study limits its analysis to one aspect of physical resources (DSC) and four elements of human capital resources (communication, competence, transparency, and training) in assessing their effects on firm performance. From the perspective of resource-based view theory, alongside human resources, physical resources (such as firm characteristics, asset ownership, location, and raw materials) and organizational resources (such as the firm's formal reporting structure, planning, control, coordination systems, and informal relationships both within and outside the firm) are also factors that can influence firm performance. Considering these various factors in future research could offer more comprehensive insights into the support needed for DSC implementation to enhance firm performance.

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A Critical Analysis of Science And Technology's Impact on The Re-Evaluation of Iddah From *Al-Taʿlīl Bi Al-Ḥikmah* Perspective

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Abstract: In contemporary Islamic discourse, there is an increasing emphasis on the role of wisdom in determining Islamic law due to its significant connection with the concepts of ʿillah and Maqasid Shariah. This discussion in Uṣūl al-Fiqh is known as al-Taʿlīl bi al-Ḥikmah. Additionally, the rapid advancements in modern science and technology are recommended for integration into contemporary Islamic legal research. Thus, exploring the intersection of wisdom and science is crucial. One of the issues that is often a concern in responding to the relationship between wisdom and science within Islamic law is the rule of iddah. This study aims to investigate the relationship between the rule of iddah and its underlying wisdom, as well as the role of science in realizing this wisdom and its impact on legal rulings. A qualitative approach was employed, using document analysis of both classical and contemporary writings on the rule of iddah. The analysis was conducted inductively to identify the principles of al-Taʿlīl bi al-Ḥikmah, which form the primary framework for examining the iddah issue. This study finds that if the use of wisdom and science in determining Islamic rules aims at realizing the objectives of the Shariah, performed by its guidelines, then it conforms with the requirements of Shariah and achieves Maqasid Shariah.

Keywords: *Waiting period, iddah and science, al-Taʿlīl bi al-Ḥikmah, science and technology in Islamic law.*

1. Introduction

The rapid advancement of science and technology in the present era has been remarkable. Since the industrial revolution started in the 18th century, the globe has currently been through its fourth phase. The effects of modern scientific and technological developments, primarily driven by the West, are increasingly felt by the Muslim community. These effects extend beyond lifestyle changes and the use of modern technologies; they also have an impact on Muslims' religious behavior and worldview (Badhrulhisham et al., 2019).

One intellectual impact of science and technology is the proposal by some contemporary scholars to integrate scientific endeavors i.e. facts and theories into Quranic Exegesis. This is one of the key topics in the integration of Islam and science, namely *Iʿjāz al-ʿIlmī* or *Tafsīr al-ʿIlmī* (Miraculous Signs of the Quran), as developed by some contemporary Muslim scholars (Yusuf al-Haj, 2010). Nevertheless, the discourse on this matter is much debated and contested by many contemporary scholars.

Apart from that, there are also proposals to integrate advancements in science and technology into Islamic legal discourse (al-Qaradawi, 2001; Majid, 2010). This proposal warrants attention, as science and technology can add value to legal rulings derived through ijtihad. For instance, they can aid in determining the halal status of consumer goods, provide a clearer understanding of issues before decisions are made, and reassess past ijtihad based on *ʿurf* and other considerations (Jamaludin et al., 2011; Hamdan et al., 2015).

The consideration of scientific values is also relevant in the fields of Fiqh and Usul al-Fiqh (Ḥusayn, 2012). One particular idea that has not yet been explored in-depth and extensively is to incorporate scientific and technological advancements to search for the purpose, wisdom or rationale (*ḥikmah*) behind Islamic legal rulings. The Islamic legal injunctions, when examined through scientific perspectives, can highlight the rationality and appropriateness of these laws.

In such integration, science is employed to understand the aspects of wisdom, benefits, public interest, and advantages behind each command and prohibition in Islamic law. Thus, the scientific rationale, also known as

'scientific wisdom,' inherent in Islamic rulings can be extracted and comprehended, assuring Muslims that Islamic law is rational and not merely ritualistic. This approach is, in fact, an inherent component of the Maqasid Shariah framework itself (al-Raysūnī, 2014).

Meanwhile, certain Muslims contemplate that the underlying rationale of the Shariah, which serves as the foundation of Islamic rulings, can be actualized through the advancement of science and technology. Hence, the progress of science and technology must not be disregarded and should be duly considered while developing contemporary Islamic legislation. This concept can be further elucidated through a frequently cited example, specifically the rule of iddah or the waiting period for divorcee or widow in Islamic marriage law (Wahyudi, 2009; Rofiq, 2020).

Due to advancements in biomedical science and technology, some groups propose replacing the traditional method prescribed in the Quran for divorced women in the iddah period - three menstrual cycles (*qurū'*) or three lunar months before she can marry again with another man - with more advanced and sophisticated modern methods, such as the use of modern pregnancy detection tools and technologies. This is based on the premise that the iddah period was established to determine the emptiness of a woman's womb (*barā'ah al-raḥim*) after divorce or the death of her husband.

With modern scientific and technological advancements, it is now possible to determine the status of a woman's womb in a much shorter time, compared to the traditional waiting for three menstrual cycles or three months. Therefore, the proposal is that the traditional method of three *qurū'* be replaced with modern technological methods to ascertain womb emptiness. This issue is also increasingly gaining attention from many researchers (Elbashir, 2024; Muhammad Iqbal, 2024; Arafah et al, 2023) However, there has not yet been a study that examines this issue from the perspective of *al-Taʿlīl bi al-Ḥikmah*.

2. Literature Review

Adapting Iddah to Scientific Advancements

The rule of iddah holds significant importance within the Islamic community of the Nusantara archipelago. All related issues necessitate a comprehensive resolution, either from a legal standpoint (Pomahiya et al., 2022; Mahmud et al., 2020) or in terms of dispelling any confusion arising from contemporary ideologies (Hilal & Harahap, 2021).

The question of the relationship between the waiting period (iddah) and the emptiness of the womb (*barā'ah al-raḥim*) in light of scientific advancements is a matter of concern among Muslims today which can be seen on the fatwa website platform (binbaz.org.sa, n.d.; islamweb.net, 2021). Furthermore, due to the advancements in science and technology, there have been proposals from certain individuals, such as those by Abd al-Majīd al-Sharfī (2001) and Boukani et al. (2015) to reform or alter the laws of iddah for women who are divorced or widowed.

Those who hold this view argue that the underlying philosophy, wisdom, purpose, and rationale behind the iddah ruling, as elucidated by classical jurists, aim to ascertain the emptiness of the womb and prevent the mixing of progeny between the previous husband and a future spouse. In other words, to avoid the mixing of offspring or lineage. Thus, advocates of this perspective contend that these objectives can now be achieved with the advancements in science and technology available today. The traditional waiting period was deemed appropriate and relevant only in the past when technological advancements were not available.

The prescribed divorce waiting period in Islamic law, which traditionally serves to determine the presence of pregnancy or a fetus in the womb, can now be easily resolved with modern medical technology without waiting for three menstrual cycles (*qurū'*) or three lunar months. Islam, being a rational religion that is universal and aligns with the advancement of knowledge, inherently suggests that the rules regarding iddah should also be adapted and updated in accordance with scientific and technological developments (Boukani et al., 2015).

Through the use of scientific tools and tests, pregnancy can be detected within a short period of time, as early as five to six weeks after the last menstrual period using sonography or ultrasound scans, and eight to ten days

after the embryo implants in the uterine wall through devices or kits such as hCG (Human Chorionic Gonadotropin), ultrasonography, and Gravindex. Moreover, the results of these pregnancy tests can be obtained immediately without the need to wait for an extended period, such as three menstrual cycles or four months and 10 days traditionally (Wahyudi, 2009; Boukani et al., 2015).

Furthermore, to prevent the potential mixing of lineage in cases where a divorced woman is pregnant, DNA testing or genetic fingerprinting methods can be employed to determine whether the fetus belongs to her former husband or her new husband (Boukani et al., 2015). Therefore, given these advancements in science and technology, the traditional methods of observing the iddah period are no longer necessary. In fact, a woman could remarry immediately after a divorce or the death of her husband without concerns about the paternity of the child, as this can now be definitively established through DNA testing.

Put simply, the abolition of the iddah period would not lead to issues of lineage mixing, as the preservation of lineage (*ḥifẓ al-nasl*) can now be ensured through modern scientific and medical advancements. If these scientific developments are ignored or not utilized for the benefit of the Muslim community, the claim that Islam is a rational religion would be invalidated, ultimately suggesting that Islam is merely dogmatic, incapable of evolving with the times and lacks the ability to adapt to changing circumstances.

For Islam to remain relevant in the modern era, it is vital to integrate advancements in science and technology into the formulation of legal rulings, rather than relying solely on the interpretations established by scholars of the past. Thus, the issue of the iddah must be reconsidered in light of contemporary developments and technological progress (Sodiqin, 2012). This is the perspective advocated by this group.

Iddah Law And Its Relation to *Al-Taʿlīl Bi Al-Ḥikmah*

When observed closely, those who advocate for the abolition of the iddah ruling seem to have established their legal stance based on the wisdom (hikmah) intended behind the ruling. This approach involves assessing and applying the wisdom or rationale behind a ruling rather than adhering strictly to the scriptural text. In the field of *Uṣul Fiqh*, which is the primary methodology and approach utilized in the interpretation and establishment of Islamic law, there is a topic known as *al-Taʿlīl bi al-Ḥikmah*, which involves the discussion and analysis of reasoning using wisdom. The majority of literature that analyzes the matter of iddah fails to establish a connection with *al-Taʿlīl bi al-Ḥikmah*, resulting in incomplete treatment of the subject and a significant omission in addressing this issue within the framework of Usul Fiqh.

Al-Taʿlīl bi al-Ḥikmah aims to establish the wisdom, goal, or objective desired by the Shariah as the underlying basis and foundation of a ruling *(ʿillah/manāṭ)* (al-Kamālī, 2013). Islamic rules are predominantly based on an evident attribute rather than wisdom. Clarity and consistency are qualities that may be easily discerned and established. It differs from wisdom that is ambiguous, obscure, and challenging to ascertain. Consequently, scholars generally dismiss the utilization of wisdom as a means of deciding the law completely (Rā'id Naṣrī, 2007).

A frequently cited example is the application of *qasar* prayer for travelers. The concession (*rukhṣah*) to shorten (*qasar*) prayer when someone is travelling is given because of the reason for "travel" itself, which may be easily identified and defined based on the distance travelled. The goal or rationale behind this law is to "discard hardship" from the travelers along the travels. However, the ruling is not based on that rationale because it is elusive and challenging to determine with clarity and certainty (Wahbah al-Zuḥaylī, 1986). For instance, the hardship experienced by someone traveling by motorcycle is undoubtedly different from that of someone traveling by airplane, as the degree of difficulty is difficult to ascertain with certainty.

However, when examined more closely, scholars of *Uṣūl al-Fiqh* have indeed discussed whether rulings can be linked or based on their underlying wisdom (ḥikmah). In discussing the issue of *al-Taʿlīl bi al-Ḥikmah*, Islamic scholars have three different views. Some scholars argue that rulings cannot be based on wisdom at all, while a small minority believe that rulings can be based on wisdom unconditionally. On the other hand, a significant portion of scholars assert that rulings can only be based on wisdom when certain conditions are met (al-Āmidī, 2003).

The discourse on *al-Taʿlīl bi al-Ḥikmah* has increasingly gained attention among contemporary Islamic legal researchers, to the point where it has become a specialized area of study at higher education levels. When selecting (*tarjīḥ*) among the views of scholars on this issue, the majority of researchers agree that rulings can be based on wisdom only when the wisdom meets the necessary conditions. If the wisdom does not fulfill these conditions, then it is not permissible to base the ruling on it (al-Ḥukmī, 1994; al-Saʿdī, 2000; al-Sāmirrāʿī, 2009; Nānī, 2019).

The conditions laid out by scholars need to be carefully considered to ensure that the determination of rulings based on wisdom aligns with the principles of Shariah and the authentic methods of Islamic jurisprudence. Among the conditions that must be met when applying *al-Taʿlīl bi al-Ḥikmah* are that the wisdom must possess characteristics of being *ẓāhir* and *munḍabiṭ*. *Ẓāhir* means that the wisdom must be clearly and evidently understood, while *munḍabiṭ* means consistent or constant, indicating that it will occur uniformly for all individuals (Rā'id Naṣrī, 2007).

In addition to these two conditions, several other key conditions must be fulfilled when applying *al-Taʿlīl bi al-Ḥikmah*. One such condition, closely related to the focus of this study i.e., the ruling on *ʿiddah* and its connection to the emptiness of the womb (*barā'ah al-raḥim*), is that *al-Taʿlīl bi al-Ḥikmah* cannot be applied to rulings categorized as *taʿabbudī* rulings, nor can it be applied if doing so would completely negate the primary objective intended by Shariah in legislating its rulings.

A ruling in the *taʿabbudī* category means that it must be accepted and implemented as literally stated in the scriptural texts. It is obligatory to practice, whether or not Muslims can comprehend the rationale, reasoning, wisdom or why the ruling was legislated. Examples of rulings in the *taʿabbudī* category include the number of units (*rakʿah*) in prayer, the setting of the sun as the reason for the start of the *ẓuhr* prayer time, and the designation of Ramadan as the month of fasting. These examples are directly related to rulings. However, human beings cannot fully grasp the exact purpose that Shariah intends in legislating these rulings or the reasoning and appropriateness behind the number of *rakʿah*, the setting of the sun, or the month of Ramadan, which determine and bind or associate the rulings of prayer and fasting with these elements (Nyazee, 2002).

Similarly, even if there are situations where humans can comprehend the purpose and appropriateness of something that Shariah has linked to a ruling if the ruling falls under the category of worship (*ʿibādah*), it still must be practiced or accepted as stated in the text. Even if humans understand the purpose, goal, or reason behind its legislation and can achieve that purpose using a different method than what is mentioned in the text, the ruling does not and cannot change because it belongs to the *taʿabbudī* category (Shaaranii & Muhamad, 2021).

The question then arises: Is the ruling on iddah considered *taʿabbudī*? This matter requires reference to the views of Islamic Jurisprudence scholars so that it can be clearly analyzed whether the suggestion to alter the ruling on iddah, which is traditionally linked to the method of counting menstrual cycles (*qurūʾ*) or months, to the method of determining the emptiness of the womb through modern science and technology, can be accepted or not.

3. Methodology

This research was conducted qualitatively by using content analysis based on *al-Taʿlīl bi al-Ḥikmah* perspective. The content analysis was applied to writings related to iddah, encompassing both classical and contemporary works. The classical writings focus specifically on the works of traditional Muslim scholars in the field of Islamic Jurisprudence discussing both the topic of *al-Taʿlīl bi al-Ḥikmah* and iddah, while the contemporary literature includes books and journal articles authored by various scholars on the topic of iddah and *al-Taʿlīl bi al-Ḥikmah*.

4. Findings of the Study

In reality, the issue of iddah, which some have linked to its wisdom, is not a new topic arising solely due to scientific advancements. Classical scholars have long discussed this matter. For instance, ʿIzz al-Dīn (2010) addressed this issue in his book al-Qawāʿid al-Kubrā, asserting that the obligation to observe iddah according

to the prescribed method in Shariah remains, even if the wisdom behind it - such as ensuring the emptiness of the womb - can be determined with absolute certainty.

He argued that certain rulings may be legislated with a focus on their benefits (*maṣlaḥah*), yet similar rulings may be established in a purely devotional (*taʿabbudī*) manner. This means that such rulings do not change even if the associated wisdom or benefit is fully realized through different circumstances, as they fall under the category of *taʿabbudī*. A few examples of the obligation for a divorced woman to observe iddah, even when the emptiness of her womb is already known with absolute certainty (ʿIzz al-Dīn, 2010) such as:

- The wife is a child (not yet menstruate).
- The wife of a man who is still a child.
- A wife who is divorced after twenty years of living separately.
- A wife divorced through *taʿlīq* (conditional divorce) by her husband, where the condition is that her womb is empty. Once it was confirmed that his wife was not pregnant, the divorce was pronounced on her.

Despite the absolute assurance of being able to establish and guarantee *barā'ah al-raḥim*, the aforementioned circumstances and situations continue to necessitate the obligation of iddah for women. These scenarios illustrate that in the past, it was possible to confidently know and ascertain *barā'ah al-raḥim* without relying on advanced technology. Nevertheless, none of the scholars have asserted that the implementation of iddah has ceased or that there is no longer a requirement for iddah (ʿIzz al-Dīn, 2010).

From ʿIzz al-Dīn's explanation, it can be concluded that no method, tool, or advanced technology used to determine *barāʾah al-raḥim* can negate the obligation of iddah. This is because iddah is categorized as a *taʿabbudī*, definitive (*qaṭʿiyyāt*) and immutable (*thawābit*) ruling. Al-Qarāfī (2010) further elaborates that, although there are rational aspects (*maʿqūl al-maʿnā*) to the issue of iddah, such as the verification of womb emptiness, the fact that iddah is obligatory for all divorced women or widows under Shariah, regardless of circumstance, clearly indicates it is *taʿabbudī* in nature.

In other words, the wisdom behind iddah is understood as a hikmah (wisdom) only and does not hold any significance in the determination of its legal ruling because iddah is categorized as *taʿabbudī*. In fact, almost all jurists categorize the ruling of iddah as *taʿabbudī* (al-Haytamī, 1983; al-Zaylaʿī, 1313H). This demonstrates that wisdom does not serve as the *ʿillah* (legal cause) for the ruling of iddah.

Meanwhile, Ibn Qayyim al-Jawziyyah (1991) argued that iddah should not be classified as *taʿabbudī* because there are numerous rational aspects (*maʿnā maʿqūl*) that can be understood from its legislation. However, he also emphasized that the ruling of iddah does not change with the change in its *ʿillah* or the realization of its wisdom. This means that the obligation of iddah remains, regardless of whether its wisdom can be achieved through other means. It must be observed in every instance of divorce, according to the method prescribed by Shariah.

Ibn al-Qayyim provided a criterion that if a ruling contains many hikmah, it belongs to the category of *thawābit*, which does not change with the times, changing *maṣlaḥah*, or any other forms of change (Ibn al-Qayyim, 1991). In Islam, iddah is determined by apparent characteristics or simple observable phenomena such as months, menstruation, or childbirth. These characteristics are clear and reflect the wisdom intended by Shariah, namely, ensuring the womb's purity from the husband's seed.

The wisdom behind the prescribed iddah period aligns with the Shariah's objective of safeguarding lineage, which is one of the five essential goals (*al-Ḍarūriyāt al-Khamsah*). However, this is not the only wisdom behind the legislation of iddah. If it were, then post-menopausal women, who no longer menstruate, would not be required to observe iddah. Yet, these women are still mandated to observe iddah for three months, as clearly outlined in the Quran (Istikomah & Zubir, 2019; Rofiq, 2020).

Therefore, beyond the verification of *barāʾah al-raḥim*, there must be other purposes behind the legislation of iddah. Jurists have identified several objectives, including providing time for the couple to reflect and possibly reconcile, offering the widow a period to mourn her deceased husband, and serving as a final tribute to the

husband, among other reasons that may remain beyond human understanding (Ibn al-Qayyim, 1991; al-Raysūnī, 2009).

The concept of *barā'ah al-raḥim* itself carries multiple wisdoms. For example, if the couple discovers during the iddah period that they have conceived a child, they still have the opportunity to reconcile. It also ensures the complete cleansing of the womb from any remnants of the previous husband's seed, confirms the child's lineage and inheritance rights if the husband dies, prevents the mixing of semen from different men in one womb, and so forth (al-Jurjawi, 2003; Muslimin, 2017).

The iddah period can also be seen as a time for the woman to prepare herself, both psychologically and physiologically, for the loss of her previous husband and the potential arrival of a new partner (bayanelislam.net, 2021). Thus, all this wisdom behind the iddah ruling aligns with the five Maqasid al-Syariah, which seek to preserve religion, life, intellect, lineage, and wealth (Mazri et al., 2019). Other benefits include preserving the sanctity of marriage, establishing paternity, protecting women's economic rights, and providing legal clarity in cases of divorce or death. It embodies a multifaceted framework encompassing emotional, physiological, psychological, and social facets (Ikram et al., 2023).

Given the multifaceted wisdom associated with iddah, al-Raysūnī (2009) argues that to base the iddah law solely on the verification of *barā'ah al-raḥim* is to overlook the broader wisdom embedded in its legislation. Such an approach would negate the comprehensive objectives of Shariah in favor of realizing a single, narrow aspect of its wisdom. Al-Shāṭibī (1997) also addressed this issue, stating that when a legal ruling is supported by multiple wisdoms, the failure to achieve one does not justify neglecting, replacing, or altering the ruling. This is because other wisdom underlying the legislation must still be considered and fulfilled. He provided an example of punishments for criminals.

The punishment for a criminal is intended to deter both the offender and others from repeating the crime (*al-zajr/al-izdijār*). However, there are situations where a criminal remains undeterred by punishment and continues to commit crimes despite multiple sentences. Does this mean that punishment is no longer necessary? Al-Shāṭibī (1997) emphasizes that even if the preventive aspect (*al-zajr*) behind punishment is not achieved, this does not invalidate the ruling or render it irrelevant or in need of change. This is because there is a secondary wisdom which is the expiation of sin (*kifārah*). While the preventive aspect may not be realized, the expiation of sin is still accomplished through the enforcement of punishment on the criminal.

Furthermore, according to Islamic Jurisprudence principles, a legal ruling that specifies a particular number or quantity (*al-muqaddarāt*) in the divine texts is classified as a fixed rule in Islam (*thawābit*). Such rules are immutable and do not allow for any changes. The law of iddah is one such rule, explicitly and definitively outlined (*qaṭ'ī*) in the Shariah, with a set duration and specific period for its observance. Allah SWT declares:

وَٱلۡمُطَلَّقَٰتُ يَتَرَبَّصۡنَ بِأَنفُسِهِنَّ ثَلَٰثَةَ قُرُوٓءٖۚ وَلَا يَحِلُّ لَهُنَّ أَن يَكۡتُمۡنَ مَا خَلَقَ ٱللَّهُ فِيٓ أَرۡحَامِهِنَّ إِن كُنَّ يُؤۡمِنَّ بِٱللَّهِ
وَٱلۡيَوۡمِ ٱلۡأٓخِرِۚ وَبُعُولَتُهُنَّ أَحَقُّ بِرَدِّهِنَّ فِي ذَٰلِكَ إِنۡ أَرَادُوٓاْ إِصۡلَٰحٗاۚ وَلَهُنَّ مِثۡلُ ٱلَّذِي عَلَيۡهِنَّ بِٱلۡمَعۡرُوفِۖ وَلِلرِّجَالِ عَلَيۡهِنَّ
دَرَجَةٞۗ وَٱللَّهُ عَزِيزٌ حَكِيمٞ ٢٢٨

Translation: Divorced women remain in waiting for three periods, and it is not lawful for them to conceal what Allah has created in their wombs if they believe in Allah and the Last Day. And their husbands have more right to take them back in this [period] if they want reconciliation. And due to the wives is similar to what is expected of them, according to what is reasonable. But the men have a degree over them [in responsibility and authority]. And Allah is Exalted in Might and Wise.

(Al-Baqarah, 2:228)

وَٱلَّٰٓـِٔي يَئِسۡنَ مِنَ ٱلۡمَحِيضِ مِن نِّسَآئِكُمۡ إِنِ ٱرۡتَبۡتُمۡ فَعِدَّتُهُنَّ ثَلَٰثَةُ أَشۡهُرٖ وَٱلَّٰٓـِٔي لَمۡ يَحِضۡنَۚ وَأُوْلَٰتُ ٱلۡأَحۡمَالِ أَجَلُهُنَّ أَن
يَضَعۡنَ حَمۡلَهُنَّۚ وَمَن يَتَّقِ ٱللَّهَ يَجۡعَل لَّهُۥ مِنۡ أَمۡرِهِۦ يُسۡرٗا ٤

Translation: And those who no longer expect menstruation among your women - if you doubt, then their waiting period is three months, and [also for] those who have not yet menstruated. And for those who are pregnant, their term is until they give birth. And whoever fears Allah - He will make for him of his matter ease. (Al-Talaq, 65:4)

According to Ibn Qudāmah (1995), the iddah ruling is considered *taʿabbudī* because it is explicitly determined by Shariah to be three cycles of menstruation (*qurū'*). Logically, if the ruling were solely based on the verification of womb emptiness (*barā'ah al-raḥim*), then a single cycle should suffice, as one cycle is enough to determine whether a woman is pregnant (al-Qarāfī, 2010). The fact that menstruation does not occur in pregnant women has been known to scholars since ancient times.

Ibn Qudāmah also explains that the absence of iddah for a woman who is divorced without consummation, as specified in the Quran, is because the iddah is legislated to ascertain *barā'ah al-raḥim*, which can be known with certainty in such cases. The same is mentioned by al-Qaraḍāwī (2017). However, for other cases of divorced women, iddah is a *taʿabbudī* rule and is not subject to analogical reasoning (*qiyās*), ratiocination (*taʿlīl*), or new ijtihad.

Thus, the specific prescription of three menstruation cycles (*qurū'*) through divine revelation indicates that there is more to the iddah ruling than just verifying *barā'ah al-raḥim*. Some of the wisdom and objectives behind this ruling might be known to humans, but not in full detail or precision. There is always the possibility of additional wisdom that remains beyond human comprehension. Additionally, the principle that any legal ruling specified with a particular quantity (*al-muqaddarāt*) is considered definitive (*qaṭʿī*) and fixed (*thawābit*) implies that the iddah ruling is not open to ijtihad.

Moreover, relying solely on *barā'ah al-raḥim* as the basis for the iddah ruling is rejected (*mulghāh*) by Shariah. This is evident from the fact that the Shariah replaces the three menstrual cycles with three months for those women who are definitively known to be free from pregnancy. Similarly, if a woman is divorced while pregnant, it is impossible for her to become pregnant again during that time since ovulation does not occur during pregnancy. Nevertheless, Shariah still mandates that her iddah continues until she gives birth. This clearly indicates that the essence of iddah itself is what is intended by Shariah, not merely the wisdom behind it.

The explanations provided by scholars, as discussed above, offer guidance on how to appropriately apply wisdom in determining legal rulings. It is clear that while reason is indeed optimized in uncovering the wisdom behind legislation, it remains bound by specific limits, particularly when it comes to establishing legal rulings based on it. Scholars employ their reasoning in understanding the wisdom but always respect the Quran and refrain from actions that contradict the will of Allah SWT, especially when a ruling is explicitly detailed in the Quran.

Therefore, when there is room to use wisdom as a basis for legal rulings and it does not contravene the definitive commands of Allah SWT, while also adhering to the conditions of *al-Taʿlīl bi al-Ḥikmah*, scholars will consider its application. This is why, in the case of verifying womb emptiness (*istibrā' raḥim*) for a female slave sold by her master and then subsequently repurchased during the same transaction, some scholars state that it is unnecessary to wait for any purification or menstruation cycle to ascertain the emptiness of her womb. This is because, in such a transaction, there is no sexual intercourse involved between the female slave and the buyer.

In the case of a female slave, scholars also stipulate that to determine the emptiness of her womb after changing owners, only one menstruation cycle is needed, rather than three cycles. Al-Qarāfī (2010) explains that this is the distinction between *barā'ah al-raḥim* in the case of iddah and the case of *istibrā' raḥim* for the purchase of female slaves. He asserts that the latter is *maʿqūl al-maʿnā* (rational and understandable) and not *taʿabbudī*. Once the purpose of *istibrā'* is achieved in the case of female slaves, one cycle is sufficient, and any method to determine it can be used. However, the iddah ruling is different because Shariah has designated it as *taʿabbudī*. Therefore, even if *barā'ah al-raḥim* is definitively confirmed, the iddah ruling must still be observed as prescribed by Shariah.

Based on the above arguments, it may be inferred that the ruling of iddah cannot be altered, replaced, or eliminated by any sort of technological change, sociology of society, *'urf* (custom), or any other type of change. This is also applied to the issue of opting for DNA tests to ascertain paternity instead of observing the iddah period by a woman, which is also rejected (Yusuf, 2022). The principle of *al-Taʿlīl bi al-Ḥikmah*, which prioritizes wisdom as the foundation of the law, cannot be applied to laws that are considered as *taʿabbudī*, even though advancements in science and technology in this era allow for accurate implementation of practices such as *barā'ah al-raḥim* and the mixing of lineages.

Iddah is indeed bound by the institution of marriage, which entails a highly significant contractual agreement (*mīthāqan ghalīẓan*). All married women, regardless of their physical state, including whether they are still menstruating or have gone through menopause, and regardless of whether they have reached puberty or not, are required to comply. Shariah has skillfully designed a comprehensive set of marriage institutions (Nurnazli, 2017). Muslims must embrace this directive with humility and unwavering loyalty.

According to al-Qaraḍāwī (2011), certain groups are emphasizing a few specific principles to gradually alter the teachings of Islam. They argue that the Shariah should be adapted to modernity and scientific advancements, ensuring its relevance over time. It is evident that they are incorrect in their application and comprehension of the statement's true significance since they fail to consult scholars and disregard the established methodology of Islamic jurisprudence. They failed to understand that the decisive factor in law is scripture, not science.

These individuals firmly believe that al-Qaraḍāwī himself has decided to embrace the progress of science and technology in the matter of iddah, permitting women who have been divorced by talaq three times (*ba'in*) to utilize modern equipment and technology rather than the traditional method. This assertion, as articulated by Badri Khaeruman (2016), is evidently perplexing and requires elucidation. However, a thorough analysis of al-Qaraḍāwī's ideas reveals that he was extremely cautious and strongly cautioned against the incorporation of wisdom in legal decision-making, as evidenced in al-Qaraḍāwī (1996) and (2001). He directly criticized the equivalence of *barā'ah al-raḥim* with the absolute ruling of iddah (al-Qaraḍāwī, 2006).

5. Conclusion and Recommendations

The role of wisdom in Islamic jurisprudence must be understood according to the precise methodologies established by esteemed scholars of *Uṣūl al-Fiqh*. Errors in addressing the role and significance of wisdom in *Uṣūl al-Fiqh* can lead to proposals that contravene fixed and unchanging principles of Shariah law. If such misinterpretations become widespread, they could result in the collapse of the framework of Shariah law and render it obsolete.

This does not mean that wisdom in *Uṣūl al-Fiqh* is entirely disregarded in the formulation of Islamic law. However, the permissible scope and proper methodology for applying wisdom in this context must be accurately understood. In *Uṣūl al-Fiqh*, there is a discourse on *al-Taʿlīl bi al-Ḥikmah*, which emphasizes the role of wisdom in legal rulings by making it a binding reason or rationale for the law. The majority of scholars agree that wisdom indeed plays a crucial role in the determination of Islamic law.

However, the discourse on *al-Taʿlīl bi al-Ḥikmah* must be applied with precision, meticulous, and adherence to all the conditions outlined by both classical and contemporary scholars. It should not be undertaken by individuals lacking sufficient credibility in Islamic jurisprudence. Ensuring these aspects is crucial to maintaining the integrity of Shariah law and preventing it from being easily manipulated by irresponsible parties who lack in-depth knowledge of Islamic jurisprudence.

The current misuse of the concept of wisdom and its integration with science, as seen in the proposal by some groups to alter or abolish iddah by claiming that science and technology can achieve its intended purpose, namely determining the emptiness of the womb, is an issue that the Muslims community should be aware of in the present time. The discourse on *al-Taʿlīl bi al-Ḥikmah* should be disseminated widely so that the community can appreciate the role and boundaries of wisdom or hikmah in Islamic law and its relationship with science.

Muslims need to understand that science and technology alone cannot be used as a basis to alter Islamic law. This is because Islamic law has specific criteria and categories that must be considered before *ijtihad* (juridical reasoning) is undertaken. While the integration of scientific and technological advancements in contemporary *ijtihad* is unquestionably crucial and necessary, it is only permissible within certain boundaries or categories of law. It cannot be applied to categories of law that are classified as *thawābit* (fixed), *qatʿiyyat* (definitive), and *taʿabbudī* (ritualistic).

Therefore, this study concludes that the suggestion to abolish iddah based on the advancements in science and technology that claim to fulfill the purpose of this law is unacceptable. Such views do not adhere to, contradict, and indeed violate, the principles agreed upon by Islamic scholars, which state that changes cannot be considered for laws categorized as *taʿabbudī*. *Taʿabbudī* laws are divinely mandated and cannot be arbitrarily altered or substituted. Ultimately, the rule of iddah is not contingent upon the *barā'ah al-raḥim*, regardless of whether it is deemed to be established based on historical circumstances or through advancements in science and technology in the present day.

Contribution of the Paper: The research contributes to the field of Islamic Family Law within the Islamic world. This approach enriches Islamic Family Law by aligning it with both the wisdom of Shariah and contemporary societal needs, reinforcing the ethical and practical implications of legal rulings in the modern Islamic world.

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