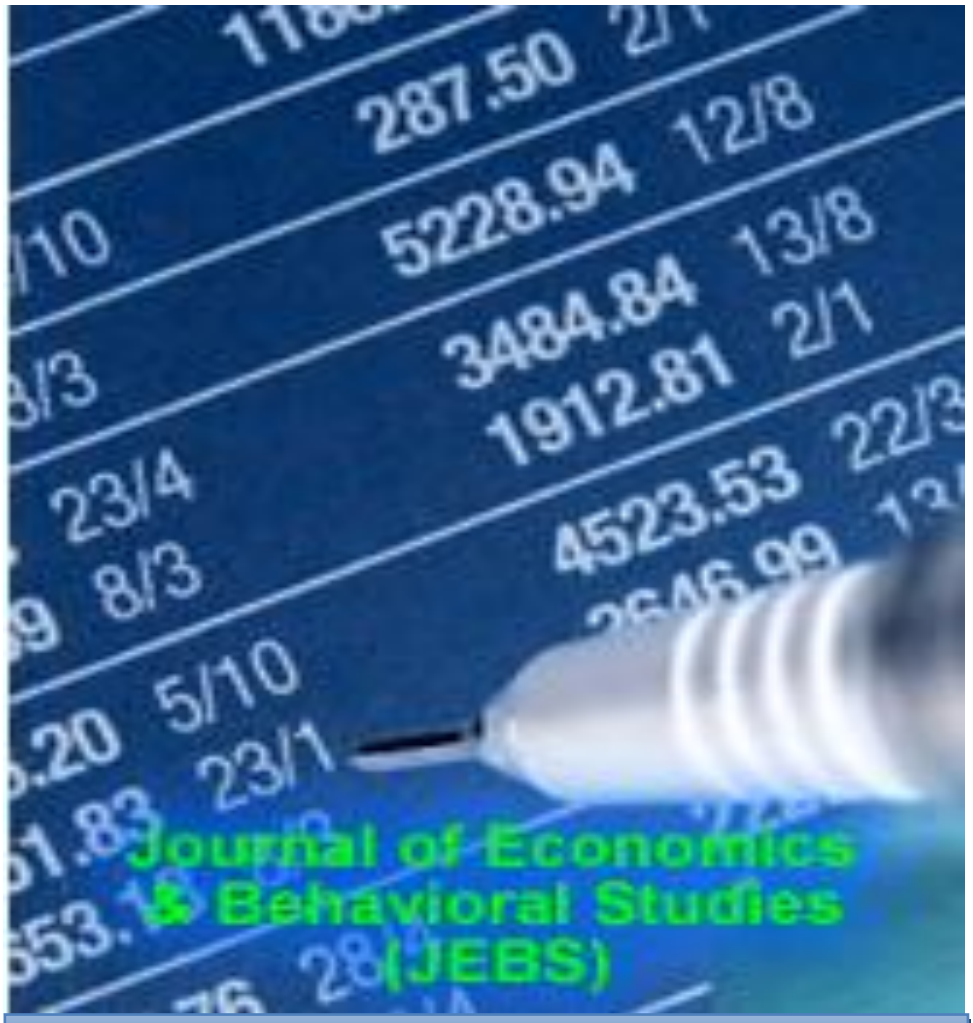

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Editorial

Journal of Economics and Behavioral Studies (JEBS) provides distinct avenue for quality research in the ever-changing fields of economics & behavioral studies and related disciplines. Research work submitted for publication consideration should not merely limited to conceptualization of economics and behavioral developments but comprise interdisciplinary and multi-facet approaches to economics and behavioral theories and practices as well as general transformations in the fields. Scope of the JEBS includes: subjects of managerial economics, financial economics, development economics, finance, economics, financial psychology, strategic management, organizational behavior, human behavior, marketing, human resource management and behavioral finance. 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 JEBS. Author (s) can submit: Research Paper, Conceptual Paper, Case Studies and Book Review. Journal received research submission related to all aspects of major themes and tracks. All submitted papers were first assessed by the editorial team for relevance and originality of the work and blindly peer-reviewed by the 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 current issue of JEBS comprises of papers of scholars from China, Ghana, South Africa, Uganda, Indonesia and Spain. Risk-taking and performance of small and medium-sized enterprises, modeling market integration and asymmetric price transmission dynamics, effects of exchange rate volatility on trade, ceo duality and financial performance: testing the moderating role of firm age, conceptual framework on the financial statement disclosure & importance of behavioral economics during COVID-19 were some of the major practices and concepts examined in these studies. Current issue will therefore be a unique offer 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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PAPERS

Journal of Economics and Behavioral Studies (JEBS)
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Risk-taking and Performance of Small and Medium-sized Enterprises: Lessons from Tanzanian Bakeries

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Abstract: SMEs are the major drivers of socioeconomic development of many economies. In order to influence economic growth, SMEs must be capable of enhancing their competiveness, growth, and sustainability. These capabilities are acquired by SMEs that understand and adopt entrepreneurial strategies that work. There is abundant literature confirming that one of these entrepreneurial strategies include risk-taking practices. SMEs are still facing challenges to understand and apply the right risk-taking strategies that influence their performance. We therefore characterize risk-taking as risk planning, risk controlling, and strategic risk initiatives, and seek to establish their contribution on SME performance. This study draws lessons from the risk management practices of small and medium-sized bakeries in Tanzania where agriculture, a sector that directly relates with bakery business, is one of the leading sectors in driving economic growth. We adopt a multi-stage sampling technique and receive responses from 161 questionnaires, and 20 in depth interviews from bakery owners/managers throughout Tanzania. The principal component analysis, qualitative content analysis (manifest analysis), and the moderator analysis are used in analyzing these data. We ascertain that both the firm age, and the gender of the owner/manager moderate the relationship between risk-taking strategies and SME performance. We argue that SMEs have the responsibilities of improving their risk-taking practices and capabilities in order to drive their competitiveness. Additionally, SMEs need to employ their efforts and resources in supporting their risk management initiatives, and integrate them in their business operations, and policy development practices, and ultimately advance their sustainability.

Keywords: *Risk planning, risk controlling, strategic risk initiatives, SME performance, Tanzanian bakeries.*

1. Introduction

The contribution of SMEs on the world economy is enormous. Their growth impacts both developed and developing economies. SMEs account for almost 99% of all enterprises around the globe (Robu, 2013; Savlovschi & Robu, 2011). In Sub-Saharan Africa, they account for 95% of all operating businesses (Fjose, Grünfeld, & Green, 2010). In this regard, their contribution on socio-economic developement and poverty reduction is undisputable (Katua, 2014; Savlovschi & Robu, 2011). Tanzania has always enjoyed the presence of SMEs in its economy. Their contribution in GDP growth, poverty reduction (URT, 2012), and in creating employment opportunities (Maliti & Mnenwa, 2008) is significant. Despite their contribution to Tanzania's socio-economic development, Tanzanian SMEs have been facing a lot of challenges. Failure to meet the growing demands and customer needs, failure to understand the customers and markets, poor networking strategies (Kazimoto, 2014), poor information management skills (Richard & Mori, 2012), poor access to finance (Mashenene & Rumanyika, 2014; Kazimoto, 2014; Richard & Mori, 2012), poor entrepreneurship training, lack of entrepreneurial culture (Mashenene & Rumanyika, 2014), engagement in unstable networks (Kazimoto, 2014), and failure to execute developed strategic plans (Mori, Kazungu, & Mchopa, 2014) are a few examples of the challenges. Most of these challenges can be addressed if Tanzanian SMEs are capable of accessing business information, and creating sound strategies that enable them to analyze the needs of their customers, and be able to access markets, and finance. However, these capabilities can be enhanced by relevant and frequent business training (Kazimoto, 2014). Tanzanian SMEs need proper business knowledge and skills that promote their entrepreneurial competency (Mashenene & Rumanyika, 2014). Additionally, in order to address most of the challenges, the employees in Tanzanian SMEs should be given autonomy in managing business operations (Kapaya, Shayo, Jaensson, & Stanslaus, 2018). Tanzanian SMEs can enhance their business operations if they get an opportunity to exchange useful business information with key players (Hamisi, 2011). The acquired business information can be used in addressing most of their growth barriers (Kazimoto, 2014). Conversely, Tanzanian SMEs are reluctant in sharing information to key players due to the fact that the information are likely to be acquired by their major rivals, and ultimately pose potential risks to their business interests and goals (Katunzi & Zheng, 2010). However, there are a lot of benefits gained when

SMEs share resources and information (Bengesi & Le Roux, 2014). Collaborations are likely to enable Tanzanian SMEs access markets, attain efficiency through reduced transaction costs (Nyangarika, 2016).

The growth of SMEs is heavily dependent on their capabilities and readiness to initiate and implement changes, particularly the adoption of entrepreneurial strategies that work. One of these strategies is risk-taking. SMEs need to manage risks in order to influence their profitability (Nanthuru, Pingfeng, Guihua, & Mkonya, 2018). Risk-taking can be defined as the propensity that involves bold engagements in product development, technological innovations, venturing into the unknown, embracing considerable borrowing, and injecting a great amount of resources in uncertain environments in order to meet current and future demand, increase profitability, and for the sake of outperforming rivals (Mason, Floreani, Miani, Beltrame, & Cappelletto, 2015; Lawal, Adegbuyi, Iyiola, Ayoade, & Taiwo, 2018; Kitigin, 2017). Risks are found in both internal and external business environments. These environments contribute significantly to SME performance (Basile, 2012). For example, the internal environments may result to risks that are associated with the incompetency of staff, poor accessibility of resources, bankruptcy of key business stakeholders and partners, failure to manage contracts, and weak compliance of relevant rules, regulations, and standards. On the other hand, risks from the external environments may be linked with economic situations, dynamics in politics, purchasing power, legal, and tax systems (Belinskaja & Velickiene, 2015). Risk-taking can drive SME competitiveness (Lawal, Adegbuyi, Iyiola, Ayoade, & Taiwo, 2018; Kitigin, 2017; Bakar & Zainol, 2015). For example, risk management knowledge can drive financial performance (Nanthuru, Pingfeng, Guihua, & Mkonya, 2018). However, the risk management capabilities of most SMEs are very low. For example, most of the SMEs lack know-how in managing business operations, and in making financial and marketing forecasts (Smit & Watkins, 2012) despite the fact that their readiness to take risks is very high (Dominguez & Raïs, 2012).

Most of the SMEs face difficulties when it comes to intertwining risk practices and business processes (Gorzeń-Mitka, 2015). In this regard, SMEs are likely to increase their costs if they fail to manage risks (Nanthuru, Pingfeng, Guihua, & Mkonya, 2018). Therefore, risk management techniques that suit the need of SMEs should be in place (Kagwathi, Kamau, Njau, & Kamau, 2014). These techniques require the capabilities of SME owners/managers in foretelling potential hazards (Smit & Watkins, 2012). The SMEs are also required to adopt relevant instruments that can manage risks associated with the business operations in relation to the respective internal and external business environments. These instruments should be the drivers of SME performance (Belinskaja & Velickiene, 2015). For example, tools such as enterprise risk management can be adopted in order to manage risks, costs, and ultimately integrate risk practices in their strategic objectives. These tools enable SMEs to assess their risk management strategies and capabilities, and to prioritize risks according to needs and resources (Smit & Watkins, 2012). However, SMEs need to enhance their learning environments, research capabilities, and utilize knowledge in business practices, and increase their entrepreneurial spirit (Zhai, Sun, Tsai, Wang, Zhao, & Chen, 2018). Therefore, the SMEs' risk management practices are likely to influence their competitiveness if employees are involved in the risk management processes that involve risk planning, risk controlling, and risk evaluation (Smit & Watkins, 2012). The risk management processes need to be integrated in the SME's business operations, processes, practices, strategies, objectives, and capabilities so that they can result to positive performance (Belinskaja & Velickiene, 2015). These capabilities can be influenced by frequent employee trainings on risk management (Nanthuru, Pingfeng, Guihua, & Mkonya, 2018). In this regard, SMEs need to embrace initiatives that can help them to forge strategic collaborations with key stakeholders aiming at accessing resources, knowledge, and capabilities (Zhai, Sun, Tsai, Wang, Zhao, & Chen, 2018).

In order to influence their performance, SMEs need to define, and understand risk management strategies that work. These are the risk planning strategies, risk controlling strategies, and the strategic risk initiatives. This study seeks to ascertain whether these strategies contribute significantly to both cost level and production/output level of SMEs. The intention of this study is to draw lessons based on the business practices of Tanzania-based small and medium-sized bakeries whose products have been experiencing a growing demand in Tanzania (Bennett, Naziri, Mahende, & Towo, 2012). The Tanzanian food industry, in which bakeries operate, is regarded as a major source of employment (URT & UNIDO, 2012). The food sector is also directly linked with agriculture, a sector that significantly impacts the Tanzania economy (Chongela, 2015). We therefore seek to answer the following questions:

- Does risk planning influence the cost level, and output level of Tanzania-based bakeries under the moderation of the bakery age, and the gender of the bakery owner/manager respectively?
- Does risk controlling influence the cost level, and output level of Tanzania-based bakeries under the moderation of the bakery age, and the gender of the bakery owner/manager respectively?
- Do strategic risk initiatives influence the cost level, and output level of Tanzania-based bakeries under the moderation of the bakery age, and the gender of the bakery owner/manager respectively?

2. Literature Review

Enterprise Risk Management in SMEs: Enterprise risk management (ERM) is a crucial aspect of corporate governance (Sprčić, Kožul, & Pecina, 2015) that supports businesses in predicting risks and establishing tradeoffs between costs and earnings (Zou & Hassan, 2015). By adopting ERM, enterprises are likely to identify possible risks and develop relevant controlling techniques (Soltanizadeh, Rasid, Golshan, Quoquab, & Basiruddin, 2014; Nocco & Stulz, 2006) aiming at managing risks and not eliminating them (Fadun, 2013). ERM involves all members of an organisation in developing strategies that identify and manage possible risks (Nocco & Stulz, 2006; COSO, 2004; Harner, 2010) particularly the strategic, operational, and financial risks (Harner, 2010; Zou & Hassan, 2015; Sprčić, Kožul, & Pecina, 2015) or other risks depending on the characteristics of the industry (Nocco & Stulz, 2006). Strategic risks are mainly associated with product development, competition, and customers. Financial risks are mainly linked to currency, price, liquidity, credit, and interest rate (Sprčić, Kožul, & Pecina, 2015). Operational risks are heavily connected with business operations such as the internal processes, human capital, and external events (Basel Committee on Banking Supervision, 2005).

The relationship between risk management and SME performance is apparent (Kehinde, Opeyemi, Benjamin, Adedayo, & Abel, 2017). Risk management helps SMEs to assess and make risky decision aimed at influencing their financial performance (Belinskaja & Velickiene, 2015). Understanding of risk management plays a vital role in influencing SMEs' capabilities in managing uncertainties (Crovini, 2017), and disturbances to their operations (Verbano & Venturini, 2013). However, the SME owners/managers, who are the key actors in the risk management process (Zoghi, 2017; Belinskaja & Velickiene, 2015), have little understanding on risk management (Agrawal, 2016). In this regard, owners/managers and their employees need to acquire the risk management knowledge in order to manage the multiple aspects of their businesses (Lukianchuk, 2015; Falkner & Hiebl, 2015). Additionally, the risk management process should involve all members of an enterprise (Agrawal, 2016).

SMEs have been facing financial, operational, and strategic risks (Zoghi, 2017). Risk management techniques, depending on the form of risks, should be adopted by SMEs in order to manage these risks. These would for instance, include compliance on safety standards, regular employee trainings in risk management, and their readiness to adopt risk planning techniques that can support the management of business and operational crises related to order management, production, and payment (Belinskaja & Velickiene, 2015). However, a successful risk management process depends on the improved internal environments that facilitate the sharing of information on risks and their respective controlling tactics. Such environments are likely to influence SME's performance (Jenya & Sandada, 2017). However, most of the SMEs put little emphasis on the risk management process (Brustbauer, 2016). They also face difficulties in intertwining risk management and other business processes within their entities (Gorzeń-Mitka, 2015). However, SMEs do sometimes consult friends or other people with deeper risk knowledge and experience, or outsource risk management assignments whenever they encounter risk management problems (Belinskaja & Velickiene, 2015). Additionally, their involvement in risk management tasks is very infrequent. They mainly develop risk management techniques based on experience, and brainstorming (Zoghi, 2017). Some do manage risks through an emergency plan (Falkner & Hiebl, 2015). This plan informs the SME capabilities in managing risks, and can be used by lenders or investors in assessing the future performance of SMEs (Lukianchuk, 2015). However, most of their risk management processes are not documented (Zoghi, 2017).

SMEs need to enhance their capabilities in accessing markets, responding to the changes and challenges from the business environments, and in developing and executing business plans (Agrawal, 2016; Belinskaja & Velickiene, 2015). Through these plans, they can access resources such as big loans. However, the

development and execution of these plans need the support of enhanced risk management strategies (Belinskaja & Velickiene, 2015). These strategies can be influenced by the adoption of ERM. SMEs are encouraged to adopt ERM (Brustbauer, 2016) due to its significance in influencing business performance, and competitiveness (Yang, Ishtiaq, & Anwar, 2018; Brustbauer, 2016; Lukianchuk, 2015; Agrawal, 2016; Smit & Watkins, 2012). However, the adoption of ERM depends on the SMEs' readiness to train their workforce in managing risks and intertwining them with their daily business operations (Crovini, 2017; Kehinde, Opeyemi, Benjamin, Adedayo, & Abel, 2017; Brustbauer, 2016).

Transaction Cost Economics in SMEs: The focus of Transaction Cost Economics (TCE) is on transactions and modes of governance (Williamson, 1997). TCE considers transactions as an essential unit of analysis (Riordan & Williamson, 1985; Williamson, 1997; Williamson, 1999). TCE tells that "the governance of exchange agreements between economic actors is costly" (Leiblein, 2003, p. 939). That is why TCE emphasizes the need to have a governance form that minimizes costs (Das & Teng, 2000; Williamson, 1979; Leiblein, 2003). It advocates for the enterprises' commitment in having effective operation and structure and at the same time attaining efficiency (Williamson, 1981). One of the central questions in TCE is whether efficiency can be attained when a transaction takes place within a firm or outside it (Geyskens, Steenkamp, & Kumar, 2006). TCE assumes that enterprises have the capabilities to foresee potential hazards, and integrate them into the organizational design (Williamson, 1999). However, the theory asserts that enterprises face difficulties in accurately foretelling and planning for the future. This is why enterprises struggle in accessing and analyzing information about the economic actor(s) and the contracting environment (Leiblein, 2003). TCE assumes that economic actor(s) are disposed to use dishonesty as a mechanism to individual gains in transactions (Williamson, 1973).

SMEs strive to manage costs. They strive to adopt mechanisms that can maximize their profitability with low costs (Agburu, Anza, & Iyortsuun, 2017). Poor cost management is likely to attract risks, leading to SME unprofitability (Nikolaeva & Pletnev, 2016). Therefore, effective cost management, and efficiency can be attained when effective governance mechanisms are adopted (Lopez-Perez, Perez-Lopez, & Rodriguez-Ariza, 2013). The adoption can be done by the SME owners/managers since they are the key decision makers in their organizations (Priyanath & Premaratne, 2015). Nevertheless, the SMEs' small structures have higher chances of influencing performance (Lopez-Perez, Perez-Lopez, & Rodriguez-Ariza, 2013). Such performance can be translated in terms of cost reduction. On this regard, Shahzad (2017) argues that both relational and structural governance approaches have direct impact in the reduction of transaction cost.

The transaction cost mediates the link between entrepreneurial orientation and SME growth. It also mediates the link between social capital and SME growth (Wimba, Budhi, Yasa, & Saskara, 2015). Through social capital, SMEs can easily reduce monitoring costs (Priyanath & Premaratne, 2015). For example, in Tanzania, SMEs do manage transaction costs related to information, monitoring, and negotiation (Rasheli, 2016). Negotiation costs comprise of costs related to transaction details, obligations of exchange partners, transaction arrangements, and benefit structure. Therefore, SMEs need to evaluate information before making any decision. However, SMEs have little capabilities in assessing complex information. Given this context, they need capabilities in mitigating opportunism from exchange partners. Exchange partners would be suppliers, customers, and any other relevant player involved in transaction. Through social relationships, SMEs are likely to access information that mitigates opportunism and which ultimately reduces transaction costs (Priyanath & Premaratne, 2015).

Risk-taking and SME Performance: The adoption of risk-taking strategies can have great influence on SME performance (Wambugu, Gichira, Wanjau, & Mung'atu, 2015; Naldi, Nordqvist, Sjöberg, & Wiklund, 2007). These strategies are characterized as the readiness to invest in high risk businesses that expect significant returns (Wambugu, Gichira, Wanjau, & Mung'atu, 2015; Fairoz, Hirobumi, & Tanaka, 2010), the capabilities of SMEs to take calculated risks, develop a backup plan, and the readiness to exploit opportunities in uncertainty (Maladzhi, 2015; Fairoz, Hirobumi, & Tanaka, 2010). They also involve the readiness of SMEs to acknowledge ideas from key stakeholders such as customers (Maladzhi, 2015), the use of huge resources for growth ambitions such as readiness to take big loans (Wambugu, Gichira, Wanjau, & Mung'atu, 2015), revealing boldness in business operations aiming at achieving business objectives (Fairoz, Hirobumi, & Tanaka, 2010), continuous searching of opportunities such as adopting new technology in exploring business opportunities

(Wambugu, Gichira, Wanjau, & Mung'atu, 2015), and creating an environment that encourages innovation, and creative solutions (Maladzhi, 2015). There is little risk-taking and SME performance research that is based on the bakery industry. We characterize risk-taking strategies as risk planning, risk controlling, and strategic risk initiatives, and seek to establish their contribution on bakery performance: level of operation and production costs, and production/output level, under the moderation of bakery age, and owner's/manager's gender respectively. The preference on firm age has been influenced by Lee & Marvel (2009); Valdez-Juárez, García-Pérez de Lema, & Maldonado-Guzmán, (2016); Voulgaris, Asteriou, & Agiomirgianakis (2003); Rosenbusch, Brinckmann, & Bausch (2011); Rosli & Sidek (2013); and Salojärvi, Furu, & Sveiby (2005). Additionally, gender is also preferred based on the fact that the presence of women in bakery industry is significant (Quaye, Onumah, Tortoe, Akonor, & Buckman, 2018), and are able to identify the relationship between risk management and firm's planning and controlling tasks than men (Gorzeń-Mitka, 2015). Nevertheless, male SME owners/managers demonstrate higher risk appetite than female owners/managers (Falkner & Hiebl, 2015). In this regard, the role of gender in risk management is apparent.

Although sales growth (Fairoz, Hirobumi, & Tanaka, 2010; Naldi, Nordqvist, Sjöberg, & Wiklund, 2007; Wambugu, Gichira, Wanjau, & Mung'atu, 2015), profitability (Wambugu, Gichira, Wanjau, & Mung'atu, 2015; Naldi, Nordqvist, Sjöberg, & Wiklund, 2007; Fairoz, Hirobumi, & Tanaka, 2010), and productivity (Maladzhi, 2015) have been widely used as performance indicators in most of the risk-taking and SME performance studies, our assumption of adopting cost level is based on the fact that profitability cannot be attained if cost management measures are not in place. We also adopt the output level after associating sales level with both quality output and productivity. Our study adopts a large sample based on Naldi, Nordqvist, Sjöberg, & Wiklund (2007), Amin (2015), and Kiprotich, Kimosop, Kemboi, & Chepkwony (2015). We also involve random selection as adopted by Amin (2015), and stratification as used by Naldi, Nordqvist, Sjöberg, & Wiklund (2007). We also involve questionnaires (Maladzhi, 2015; Wambugu, Gichira, Wanjau, & Mung'atu, 2015; Kiprotich, Kimosop, Kemboi, & Chepkwony, 2015; Amin, 2015), and interviews (Fairoz, Hirobumi, & Tanaka, 2010) in collecting data. These data are analyzed using the principal component analysis, and moderator analysis whereby a hierarchical regression analysis is involved. We draw this experience from the studies of Maladzhi (2015); Wambugu, Gichira, Wanjau, & Mung'atu (2015); and Naldi, Nordqvist, Sjöberg, & Wiklund (2007) that adopted a factor analysis, and the studies of Wambugu, Gichira, Wanjau, & Mung'atu (2015); and Amin (2015) that adopted a structural equation modelling. Our preference on the moderator analysis is also based on the use of a multiple regression analysis as used by Fairoz, Hirobumi, & Tanaka (2010); Naldi, Nordqvist, Sjöberg, & Wiklund (2007); and Kiprotich, Kimosop, Kemboi, & Chepkwony (2015).

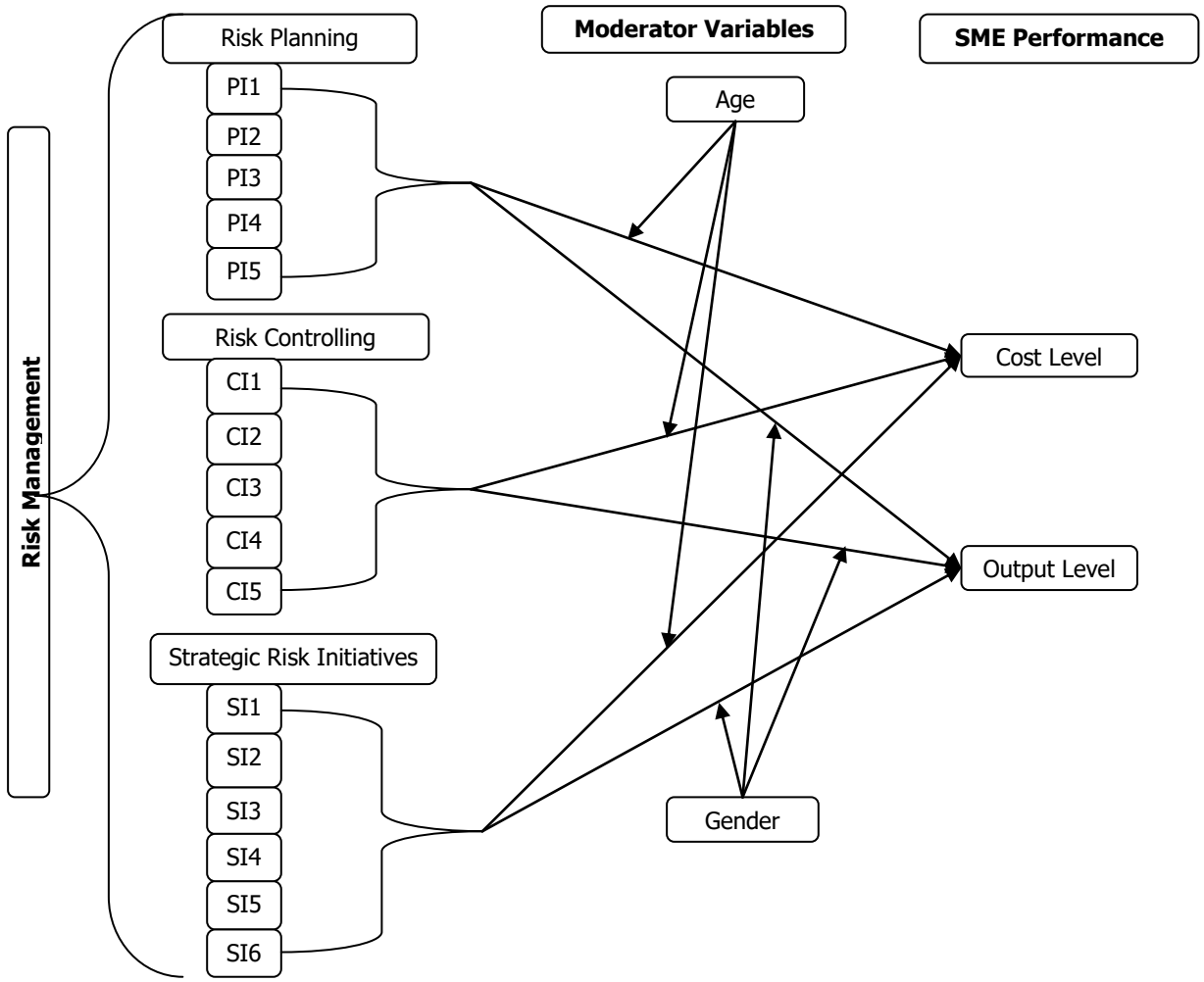
Risk-taking Practices in Bakeries: Bakeries have been facing risks associated with planning and growth (Sum & Mahussin, 2017). Food enterprises need capabilities to foretell market needs in order to drive customer satisfaction (Cantaleano, Rodrigues, & Martins, 2018). Therefore, a contingency plan is of paramount importance in the risk management process (Ariyanti & Andika, 2016). Strategic plans are to a great extent developed by the owners/managers than other employees (Mithwani, 2015). The plans of most of the small bakeries are based on experience (Van Der Spiegel, Luning, De Boer, Ziggers, & Jongen, 2005). There is also low risk management training in bakeries (Alexopoulos, Kavadi, Bakoyannis, & Papantonopoulos, 2009). They also reveal low capabilities in managing essential business operations (Louw, Troskie, & Geyser, 2013). In this case, bakeries have the responsibility of training their workforce especially on food chain issues aiming at propelling business performance (Marques, Matias, Teixeira, & Brojo, 2012). These trainings should be intertwined with risk issues in order to interconnect business operations with risk management processes. Most of the risk issues are related with demand, raw materials, and recession (Ariyanti & Andika, 2016), ergonomics, hygiene, machinery, and logistics (Alexopoulos, Kavadi, Bakoyannis, & Papantonopoulos, 2009). They also face financial, operational, and strategic risks. They also face risks associated with planning, sustainability, and the workforce (Sum & Mahussin, 2017). There are also work-related risks in bakeries which are mainly influenced by managing big load, temperatures, noise, stress, and highly demanding and time consuming tasks (Alexopoulos, Kavadi, Bakoyannis, & Papantonopoulos, 2009). These risks negatively affect cost management especially the rising costs of raw materials, logistics, and costs related to machinery. Also, risks in bakeries negatively affect production output level, and revenues (Sum & Mahussin, 2017).

Bakery products face forms of spoilage (Smith, Daifas, El-Khoury, Koukoutsis, & El-Khoury, 2004) mostly caused by bacteria and fungi (Pundir & Jain, 2011). Apart from microbiological spoilage, they also face physical and chemical spoilage (Smith, Daifas, El-Khoury, Koukoutsis, & El-Khoury, 2004). In this regard, bakeries need to integrate an advanced technology in producing safe and healthy products (Marques, Matias, Teixeira, & Brojo, 2012). They also need to improve the working conditions for their workforce in order to influence competiveness (Rocha, Oliveira, Campos, Oliveira, & Saldanha, 2009). Through enhanced working environments, bakeries are likely to control most of the work-related risks. One of the techniques is to provide employee training in risk management (Aguwa & Arinze-Onyia, 2014).

Most of the strategic risks in bakeries are associated with failures in planning, poor customer relationship management, and weak financial management practices (Sum & Mahussin, 2017). Therefore, capabilities to manage costs, cash flow, and to acquire and utilize knowledge on bakery operations need to be enhanced (Louw, Troskie, & Geyser, 2013). In this case, risks related with demand can be mitigated by effective customer relationship management techniques whose primary goal is to acquire and utilize information that is used to develop and execute plans on customer needs and business operations (Ariyanti & Andika, 2016). Additionally, bakeries can also manage customer needs if they offer more innovative product choices (Fejza, Ismajli, & Misini, 2013) such as nutritional and health products (Brodowska, Guzek, & Wierzbicka, 2014). However, the adoption of ERM is of paramount importance in addressing most of the risks (Ariyanti & Andika, 2016).
Bakeries lack capabilities to conduct market research and competition diagnosis (Fejza, Ismajli, & Misini, 2013). These researches are crucial in understanding the business environments, identifying risks, and in assessing bakery performance (Oleiniuc, 2012). The positive performance is likely to be achieved if bakeries attain capabilities in managing competition, develop more quality products, enhance their distribution systems (Sum & Mahussin, 2017), and improve their relationship with suppliers (Ariyanti & Andika, 2016). To a great extent, bakeries have the responsibility of designing proper mechanisms that enhance their working environments in order to manage risks related to product quality, production processes and output, accidents, and work-related illness (Rocha, Oliveira, Campos, Oliveira, & Saldanha, 2009). However, an effective designing of these mechanisms depends on the support from bakery owners/managers and the respective governance structures (Mithwani, 2015).

Conceptual Framework: We have defined our independent variables characterizing risk planning as the commitment of bakeries to ensure that they have the relevant knowledge and technical know-how in foreseeing potential hazards (PI1); the commitment of bakeries to integrate potential hazards in their day to day operations (PI2); the commitment of bakeries to make an in-depth analysis before entering into any contract with any supplier or business partner (PI3); the commitment of bakeries to frequently find whether there are any changes in their business environment related to pricing, technology, products, policies, and legal requirements (PI4); and the capabilities of bakeries to develop and use a backup plan whenever unexpected changes in their business and operating environment occur (PI5). Under the risk controlling, the study defines the independent variables as the commitment of bakeries to replace bakery appliances and other equipments with new ones as per technical advice (CI1); the commitment of bakeries to frequently evaluate the performance of their contracts with their suppliers, agents or business partners (CI2); the commitment of bakeries to frequently test the performance of their product development processes (CI3); the commitment of bakeries to frequently test the performance of their operating procedures (CI4); and the commitment of bakeries to frequently request for feedback from customers with regard to their product performance in terms of price, packaging, ingredients, and taste (CI5). Under the strategic risk initiatives, the study defines the independent variables as the commitment of bakeries to frequently analyze the strengths and weaknesses of their major competitors (SI1); the commitment of bakeries to frequently request for feedback from employees about their satisfaction level against their working environment (SI2); the readiness of bakeries to incur any additional cost to meet their customers' demands (SI3); the readiness of bakeries to incur any additional cost to comply with the legal requirements (SI4); the readiness of bakeries to invest in any risky business that will yield significant returns (SI5); and the commitment of bakeries in applying and acquiring big loans (SI6). The moderator variables include the bakery age (A), and bakery owner's/manager's gender (G). The dependent variables are the cost level (CT), and output level (OT) as shown in Figure 1.

Figure 1



3. Methodology

Research Design and Sampling: This study adopted a concurrent nested design (Almeida, 2018) in which both quantitative and qualitative data were collected concurrently (Santos, Erdmann, Meirelles, Lanzoni, Cunha, & Ross, 2017). The choice of the design was influenced by the fact that there was a predominance of an approach (Almeida, 2018). In this regard, the quantitative approach was predominant. The study took place in the United Republic of Tanzania that is made up of Mainland Tanzania, and Zanzibar. However, the study was based in Mainland Tanzania where Tanzania Food and Drugs Authority (TFDA) regulated the operations of bakeries. Currently, the administration of bakery operations has been shifted to the Tanzania Bureau of Standards (TBS). The Mainland Tanzania is the largest part of Tanzania with twenty six (26) geographical regions while Zanzibar comprises of five (5) regions. This study focused on registered bakeries only as its population. The population comprised of 359 registered small and medium-sized bakeries operating in Mainland Tanzania. The study relied on Krejcie & Morgan's (1970) Table to determine a sample size. According to the Table, a population of 359 gives a sample size of 186 registered small and medium-sized bakeries. We also adopted a multi-stage sampling technique in which all the 26 regions of Mainland Tanzania were stratified into 7 geographical zones based on TFDA's zone classification. We thereafter adopted the probability proportional to size in order to establish the number of bakeries that are incorporated in the sample from each zone. Afterwards, we adopted the simple random sampling technique in order to identify bakeries from each zone. This resulted to 21 bakeries from Central Zone, 94 bakeries from

Eastern Zone, 23 bakeries from Lake Zone, 23 bakeries from Northern Zone, 9 bakeries from Southern Zone, 12 bakeries from Southern Highlands Zone, and 4 bakeries from Western Zone. The multi-stage sampling technique was adopted due to the fact that it is useful in a study whose population is scattered over a wide area (Chauvet, 2015) such as Tanzania Mainland.

Data Collection and Analysis: A total of 186 questionnaires were distributed to the owners/managers of the bakeries. Each bakery received a questionnaire. We received a positive response from 161 bakeries as follows: 19 bakeries from Central Zone, 78 bakeries from Eastern Zone, 19 bakeries from Lake Zone, 22 bakeries from Northern Zone, 7 bakeries from Southern Zone, 12 bakeries from Southern Highlands Zone, and 4 bakeries from Western Zone. Additionally, we carried out in-depth interviews to 20 bakeries as follows: 3 bakeries from Central Zone, 10 bakeries from Eastern Zone, 3 bakeries from Lake Zone, 3 bakeries from Northern Zone, and 1 bakery from Southern Highlands Zone. Our data collection took place from November 2018 to February 2019. The responses based on the operations and practices that have been taking place in bakeries for a period of three years. The data analysis was done using the principal component analysis, qualitative content analysis (manifest analysis), and the moderator analysis.

Variables and Measurements: The responses of both the independent, and dependent variables were collected using the seven-point Likert scale. The moderator variables were grouped to form dichotomous variables. The bakery age is categorized as advanced age (AA), and basic age (BS). It is measured as AA (A>10years), and BA (A≤10years). The bakery owner's/manager's gender is categorized as male (M), and female (F).

Validity and Reliability: The principal component analysis was run with all variables associated with risk-taking strategies and confirmed that all variables (except SI6) had at least one correlation with another variable; where $r \geq 0.3$. Therefore, SI6 was removed and the PCA was re-run and it was revealed that all variables had at least one correlation with another variable. The overall KMO measure was 0.886, and the Bartlett's Test of Sphericity was statistically significant, $\mathbf{p} = 0.000$ ($\mathbf{p} < 0.0005$) confirming that there was adequacy of sampling. Additionally, the rotated component matrix appeared to be a simple structure in which each variable had only one component that loads strongly on it. Also, each component loaded strongly on at least three variables. Therefore, validity was confirmed. On the other hand, the values of Cronbach's alpha were 0.837 (risk planning), 0.844 (risk controlling), and 0.821 (strategic risk initiatives). All these values were at least 0.700 signifying that in all cases, the scale was found to have a good level of internal consistency (DeVellis, 2003; Kline, 2005).

Testing for Assumptions: The major assumptions such as linearity, multicollinearity, unusual points, homoscedasticity, and normality were tested. Linearity was established by visual inspection of a scatterplot between: CT and PI1, OT and PI1; CT and PI2, OT and PI2; CT and PI3, OT and PI3; CT and PI4, OT and PI4; CT and PI5, OT and PI5; CT and CI1, OT and CI1; CT and CI2, OT and CI2; CT and CI3, OT and CI3; CT and CI4, OT and CI4; CT and CI5, OT and CI5; CT and SI1, OT and SI1; CT and SI2, OT and SI2; CT and SI3, OT and SI3; CT and SI4, OT and SI4; CT and SI5, OT and SI5. On the other hand, the study found that there was no evidence of multicollinearity. All the tolerance values were greater than 0.1 (the lowest were 0.111, 0.111, 0.114, 0.108, 0.107, 0.111, 0.113, 0.120, 0.110, 0.122, 0.113, 0.101, 0.108, 0.108, 0.113, 0.103, 0.100, 0.108, 0.107, 0.107, 0.107, 0.102, 0.103, 0.110, 0.103, 0.107, 0.104, 0.103, 0.100, 0.102). All their corresponding VIF values were less than 10 (the greatest were 8.989, 9.001, 8.750, 9.296, 9.349, 9.003, 8.833, 8.323, 9.099, 8.172, 8.841, 9.915, 9.291, 9.280, 8.865, 9.693, 9.989, 9.288, 9.369, 9.331, 9.332, 9.801, 9.693, 9.130, 9.703, 9.350, 9.631, 9.739, 9.973, 9.762). Also, there were neither outliers nor influential case. This is because; there was no any standard deviations >±3, no leverage value >0.04969, and no cook's distance>1. It was also found that there was homoscedasticity based on the visual inspection of the studentized residuals plotted against the predicted values for bakeries with AA and BA between: CT and PI1; CT and PI2; CT and PI3; CT and PI4; CT and PI5; CT and CI1; CT and CI2; CT and CI3; CT and CI4; CT and CI5; CT and SI1; CT and SI2; CT and SI3; CT and SI4; CT and SI5. There was also homoscedasticity based on the visual inspection of the studentized residuals plotted against the predicted values for bakeries with M and F between: OT and PI1; OT and PI2; OT and PI3; OT and PI4; OT and PI5; OT and CI1; OT and CI2; OT and CI3; OT and CI4; OT and CI5; OT and SI1; OT and SI2; OT and SI3; OT and SI4; OT and SI5. Additionally, in all cases, the Normal Q-Q Plot of Studentized Residual was used and found that studentized residuals were normally distributed.

4. Findings

As explained earlier, the PCA was employed to confirm variables that explain the risk planning, risk controlling, and strategic risk initiatives. Three components were retained. The PCA confirmed that risk planning is characterized by PI1, PI2, PI3, PI4, and PI5 while risk controlling is characterized by CI1, CI2, CI3, CI4, and CI5. It also confirmed that strategic risk initiatives are characterized by SI1, SI2, SI3, SI4, and SI5. Nevertheless, based on the qualitative content analysis (manifest analysis), the interviews confirm that there is still little understanding of risk management practices among bakeries in Tanzania. However, most of the owners/managers confirmed that they had been undergoing necessary risk management trainings with the aim of increasing their capabilities in risk planning, controlling, and in making strategic risk decisions. According to the interviews, they were keeping on finding the possible "dangers" that may occur in their operating environment, or in the external environment relating to their business such as technology, pricing of raw materials and finished bakery products, and all matters pertaining to compliance. This was being done by consulting all members of the bakery, and their stakeholders such as agents, supermarkets, stores, hotel, restaurants, suppliers, individual customers, and business partners. Within their operating environment, 0bakeries take time to foresee possible "dangers" that may affect the production of bakeries, transportation, and the contracts between the bakeries and their stakeholders. However, most of them do not make an appropriate documentation of their plans. Also, according to the interviews, bakeries keep on controlling risks by abiding by the technical advice on the operations and management of bakery appliances and other relevant equipments, and on development and operations of business contracts with their stakeholders. As the findings reveal, most of the bakeries were ready to analyze their operations and production processes and practices in order to fix all the relevant problems on time. To a great extent, the bakeries were consulting and interviewing their stakeholders in order to acquire the relevant information regarding the challenges, weaknesses, and other operational problems in order to fix them before they grew out of proportions thus negatively affecting their business. Also, according to the interviews, bakeries were aware of the fact that unexpected changes could affect their performance. This is why they were frequently making self-evaluations and adapting to the changes and relevant solutions on time. They were also conducting a competitor diagnosis in order to understand their weaknesses and strengths and improve accordingly. According to the interviews, they were financing these tasks with a clear understanding that failure to do so might result to unbearable costs in future. This was their strategy of preventing problems before they occur.

Risk Planning and Bakery Performance: A hierarchical multiple regression was run to assess the increase in variation explained by the addition of an interaction term between PI1 and A; PI1 and G; PI2 and A; PI2 and G; PI3 and A; PI3 and G; PI4 and A; PI4 and G; PI5 and A; and PI5 and G to a main effects model. A moderates the effect of PI1 on CT, as evidenced by a statistically significant increase in total variation explained of 3.5%, $\mathbf{F}(1, 157) = 5.916$, $\mathbf{p} = 0.016$. It also moderates the effect of PI2 on CT, as evidenced by a statistically significant increase in total variation explained of 2.9%, $\mathbf{F}(1, 157) = 4.934$, $\mathbf{p} = 0.028$. It was also revealed that A moderates the effect of PI3 on CT, as evidenced by a statistically significant increase in total variation explained of 5.1%, $\mathbf{F}(1, 157) = 8.861$, $\mathbf{p} = 0.003$. It also moderates the effect of PI4 on CT, as evidenced by a statistically significant increase in total variation explained of 4.0%, $\mathbf{F}(1, 157) = 6.871$, $\mathbf{p} = 0.010$. Similarly, A moderates the effect of PI5 on CT, as evidenced by a statistically significant increase in total variation explained of 4.1%, $\mathbf{F}(1, 157) = 7.053$, $\mathbf{p} = 0.009$. On the other hand, the findings reveal that G moderates the effect of PI1 on OT, as evidenced by a statistically significant increase in total variation explained of 3.7%, $\mathbf{F}(1, 157) = 7.209$, $\mathbf{p} = 0.008$. It also moderates the effect of PI2 on OT, as evidenced by a statistically significant increase in total variation explained of 2.9%, $\mathbf{F}(1, 157) = 5.569$, $\mathbf{p} = 0.020$. Also, the findings reveal that G moderates the effect of PI3 on OT, as evidenced by a statistically significant increase in total variation explained of 3.4%, $\mathbf{F}(1, 157) = 6.046$, $\mathbf{p} = 0.015$. It also moderates the effect of PI4 on OT, as evidenced by a statistically significant increase in total variation explained of 2.8%, $\mathbf{F}(1, 157) = 5.282$, $\mathbf{p} = 0.023$. Similarly, G moderates the effect of PI5 on OT, as evidenced by a statistically significant increase in total variation explained of 3.8%, $\mathbf{F}(1, 157) = 6.490$, $\mathbf{p} = 0.012$.

The simple slopes analysis revealed that the linear relationship between CT and PI1 in bakeries with AA (0.164 ± 0.217), was not statistically significant $\mathbf{p} = 0.451$. However, the simple slopes analysis revealed that the linear relationship between CT and PI1 in bakeries with BA (-0.467 ± 0.141), was statistically significant, $\mathbf{p} = 0.001$. The relationship is negative. The coefficient of the interaction term (0.631 ± 0.259) was statistically

significant (**p** = 0.016) indicating that A moderates the relationship between CT and PI1. On the other hand, the simple slopes analysis revealed that the linear relationship between OT and PI1 in bakeries with M (0.351 ± 0.061), was statistically significant, **p** = 0.000 (**p** < 0.0005). However, the simple slopes analysis revealed that the linear relationship between OT and PI1 in bakeries with F (0.075 ± 0.082), was not statistically significant, **p** = 0.361. The coefficient of the interaction term (0.276 ± 0.103) was statistically significant (**p** = 0.008) indicating that G moderates the relationship between OT and PI1. Again, the simple slopes analysis revealed that the linear relationship between CT and PI2 in bakeries with AA (0.077 ± 0.213), was not statistically significant **p** = 0.718. However, the simple slopes analysis revealed that the linear relationship between CT and PI2 in bakeries with BA (-0.497 ± 0.146), was statistically significant, **p** = 0.001. The relationship is negative. The coefficient of the interaction term (0.574 ± 0.258) was statistically significant (**p** = 0.028) indicating that A moderates the relationship between CT and PI2. On the other hand, the simple slopes analysis revealed that the linear relationship between OT and PI2 in bakeries with M (0.172 ± 0.078), was statistically significant, **p** = 0.029. However, the simple slopes analysis revealed that the linear relationship between OT and PI2 in bakeries with F (0.438 ± 0.082), was statistically significant, **p** = 0.000 (**p** < 0.0005). The coefficient of the interaction term (0.266 ± 0.113) was statistically significant (**p** = 0.020) indicating that G moderates the relationship between OT and PI2. Again, the simple slopes analysis revealed that the linear relationship between CT and PI3 in bakeries with AA (0.295 ± 0.214), was not statistically significant **p** = 0.170. However, the simple slopes analysis revealed that the linear relationship between CT and PI3 in bakeries with BA (-0.447 ± 0.128), was statistically significant, **p** = 0.001. The relationship is negative. The coefficient of the interaction term (0.742 ± 0.249) was statistically significant (**p** = 0.003) indicating that A moderates the relationship between CT and PI3. On the other hand, the simple slopes analysis revealed that the linear relationship between OT and PI3 in bakeries with M (0.062 ± 0.052), was not statistically significant, **p** = 0.238. However, the simple slopes analysis revealed that the linear relationship between OT and PI3 in bakeries with F (0.288 ± 0.075), was statistically significant, **p** = 0.000 (**p** < 0.0005). The coefficient of the interaction term (0.226 ± 0.092) was statistically significant (**p** = 0.015) indicating that G moderates the relationship between OT and PI3. Again, the simple slopes analysis revealed that the linear relationship between CT and PI4 in bakeries with AA (0.075 ± 0.189), was not statistically significant **p** = 0.692. However, the simple slopes analysis revealed that the linear relationship between CT and PI4 in bakeries with BA (-0.583 ± 0.165), was statistically significant, **p** = 0.001. The relationship is negative. The coefficient of the interaction term (0.658 ± 0.251) was statistically significant (**p** = 0.010) indicating that A moderates the relationship between CT and PI4. On the other hand, the simple slopes analysis revealed that the linear relationship between OT and PI4 in bakeries with M (0.339 ± 0.061), was statistically significant, **p** = 0.000 (**p** < 0.0005). However, the simple slopes analysis revealed that the linear relationship between OT and PI4 in bakeries with F (0.109 ± 0.079), was not statistically significant, **p** = 0.169. The coefficient of the interaction term (0.230 ± 0.100) was statistically significant (**p** = 0.023) indicating that G moderates the relationship between OT and PI4. Again, the simple slopes analysis revealed that the linear relationship between CT and PI5 in bakeries with AA (0.339 ± 0.223), was not statistically significant **p** = 0.131. However, the simple slopes analysis revealed that the linear relationship between CT and PI5 in bakeries with BA (-0.379 ± 0.153), was statistically significant, **p** = 0.014. The relationship is negative. The coefficient of the interaction term (0.718 ± 0.270) was statistically significant (**p** = 0.009) indicating that A moderates the relationship between CT and PI5. On the other hand, the simple slopes analysis revealed that the linear relationship between OT and PI5 in bakeries with M (0.061 ± 0.087), was not statistically significant, **p** = 0.487. However, the simple slopes analysis revealed that the linear relationship between OT and PI5 in bakeries with F (0.433 ± 0.117), was statistically significant, **p** = 0.000 (**p** < 0.0005). The coefficient of the interaction term (0.372 ± 0.146) was statistically significant (**p** = 0.012) indicating that G moderates the relationship between OT and PI5.

Risk Controlling and Bakery Performance: A hierarchical multiple regression was run to assess the increase in variation explained by the addition of an interaction term between CI1 and A; CI1 and G; CI2 and A; CI2 and G; CI3 and A; CI3 and G; CI4 and A; CI4 and G; CI5 and A; and CI5 and G to a main effects model. A moderates the effect of CI1 on CT, as evidenced by a statistically significant increase in total variation explained of 3.3%, **F**(1, 157) = 5.761, **p** = 0.018. It also moderates the effect of CI2 on CT, as evidenced by a statistically significant increase in total variation explained of 4.0%, **F**(1, 157) = 6.880, **p** = 0.010. It was also revealed that A moderates the effect of CI3 on CT, as evidenced by a statistically significant increase in total variation explained of 3.8%, **F**(1, 157) = 6.504, **p** = 0.012. It also moderates the effect of CI4 on CT, as

evidenced by a statistically significant increase in total variation explained of 3.3%, **F**(1, 157) = 5.569, **p** = 0.020. Similarly, A moderates the effect of CI5 on CT, as evidenced by a statistically significant increase in total variation explained of 6.5%, **F**(1, 157) = 11.466, **p** = 0.001. On the other hand, the findings reveal that G moderates the effect of CI1 on OT, as evidenced by a statistically significant increase in total variation explained of 2.9%, **F**(1, 157) = 5.506, **p** = 0.020. It also moderates the effect of CI2 on OT, as evidenced by a statistically significant increase in total variation explained of 3.1%, **F**(1, 157) = 5.388, **p** = 0.022. Also, the findings reveal that G moderates the effect of CI3 on OT, as evidenced by a statistically significant increase in total variation explained of 3.4%, **F**(1, 157) = 6.778, **p** = 0.010. It also moderates the effect of CI4 on OT, as evidenced by a statistically significant increase in total variation explained of 4.1%, **F**(1, 157) = 7.171, **p** = 0.008. Similarly, G moderates the effect of CI5 on OT, as evidenced by a statistically significant increase in total variation explained of 3.1%, **F**(1, 157) = 5.601, **p** = 0.019.

The simple slopes analysis revealed that the linear relationship between CT and CI1 in bakeries with AA (0.161 ± 0.220), was not statistically significant **p** = 0.465. However, the simple slopes analysis revealed that the linear relationship between CT and CI1 in bakeries with BA (-0.472 ± 0.146), was statistically significant, **p** = 0.001. The relationship is negative. The coefficient of the interaction term (0.633 ± 0.264) was statistically significant (**p** = 0.018) indicating that A moderates the relationship between CT and CI1. On the other hand, the simple slopes analysis revealed that the linear relationship between OT and CI1 in bakeries with M (0.334 ± 0.068), was statistically significant, **p** = 0.000 (**p** < 0.0005). However, the simple slopes analysis revealed that the linear relationship between OT and CI1 in bakeries with F (0.062 ± 0.093), was not statistically significant, **p** = 0.507. The coefficient of the interaction term (0.272 ± 0.116) was statistically significant (**p** = 0.020) indicating that G moderates the relationship between OT and CI1. Again, the simple slopes analysis revealed that the linear relationship between CT and CI2 in bakeries with AA (0.371 ± 0.222), was not statistically significant **p** = 0.096. However, the simple slopes analysis revealed that the linear relationship between CT and CI2 in bakeries with BA (-0.309 ± 0.135), was statistically significant, **p** = 0.023. The relationship is negative. The coefficient of the interaction term (0.680 ± 0.259) was statistically significant (**p** = 0.010) indicating that A moderates the relationship between CT and CI2. On the other hand, the simple slopes analysis revealed that the linear relationship between OT and CI2 in bakeries with M (0.040 ± 0.068), was not statistically significant, **p** = 0.558. However, the simple slopes analysis revealed that the linear relationship between OT and CI2 in bakeries with F (0.313 ± 0.096), was statistically significant, **p** = 0.001. The coefficient of the interaction term (0.273 ± 0.118) was statistically significant (**p** = 0.022) indicating that G moderates the relationship between OT and CI2. Again, the simple slopes analysis revealed that the linear relationship between CT and CI3 in bakeries with AA (0.219 ± 0.182), was not statistically significant **p** = 0.230. However, the simple slopes analysis revealed that the linear relationship between CT and CI3 in bakeries with BA (-0.400 ± 0.161), was statistically significant, **p** = 0.014. The relationship is negative. The coefficient of the interaction term (0.619 ± 0.243) was statistically significant (**p** = 0.012) indicating that A moderates the relationship between CT and CI3. On the other hand, the simple slopes analysis revealed that the linear relationship between OT and CI3 in bakeries with M (0.367 ± 0.058), was statistically significant, **p** = 0.000 (**p** < 0.0005). However, the simple slopes analysis revealed that the linear relationship between OT and CI3 in bakeries with F (0.109 ± 0.080), was not statistically significant, **p** = 0.176. The coefficient of the interaction term (0.258 ± 0.099) was statistically significant (**p** = 0.010) indicating that G moderates the relationship between OT and CI3. Again, the simple slopes analysis revealed that the linear relationship between CT and CI4 in bakeries with AA (0.252 ± 0.208), was not statistically significant **p** = 0.226. However, the simple slopes analysis revealed that the linear relationship between CT and CI4 in bakeries with BA (-0.372 ± 0.164), was statistically significant, **p** = 0.025. The relationship is negative. The coefficient of the interaction term (0.624 ± 0.264) was statistically significant (**p** = 0.020) indicating that A moderates the relationship between CT and CI4. On the other hand, the simple slopes analysis revealed that the linear relationship between OT and CI4 in bakeries with M (-0.012 ± 0.070), was not statistically significant, **p** = 0.861. However, the simple slopes analysis revealed that the linear relationship between OT and CI4 in bakeries with F (0.304 ± 0.095), was statistically significant, **p** = 0.002. The coefficient of the interaction term (0.317 ± 0.118) was statistically significant (**p** = 0.008) indicating that G moderates the relationship between OT and CI4. Again, the simple slopes analysis revealed that the linear relationship between CT and CI5 in bakeries with AA (0.473 ± 0.201), was statistically significant **p** = 0.020. However, the relationship is positive. The simple slopes analysis revealed that the linear relationship between CT and CI5 in bakeries with BA (-0.379 ± 0.152), was statistically significant, **p** = 0.014. The relationship is negative. The coefficient of the

interaction term (0.853 ± 0.252) was statistically significant (**p** = 0.001) indicating that A moderates the relationship between CT and CI5. On the other hand, the simple slopes analysis revealed that the linear relationship between OT and CI5 in bakeries with M (0.299 ± 0.067), was statistically significant, **p** = 0.000 (**p** < 0.0005). However, the simple slopes analysis revealed that the linear relationship between OT and CI5 in bakeries with F (0.059 ± 0.076), was not statistically significant, **p** = 0.441. The coefficient of the interaction term (0.240 ± 0.102) was statistically significant (**p** = 0.019) indicating that G moderates the relationship between OT and CI5.

Strategic Risk Initiatives and Bakery Performance: A hierarchical multiple regression was run to assess the increase in variation explained by the addition of an interaction term between SI1 and A; SI1 and G; SI2 and A; SI2 and G; SI3 and A; SI3 and G; SI4 and A; SI4 and G; SI5 and A; and SI5 and G to a main effects model. A moderates the effect of SI1 on CT, as evidenced by a statistically significant increase in total variation explained of 3.3%, **F**(1, 157) = 5.631, **p** = 0.019. It also moderates the effect of SI2 on CT, as evidenced by a statistically significant increase in total variation explained of 2.9%, **F**(1, 157) = 5.014, **p** = 0.027. It was also revealed that A moderates the effect of SI3 on CT, as evidenced by a statistically significant increase in total variation explained of 7.7%, **F**(1, 157) = 14.161, **p** = 0.000 (**p** < 0.0005). It also moderates the effect of SI4 on CT, as evidenced by a statistically significant increase in total variation explained of 3.6%, **F**(1, 157) = 6.208, **p** = 0.014. Similarly, A moderates the effect of SI5 on CT, as evidenced by a statistically significant increase in total variation explained of 3.3%, **F**(1, 157) = 5.654, **p** = 0.019. On the other hand, the findings reveal that G moderates the effect of SI1 on OT, as evidenced by a statistically significant increase in total variation explained of 2.8%, **F**(1, 157) = 4.878, **p** = 0.029. It also moderates the effect of SI2 on OT, as evidenced by a statistically significant increase in total variation explained of 3.1%, **F**(1, 157) = 5.907, **p** = 0.016. It was also revealed that G moderates the effect of SI3 on OT, as evidenced by a statistically significant increase in total variation explained of 6.2%, **F**(1, 157) = 10.877, **p** = 0.001. It also moderates the effect of SI4 on OT, as evidenced by a statistically significant increase in total variation explained of 3.9%, **F**(1, 157) = 6.878, **p** = 0.010. Similarly, G moderates the effect of SI5 on OT, as evidenced by a statistically significant increase in total variation explained of 3.9%, **F**(1, 157) = 8.444, **p** = 0.004.

The simple slopes analysis revealed that the linear relationship between CT and SI1 in bakeries with AA (0.301 ± 0.223), was not statistically significant **p** = 0.180. However, the simple slopes analysis revealed that the linear relationship between CT and SI1 in bakeries with BA (-0.332 ± 0.145), was statistically significant, **p** = 0.024. The relationship is negative. The coefficient of the interaction term (0.633 ± 0.267) was statistically significant (**p** = 0.019) indicating that A moderates the relationship between CT and SI1. On the other hand, the simple slopes analysis revealed that the linear relationship between OT and SI1 in bakeries with M (0.246 ± 0.065), was statistically significant, **p** = 0.000 (**p** < 0.0005). However, the simple slopes analysis revealed that the linear relationship between OT and SI1 in bakeries with F (0.019 ± 0.080), was not statistically significant, **p** = 0.815. The coefficient of the interaction term (0.227 ± 0.103) was statistically significant (**p** = 0.029) indicating that G moderates the relationship between OT and SI1. Again, the simple slopes analysis revealed that the linear relationship between CT and SI2 in bakeries with AA (0.226 ± 0.231), was not statistically significant **p** = 0.328. However, the simple slopes analysis revealed that the linear relationship between CT and SI2 in bakeries with BA (-0.384 ± 0.145), was statistically significant, **p** = 0.009. The relationship is negative. The coefficient of the interaction term (0.610 ± 0.272) was statistically significant (**p** = 0.027) indicating that A moderates the relationship between CT and SI2. On the other hand, the simple slopes analysis revealed that the linear relationship between OT and SI2 in bakeries with M (0.180 ± 0.072), was statistically significant, **p** = 0.013. The simple slopes analysis revealed that the linear relationship between OT and SI2 in bakeries with F (0.472 ± 0.096), was statistically significant, **p** = 0.000 (**p** < 0.0005). The coefficient of the interaction term (0.292 ± 0.120) was statistically significant (**p** = 0.016) indicating that G moderates the relationship between OT and SI2. Again, the simple slopes analysis revealed that the linear relationship between CT and SI3 in bakeries with AA (0.132 ± 0.175), was not statistically significant **p** = 0.453. However, the simple slopes analysis revealed that the linear relationship between CT and SI3 in bakeries with BA (-0.813 ± 0.180), was statistically significant, **p** = 0.000 (**p** < 0.0005). The relationship is negative. The coefficient of the interaction term (0.945 ± 0.251) was statistically significant (**p** = 0.000 or **p** < 0.0005) indicating that A moderates the relationship between CT and SI3. On the other hand, the simple slopes analysis revealed that the linear relationship between OT and SI3 in bakeries with M (0.031 ± 0.065), was not statistically significant, **p** = 0.637. The simple slopes analysis revealed that the linear relationship

between OT and SI3 in bakeries with F (0.425 ± 0.100), was statistically significant, **p** = 0.000 (**p** < 0.0005). The coefficient of the interaction term (0.394 ± 0.119) was statistically significant (**p** = 0.001) indicating that G moderates the relationship between OT and SI3. Again, the simple slopes analysis revealed that the linear relationship between CT and SI4 in bakeries with AA (0.124 ± 0.195), was not statistically significant **p** = 0.523. However, the simple slopes analysis revealed that the linear relationship between CT and SI4 in bakeries with BA (-0.544 ± 0.185), was statistically significant, **p** = 0.004. The relationship is negative. The coefficient of the interaction term (0.668 ± 0.268) was statistically significant (**p** = 0.014) indicating that A moderates the relationship between CT and SI4. On the other hand, the simple slopes analysis revealed that the linear relationship between OT and SI4 in bakeries with M (0.103 ± 0.057), was not statistically significant, **p** = 0.072. The simple slopes analysis revealed that the linear relationship between OT and SI4 in bakeries with F (0.392 ± 0.094), was statistically significant, **p** = 0.000 (**p** < 0.0005). The coefficient of the interaction term (0.289 ± 0.110) was statistically significant (**p** = 0.010) indicating that G moderates the relationship between OT and SI4. Again, the simple slopes analysis revealed that the linear relationship between CT and SI5 in bakeries with AA (0.302 ± 0.221), was not statistically significant **p** = 0.173. However, the simple slopes analysis revealed that the linear relationship between CT and SI5 in bakeries with BA (-0.326 ± 0.145), was statistically significant, **p** = 0.026. The relationship is negative. The coefficient of the interaction term (0.628 ± 0.264) was statistically significant (**p** = 0.019) indicating that A moderates the relationship between CT and SI5. On the other hand, the simple slopes analysis revealed that the linear relationship between OT and SI5 in bakeries with M (0.272 ± 0.069), was statistically significant, **p** = 0.000 (**p** < 0.0005). The simple slopes analysis revealed that the linear relationship between OT and SI5 in bakeries with F (0.623 ± 0.099), was statistically significant, **p** = 0.000 (**p** < 0.0005). The coefficient of the interaction term (0.350 ± 0.121) was statistically significant (**p** = 0.004) indicating that G moderates the relationship between OT and SI5.

Discussion

Risk Planning and Bakery Performance: The findings tell that the age of the bakery moderates the relationship between bakeries' commitment in ensuring that they have the relevant knowledge and technical know-how in foreseeing potential hazards; and the cost level. It also moderates the relationship between bakeries' commitment in integrating potential hazards in their day to day operations; and the cost level. The findings also confirm that the age of the bakery moderates the relationship between bakeries' commitment in making an in-depth analysis before entering into any contract with any supplier or business partner; and the cost level. Similarly, the bakery age moderates the relationship between bakeries' commitment in frequently finding whether there are any changes in their business environment related to pricing, technology, products, policies, and legal requirements; and the cost level. It also moderates the relationship between bakeries' capabilities in developing and using a backup plan whenever unexpected changes in their business and operating environment occur; and the cost level. All these relationships exist in bakeries with basic age than in bakeries with an advanced age. This tells that the readiness and commitment of younger bakeries to adopt risk planning initiatives is higher than that of bakeries with an advanced age. Their readiness is likely to be attributed to by growth ambitions of most of the young firms. Ultimately, these commitments reduce their production and operation costs. On the other hand, the findings tell that the gender of the bakery owner/manager moderates the relationship between bakeries' commitment in ensuring that they have the relevant knowledge and technical know-how in foreseeing potential hazards; and the production/output level. This relationship exists in bakeries with male owners/managers than bakeries with female owners/managers. Also, gender moderates the relationship between bakeries' commitment in integrating potential hazards in their day to day operations; and the production/output level. Again, this relationship exists in bakeries with male owners/managers and those with female owners/managers. The findings also confirm that gender moderates the relationship between bakeries' commitment to make an in-depth analysis before entering into any contract with any supplier or business partner; and the production/output level. Conversely, this relationship exists in bakeries with female owners/managers than bakeries with male owners/managers. Similarly, gender moderates the relationship between bakeries' commitment in frequently finding whether there are any changes in their business environment related to pricing, technology, products, policies, and legal requirements; and the production/output level. This relationship exists in bakeries with male owners/managers than bakeries with female owners/managers. Also, gender moderates the relationship between bakeries' capabilities in developing and using a backup plan whenever unexpected

changes in their business and operating environment occur; and the production/output level. This relationship exists in bakeries with female owners/managers than bakeries with male owners/managers. However, these relationships tell that both males' and females' commitments in adopting risk planning initiatives are significant. These commitments influence production/output performance. All the results corroborate with the fact that effective risk planning requires the competency of the SME workforce and their involvement in the planning process. The involvement of the workforce in decision-making process and readiness of the management to honor their ideas foster their motivation (Irawanto, 2015). Although SMEs that involve females in their top management teams are likely to achieve positive performance (Wu, Yao, & Muhammad, 2017), we argue that the commitment of the owners/managers and employees is more important than gender issues. We however argue that effective risk management in SMEs can be fuelled by the decision of owners/managers to adopt ERM. This is a source of SME's competitive advantage (Yang, Ishtiaq, & Anwar, 2018). As revealed by the findings, young SMEs have higher chances of increasing their competitiveness if they adopt ERM in their business operations and risk planning strategies. This is because, firms with advanced age are bureaucratic, and inflexible (Pervan, Pervan, & Ćurak, 2017).

Risk Controlling and Bakery Performance: The findings tell that the age of the bakery moderates the relationship between bakeries' commitment in replacing bakery appliances and other equipments with new ones as per technical advice; and the cost level. It also moderates the relationship between bakeries' commitment in frequently evaluating the performance of their contracts with their suppliers, agents or business partners; and the cost level. The findings also confirm that the bakery age moderates the relationship between bakeries' commitment in frequently testing the performance of their product development processes; and the cost level. Similarly, the bakery age moderates the relationship between bakeries' commitment in frequently testing the performance of their operating procedures; and the cost level. Again, all these relationships exist in bakeries with basic age than in bakeries with an advanced age. This tells that the readiness and commitment of younger bakeries to adopt risk controlling techniques is higher than that of bakeries with an advanced age. Their readiness is likely to be attributed to by growth ambitions of most of the young firms. Ultimately, this commitment reduces their production and operation costs. Again, the bakery age moderates the relationship between bakeries' commitment in frequently requesting for feedback from customers with regard to their product performance in terms of price, packaging, ingredients, and taste; and the cost level. The findings reveal that this relationship exists in bakeries with both basic age and advanced age. However, a positive relationship in bakeries with advanced age informs that their commitment to adopt risk controlling initiatives leads to an increase in production and operation costs. The negative relationship revealed in bakeries with a basic age tells that their commitment in adopting risk controlling initiatives influences a reduction in production and operation costs. This tells that the younger bakeries have more of the right risk controlling techniques than bakeries with an advanced age. We also argue that their commitment in adopting the right techniques is likely to be attributed to by growth ambitions of most of the young firms. On the other hand, the findings tell that the gender of the bakery owner/manager moderates the relationship between bakeries' commitment in replacing bakery appliances and other equipment with new ones as per technical advice; and the production/output level. This relationship exists in bakeries with male owners/managers than bakeries with female owners/managers. Also, gender moderates the relationship between bakeries' commitment in frequently evaluating the performance of their contracts with their suppliers, agents or business partners; and the production/output level. However, this relationship exists in bakeries with female owners/managers than bakeries with male owners/managers. The findings also confirm that gender moderates the relationship between bakeries' commitment to frequently test the performance of their product development processes; and the production/output level. This relationship exists in bakeries with male owners/managers than bakeries with female owners/managers. The findings also tell that gender moderates the relationship between bakeries' commitment to frequently test the performance of their operating procedures; and the production/output level. However, this relationship exists in bakeries with female owners/managers than bakeries with male owners/managers. Similarly, gender moderates the relationship between bakeries' commitment in frequently requesting for feedback from customers with regard to their product performance in terms of price, packaging, ingredients, and taste; and the production/output level. This relationship exists in bakeries with male owners/managers than bakeries with female owners/managers. Similarly, based on these relationships, we argue that there are both males' and females' commitments in adopting risk controlling techniques. These commitments influence production/output performance. All the results corroborate with the fact that risk controlling needs to

consider the nature and characteristics of products, processes, and the working environments. This is due to the fact that poor procedures may cause a lot of operational risks. Other causative agents include incapability in detecting respective threats, and failures of relevant systems (Hemrit & Ben Arab, 2012). Also, the business performance may be contributed to by the respective product development processes (Udegbe, 2014). The relationship between product performance and customer satisfaction is apparent (Sitanggang, Sinulingga, & Fachruddin, 2019). Additionally, peculiar and appealing innovations as perceived by customers play a vital role in influencing the relationship between product development and business performance (Udegbe & Udegbe, 2013). However, the competent workforce is needed in integrating risk controlling practices with the interest of key stakeholders such as customers, business partners, suppliers, creditors, and employees to mention a few. This competency is mainly driven by regular employee training in matters pertaining to risk controlling. Employee training is crucial in managing potential risks (Mohammed, 2014).

Strategic Risk Initiatives and Bakery Performance: The findings tell that the age of the bakery moderates the relationship between bakeries' commitment in frequently analyzing the strengths and weaknesses of their major competitors; and the cost level. It also moderates the relationship between bakeries' commitment in frequently requesting for feedback from employees about their satisfaction level against their working environment; and the cost level. The findings also confirm that the age of the bakery moderates the relationship between bakeries' readiness in incurring any additional cost to meet their customers' demands; and the cost level. Similarly, the bakery age moderates the relationship between bakeries' readiness in incurring any additional cost to comply with the legal requirements; and the cost level. It also moderates the relationship between bakeries' readiness in investing in any risky business that will yield significant returns; and the cost level. All these relationships exist in bakeries with basic age than in bakeries with an advanced age. This tells that the readiness and commitment of younger bakeries to adopt strategic risk initiatives is higher than that of bakeries with an advanced age. Again, we argue that their readiness is likely to be attributed to by growth ambitions of most of the young firms. Ultimately, these commitments reduce their production and operation costs. On the other hand, the findings tell that the gender of the bakery owner/manager moderates the relationship between bakeries' commitment in frequently analyzing the strengths and weaknesses of their major competitors; and the production/output level. This relationship exists in bakeries with male owners/managers than bakeries with female owners/managers. Gender also moderates the relationship between bakeries' commitment in frequently requesting for feedback from employees about their satisfaction level against their working environment; and the production/output level. However, this relationship exists in bakeries with male owners/managers and those with female owners/managers. Similarly, gender moderates the relationship between bakeries' readiness to incur any additional cost to meet their customers' demands; and the production/output level. This relationship exists in bakeries with female owners/managers than bakeries with male owners/managers. Again, gender moderates the relationship between bakeries' readiness to incur any additional cost to comply with the legal requirements; and the production/output level. This relationship exists in bakeries with female owners/managers than bakeries with male owners/managers. The findings also confirm that gender moderates the relationship between bakeries' readiness to invest in any risky business that will yield significant returns; and the production/output level. The findings tell that this relationship exists in bakeries with male owners/managers and those with female owners/managers. Again, based on these relationships, we argue that there are both males' and females' commitments in adopting strategic risk initiatives. These commitments influence production/output performance. All the results corroborate with the fact that strategic risk initiatives should focus on integrating risk management practices with strategic business operations and decisions in order to influence competitive advantage. In this regard, both internal and external environments can be analyzed. For example, by carrying out a competitor analysis, the chances of achieving positive performance increase significantly (Adom, Nyarko, & Som, 2016). However, all the strategic risk initiatives need the support of favorable working environment. The favorable working environment is a driver of positive employee performance (Nderi & Kirai, 2017). Motivated employees are likely to influence customer satisfaction. The customer satisfaction is mainly contributed to by the commitment of firms in meeting customer demands and offering quality service (Masrurul, 2019). Effective risk management is linked with the provision of quality service and the readiness of SMEs to adopt strategic initiatives that address operational inefficiency and support business mission.

5. Conclusion and Recommendations

This study has revealed that SMEs need to characterize and employ their risk planning strategies in influencing both the reduction of production and operation costs, and the increase in production/output level. These strategies include bakeries' commitment to ensure that they have the relevant knowledge and technical know-how in foreseeing potential hazards, bakeries' commitment in integrating potential hazards in their day to day operations, bakeries' commitment in making an in-depth analysis before entering into any contract with any supplier or business partner, bakeries' commitment in frequently finding whether there are any changes in their business environment related to pricing, technology, products, policies, and legal requirements, and the bakeries' capabilities in developing and using a backup plan whenever unexpected changes in their business and operating environment occur. Both the age of the bakery and gender of the bakery owners/managers moderate the relationship between these strategies; and the cost level, and production/output level respectively. This study has also revealed that SMEs need to characterize and employ their risk controlling strategies in influencing both the reduction of production and operation costs, and the increase in production/output level. These strategies include bakeries' commitment in replacing their appliances and other equipment with new ones as per technical advice, bakeries' commitment to frequently evaluate the performance of their contracts with their suppliers, agents or business partners, bakeries' commitment to frequently test the performance of their product development processes, bakeries' commitment to frequently test the performance of their operating procedures, and bakeries' commitment to frequently request for feedback from customers with regard to their product performance in terms of price, packaging, ingredients, and taste. Again, both the age of the bakery and gender of the bakery owners/managers moderate the relationship between these strategies; and the cost level, and production/output level respectively. This study has also revealed that SMEs need to characterize and employ their strategic risk initiatives in influencing both the reduction of production and operation costs, and the increase in production/output level. These initiatives include bakeries' commitment to frequently analyze the strengths and weaknesses of their major competitors, bakeries' commitment to frequently request for feedback from employees about their satisfaction level against their working environment, bakeries' readiness to incur any additional cost to meet their customers' demands, bakeries' readiness to incur any additional cost to comply with the legal requirements, and bakeries' readiness to invest in any risky business that will yield significant returns. Similarly, both the age of the bakery and gender of the bakery owners/managers moderate the relationship between these strategies; and the cost level, and production/output level respectively. This study recommends that bakeries with an advanced age can adopt the risk planning, risk controlling, and strategic risk initiatives from young bakeries in order to manage their production and operation costs. Nevertheless, both female and male owners/managers need to learn from one another in order to adopt risk planning, risk controlling, and strategic risk initiatives that can increase the production/output performance of their bakeries.

All the results corroborate with the fact that SMEs need to enhance their capabilities in managing risks. One of the enhancement strategies is frequently training their people so as to make them define hazards and their underlying causes, and in predicting their occurrence, and relevant controlling techniques. Without such trainings, there will be internal inefficiencies (Kagwathi, Kamau, Njau, & Kamau, 2014). The study recommends for the need to have frequent risk management trainings to SME workforce so that they can enhance their competencies in risk planning, risk controlling, and strategic risk initiatives, and eventually link them with their business operations. Through such competences, effective human resource management is enhanced and subsequently increases the survival of SMEs (Mulolli, Islami, & Skenderi, 2015). Additionally, the involvement of all employees in decision making processes pertaining to enhanced risk management practices should be prioritized by SME owners/managers. SMEs also need to analyze and integrate the role of gender in risk planning, risk controlling, and strategic risk initiatives in order to influence their competitiveness. Nevertheless, the competitiveness of SMEs can be driven by efficient risk management practices in favorable working environments. This study argues that the working environments in SMEs should support the risk management practices. Effective risk management practices can be promoted by the commitment of SMEs to create learning environments that embrace the sharing of risk management knowledge amongst employees. Effective knowledge management practices and information systems need to be adopted by SMEs in order to enhance their risk planning, risk controlling, and strategic risk initiatives. In this regard, the study recommends that the adoption of enterprise risk management in order to facilitate the

risk management processes in SMEs. The adoption of effective risk management instruments and the enhancement of risk management processes and systems in SMEs need the support of relevant stakeholders. One of the SMEs' key stakeholders in risk management particularly in matters pertaining to capacity building is the government. This study argues that the government support in building SME capability should be sought in order to drive the growth and competitiveness of SMEs (Osei, Forkuoh, Shao, & Osei, 2016). For example, the capacity building programmes may focus on enabling SMEs to address most of their major business challenges such as poor access to loans particularly big loans that are mainly driven by lack of collaterals, lack of financial management skills, lack of financial discipline, and poor record management skills and systems (Richard & Mori, 2012). Apart from the government, SMEs need to forge strategic partnerships with key risk management players such as the training institutions, policy development organs, and the financial institutions in order to get a deeper understanding on how to develop and implement effective risk planning, risk controlling, and strategic risk initiatives.

Limitations and Further Studies: The respondents of this study were the owners/managers of the bakeries since they are the top decision makers and chief spokespersons of their SMEs. We argue that the owners/managers cannot understand each and specific details regarding the involvement of their employees in risk management practices. Therefore, specific information and detailed practices especially from the employees who are greatly involved in the development and implementation of risk management strategies would broaden the understanding of the contribution of risk management on SME performance. We also propose that similar studies may be conducted in different industries and in both developed and developing countries, and involve different respondents such as employees, customers, suppliers, agents, rivals, lenders, and relevant business partners.

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Modeling Market Integration and Asymmetric Price Transmission Dynamics of Yam Markets in Ghana

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Abstract: Functioning agricultural markets are fundamental to unlock economic growth and to accelerate agricultural development. Understanding the behavior of agriculture markets is crucial for price, poverty and livelihood policy strategies in agrarian economies. To assess price transmission and market efficiencies of Ghanaian yam markets spatial market integration analysis of five major yam markets: Techiman, Tamale, Wa, Kumasi and Accra was conducted. Monthly wholesale price data between January 2006 and June 2018 were used. Results from the momentum threshold autoregressive (M-TAR) model indicated the presence of co-integration and price transmission asymmetries. Thus, price increases in Techiman reference market are more rapidly transmitted to the other regional markets than price reductions. It is recommended that the source of this type of asymmetry be investigated as it favors middlemen at the expense of producers and retailers/consumers for appropriate marketing policy intervention.

Keywords: *Ghana, Spatial Market Integration, Asymmetric price transmission, momentum threshold autogressive model*.

1. Introduction

The issues of agricultural market restructuring, price transmission dynamics and efficiency in developing countries have gained considerable attention over the past two decades. This is due to the complexities and imperfections that have characterized interconnections among producers, wholesalers, retailers, and other market agents in a multifaceted structure. The efficient operation of agricultural markets relies extensively on the momentum of price transmission within and across markets in both vertical and horizontal directions across a country. Thus, understanding the relationships among market agents is a key to establishing marketing efficiency, consumer and producer welfare levels (Lemma and Singh, 2015). In agricultural market analysis, and price transmission studies in particular, evidence of asymmetric adjustments carries important theoretical and policy implications as it concerns consumer and producer welfare; equilibrium dynamics, market power and efficiency; and market policy effectiveness. Consequently, empirical studies in market integration (MI) analysis have received a lot of attention over the past five decades in both outcomes and methods. For instance, studies that found presence of asymmetric price transmission adjustment processes or non-cointegrated relationships generated market power and imperfections concerns. With respect to methods, while many earlier studies assumed linear relationships between inter-markets price responses and as a result applied linear econometric models, over the past decade, many researchers have presented arguments for nonlinearities.

In market integration and price transmission mechanisms (Baulch, 1997; von Cramon, 1998; Barrett and Li, 2002; Zapata and Gauthier, 2003; Abunyuwah, 2008, 2013). Presence of strongly integrated markets across space ensures the prevalence of the law of one price and in effect reduces price variability and its adverse consequences on consumer and producers' resource utilization behaviors. Despite continued, direct and indirect, calls for and implementation of agricultural market and trade based policy strategies to improving market accessibility, integration and efficiency, observed activities of agricultural market intermediaries and nested variations in prices within and across production seasons between producer markets and others in Ghana call for deeper insights and evaluation of price formation dynamics and levels of agricultural market interconnectedness. One crop which has received little attention in the MI literature is Yam. In Ghana yam is an essential crop for both commercial and subsistence production, almost across all regions of the country. In terms of production, Ghana ranks third in the world, following Nigeria and Cote d'Ivoire and yam accounts for about 16% of agricultural gross domestic product (GDP) (FAOSTAT, 2014). Domestically yam is widely produced, consumed and traded across the country providing economic livelihood for many actors involved in its supply and value chains. Despite its significance in the livelihood of agents involved in its production, distribution and marketing of the commodity, little or no study has emphasized.

On the price transmission dynamics and market integration analysis to appropriately inform policy recommendations. Yam production in Ghana like many others requires efficient markets to ensure that producers receive appropriate prices for their produce. To understand the Ghanaian yam markets dynamics and implied efficiency, the study was set to examine the spatial price transmission mechanisms within Ghana's yam markets through non-linear cointegration approach. This is to provide empirical basis for policy recommendations on the functioning structure of the major yam markets in Ghana.

2. Related Studies

In agricultural based economies, market efficiency and active market participation of smallholder farmers are necessary for sustained livelihood improvements and economic development. In market efficiency assessments price transmission and spatial market integration analyses have been adopted. For its theoretical, policy and welfare implications, extensive MI studies abound for both developed and developing agricultural markets worldwide. Popular market integration (MI) studies in Ghana include (Abdulai, 2000; Alderman, 1992; Badiane and Shively, 1998) who reported varied degree of price transmission adjustments, asymmetric responses and long-run interrelationships in the Ghanaian food markets. Explaining price adjustment processes Badiane and Shively (1998) reported that price transmission dynamics were responsive to the degree of market interconnectedness to the reference market using cointegration analysis. Employing threshold cointegration analysis Abdualai (2000) reported that wholesale maize prices from (Accra and Bolgatanga) respond asymmetrically to price changes in Techiman market. Similar to studies that found price transmission asymmetries, it was observed that responses were slower when margins were stretched by price decreases in the central market (see von Cramon, 1998). In Amikuzuno (2009), it was reported that degree and speed of spatial price transmission within fresh tomato markets in Ghana varied in space and across tariff policy regimes. Applying threshold autoregressive (TAR) model, he found that price transmission between some market pairs improved while others deteriorated during low tariffs regime. The study also reported an improvement in the speeds of price adjustment and integration under low tariff regime.

Employing the Johansen multivariate co-integration analysis and error correction model, Mensah-Bonsu et al. (2011) assessed the efficiency of the plantain marketing system in Ghana and concluded that price transmission and market integration between the central consumption market and others were weak. Acquah (2012) studied retail and wholesale maize markets in Ghana using vertical price transmission framework. The researcher found that the markets were cointegrated and exhibited threshold effects with asymmetric price adjustments in which negative deviations from long-term equilibrium reverted faster than for positive deviations. Assessing price transmission dynamics of imported and local wholesale rice prices from 2006 to 2011 in Ghana, Amikuzuno et al. (2013) observed in the presence of long-run equilibrium relationships that imported rice prices responded partially to price shocks from the local market. With methodological focus, Abunyuwah (2013), building on (Baulch, 1997; von Cramon, 1998; Barrett and Li, 2002) in particular demonstrated with synthesized data how various relative non-linear data complexities impose limitations on linear and simple non-linear time series econometric models under specific market equilibrium assumptions. Blay et al. (2015) studied price volatility, market integration and price transmission adjustments of sorghum and millet markets in Ghana using both the framework of M-TAR and threshold vector error correction models. They reported that for both commodities, the markets and their respective reference markets emitted asymmetric adjustment processes towards the long-run equilibrium where relatively high persistence characterized positive deviations as compared to negative deviations. The study also reported higher levels of price instability and risk.

3. Methodology and Data

The present study focuses on price transmission dynamics of major yam markets in Ghana. Data set for the analysis was a time series of yam monthly wholesale prices spanning from January 2006 to June 2018. Techiman, Kumasi, Tamale, Accra and Wa markets, been major yam and bigger markets in Ghana were purposively used for the study. The Techiman market was selected as the reference market. The underlying data generating process (DGP) of the variables were first assessed by testing for the presence of unit root properties and seasonal patterns using the standard augmented Dickey-Fuller (ADF) and Kwiatkowski-

Phillips-Schmidt-Shin (KPSS) unit root tests and the seasonal unit root test developed by Hylleberg et al. (1990) respectively as many economic time series variables exhibit these characteristics. The model for the monthly data was specified as:

$$\Delta_{12}y_t = \pi_1 z_{1,t-1} + \pi_2 z_{2,t-1} + \pi_3 z_{3,t-1} + \pi_4 z_{3,t-2} + \pi_5 z_{4,t-1} + \pi_6 z_{4,t-2} + \pi_7 z_{5,t-1} + \pi_8 z_{5,t-2} + \pi_9 z_{6,t-1} + \pi_{10} z_{6,t-2} + \pi_{11} z_{7,t-1} + \pi_{12} z_{7t-2} + \sum_{j=1}^{p} \alpha_j^* \Delta_{12} y_{t-j} + \mu_t \quad (1)$$

The null hypotheses H_0: π_1 = 0, H_0: π_2= 0 and H_0 : π_1= π_2 = 0 correspond to tests for regular, semi-annual and annual unit roots respectively.

Threshold Cointegration: In the traditional cointegration modeling framework asymmetric adjustments are not directly captured as the models are built within linear and symmetric equilibrium structure (Balk and Fomby, 1997; Enders and Siklos, 2001). Taking into consideration high incidence of price transmission asymmetries reported by researchers over the past three decades and their modeling implications in time series MI analysis, we employed an asymmetric model (M-TAR) of Enders and Siklo (2001) in the cointegration analysis of yam markets in Ghana. The threshold autoregressive model was expressed as

$$\Delta\mu_t = M_t \rho_1 \mu_t + (1 - M_t)\rho_2 \mu_{t-1} + \sum_{i=1}^{p} \gamma_i \Delta\mu_{t-i} + \omega_t \quad (1)$$

Where $M_t = \begin{cases} 1 \; if \; \Delta\mu_{t-1} \geq \Psi \\ 0 \; if \; \Delta\mu_{t-1} < \Psi \end{cases}$

Where M_t is the Heaviside indicator function; Ψ defines the threshold point value; ρ_1 *and* ρ_2 represent the cointegration parameters; and ω_t is made up of zero-mean, constant variance errors, such that ω_t is independent of the residuals from the yam prices specification, μ_t. The test for no co-integration ($\rho_1 = \rho_2 = 0$) in the model is of a nonstandard joint F-test (Φ_i), where the test statistic Φ_i ($i = MTAR$) is compared to critical values of those provided by Enders and Siklos (2001). In the estimation of M-TAR, the Ψs are usually unknown and are estimated. We used Chan's (1993) approach in the estimation of the threshold value (Ψ) and employed the two-step approach for analyzing the price transmission dynamics mechanisms. First, we tested for the presence of cointegration against the null hypothesis of no cointegration in the linear framework.

Next, after the null hypothesis of no cointegration was rejected, a test of linear against threshold cointegration was conducted along Hansen-Seo's (2002) lagrangian multiplier (LM) test. The structure of the model under the null hypothesis of "no threshold effect" reduces to a linear Vector Error Correction Model (VECM), and this is compared to its alternative nonlinear model structure that incorporates threshold effects. In order to incorporate the threshold and asymmetric non-linearities, the threshold vector error correction model (TVECM) as expressed in equation (2) was adopted for the study. Threshold cointegration has become one of the popular modeling approaches for dealing with the combination of both asymmetries and cointegration which captures nonlinear adjustment towards long-run equilibrium, thus making it feasible for studying the dynamics of market integration and price transmission processes (Abdulai, 2002; Jawadi et al., 2009), under non-multiple equilibria assumption (Abunyuwah, 2008; 2013).

$$\Delta P_t = \begin{cases} \rho_1 \gamma' P_{t-1} + \theta_1 + \sum_{m=1}^{M} \circledast_{1m} \triangle P_{t-m} + \varepsilon_t, & \gamma' P_{t-1} \leq \Psi \; (Regime\ 1) \\ \rho_2 \gamma' P_{t-1} + \theta_2 + \sum_{m=1}^{M} \circledast_{2m} \triangle P_{t-m} + \varepsilon_t, & \Psi < \gamma' P_{t-1} (Regime\ 2) \end{cases} \quad (2)$$

In equation (2) Ψ defines the threshold parameter. The TVECM explains price (P_t) changes by lag price adjustments in both short term and long term, but conditionally on the magnitude of the deviation from the long term equilibrium ($\gamma' P_{t-1}$). Lags length (n) used in the model were determined by using Bayesian Information Criterion (BIC).

4. Results and Discussion

Seasonality and Unit Root Test: The results of the HEGY test are presented in Table 1. The results from the test indicate that among all the series, the presence of unit root at the zero frequency could not be rejected at any of the conventional levels of significance. For the rest of the frequencies, unit roots were rejected in all the series with the exception of Tamale market series. The Tamale series exhibited seasonal unit root at all frequencies. Therefore, in addition to the long run unit root that characterized all series, some series were affected by seasonal unit roots. The seasonality pattern in some of the series could be attributed to weather, market and other technological effects. In effect seasonality was treated deterministically and all further analyses were based on the seasonally adjusted data.

Table 1: Results of HEGY Test

VARIABLE	ACCRA	KUMASI	TAMALE	TECHI	WA	FREQ
π_1	3.143	-0.067	2.489	0.389	2.048	0
π_2	1.597	2.539	2.586	-0.756	2.296	π
$\pi_3 = \pi_4$	2.844	1.349	2.686	3.382	0.763	$\pi/2$
$\pi_5 = \pi_6$	3.796	7.784**	3.406	2.945	5.145	$2\pi/3$
$\pi_7 = \pi_8$	5.737**	7.055**	3.246	3.233	7.244	$\pi/3$
$\pi_9 = \pi_{10}$	3.964	7.198**	3.292	9.277**	8.122**	$5\pi/6$
$\pi_{11} = \pi_{12}$	4.309	5.559	1.778	0.821	5.326	$\pi/6$
T(Lags)	74(12)	74(12)	74(12)	74(12)	74(12)	

Note: ** indicates significance at 5 percent probability

Table 2 presents further results of the evaluation of the univariate time series properties of price series of the markets under study.

Table 2: Results of Unit Root Test

Markets	ADF Level	Diff.	KPSS Level	Diff.
Accra	-2.44	-9.11***	0.189	0.082**
Kumasi	-3.02	-9.54***	0.201	0.022**
Techiman	-2.72	-7.15****	0.264	0.129**
Wa	-2.78	-6.48***	0.223	0.070**
Tamale	-3.27	-12.21***	0.178	0.027**

From table 2 the test results indicate that the null hypothesis of a unit root could not be rejected at levels for all the markets series. At difference however, the null hypothesis of unit root was rejected at 1% significance level for the ADF test. Similar results were produced by the KPSS test. It also rejected the null of stationarity at levels for all the markets and failed to reject the null hypothesis at first difference at 95% confidence level. In summary, the ADF and KPSS tests provided evidence for unit root at the zero frequency, which implied that the yam price series in the various markets were integrated of order one I(1).

Cointegration: In this study, we focused on the possibilities of asymmetric adjustments (non-linearity) and threshold co-integration other than assuming symmetric and linear relationships as economic data are generally nonlinear in nature due to switching policy strategies, technical innovations, human behavior and dynamics of economic processes. Thus, Hansen and Seo's (2002) test was used to evaluate the linear cointegration model against the threshold cointegration model. The test results are shown in Table 3 below as Sup-LM statistics.

Table 3: Results of Hansen and Seo Test

Markets	TA	TK	TT	TW
Sup-LM statistics	21.36	22.309	27.47	24.46
P-Value	0.05	0.017	0.00	0.04

The results indicate that the other yam markets in relation to the reference market exhibit a threshold co-integration, suggestion the possibility of non-linear adjustments towards equilibrium. In this regard, the momentum threshold autoregressive model (M-TAR) was estimated to analyze threshold co-integration and asymmetric adjustment behaviors of the markets. The results of the threshold autoregressive models are presented in Table 4**.** The results indicate that all the markets pairs are cointegrated with a mixed adjustment (symmetric and asymmetric) processes towards equilibrium in the long-run and some response more swiftly to price shocks that stretch profit margin than price shocks that squeeze the margin. The Techiman-Kumasi (TA) and Techiman-Tamale (TT) relationships for instance respond rather more swiftly to deviations that squeeze profit margins. Many previous studies found similar asymmetric relationships in agricultural commodity markets (see Abdualai, 2000; Acquah, 2012; Amikuzuno et al., 2013; Blay et al., 2015; Cramon, 1998; Hahn, 2010; Peltzman 2000). The near symmetric adjustment towards equilibrium between Techiman and Kumasi can be explained by the closeness of the two markets, as traders in Kumasi obtain their supply from Techiman implying that price signals in one of the markets are easily transmitted to the other.

The point estimates for Techiman-Accra markets pair (TA) and Techiman-Wa (TW) are found to be (ρ_2 =-0.390 and -0.402) and (ρ_2 =-0.211 and -0.268) respectively indicating at convergence of approximately 40/40 percent of positive deviations and 21/27 percents of negative deviations from the equilibrium will be corrected within a month. The markets exhibit relatively weak adjustments for negative deviations as compared to the positive deviations indicating a faster adjustment process toward equilibrium when the price difference (spread) deviates above the equilibrium. These markets are relatively efficient as the dynamics are consistent with market equilibrium theory (Abunyuwah, 2013; Barret and Li, 2002) compared to the others that exhibit the opposite adjustment dynamics. The asymmetric adjustments which imply market imperfections can be attributed to the fact that price determination is strongly influenced by the trader's associations rather than perfect competition (demand-supply) markets that are normally associated with barrier-free trading. Yam markets are controlled by market women, especially in the urban cities where majority of the consumption takes place with either little or no production. These market women under one association and queen, at specific periods collude to influence the price mechanism.

Table 4: Results from M-TAR Model

Variable	TA	TK	TT	TW
ρ_1	-0.390*** [-8.412]	-0.204*** [-7.251]	-0.113** [-7.639]	-0.402 ** (-3.247)
ρ_2	-0.211** [-6.590]	-0.413*** [-5.530]	-0.370*** [-5.543]	-0.268** (-4.183)
$\rho_1 = \rho_2 = 0$	7.983*** (0.01)	9.692*** (0.000)	6.502** (0.002)	13.473*** (0.000)
$\rho_1 = \rho_2$	4.664** (0.032)	2.772* (0.098)	4.553** (0.035)	0.958 (0.329)
Lags	2	3	5	3
LB(4)	0.994	0.321	0.351	0.515
LB(8)	0.966	0.578	0.297	0.164

Probability level are in parentheses and *, ** and *** indicate rejection of null hypothesis at 10%, 5% and 1% probability level respectively. Values in parenthesis and brackets represent t-statistics and probability values of estimated statistics.

Price Transmission Dynamics: The price transmission dynamics of yam markets prices were studied by employing two regime TVEC model. The results of the TVECM are presented in Table 5 below. The results for Techiman-Accra markets combination from the TVECM through the search procedure yields a threshold parameter (Ψ) of 24 which can be expressed as arbitrage cost. This implies that adjustment from disequilibrium towards the long-term equilibrium will occur when the arbitrage opportunities are above Gh¢24(US$5.2) between both markets. For adjustments in response to positive shocks to occur, the absolute price change from the long-term equilibrium should be above Gh¢24 to cover average cost of

transportation/transactions cost of the commodity between the two markets. The threshold vector error correction model revealed that for the Techiman-Accra markets equations, both markets had significant error correction terms for positive and negative deviations from disequilibrium towards equilibrium.

The point estimates for the adjustment parameters imply that Accra market adjusts to clear about 63.6% of the 39% positive shocks and 67.8 of 21.1% of negative shocks of price change from Techiman. The results also revealed that when an external shock is exerted in the Accra market, Techiman market will respond to eliminate approximately 51.2% of positive shocks and 44.7% of negative shocks within a month. Thus, at lower price spread where profit margins are squeezed, fast adjustment towards long-run equilibrium occurs in Techiman market. This implies the suppliers (farmers) will regulate the quantity of the commodity to be supplied to the market (speculation). In both markets, there was fairly symmetrical adjustments response to positive deviations from the equilibrium compared with negative deviations. Conversely, positive and negative deviation in the supplier market (Techiman) requires approximately 2 months (half-life (λ) of 1.68 and 1.87 respectively) to be fully digested when there is a price shock in the consumer market (Accra). Similarly, the results revealed that Kumasi market responds significantly to positive and negative deviations from the long-term disequilibrium. Thus if deviations are above the arbitrage cost, an error correction terms ($\phi^{techiman} = 0.669$) for Techiman market implying that markets agents in the market respond rapidly to positive price shocks than negative shocks ($\phi^{techiman} = 0.501$).

Kumasi market responds moderately to both positive deviation ($\phi^{kumasi} =$ -0.473) and negative deviation ($\phi^{Kumasi} = 0.447$) towards long-term equilibrium. The result is expected because the market agents in the Techiman (supplier market) will respond faster to any shock that stretches their profit margins than shock that squeezes profit. The half-time[1] necessary to correct the disequilibrium in Kumasi is around 2 months ($\lambda = 1.79$) when there is a positive price shock from Techiman while Techiman responds swiftly to adjust within 1 month 10 days ($\lambda = 1.36$) when there is a positive shock from Kumasi market. The long term coefficients of elasticity (β) are 0.321, 0.172, 0.115, 0.03 for the markets in relation to the reference (Techiman) which may be thought of as price transmission elasticity estimate. This implies that a unit percentage increase in the prices of yam in Techiman market will bring about 32, 17, 11.5 and 3 percentages increases in the prices of yam in Accra, Kumasi, Tamale and Wa markets respectively. Furthermore, Tamale and Wa respond to positive and negative shock respectively as a result of external price shocks created by price changes in Techiman market. In Tamale markets, there was faster adjustments to positive deviations from the disequilibrium than negative ones; implying positive asymmetry while Wa market exhibited faster adjustment to negative perturbation to negative shocks as created by price changes in Techiman.

Table 5: Results of Threshold Vector Error Correction Model

	TA Pair		**TK Pair**		**TT Pair**		**TW Pair**	
Threshold	**24.00**		**42.142**		**41.38**		**40.02**	
Variables	**Techiman**	**Accra**	**Techiman**	**Kumasi**	**Techiman**	**Tamale**	**Techiman**	**Wa**
Ect^{+}	0.512***	-0.636**	-0.669***	-0.473**	-0.313**	-0.316*	-0.607***	-0.087*
	[-4.498]	[-2.358]	[-5.342]	[-3.112]	[-2.526]	[-1.761]	[-5.505]	[-1.876]
Ect^{-}	-0.447***	0.678**	-0.501***	-0.447**	-0.992***	-0.130	-0.572**	-0.598**
	[-7.306]	[-0.508]	[-6.132]	[-3.331]	[-3.992]	[-0.922]	[-4.838]	[-1.985]
ΔT_{t-1}	0.181**	0.206*	0.258*	-0.277	0.102	-0.150	-0.340***	-0.427*
	[3.970]	[-1.537]	[1.309]	[-0.827]	[0.431]	[-0.957]	[-2.620]	[-1.517]
ΔT_{t-2}	0.136	0.771***	0.029	0.563*	0.160*	-0.122*	0.258**	-
	[0.511]	[3.329]	[0.155]	[1.659]	[1.44]	[-1.240]	[1.207]	0.613***
								[-4.301]
ΔT_{t-3}	0.407**	0.872***	0.191*	-0.659**	0.313**	-0.105	-0.013	-0.484**
	[2.226]	[3.642]	[1.458]	[-2.392]	[2.526]	[-0.756]	[-0.072]	[-1.775]

[1] Half Time was computed as: HT = $\frac{In\ 0.5}{In\ (\alpha+1)}$

ΔA_{t-1}	-0.450** [-2.689]	-0.504*** [-3.202]						
ΔA_{t-2}	-0.018 [-0.098]	-0.940** [-5.204]						
ΔA_{t-3}	-0.342 [-1.797]	-0.274* [-1.987]						
ΔK_{t-1}			0.154* [1.952]	-0.294** [-2.190]				
ΔK_{t-2}			0.475*** [5.592]	-0.674*** [-4.673]				
ΔK_{t-3}			0.258** [2.561]	-0.745*** [-4.344]				
ΔTA_{t-1}					-0.270* [-1.163]	-0.841*** [-5.454]		
ΔTA_{t-2}					-0.220 [-0.959]	-0.550** [-3.521]		
ΔTA_{t-3}					-0.219* [-1.407]	-0.098 [-0.770]		
ΔW_{t-1}							-0.018 [-0.167]	-0.881*** [-6.384]
ΔW_{t-2}							-0.018 [-0.784]	-0.736** [-4.685]
ΔW_{t-3}							-0.148* [-1.325]	-0.139 [0.921]
$\phi^+ = \phi^-$	6.252** (0.012)	0.887 (0.20)	0.206 (0.651)	3.685** (0.05)	0.836 (0.362)	5.041* (0.026)	0.790 (0.41)	2.272* (0.09)
β[2]	0.321** [2.77]		0.172** [2.99]		0.115*** [7.89]		0.03** [4.24]	

Further analysis was conducted to examine the short and long-run price dynamics. The results revealed that the price changes in Accra market was influenced by its internal short-run forces and were as the short-run prices changes in Techiman. Conversely, Kumasi market had asymmetric short-run effect on Techiman prices. Similarly, distributed short-run asymmetric effect was found for Techiman for its own price with symmetric effect on Tamale and Wa market. However, there was asymmetric path of adjustment towards long-run equilibrium in Accra, Tamale and Wa markets due to price dynamics created by Techiman market. Kumasi exhibited symmetric path of adjustment implying that market player's response quickly with equal momentum to positive and negative shocks from price changes in Techiman market.

This result supports Abdulai (2000) and Blay et al. (2015) who reported asymmetric adjustment in Ghanaian maize and sorghum and millet market respectively. Finally, the results of the granger causality model reveal that in Accra and Kumasi, there is evidence of bi-directional causality effects from the supplier market to the consumer market and vice versa. Tamale and Wa exhibit a unidirectional causality running from Tamale and Wa to Techiman. This may be explained by the fact that the markets players (farmers, middlemen) use information from each other when speculating their price with primary focus on the price level in the supplier or consumer markets. Notwithstanding the flow of information, the price adjustment responses are

[2] $\phi^+ = \phi^-$ test the equilibrium adjustment path of asymmetric effect. *, **,*** denotes significance at the10%, 5% and 1% level respectively. The estimates in the carry bracket are the T statistics values of their corresponding estimated coefficient and β is long-run estimate of transmission.

asymmetrically transmitted through the markets especially to the supplier markets where adjustments tend to squeeze the profit margin of the middlemen.

5. Conclusion

The study focused on the analysis of market integration and price transmission dynamics to infer market efficiency and functionality of the Ghanaian yam markets. The M-TAR model was employed to examine the degree of spatial market integration among yam markets in Ghana. The price transmission adjustment processes were analyzed through nonlinear error correction model with threshold cointegration incorporated (TVECM). The markets for the commodity considered for the study were found to be highly integrated. The coefficients from the MTAR models revealed an asymmetric adjustment processes with mixed pattern of outcomes with respect to speed and degree of adjustments. Some of the markets exhibited faster adjustment for positive deviation than negative deviations and vice versa. We recommend that policy strategies be directed to improving market communication and infrastructure accessibility and regulating activities of middlemen since the nature of asymmetric price adjustments found in this study is associated with market power and inefficiency. These are to improve agricultural food market structure, conduct and performance which, in effect, will provide fair producer prices and value for money for producers and consumers respectively.

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Effects of Exchange Rate Volatility on Trade: Evidence from West Africa

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Abstract: The objective of this paper has been to investigate the impact of exchange rate volatility on trade in the context of exports, imports, and the trade balance in West Africa. Applying the pooled Ordinary Least Square, the fixed effects, and the random effect models, and obtaining robust estimates for export and trade balance models by employing xtgls, panels (correlated) Corr (ar1), and adopting xtscc, fe regression with Driscoll-Kraay standard error to estimate the import model. The empirical results show that the impact of exchange rate volatility on exports and imports is insignificant. However, the result of the trade balance model shows a positive and significant link between exchange rate volatility and the trade balance. Thus, suggesting that traders tend to engage more in export activities with an increase in exchange rate volatility. Also, the analysis suggests that depreciation of the real exchange rate will lead to a decrease in exports. Thereby, confirming the limited production capability and heavy reliance on imported goods and services. Hence, this study recommends diversification of production activities and adopting strategies aiming at reducing dependence on imported goods and services. The empirical result shows a positive association between an increase in domestic economic activities of trading partners and exports of the West African countries. This implies that West African countries must engage in trade with countries that have a high economic growth rate. The result also shows a positive link between inflation rate and imports. This suggests the implementation of effective monetary policies geared towards controlling inflation.

Keywords: *Exchange rate volatility; exports and imports; pooled effects; random effects, fixed effects.*

1. Introduction

Trade continues to play an important role in an open economy and serves as a major determinant of output and economic growth in a country (Chaudhary et al., 2016). It is the backbone of our modern commercial world, as producers in various nations try to profit from an expanded market, rather than selling within their borders. Trade occurs due to several reasons, including lower production costs in one region versus another, specialized industries, lack, or surplus of natural resources, differences in consumer's taste, physical as well as geographic conditions (Chaudhary et al., 2016). A nation can specialize in the production and export of a commodity on which it has a comparative advantage and then imports the commodity on which it has a comparative disadvantage. No nation can produce and absorb every commodity by itself (Ricardo, 1817). The foreign trade also ensures the efficient utilization of resources. Thereby leading to the welfare being for everyone in the society. However, many factors may affect trade between nations. In the context of high-risk aversion, the exchange rate volatility[3] is the main obstacle to trade flows (Satawatananon, 2014; Senadza and Diaba, 2017).

Exchange rate volatility can affect trade directly, through uncertainty and adjustment costs, and indirectly, through its effect on the structure of output and investment and on government policy (Côté, 1994). Volatility in the exchange rate can affect the overall growth and development of a country's trade and economy. Thus, developed countries fought hard in the 1980s to limit United States U.S. dollar fluctuations, and some European countries took an even more radical decision by giving up their national currencies to the Euro in 1999 that seems moving toward a fixed peg. The intuition is that exchange rate risk, maximizes transaction costs and reduces the benefits of international trade. Given the risks of economic transactions, policy makers and academics have put great concern on the exchange rate, particularly after the collapse of the Bretton Woods system of the fixed exchange rate from 1971 to 1973. Since then, the exchange rate risks and its

[3]. Throughout this paper, the study will make an alternative use of the following words: "volatility", "changes", "depreciation/appreciation", "uncertainty", "fluctuation" and "variation".

impacts have become obvious in most developing countries (Umaru et al., 2018). This argument has been evident in the establishment of the Economic Community of West African States ECOWAS.

As one of its objectives is to ensure exchange rate stability and hence promote trade. Senadza and Diaba (2017) also note that exchange rate liberalization in sub-Saharan Africa SSA in the 1980s and 1990s led to a surge in exchange rate volatility. Also, Olayungbo et al. (2011) stated that the foreign exchange rate for SSA countries has been highly volatile following the introduction of the structural adjustment reforms since the early 1980s. Clark et al. (2004), on a similar note, asserts that the crisis in emerging markets, which have become more frequent in the last two decades, is especially notable cases of large exchange rate volatility. Correspondingly, Tarawalie et al. (2012) submit that, although the market-determined exchange rate was instrumental in the economic revival experience of most African economies in the 1980s and 1990s, it has also led to an upsurge in exchange rate fluctuations. Again, Tarawalie et al. (2012) maintained that following the introduction of the Structural Adjustment Program (SAP), and the adoption of the floating exchange rate system, sharp currency depreciation in most of the West African Monetary Zone WAMZ countries causes an increase in the general price levels and a reduction in output growth. Fatum et al. (2018), opined that the slow growth rate in the aftermath of the global financial crisis GFC has prompted several countries to pursue economic policies that could depreciate the relative values of their respective currencies. However, the premise of depreciation leading to export growth and improvement in trade balance has not received a uniform conclusion in the literature (see Fatum, et al., 2018; and Umaru, et al., 2018). The relationship between exchange rate changes and trade remains a problem.

The numerous studies by other researchers have shown controversial results of; mixed, negative, positive and insignificant effects between exchange rate volatility and trade relationship. Some of the studies that came up with mixed conclusions include Tarawalie, et al. (2013), Satawatananon (2014), Bahmani-Oskooee, Havery and Hegerty (2012 and 2015), Moslares and Ekanayake (2015), Serenisa and Tsounis (2012), Asteriou et al. (2016), Senadza and Diaba (2017), Simakova (2013), Bahmani-Oskooee and Gelan (2018), Šimákováa and Staváreka (2014), and Togba and Bari (2017). Others have also reached positive conclusions, including Fatum et al. (2018), Hooy and Choong (2010), Khan et al. (2010), Halicioglu (2008), Olayungbo et al. (2011) and Kodongo and Ojah (2013). Those that came up with negative results are Serenis and Tsounis (2014), Omojimite and Akpokodje (2010), Srinivasan and Kalaivani (2013), Baak (2004), Caporal and Dorood (1994), Zafar and Ahmed (2011), and Ariz et al. (2000). Whilst some studies yielded insignificant conclusions includes: Gagnon (1993), Wilson and Tae (2001), Adeyemi and Ajibola (2019), Dzanan and Masih (2017) and Edwards (1989). A critical study on the main difference in the empirical literature (see section 2) shows that most of the conclusions were due to the kind of data used in the empirical analysis, the estimation technique or methodology, and the geographical region or the country where the study takes place. The literature also reveals limited research on the effects of exchange rate volatility on trade in West African countries. The few studies on this topic were mostly conducted in a single country framework analysis and using time series data.

Hence, the need to conduct further studies in 14 West African countries (namely: Benin, Burkina Faso, Cape Verde, The Gambia, Ghana, Guinea-Bissau, Ivory Coast, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, and Togo) on the impact of exchange rate volatility on trade is important. In this regard, the research questions are as follows: What is the impact of exchange rate volatility on the exports of West African countries? What is the impact of exchange rate volatility on the imports of West African countries? And what is the impact of exchange rate volatility on the trade balance of West African countries? Thus, four research objectives were developed with the research questions acting as a foundation, and these objectives are: To investigate the impact of exchange rate volatility on the exports of West African countries; To investigate the impact of exchange rate volatility on the imports of West African countries; To investigate the impact of exchange rate volatility on the trade balance of West African countries; and to recommend policies based on the outcome of the theoretical and empirical analysis. Hence, the importance of this paper will be to address the research questions posed above and to overcome the shortcomings and limitations of previous studies. A study of this nature is significant for West African countries because; a recent publication by the African Development Bank (2019), remarked that "West African countries tend to export mainly primary commodities whose prices are exogenously determined, and import manufactured products." Thus, the relative prices of commodities are critical.

Exchange Rate Volatility, Exports, Imports, and Trade Balance in West African Countries: Two types of exchange rate systems operate in West Africa: A fixed or pegged rate is a rate the government (central bank) sets and maintains as the official exchange rate. A set price will be determined against a currency (usually the U.S. dollar, but also other currencies such as the euro, the yen, or a basket of currencies). To maintain the local exchange rate, the central bank buys and sells its currency on the foreign exchange market. In a flexible or floating regime, the private market determines the exchange rate through supply and demand. In the West African Economic and Monetary Union WAEMU bloc, which comprised of; Cote D'Ivoire, Mali, Niger, Senegal, Togo, Guinea Bissau, Benin and Burkina Faso, the bloc's currency Communauté Financière Africaine (African Financial Community) CFA is pegged to the euro but is flexible against other tradable currencies, including the U.S. dollar. Non-WAEMU countries, except Liberia, have a floating or managed float system. From 1992 to 2017, the West African countries under consideration experienced a considerable level of exchange rate volatility (see figure 1 in the Appendix). A publication by the African Development Bank (2019) suggests that "several central banks in the region, especially in non-WAEMU countries, periodically intervene in the foreign exchange market to smooth out fluctuations and limit currency fluctuation". However, exchange rate volatility in the region remains a persistent phenomenon. Thus, it is necessary to investigate the impact of exchange rate volatility on the components of trade in West African countries, which are exports, imports and trade balance.

The trade balance is the net sum of a country's exports and imports of goods and services without taking into account all financial transfers, investments, and other financial components. A country's trade balance is positive (meaning that it registers a surplus) if the value of exports exceeds the value of imports. Conversely, a country's trade balance is negative or registers a deficit, if the value of imports exceeds the value of exports. Evidence of the values of exports and imports of goods and services for the year 1992 to 2017 reveals a persistent deficit trade balance in most of the countries in the region except Côte D'Ivoire and Nigeria, excluding 1998 and 2015 to 2017 in the case of the latter, (see figure 2 in the Appendix). Strong dependence on unprocessed primary commodity exports reinforces the persistent current account deficits in countries with volatile movement in exchange rates. Hence, an understanding of the degree to which exchange rate volatility affects their trade is important for setting the optimal exchange rate policy in the region. Thus, based on data availability, the paper covers 14 countries in West Africa over the review period of 1992 to 2017. The rest of the study is as follows; Section 2 presents the literature, including theoretical and empirical review of past works by different writers on the exchange rate, trade and the related field of study. Section 3 focuses on the model specification and the source of data. Section 4 describes the methodology. Section 5 presents summaries of results and interpretation. Section 6 presents conclusions and policy recommendations.

2. Theoretical and Empirical Literature

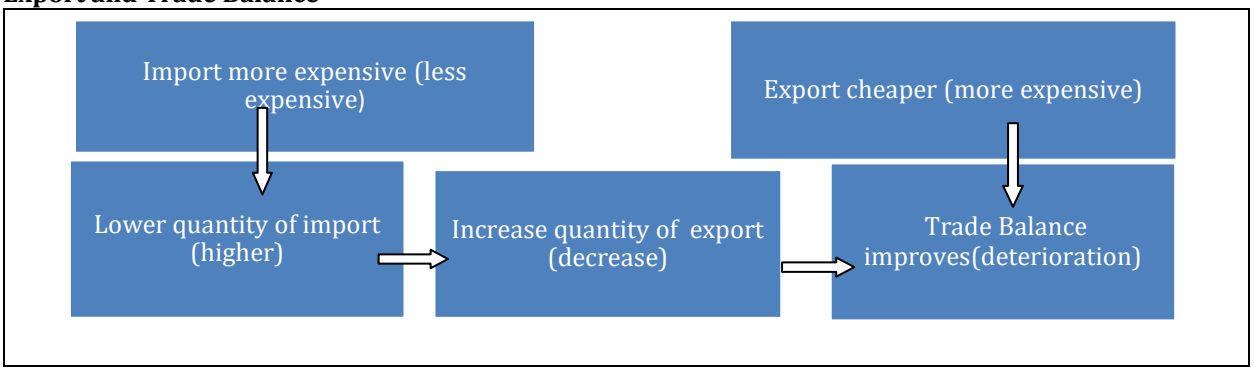
The Theoretical Literature: Numerous studies on the effect of exchange rate movement on trade have shown conflicting conclusions, and the various channels through which currency depreciation/appreciation transmits to imports, exports, and the trade balance are shown in the literature.

Impact of Exchange Rate Movement on Import, Export and Trade Balance: Currency exchange rates are quoted as relative values. These values are influenced by the demand for currency, which in turn is influenced by trade. If a country exports more than it imports, there is a high demand for its currency. The economics of supply and demand dictates that when demand is high, prices rise and the currency appreciates. When the exchange rate appreciates, foreign goods become cheaper in the domestic market. Thus, there is an overall downward pressure on domestic prices. In contrast, the prices of domestic goods paid by foreigners go up, which tends to decrease foreign demand for domestic products. If there is no corresponding change in the relative prices in the rest of the world, the exchange rate appreciation would represent a decrease of the country's competitiveness, which will transmit to higher imports and lower exports, this event will

deteriorate the balance of payment[4] (hereinafter, Bop). In contrast, if a country imports more than it exports, there is relatively less demand for its currency, so prices should decline. In the case of currency, it depreciates or loses value. Exchange rate depreciation has the opposite effect. It tends to affect a country's balance of trade by improving the competitiveness of domestic goods in foreign markets while making foreign goods less competitive in the domestic market by becoming more expensive.

Which will subsequently lead to higher export and lower imports if the Marshall-Lerner condition is satisfied[5] (Tarawalie et al., 2012; Jiang, 2014; Siklar and Kecili, 2018). Furthermore, the effect of the exchange rate movement on imports and exports also depends on the global economy. If the global economy is in a recession, the depreciation of the domestic exchange rate may be insufficient to boost export demand. On the other hand, if the growth rate in the global economy is strong, depreciation will increase export demand. The figure below shows the transmission mechanism of depreciation and appreciation on import, export and trade balance.

Figure 1: The Transmission Mechanism of Exchange Rate Depreciation and (Appreciation) on Import, Export and Trade Balance



However, experience with structural adjustment programs in developing countries seems to suggest important facts in the failure of a depreciation in the exchange rate to increase exports is the inability of the authorities to ensure that the exchange rate remains at its depreciated rate for a period long enough to permit adjustment supply. Invariably, this is due to a failure to pass on price increases to exporters where there is price regulation. Furthermore, lag in recognition of the changed situation, lag in the decision to change real variables, lag in delivery time, lag in replacement of inventories and materials, and lag in production. These lags ensure that the demand for exports remains inelastic in the short term. In the long-term, when the prices become flexible, there will be a positive quantity effect on the balance of trade because domestic consumers will buy fewer imports while foreign consumers buy more exports; this effect is the J-curve phenomenon, but offsetting this is a negative cost effect on the balance of trade since the relative cost of imports will be higher. Thus, whether the net effect on the trade balance is positive or negative depends on whether or not the quantity effect outweighs the cost effect; if the quantity effect is greater, it confirms the Marshall–Lerner condition.

The reverse is true if otherwise. Côté, (1994), McKenzie, (1999) and Ilhan, (2006) confirm that the result of exchange rate volatility on trade have shown inconsistent results, depending on various factors that the studies have assumed, such as proxies for volatility, the degree of risk aversion, hedging possibilities, and the specification on the forward exchange markets, especially in a general equilibrium setting where other

[4] Bop is a detailed record of the composition of the current account and the currency transactions that fund it. The Bop keeps track of both payment to and receipt from foreigners.
[5] The Marshall–Lerner condition is the condition that exchange rate devaluation/depreciation will only cause a balance of trade improvement if the absolute sum of the long-term export and import demand elasticity is greater than unity (see Cao-Alvira, 2014).

variables change along with exchange rates[6], all of these may reflect conflicting results for exchange rate volatility on trade. For more analysis of the literature, see Bahmani-Oskooee et al. (2012); Srinivasan and Kalaivani (2013); and Satawatananon (2014). Ethier (1973) asserts that exchange rate volatility leads to a decrease in international trade. Hooper and Kohlhagen, (1978) also support the assertion and submit that traders and institutions are risk-averse. Hence, they face higher costs in situations with high exchange rate volatility. This reduces the incentive to trade since making the agreement on the exchange rate is at the time of the trade contract, but delivery only occurs after payment. If changes in exchange rates become unpredictable, it will create uncertainty about the profits and hence reduces the benefits of international trade.

However, Sercu and Uppal (1998); and Clark et al. (2004) contend that these results are from a general partial equilibrium model as most of the theoretical literature assumes that exchange rate uncertainty is the sole source of uncertainty in decision-making, and either ignore the availability of hedging, which is the avoidance of a foreign exchange risk. For example, there are some ways to hedge against exchange rate risk. With short term deposits, an investor can buy a forward contract or enter into a futures market. In these cases, the investor would arrange to sell the domestic currency in the future when converting the deposit back to dollars. On such a contract, a pre-plan on the future exchange rate is possible, therefore, the rate of return is certain as well. Thus, reducing the risk of exchange rate volatility. In support of this view, Baron, (1976) asserts that forwards and futures contracts can reduce the risk in exchange rate volatility. Hedging in currencies is mostly applicable in developed countries where the financial structures are advancing. However, the decision to trade depends on bargaining in which foreign currency receipts and payments are unknown during the initial period of bargaining.

In the case of developing countries/West Africa in particular, where the financial institutions are weak, hedging in currency is almost impossible. Hence, the majority of traders cannot eliminate risk due to the structures of these economies. However, from a financial perspective, large corporations may hedge foreign currency risks arising from international trade by holding a portfolio of assets and liabilities in different currencies (Clark et al., 2004). On the other hand, theoretical studies of Viaene and Devries (1992); Franke (1991); and De-grauwe (1988) argue that the volatility of the exchange rate has a positive effect on trade[7]. Thus, the theoretical prediction of exchange rate movement and trade does not provide a uniform conclusion as to what is the impact of exchange rate depreciation/appreciation on trade. Most of the conclusions are dependent on quantity as well as the cost effect on trade, the global economy, the elasticity of demand for exports and imports, attitude towards risk, proxies for volatility, hedging possibilities, lags, and government policies. Hence, the need to study empirically the relationship between exchange rate volatility on the components of trade.

The Empirical literature: Empirically, there are numerous researches on exchange rate volatility and trade. However, there are few studies in the context of West Africa in particular, this review, therefore, brings together the relevant literature on this subject. In the African context, Edwards (1989), asserts that there are no indications that higher variability in the real exchange rate affects the level of exports. This result implies that volatility in the real exchange rate does not impact export. However, the study by Serenis and Tsounis (2014) using a measure of unexpected fluctuation found significant negative effects of volatility on exports for all the countries in their sample. Omojimite and Akpokodje (2010) empirically compare the effect of exchange rate volatility on the exports of the panel of CFA countries with that of the non-CFA counterparts during the period 1986 to 2006. Using the generalized autoregressive conditional heteroskedasticity (GARCH) model to generate the exchange rate volatility series, and merging the series into an export equation, and estimated using ordinary least squares (OLS), fixed effects, first difference generalized moment method (GMM) and system (GMM) equation techniques. The results reveal that exchange rate volatility negatively impacts on the exports of both panels of countries.

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[6]See Clerk et al. (2004).
[7] For more details on the theory, see Senadza and Diaba, (2017).

However, exchange rate volatility has a larger effect on the panel of the non-CFA countries than in the CFA countries. The paper concludes with the need to take appropriate monetary and fiscal policy actions to stem the rising exchange rate volatility. Correspondingly, Olayungbo, Yinusa, and Akinlo (2011) investigate the impact of exchange rate volatility on trade in 40 selected sub-Saharan African countries for the period 1986-2005. The study uses a gravity model with pooled ordinary least squares (POLS) allowing for fixed effects and panel generalized method of moment (GMM) techniques. The results of the analysis show a positive net effect of exchange rate volatility on aggregate trade. The results also show that there is not much difference between the impacts of exchange rate volatility on primary and manufactured trade as well as between the Economic Community of West African States (ECOWAS) and non-ECOWAS countries. The empirical analysis of Senadza and Diaba (2017) employs the pooled mean estimator of dynamic heterogeneous panel techniques to the data of 11 economies in sub-Saharan Africa from 1993 to 2014. Their paper uncovers no significant effects of exchange rate volatility on imports. In the case of exports, however, the study finds a negative effect of volatility in the short-run, but a positive impact in the long-run.

While Akpokodje and Omojimite (2009) investigate the effect of exchange rate volatility on the imports of ECOWAS countries over the 1986-2006 periods during which the countries operated a flexible exchange rate system. Use the exchange rate volatility series generated using the GARCH model to estimate the import model. The result shows that exchange rate volatility negatively affects the imports of the panel of all ECOWAS countries. However, the results show mixed effects on the subgroups. While exchange rate volatility negatively affects the imports of the group of non-CFA countries, its effects on the group of the CFA countries are positive. Tarawalie et al. (2013) examine the relationship between exchange-rate volatility and export performance in the West Africa Monetary Zones (WAMZ) countries using quarterly data for the period 1990 to 2010. The paper utilizes the Engel-Granger dynamic Ordinary Least Square (DOLS) estimation technique as well as the generalized autoregressive conditional heteroskedasticity (GARCH) approach to model the exchange-rate volatility. Based on theoretical considerations, the results indicate that the increased exchange rate volatility has had a significant negative impact on exports from Liberia, Nigeria and Sierra Leone. While establishing positive links with Gambia, the impact of exchange rate fluctuations on Ghana and Guinea is negligible. On the other hand, Bahmani Oskooee and Gelan (2018) studied a sample of twelve African countries to examine the impact of real exchange rate volatility on their trade flows. In order to distinguish between the short-term and long-term differences in real exchange rate volatility on their exports and imports, they used the bound testing method. The findings reveal that, while exchange rate volatility affects trade flows of many of the countries in their sample in the short run.

The long run effects were restricted only on the exports of five countries and on the imports of one country. Meniago and Eita (2017) investigate the impact of exchange rate changes on imports, exports, and the trade balance in Sub Saharan Africa. The results show that there is a positive relationship between exchange rate changes and imports. The findings imply that a depreciation of the exchange rates may have little or no effects on imports. Their analysis suggests a significant negative relationship between exchange rate changes and exports. Implying that, exchange rate depreciation may not increase exports. The study also suggests an insignificant relationship between exchange rate changes and trade balance. Kodongo and Ojah (2013) analyze the inter-temporal causal relationships between the real exchange rate, the trade balance and cross-border capital flow in Africa. Using annual data from nine African countries from 1993 to 2009, and using panel vector autoregressive (VAR) techniques. The findings lend support to the classical balance of trade theoretic view in which the net effect of depreciation of the domestic currency is an improvement in the domestic country's balance of payments position in the short-run. Similarly, the paper by Rawlins (2011) explores the relationship between the trade balance of 19 SSA countries, and the real exchange rate. This study used a bilateral approach between the panel of a sample country and four industrial countries. United States, United Kingdom, France and Japan. Using the Johansen-Fisher Panel Cointegration technique, the findings suggest a combined outcome, with the tentative implication that currency devaluations would be an effective policy tool in reversing the precarious balance of payment situation facing most of these countries.

In the West African context, some researchers have analyzed the impact of exchange rate changes on trade from a single country framework. For example, Togba and Bari (2017) use an Autoregressive Distributed Lag (ARDL) model framework to estimate the effect of foreign exchange intervention and exchange rates on foreign trade in Liberia in three separate models namely exports, import, and trade balance using yearly data

from 1980 to 2015. The results show that the nominal exchange rate has a statistically significant positive effect on exports, but it is not necessarily for the real exchange rate. The nominal exchange rate is inversely proportional to imports, while the real exchange rate is directly proportional to imports. Also, the results of the trade balance model show that there is a statistically significant negative effect between the nominal exchange rate and the trade balance, while the real exchange rate and the trade balance show a positive relation. The devaluation of the Liberian dollar often worsens the trade balance. Adeyemi and Ajibola (2019), examine the effects of Naira devaluation on the trade balance in Nigeria. Using annual time series data over the period from 1986 to 2017 and employing the Engle-Granger cointegration test to study the existence of a long-run relationship. The result suggests that Naira devaluation exerts no significant impact on the trade balance in Nigeria over the study periods. Other studies on this subject were also done for other countries besides Africa in general and West Africa in particular. Some of these include: Dzanan and Masih (2017) investigate how the exchange rate affects the trade balance in developed countries such as Norway, by using time series multivariate forecasting techniques. Their study found no empirical evidence for the effect of the exchange rate on the trade balance in the long run.

Srinivasan and Kalaivani (2013) empirically investigate the impact of exchange rate volatility on the real experts in India, using the ARDL bounds testing procedure with annual time series data. Their findings suggest that the exchange rate volatility has a significant negative impact on real exports both in the short-run and long-run, implying that higher exchange rate fluctuation tends to reduce real exports in India. A study by Baak (2004) investigates the impact of exchange rate volatility on exports in 14 Asia Pacific countries. The paper estimates, gravity, and unilateral export models. The empirical tests, using annual data for the period from 1980 to 2002, detect a significant negative impact of exchange rate volatility on the volume of exports. The study finds a significant negative effect of exchange rate volatility on export growth. Correspondingly, Arize et al. (2000) investigate empirically the impact of real exchange-rate volatility on the export flows of 13 less developed countries (LDC's) over the quarterly period 1973 to 1996. Using Johansen's multivariate procedure to estimate the cointegrating relations. And applying the error-correction technique to estimate the short run dynamics in each country. The results show that increases in the volatility of the real effective exchange rate, approximating exchange-rate uncertainty, exert a significant negative effect on export demand in both the short-run and the long-run in each of the 13 LDC's. Serenisa and Tsounis (2012) use three different volatility measures. The empirical analysis suggests that although exchange rate volatility when measured as the standard deviation of the log effective exchange, has a small effect on the level of exports for the sample European Union (EU) countries.

However, using alternative measures to capture the effects on high and low values of the exchange rate, there is an indication of a stronger effect from movements of the exchange rate to the level of exports. Hence, their findings suggest that there is a significant statistical relationship, showing the negative impact between sector exports and exchange rate volatility. This result confirms the view that different exchange rate measurements have different effects on exports. Simakova (2013) investigate the J-curve effect on bilateral trade flows between Hungary and its major trading partners: Germany, Austria, Italy, France, the Netherlands, the United Kingdom, Poland, and the Czech Republic. Using quarterly data over the period 1997 to 2012, and employing the cointegration test to analyze the long run, whilst evaluating the short run and the related J-curve effects using an error correction model and by assessing impulse response functions. The estimates show a typical J-curve effect on bilateral trade flows with the United Kingdom. In the trade flows with Austria and Italy, the results suggest a partial J-curve, and show an inverse J-curve in the bilateral trade with the Czech Republic. In other cases, the coefficient estimates follow any specific pattern. Bahmani-Oskooee and Kutan (2009) using monthly data over January 1990 to June 2005 period from 11 East European emerging economies, their study uses the bounds testing approach to cointegration and error-correction modeling and finds empirical support for the J-curve hypothesis in three countries of Bulgaria, Croatia, and Russia. Nusair (2017) studied the J-curve phenomenon in 16 European transition economies. Utilizing the linear and the nonlinear cointegrating autoregressive distributed lag, the study is unable to find support for the J-curve phenomenon in any case.

However, using the Nonlinear Autoregressive Distributed Lag (NARDL) model, the study finds evidence for the J-curve in 12 out of the 16 countries. Therefore, it is recommended that when studying the J-curve phenomenon, it is important to consider nonlinearity in the adjustment process. Satawatananon (2014) using the annual disaggregated commodity trade data between the U.S. and Thailand from 1971 to 2012, his study

investigates the effect of exchange rate volatility on imports and exports separately to reveal the entire perspective of such relationship. He employed an Autoregressive Distributed Lag (ARDL) approach to co-integration, within an error-correction modeling framework for the empirical analysis to distinguish between the short-run effects from the long-run effects in each commodity. The findings suggest that in the short-run, the volatility of the real Baht- US dollar exchange rate has a significant mixed impact on the trade flows in most of the commodities. However, less than half of these commodities carry the effect in the long-run. These results indicate that specific commodities respond differently to volatility, thus supporting the problem of aggregation bias. On the other hand, Bahmani-Oskooee, Harvey and Hegerty (2015) studied the role of exchange rate volatility on trade between the United States and Indonesia. They used disaggregated trade data by commodity and surveyed 108 U.S. export industries and 32 U.S. import industries. The results show that in the short term, real exchange rate volatility will affect more than half of the import and export industries. Zafar and Ahmad (2011) apply a fixed-effects model to find out the impact of exchange rate volatility on export growth of 16 Latin American countries over the period 1980 to 2008. However, only one-third of the import and export industry has a long-term impact.

They further observed that for large industries, exports and imports behave similarly, but smaller Indonesian exporters find that their trade has decreased due to increased risk. Fatum, Liu, Tong and Xu (2018) studied whether there is a systematic correlation between currency fluctuations and trade flows. Using the Chinese custom dataset of bilateral transaction-level trades over the 2000 to 2011 period, the key findings of firm-level estimations of trade elasticities include that the response of Chinese firms to exchange rate changes depends strongly on the extent of the firms' involvement in processing trade. Chinese trade balance responds strongly to changes in the relative value of the Chinese Yuan, thereby implying that the influence of exchange rates on trade flows is significant and that currency depreciation does lead to export growth and improves trade balance. Employing annual aggregated data, Mehmood Khan Kakar, Kakar and Khan (2010) examine the short and long-run relationship between the trade balance, income, money supply, and real exchange rate of Pakistan's economy for the period 1970 to 2005. The bounds testing method of cointegration and error correction model developed in the autoregressive distributed lag (ARDL) framework. In addition, using variance decomposition (VDC) and impulse response function (IRF), the result of the bounds test indicates that there is a long term stable relationship between trade balance and exchange rate variables. There is also a positive correlation between exchange rate depreciation and long-term and short-term trade balances, so it meets the Marshall Lerner condition. Halicioglu (2008) used quarterly time series data from 1985 to 2005 to conduct an empirical analysis of the bilateral J- curve dynamics of Turkey and its 13 trading partners.

The short-term and long-term effects of the devaluation of the Turkish lira on the trade balance between Turkey and her 13 trading partners were estimated by the bounds cointegration test method and error correction model. The empirical results show that whilst there is no J-curve effect in the short-run, but in the long-run, the depreciation of the Turkish lira has a positive impact on Turkey's trade balance in a couple of countries. The study of Šimákováa and Staváreka (2014) explores differences in the long term and short term relationship between the bilateral exchange rate development of the Czech Koruna and international trade flows with various groups of products. In the context of disaggregated industry data of bilateral trade between the Czech Republic and its major trading partners. (Germany, Slovakia, Poland, France, Italy, and Austria) and selected product categories, determined based on the Standard International Trade Classification (SITC) over the period 1993–2013. They use the Johansen cointegration test to analyze the long term relationship, and a vector error correction model to explore the short term effects. Their findings suggest that most of the product groups related to the exchange rate in the long term. Most categories show a positive effect of depreciation. The short-term coefficients show almost no relationship. Asteriou et al. (2016) examine the effect of exchange rate volatility on international trade volumes for Mexico, Indonesia, Nigeria, and Turkey. Using volatility predicted from GARCH models for both nominal and real effective exchange rate data to detect the long-term relationship while utilizing the autoregressive distributed lag (ARDL) bounds testing approach, and the Granger causality model to detect the short-term effect. The results show that in the long term, there is no link between exchange rate volatility and international trade activities except for Turkey and even then, the magnitude of the effect of volatility is quite small.

In the short term, however, the estimate suggests a significant causal relationship from volatility to import/export demand in Indonesia and Mexico. In the case of Nigeria, the estimate shows unidirectional

causality from export demand to volatility, while in the case of Turkey, it shows no causality between volatility and import/export demand. Wilson and Tae (2001) used a partial reduce-form model to study the relationship between the real trade balance and the real exchange rate for merchandise trade between Singapore and the United States for the period 1970 to 1996. The survey results show that despite periods of nominal and real appreciation of the Singapore dollar, total exports have continued to grow. Their findings suggest that the real exchange rate does not have a significant impact on the real bilateral trade balance for Singapore and the United States, thus confirms previous work which finds a weak relationship between changes in the exchange rate and changes in volumes of export and import prices in Singapore. Choudhrya and Hassan (2015) study the role of exchange rate volatility in determining the United Kingdom's real imports from three major developing countries - Brazil, China, and South Africa. Using the asymmetric autoregressive distribution lag (ARDL) method and applying monthly data, their results show that exchange rate volatility plays an important role in determining the United Kingdom's import trade. The third country volatility effect reveals a significant causal relationship between exchange rate volatility and United Kingdom's imports. In another related study.

Caporale and Doroodian (1994) used the GARCH model to test whether actual exchange rate fluctuations would damage the value of United States' imports from Canada. The results show that the uncertainty of the real exchange rate has a negative impact on trade flows and has a statistically significant impact. In general, the relationship between exchange rate volatility and trade remains a problem. Various studies by other researchers have shown controversial results. Mixed, negative, positive and insignificant effects. Thus, the prevalence of inconclusive results on the impact of exchange rate volatility on trade prompted this research in order to overcome the limitations of previous studies.

The Model Specification and Source of Data

The Model Specification: Economists normally agree that changes in the exchange rate can either be nominal or real (Betten and Belongia, 1984). The nominal exchange rate is the relative price of the currencies of the two countries. These are rates we can see and are a result of the market and other forces out of our control (Kristinek and Anderson, 2002). Edwards (1989) opined that in an inflationary world, changes in the nominal exchange rate have no clear meaning and that researchers should give explicit consideration to changing values in the domestic and foreign currencies as measured by the rates of inflation. In this regard, considering that the nominal exchange rate and the real exchange rate are getting closer and closer since the beginning of the floating exchange rate (see Qian and Varangis, 1992), I decided to use real effective exchange rate data to calculate volatilities. Therefore, in order to empirically analyze the impact of exchange rate volatility on trade, this study proposes the following three models: export, import, and trade balance. The annual volatility measure of variance is obtained by averaging the variance of the real effective exchange rate for twelve months each year. Therefore, these models are:

$$LnX_{it} = \alpha_0 + \alpha_1 LnRER_{it} + \alpha_2 LnNER_{it} + \alpha_3 LnUSGDP_{it} + \alpha_4 INF_{it} + \alpha_5 LnVOL_{it} + U_{it} \quad (1)$$

$$LnM_{it} = \alpha_0 + \alpha_1 LnRER_{it} + \alpha_2 LnNER_{it} + \alpha_3 LnGDP_{it} + \alpha_4 INF_{it} + \alpha_5 LnVOL_{it} + U_{it} \quad (2)$$

$$TB_{it} = \alpha_0 + \alpha_1 LnRER_{it} + \alpha_2 LnNER_{it} + \alpha_3 LnGDP_{it} + \alpha_4 LnUSGDP_{it} + \alpha_5 INF_{it} + \alpha_6 LnVOL_{it} + U_{it} \quad (3)$$

The subscript *i* represents the cross-sectional dimension, *t* denotes the time-series dimension, U is an error term, LnX is the log of the total value of exports, LnM is the log of the total value of imports, TB is the trade balance, LnGDP is the log of the gross domestic product, LnUSGDP is the log of the gross domestic product of trading partners (U.S gross domestic product is a proxy for this variable), LnRER is the log of real exchange rate measured as {Nominal Exchange Rate (NER)* price of foreign goods (P_f) / price of domestic goods (P_d)}, INF is the inflation rate and LnVOL is the exchange rate volatility proxy generated from the monthly real effective exchange rates. In this paper, the nominal exchange rate is the relative price of the local currency unit devided by the relative price of the U.S. dollar (RPLCU / RPUSD). Also, an increase in the exchange rate in this paper indicates a depreciation of the domestic currency and a decrease indicates an appreciation of the domestic currency. LnX is the dependent variable of equation (1). As far as the expected signs of these estimated coefficients are concerned, in this equation, α_0 is the constant intercept. Thus, as to whether to use nominal or real exchange rate data in calculating volatilities, many studies claim that when using the real exchange rate data the result tends to be more significant than when using the nominal exchange rate (see Qian and Varangis, 1992).

An increase or depreciation in the real exchange rate (LnRER), all things being equal, will make exports more competitive than before, thereby increasing the demand for domestic exports, so that $\alpha_1>0$. Similarly, the sign of the nominal exchange rate (LnNER) is expected to relate positively to export, so that $\alpha_2>0$. It is assumed that exports relate positively to the gross domestic product of trading partners (LnUSGDP), thus, $\alpha_3>0$. The sign of Inflation rate (INF) is expected to relate negatively to exports, so $\alpha_4<0$. And the sign of the exchange rate volatility (LnVOL) is indeterminate. LnM is the dependent variable of the equation (2). As far as the expected signs of these estimated coefficients are concerned, in this equation, α_0 is the constant intercept. An increase or depreciation in the real exchange rate, a priori, will make imports more expensive than before, thereby resulting in a decrease in the demand for imports, so that $\alpha_1<0$. The sign of LnNER is expected to relate negatively with imports, so that $\alpha_2<0$. It is assumed that imports relate positively to the gross domestic product (LnGDP), thus, $\alpha_3>0$. The sign of Inflation rate (INF) is expected to relate positively to imports, so $\alpha_4>0$. And the sign of the exchange rate volatility (LnVOL) is indeterminate. TB is the dependent variable of equation (3). As far as the expected signs of these estimated coefficients are concerned, in this equation, α_0 is the constant intercept.

An increase or depreciation in the real exchange rate (LnRER), a priori, will make exports more competitive than before, thereby increasing the demand for domestic exports, this has a positive influence on the trade balance, so that $\alpha_1>0$. Similarly, the sign of the nominal exchange rate (LnNER) is expected to be positively related to the trade balance, so that $\alpha_2>0$. It is also assumed that an increase in the gross domestic product (LnGDP) of West African countries will increase domestic demand, which will subsequently increase imports, this will have a negative influence on the trade balance, thus, $\alpha_3<0$. An increase in the gross domestic product of trading partners (LnUSGDP) is expected to increase exports, which subsequently improves the trade balance, a priori, therefore $\alpha_4>0$. The sign of Inflation rate (INF) is expected to be negatively related to exports and positively related to imports, therefore, $\alpha_5<0$. And the sign of the exchange rate volatility (LnVOL) is indeterminate.

Data and Sources: Figures 1 and 2 in the appendix show that the countries under consideration experienced large exchange rate fluctuations and persistent Bop deficits from 1992 to 2017. Hence, the study employs annual data from 1992 to 2017 to capture the period in the analysis. For variables, units of measurement and their sources, see Table 1 below. Note that some variables (RER, NER, X, M, GDP, USGDP, and VOL) are converted to natural logarithms, so the interpretation of the results is in terms of elasticities. That is the response of the dependent variable that is explained by a 1% increase in the independent variable.

Table 1: Variable, Unit of Measurement and Sources

NO.	Variables	Unit of Measurement	Source
1	Nominal exchange rate (NER)	The Relative price of the Local currency unit divided by the relative price of the US dollar (RPLCU/RPUSD).	World Bank
2	Real exchange rate (RER)	Current US dollars	Author's Calculation (NER* P_f/P_d). P_f = foreign price level (proxy as USCPI) P_d = domestic price level (proxy as domestic CPI)
3	The United States Consumer Price Index (USCPI)	Current US dollars	World Bank
4	Consumer price index (CPI) for the domestic economies/countries.	Current dollar	World Bank
5	Exports of goods and services (X)	Current US dollars	World bank
6	Imports of goods and services (M)	Current US dollars	World bank

7	US gross domestic product (USGDP)	Current US dollars (billions)	World bank
8	Gross domestic product(GDP)	Current US dollars (billions)	World bank
9	Trade balance (TB)	Current US dollars (billions)	Author's Calculations (Exports – Imports)
10	Inflation rates (INF)	GDP, deflator (annual %)	World bank
11	Exchange Rate Volatility (VOL)	Annual variation by averaging the variance of twelve months of each year.	Author's calculation using STATA 13 (Estimations were based on the monthly real effective exchange rate data, and obtained from the bruegel.org/publication/ dataset).

Note that; the data of nominal exchange rate (NER) for Mauritania in 2004 is not available; the average of the nominal exchange rates of 2003 and 2005 is taken to generate the data.

3. Methodology of the Study

This paper investigates the extent to which exchange rate volatility affects the components of trade in West Africa. The study employs similar econometric approaches of panel data analysis by Umaru et al. (2018) because these models combine cross-section or time-series data. Hsiao and Yanan (2006) identify several advantages of panel data analysis over cross-section or time-series analysis. First, Panel data usually contain more degrees of freedom and less multicollinearity than cross-sectional or time-series data because of a large number of observations. It has the advantage of distinguishing between fixed and random effects, hence improving the efficiency of econometric estimates. Furthermore, it allows the researcher to control the effect of missing variables and permits accurate predictions for individual outcomes by pooling the data rather than generating predictions of individual outcomes using the data on the individual in question; thereby making it appropriate to apply panel data analysis for this study.

Despite the advantages of panel data analysis, the longer time dimension of panel data may lead to the problem of non stationarity and spurious regression, which deserves attention. Thus, to conduct an initial test of non stationarity, the study adopts the popular econometric test of Im-Pesaran-Shin (2003) panel unit root tests, which is based on averaging individual unit root test statistics of the series across the panel, and Levin-Lin-Chu (2002). The Levin–Lin–Chu (LLC) test assumes that each unit in the panel shares a common autoregressive coefficient, but allows for individual effects, time effects and possibly a time trend. These tests confirm whether the variables remain stable at a certain level to avoid inefficient and biased results. The next stage involves the estimation of the panel models using the following methodology: the pooled Ordinary Least Square (OLS), the fixed effects and the random effect.

Pooled Ordinary Least Square Model: This model pools together the cross-section and the time-series data when estimating the regression equation. It assumes there are no unique attributes of individuals or countries in the measurement set, and no universal effects across time, thus this model ignores the nature of the data. It is as follows: $Y_t = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \ldots + C_i + U_{it}$

Where Y_t is the dependent variable, U_{it} is uncorrelated with all independent variables in X, C_i is unobserved and it is absorbed into the error term. Thus we can rewrite the above model as:

$Y_t = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \ldots + V_{it}$, *Where* $V_{it} = C_i + U_{it}$

The error term V_{it} consists of two components, an "idiosyncratic" U_{it} component and an "unobserved heterogeneity" C_i component (McManus, 2011). If the unobserved heterogeneity C_i is not related to the independent variables, OLS will produce valid and consistent parameter estimates even in a single cross-section. On the other hand, if the unobserved heterogeneity C_i is related to one or more independent variables, it may affect the OLS assumptions about exogeneity, homoscedasticity and non-autocorrelation (Park, 2011). This will result in bias and inconsistent estimate. The effects of unobserved heterogeneity can either be assumed as random variables, referred to as a random-effects model, or fixed parameters, referred to as fixed effects model, both models provide a way to deal with bias and inconsistent estimates.

The Fixed Effect Model (FE): This model checks whether the intercept changes with the group or time. This model can handle unobserved heterogeneity effects. The model can allow the individual and/or time-specific effects to correlate with the independent variables X but does not allow the estimation of the time-invariant coefficients. Similarly, in this model, as the number of sample observations increases, the number of unknown parameters also increases. The functional form of the one-way fixed-effect model is:

$Y_t = (\beta_0 + C_i) + \beta_1 X_{1it} + \beta_2 X_{2it} + \ldots\ldots + U_{it}$

Assume that C_i is a constant; the model is estimated by least squares dummy variable (LSDV) regression and the within effect estimation methods. The LSDV model uses dummy variables, whereas the "within" estimation does not. The LSDV model, however, becomes problematic when there are many individuals (or groups) in panel data. In this situation, the number of parameters to estimate will increase. Therefore, in this case, LSDV model is invalid due to the incidental parameters. This calls for another strategy, the within effect estimation method which relies on variations within each individual or entity.

Random Effect Model: We can use a random effects model (RE) instead of the pooled OLS, and the fixed effects. The random effects model or the error component model assumes that unobserved individual effects are not related to any regressor, and then estimates the group-specific error variance. The rationale behind the random-effects model is that, unlike the fixed effects model, the variation across entities is random and unrelated to the independent variables included in the model (Torres-Reyna, 2007). One of the advantages of the random effects model is that it can contain time-invariant variables. The model is:

$Y_t = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \ldots.. + C_i + U_{it}$

Random-effects assume that the entity's error term is not correlated with the predictors, which allow for time-invariant variables to play a role as explanatory variables. In the random-effects model, you need to specify those individual characteristics that may or may not influence the predictor variables. The problem with this model is that some variables may be unavailable, which leads to missing variables in the model (Torres-Reyna, 2007). The feasible generalized least squares (FGLS) method is used to estimate the within-cluster correlation.

In addition, this paper uses the F test, the null hypothesis of the test is the pool OLS model, and the alternative hypothesis is the FE model. This practically tests the presence of fixed effects. The Bruesch and Pagan Langrangian Multiplier (BP-LM) test to decide between a random-effects regression model and a pool OLS regression model. The null hypothesis in the (BP-LM) test is that the variation across entities is zero. And Hausman test to determine whether it is fixed effect or random effect; the null hypothesis is that the preferred model is the random effect rather than fixed effect (Torres-Reyna, 2007). In order to ensure that the model does not have heteroscedasticity and serial correlation, I conducted autocorrelation, heteroscedasticity and cross-sectional correlation tests. To obtain reliable estimates, this study used *xtgls,* panel *(correlated) corr (ar1)* and *xtscc fe* regression, with Driscoll-Kraay standard errors to test the export and trade balance and import models, respectively.

4. Results Presentation and Interpretation

Table 2: Descriptive Summary Statistics of the Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
RER	364	624.2727	941.9273	1.001347	4722.282
X	364	5.23e+09	1.59e+10	1.11e+07	1.45e+11
M	364	4.73e+09	1.08e+10	7.40e+07	8.89e+10
GDP	364	2.20e+10	7.32e+10	2.06e+08	5.68e+11
USGDP	364	1.26e+13	3.89e+12	6.52e+12	1.95e+1
NER	364	526.721	837.4799	0.0436852	7384.432
INF	364	7.50875	11.8586	-35.84	72.8355
TB	364	4.99e+08	6.60e+09	-9.25e+09	8.53e+10
VOL	364	835.4561	11926.64	0.1696195	224118.5

Source: Author's computation using STATA 13

Table 2 above provides the summary descriptive statistics for the variables with a sample of 364 observations for each. The mean of the RER is 624.2727, the standard deviation SD is 941.9273, the minimum and maximum values are 1.001347 and 4722.282 respectively. In the case of exports (X) variable, the mean is 5.23e+09, the SD is 1.59e+10, the minimum and maximum values are 1.11e+07 and 1.45e+11 respectively. The imports (M) variable shows that the mean is 4.73e+09, median value is 1.47e+09, the SD is 1.08e+10, the minimum and maximum values are 7.40e+07 and 8.89e+10 respectively. The mean of the gross domestic product, GDP 2.20e+10, the SD is 7.32e+10, minimum and maximum values are 2.06e+08 and 5.68e+11 respectively. United States gross domestic product USGDP indicates that the mean is 1.26e+13, SD is 3.89e+12, the minimum and maximum values are 6.52e+12 and 1.95e+1 respectively. The nominal exchange rate NER shows that the mean is 526.721, SD is837.4799, the minimum and maximum values are 0.0436852 and 7384.432 respectively. Inflation rate, INF suggests that the mean is 7.50875, SD is 11.8586, the minimum and maximum values are -35.84 and 72.8355 respectively. The trade balance TB indicates that the mean is 4.99e+08, SD is 6.60e+09, the minimum and maximum values are -9.25e+09 and 8.53e+10 respectively. And the real effective exchange rate volatility variable VOL shows that the mean value is 835.4561, SD is 11926.64, the minimum and maximum values are 0.1696195 and 224118.5 respectively. See the table three below for a summary result of the unit root test:

Table 3: Im-Pesaran-Shin (2003) Panel Unit Root Test Result

Variables	Level			First Difference		
	t-bar	t-tilde-bar	Z-t-tilde-bar	t-bar	t-tilde-bar	Z-t-tilde-bar
LnRER	-2.6312	-2.2743	-4.0572 (0.0000) ***			
LnX	-2.1007	-1.8257	-1.9109 (0.0280) **			
LnM	-2.1767	-1.9660	-2.5820 (0.0049) ***			
LnGDP	-2.5700	-2.0634	-3.0479 (0.0012) ***			
LnUSGDP	-2.7370	-2.4282	-4.7934 (0.0000) ***			
LnNER	-0.8184	-0.7798	3.0924 (0.9990)	-5.6329	-3.6398	-10.6287 (0.0000) ***
INF	-4.2967	-3.1245	-8.1239 (0.0000) ***			
TB	-3.0727	-2.6084	-5.6554 (0.0000) ***			
LnVOL	-4.1020	-3.1308	-8.1541 (0.0000) ***			

Note *** and ** denote stationarity at the 1% and 5% significance level respectively. Values in the parentheses are P-value.

The null hypothesis of the Im-Pesaran-Shin test is that "all panels contain unit roots". The results reject the null hypothesis for all the series except for the nominal exchange rate (LnNER). This implies the integration of order zero I (0), for eight variables. And integration of order one I (1), for one variable.

Table 4: Levin-Lin-Chu Unit-Root Test

Variables	Levin-Lin-Chu Unit-Root Test-Statistics	
	Level	First Difference
LnRER	-2.1939 (0.0141) **	
LnX	-1.5698 (0.0582)	-7.8691 (0.0000) ***
LnM	-0.6942 (0.2438)	-7.7889 (0.0000) ***
LnGDP	-0.2630 (0.3963)	-10.2545 (0.0000) ***
LnUSGDP	-6.3976 (0.0000) ***	
LnNER	-3.8164 (0.0001) ***	
INF	-5.6850 (0.0000) ***	
TB	0.6102 (0.7292)	-8.6633 (0.0000) ***
LnVOL	-5.5417 (0.0000) ***	

Note *** and ** denote stationary at the 1% and 5% significance level respectively.
Values in the parentheses are P-value.

The null hypothesis of the Levin-Lin-Chu unit-root test is that "all panels contain unit roots". The results of the Levin-Lin-Chu panel unit root test in table 4, show that five of the series are stationary at level. While four are stationary at the first difference. Considering the two tests, since the majority of the results favor I (0), this

study, therefore, considers that the variables under study are all I (0). With this conclusion, the next step will be to estimate the regression equation and select the most appropriate model for the study. The estimates of the pooled, fixed, and random effect models for each of the models of exports, imports, and the trade balance are as follows. Tables 5a, b, and c present the results of the econometric tests, helping to decide on the best models for the study.

Table 5a: Summary of F-Test Results in Choosing the Appropriate Model

Model	F-Statistics Value	Degrees of Freedom (DF)	Prob.	Decision	Decision
Export	484.05	(13, 345)	0.0000	Ho-rejected	Pooled model is not appropriate --Fixed effects model must be estimated.
Import	41.76	(13, 345)	0.0000	Ho-rejected	Pooled model is not appropriate --Fixed effects model must be estimated.
Trade Balance	9.29	(13, 344)	0.0000	Ho-rejected	Pooled model is not appropriate --Fixed effects model must be estimated.

Table 5b: Summary of Breusch and Pagan Lagrangian Multiplier (BP-LM) Test for Random Effects

Model	Chi-Square Statistics	Probability	Decision	Decision
Export	3681.67	0.0000	Ho: rejected	Pool model not appropriate --Random effect model must be estimated
Import	1115.87	0.0000	Ho-rejected	Pool model not appropriate --Random effect model must be estimated
Trade Balance	183.33	0.0000	Ho-rejected	Pool model not appropriate --Random effect model must be estimated

Table 5c: Summary of the Hausman Test Result in Choosing the Appropriate Model

Model	Chi-Square Statistics	Probability	Decision	Decision
Export	5.83	0.3227	Ho: accepted	Random effects model is the appropriate model
Import	37.16	0.0000	Ho: rejected	Fixed effects model is the appropriate model
Trade Balance	10.40	0.1087	Ho: accepted	Random effects model is the most appropriate model

After conducting the econometric tests (F-test, BP-LM test and Hausman test) to determine the appropriate model for this paper, the random effect model appears to be suitable for the exports and trade balance models, while the fixed effect model appears to be suitable for the import model. Table 6 presents suitable models for empirical findings of the exports, imports, and trade balance.

Table 6: Suitable Models for Exports Import and Trade Balance

Variable	Export Model (RE)	Import Model (FE)	Trade Balance Model (RE)
LnRER	-0. 82784433***	0.09129948	-6.150e+08
	(-8.31)	(1.42)	(-0.66)
LnNER	0. 20083113***	0.02066292	8.867e+08
	(3.68)	(0.64)	(1.06)

LnUSGDP	1. 8658811***		-3. 956e+09**
	(25.00)		(-3.04)
INF	0.00240177	0.00381907**	-22690379
	(1.09)	(3.06)	(-0.69)
LnVOL	-0.01122192	-0. 02744235**	85193159
	(-0.69)	(-3.02)	(0.36)
LnGDP		1.0793908***	2. 143e+09***
		(47.89)	(5.50)
Constant	-31. 997822***	-3. 389417***	7.084e+10
	(-13.91)	(-5.49)	(1.98)
Overall R-sq:	0.1276	0.9067	0.1679
Observation	364	364	364

Note: the symbols *** and ** refer to levels of significance of 1% and 5% respectively. The parenthesis shows t-statistics for the FE model and z-statistics for the RE model. The standard error component model assumes that the regression disturbances are not serially correlated and are homoskedastic. Table 7 below shows the results of the models.

Table 7: Results of the Autocorrelation, Heteroskedasticity and Cross-Sectional Dependence Tests

Model	**Autocorrelation** (Ho: no autocorrelation)	**Heteroskedasticity** (Ho: homoskedasticity)	**Cross-Sectional Dependence** (H0: cross-sectional dep.)
Export model (RE)	F (1,13) = 24.295	LR chi2(13) = 425.40	PSI = 5.743
	Prob> F = 0.0003	Prob> chi2 = 0.0000	Prob = 0.0000
Import model (FE)	F (1, 13) = 78.718	LR chi2 (13) =156.98	Chi2 (91) = 230.222
	Prob> F = 0.0000	Prob> chi2 = 0.0000	Prob = 0.0000
Trade balance model (RE)	F (1, 13) = 2.914	LR chi2 (13) = 1785.43	PSI =11.800
	Prob> F = 0.1115	Prob> chi2 = 0.0000	Pr = 0.0000

Note: PSI means Pesaran's test of cross-sectional independence.

As can be seen from table 7, the errors of the models have heteroskedasticity and serial correlation except for the trade balance model, and the trade balance model has no serial correlation. Using Pesaran's test of cross-sectional independence in the estimation of export and trade balance models, and the Breusch-Pagan LM test of independence in the estimation of import model produce cross-sectionally dependent regression residuals. To ensure the validity of the results, I obtained robust export and trade balance model estimates by using *xtgls, panel (correlation) Corr (ar1)* and using *xtscc, fe* regression, with Driscoll-Kraay standard errors to estimate the import model. The results are shown in table 8 below.

Table 8: Robust Estimation Results

Variable	**Export Model (Fgls)**	**Import Model (Fe)**	**Trade Balance Model (Fgls)**
LnRER	-0.15716165**	0.09129948	80436171
	(-2.07)	(1.20)	(0.45)
LnNER	-0.05054409	0.02066292	1.421e+08
	(-0.75)	(0.63)	(0.81)
LnUSGDP	1. 7686686***		-5. 579e+08***
	(14.16)		(-5.06)
INF	-0.00060268	0. 00381907**	60122.005
	(-0.63)	(2.30)	(0.03)
LnVOL	-0.00775872	-0.02744235	1. 150e+08***
	(-1.63)	(-1.86)	(7.73)
LnGDP		1. 0793908***	6. 939e+08***
		(37.84)	(4.76)
Constant	-31. 347727***	-3. 389417**	0
	(-8.30)	(-3.51)	-

Note the symbols *** and** refer to levels of significance of 1% and 5% respectively. The parenthesis shows the t-statistics for the import model and z-statistics for export and the trade balance models.

For the export model, the coefficients of LnRER and LnUSGDP are statistically significant, at 5% and 1%, respectively. The expected sign of the LnRER coefficient is inconsistent with the theoretical expectation. The empirical results show that a 1% depreciation in the real exchange rate or an increase in the real exchange rate will reduce exports by 0.15%, which means that exports will have a negative impact on changes in LnRER. Although they used nominal exchange rates in their analysis, this finding is consistent with the results of Meniago and Eita (2017). However, the inconsistent result with theoretical expectations may be due to low technological content and undiversified production activities. The empirical results also suggest that a 1% increase in LnUSGDP will result in a 1.76% increase in exports. This result is also consistent with the results of Meniago and Eita (2017), as well as theoretical predictions. Thus, West African countries' export performance does depend on the gross domestic product of their trading partners. The impact of LnNER, INF, and LnVOL on exports is insignificant. The insignificant results for real exchange rate volatility and exports are similar to the result of Edwards (1989) but differ from the findings of Omojimite and Akpokodje (2010), whose findings reveal a negative relationship between exchange rate volatility on the exports of the panel of CFA countries with that of the non-CFA counterparts. For the import model, the coefficients of LnGDP and INF are statistically significant, at 1% and 5%, respectively. The expected sign of the coefficient for LnGDP is consistent with theoretical expectations.

The results show that a 1% increase in LnGDP will result in a 1.07% increase in LnM. Thus, West Africa countries' import performance does depend on the gross domestic product. This result follows the findings of Meniago and Eita, (2017). The sign for the inflation rate is consistent with theoretical expectations. The result shows that a 1% increase in the INF rate will cause imports to increase by 0.003%. Imports of the countries under consideration tend to increase when inflation increases, though very weak. However, this result is inconsistent with the findings of Senadza and Diaba (2017), which shows a negative correlation between inflation and imports. The impact of LnRER, LnNER, and LnVOL on LnM is insignificant. The insignificant results for real exchange rate volatility and imports are similar to the result of Senadza and Diaba (2017) but differ from the findings of Omojimite and Akpokodje (2009), whose findings reveal a negative and significant relationship between exchange rate volatility and the imports of ECOWAS countries. The empirical results of the TB model show that the coefficients of LnVOL, LnGDP and LnUSGDP are statistically significant at the level of 1%. The results show a positive correlation between LnVOL and TB, indicating that an increase/decrease of 1% in LnVOL will result in an increase/decrease in TB of 1.15%. This finding, however, supports the results of Olayungbo, Yinus, and Akinlo (2011), whose findings reveal that the net effect of exchange rate volatility on aggregate trade was positive. Empirical results also show that a 1% increase in LnGDP will increase TB by 6.93%. A 1% increase in LnUSGDP will result in a 5.57% reduction in TB. Both findings are consistent with the results of Meniago and Eita, (2017). The impact of LnRER, LnNER, and INF on TB is insignificant.

5. Conclusion and Policy Recommendations

This study examines the impact of exchange rate volatility on trade from the perspective of exports, imports, and trade balance, focusing on 14 countries in West Africa. Taking exchange rate volatility as the main variable of interest, empirical results show that the impact of exchange rate volatility on imports and exports is insignificant. Although the impact of exchange rate volatility on imports and exports is insignificant, the results of the trade balance model indicate that there is a positive and significant relationship between exchange rate volatility and the trade balance. Therefore, this indicates that traders tend to participate more in export activities with an increase in exchange rate volatility. In addition, the analysis shows that the depreciation of the real exchange rate will lead to a decline in exports. Confirming the limited production capability and heavy reliance on imported goods and services. Hence, to benefit from the depreciated exchange rate, this paper suggests that West African countries should diversify.

Their production activities and device strategies that make them less dependent on imported goods and services. The empirical results also show that there is a positive correlation between the growth of domestic economic activities of trading partners and the exports of West African countries. Hence, West African countries must engage in trade with countries that have a high economic growth rate. There is a positive correlation between GDP and imports, indicating that the surveyed West African countries will increase their imports as economic activity increases. This action will negate the trade balance; it is, therefore, advisable that as the GDP of these countries grows, the authorities should develop strategies that will encourage the

growth of import substitution and service industries; and also devising strategies that will encourage local demand for goods and services. Also, an increase in the inflation rate shows a mild increase in imports. Therefore, this indicates the implementation of an effective monetary policy aimed at controlling inflation. For future research, students or prospective researchers should consider using other measurements of exchange rate volatility. The use of different measurements of exchange rate volatility is to find out whether there would be differences in the outcome of the empirical results. Similarly, promising researchers may consider targeting individual countries, focusing on the level of goods or services, rather than adopting total trade to avoid aggregation bias.

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Appendix

Figure 1: Country-Specific Exchange Rate Volatility (Variance) Plots

Figure 2: Country-Specific Trade Balance (TB)

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CEO Duality and Financial Performance: Testing the Moderating Role of Firm Age: Evidence from a Developing Economy

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Abstract: This paper tests the moderating role of firm age on the relationship between Chief Executive Officer (CEO) duality and financial performance among manufacturing firms in Uganda. A cross section survey was adopted using 78 manufacturing firms in Uganda. Data was analyzed using descriptive statistics, correlation and hierarchical regression. Modgraph software was also used to ascertain the validity of the set hypothesis**.** Results reveal that whether the CEO doubles as chairman of board or not, this does not significantly affect firm Financial Performance. However, as the firms grow older, the role of CEO-Board Chairman duality phenomenon gains significance in determining financial performance. Therefore, as firms grow in age, the CEOs should not be the same as Board chairpersons if firms have to perform well financially. Since only a single research methodological approach was employed in this study, future research can undertake to use a mixed methods approach to provide more detailed insights. Further, a longitudinal approach can also be employed to study financial performance trends among manufacturing firms over years. Entrepreneurs of these firms should put emphasis on proper segregation of the CEO role and those of the board chairman especially as firms grow in age. A moderating role of firm age on the relationship between CEO duality and financial performance was tested among manufacturing firms; previous studies have tended to test the direct or mediating effects.

Keywords: *CEO duality, Firm age, financial performance, Manufacturing firms, Uganda*.

1. Introduction

In this study, we mainly investigate the moderating role of firm age on the relationship between CEO duality and financial performance among manufacturing firms in a developing economy perspective. Most Manufacturing firms in sub-Saharan Africa provide a fulcrum around which their host economies turn (Kamukama, Kyomuhangi, Akisimire, & Orobia , 2017; Mutambi, 2011; Tumwine et al., 2015). In Uganda for instance, the industrial manufacturing sector is one of the economic pillars of the economy with a GDP contribution of 20%, generating over 80% of manufactured output (UNIDO, 2013; UBOS, 2017). Comparing the level of economic performance with the government efforts in developing industrialization, this sector should be performing better. Thus, for the economy to prosper there is need to put emphasis on this sector because; in addition to its GDP contribution, the sector creates employment for both the skilled and unskilled labor as well as providing value addition to the agricultural output for both local consumption and export purposes (Nalukenge et al., 2018; Tumwine et al., 2015). Despite their great importance, most manufacturing firms have had challenges of poor financial performance and this sometimes leads to firm failure (Mutambi, 2011; Nkundabanyanga, 2016; Akisimire et al., 2016).

In fact, most of these firms have registered a low return on investment, low return on assets and some of them fail to maintain their liquidity levels (Akisimire et al., 2016; Ishengoma & Kappel, 2008). Numerous reasons have been observed to cause this poor financial performance. Studies indicate the most of the firms have challenges of owner managers that serve both as CEOs and board chairpersons simultaneously. Subsequently, this impairs the independence of board members while executing their board duties (Hofmann & Lampe, 2013; Mutambi, 2011). Conspicuously, the board is customarily tasked with an oversight role of evaluating the management team and CEO (Firth et al., 2014; Cornforth, 2004; Freeman, 2008). Because of this, board chairpersons are expected to understand their leadership roles in relation to how it contributes to the performance of the firm (Desoky, & Mousa, 2013; Kakabadse & Kakabadse, 2013). Likewise, the CEO is tasked with overseeing the daily operations of the business as well as operationalising strategic plans (Bathula, 2008). This means that, allowing the CEO to double as the board chairman may cause CEOs to perform no duty other than evaluating themselves and the board ends up as a mere rubber stump (Tonello, 2011). Besides, founder CEOs are observed to have a tendency of treating the organization as their "baby" and want to control it as much as possible courtesy of their unified leadership.

Something that may hinder firm performance in the long run (Mori, Randøy & Golesorkhi, 2011). Notably, the positions of board chairman and CEO command a lot of power and responsibility. Besides, the effectiveness of the board and management is largely dependent on the efficacy of the CEO and the board chairman respectively (Bathula, 2008). Regulating the power of management and the board affects strategic decisions such as financing (Munir, & Li, 2018). Thus, serving dual roles has certainly been cited in most debates as paramount in predicting the financial performance of most companies. While well constituted boards are important for successful financial performance (Bathula, 2008; Nkundabanyanga, 2016), there is scanty literature about what constitutes an effective board and how the CEO duality scenario on the board fosters good financial performance of a firm. Extant empirical studies have produced conflicting results (Bathula, 2008; Adams et al., 2005; Ugwoke et al., 2013; Moscu, 2013) and none of the studies have tested the moderating role of firm age on the study variables. Besides, most studies have been conducted in a developed economy perspective, leaving other private sector manufacturing firms in developing economies unstudied. More so, theories and models that have attempted to explain financial performance as predicted by CEO duality have proved to be inadequate in explaining the phenomenon in the private sector firms especially those in a developing economy perspective (Freeman, 2008).

And yet, CEO duality is arguably seen as an important board control mechanism in mitigating agency conflicts, where owner managers have a tendency of performing a dual roles with the aim of managing succession and negotiations (Bathula, 2008; Munir, & Li, 2018). As a result, poor financial performance among manufacturing firms remains unexplained, something that creates an empirical and theoretical gap. Because of the unique challenges that exist in the turbulent business environment especially in the private sector (UNIDO, 2013). This paper focuses on testing the moderating role of firm age on the relationship between CEO duality and financial performance among private sector manufacturing firms in Uganda. This is because board dynamics are attributed to the firm age differences, in that; the complexities within these firms tend to increase as firms grow, resulting into variations in performance (Aktas et al., 2018; Bathula, 2008). Our findings are expected to contribute to the scholarly debate about the governance structures from the private sector strategic leadership view point using evidence from Uganda. Manufacturing firms in Uganda can use the findings to improve their boards by addressing challenges of CEO duality as a tool to foster firm financial performance, especially as these firms grow in age. The rest of the paper organized as follows: the next section presents literature review and hypotheses. This is followed by the research methodology, the study results, discussion and the final section covers the conclusion and implications derived from the study.

2. Literature Review

Theoretical Establishment of this Study

The Upper Echelons Theory: The central assumption of the Upper Echelons theory is that organizations are a reflection of their top executives and that top executives view their opportunities, threats, alternatives and likelihoods of various outcomes through their own perspective (Hambrick & Mason, 1984; Tacheva, 2007). The theory attributes the performance outcome of the firm to the characteristics of top management teams and associates (Cannella & Holcomb, 2005). As a result, the theory offers a new notion into strategic leadership, governance and decision making as well as processes involved in the operations of the firms. According to the theory, it is assumed that if one must understand a good strategy, they must understand strategists (Hambrick & Mason, 1984). This means that; if the upper level cadres are goods strategist, they would ultimately be in position to make good strategies for the company and vice versa.

Therefore, to effectively execute the oversight functions, the boards are left with the task of understanding the managerial cognitive behavior within the firms they govern so as to create proper synergies with management at an informed point of view other than having mixed ideas. This can be best achieved in situations where the CEO serves a dual purpose of chairing the board (Rechner & Dalton, 1991). Even in the existence of the diverse board, most of the decisions made in most private sector firms are aligned to the interest and perceptions of the owner managers (Dual CEOs). However, based on the assumptions of the theory that organizations are a reflection of their top managers (Cannella & Holcomb, 2005; Hambrick & Mason, 1984), most of its processes and perspectives proposed have not been put to systematic and comprehensive test. Further, the theory still lacks diversity in terms of contextual evidence.

Managerial Hegemony Theory: In performing its oversight function, the board is entitled to rely on the advice, reports and opinions of management (Huse, 2005). This theory assumes that managers have more powers than the rest of the stakeholders (Munir, & Li, 2018) because they have a closer interaction with the operations of the business and have the professional knowledge to foster good financial performance (Mace, 1971). Although this theory was developed with respect to large business corporations (Cornforth, 2004), many of the processes it describes are also relevant to small but growing firms. From this perspective, the board especially one that is managed by the CEO ends up embracing management's decisions with no fundamental input and because managers are assumed to know the operational details of the day to day management of the firm (Huse, 2005; Kakabadse et al., 2013), the board therefore decides to embrace or ratify whatever decisions that are taken by management and ends up being mere rubber stamp. Stiles and Taylor (2001) in their research on private sector boards also argue that in situations of CEO duality, board members are unable to constrain managerial opportunism.

By establishing control mechanisms to keep a focus on organizational goals like financial performance. What this informs the current study is that even in the presence of the board, there is a high likelihood of management dominance in strategic decision making. Therefore, unless the board is composed of independent members that are knowledgeable and strong, management under the leadership of a dual CEO may take advantage of the weaknesses to satisfy their own interests. However, one key limitation of the Managerial Hegemony theory is that it undermines the role of the board and considers it as playing a passive role in the strategic direction of the firm (Nkundabanyanga et al., 2015). The theory does not specify the board-management power as well as power boundaries between boards and management (Cornforth, 2004). The theory also puts more focus on management dominance and falls short of specificity in addressing how resourceful the board is in fostering financial performance. That is why in this study, we combine the premises of the Upper Echelons and Managerial Hegemony theories to help complement each other in understanding the roles and limitations of CEO duality.

Contextualising Financial Performance: The financial performance is a general measure of an organization financial health. It is has for overtime been measured differently, But for this study, we focused on capital growth, asset base, return on assets (ROA), return on investments(ROI) profit after tax (PAT) and firm revenues as measures of financial performance. (Hofmann & Lampe, 2013; Bathula, 2008; Tumwine et al., 2015). For instance, Return on investment is a particular metric used to measure the firms profitability, it specifically measure the amount of returns on a particular investment in relation to the initial investment costs (Mutambi, 2011; Nkundabanyanga, 2016). Mutambi (2011) further explains the key performance indicators among manufacturing firms in terms of plant and machinery, output and other capital investments. In the manufacturing perspective, scholars like Mutambi (2011) argue that key performance indicators (KPIs) among manufacturing firms especially in the recent trend need to be understood mainly because a new paradigm of performance has been adopted by most firms in the industry, given the new technological advancement. On the contrary, Nkundabanyanga (2016) while analyzing the perceived performance among the Ugandan service firms concluded that good financial performance indicators include; equity returns, controlled expenditure and profitable investments as well as shareholders in terms of dividends received.

CEO – Chairman Duality in the Context of Financial Performance: The role of the CEO and that of the board chairman are often intermingled thus creating the scenario of "CEO-chairman duality" (Bathula, 2008). CEO duality holds that these roles are held simultaneously by one party as opposed to independent structures where different persons are meant to serve these roles (Freeman, 2008; Brown, 2008). If maintaining control is imperative for founders, it is likely that the founder CEOs would serve concurrently as board chairpersons. Found out that separating the CEO and board chair positions does not, on its own, improve firm financial performance. However, Tonello (2011) argues that the CEO duality threatens board member independence and accelerates conflict of interest as well as lowering firm value (Aktaset al., 2018) although Munir and Li, (2018) found out that CEOs that are more powerful are less self-centered and tend to make decisions that favor financial strengthening of their firms. In fact Mobbs (2015) argues that CEOs who double as board chairmen are important in strengthening the human capital of a firm and usually have higher firm valuation. However, separation of CEO from the board chairmanship does not necessarily guarantee good performance (Tonello, 2011). It is therefore hypothesized that; **H1:** There is a significant relationship between CEO duality and financial performance.

Moderating Role of Firm Age on the Relationship between on CEO Duality and Financial Performance: It is observed that there has been extant research about the relationship between CEO duality and firms' financial performance. However, most of these studies have focused on the direct relationship and not considered contextual factors (Peng, Li, Xie & Zhongfeng, 2010). The adoption of CEO duality structure represents the exercise of power by the CEO (Bathula, 2008). However, it has been noted that holding multiple titles tends to be a sign of power accumulation and power hoarding (Düztas, 2008; 60). Age is a key antecedent of board structure and firm performance (Coad, Holm, Krafft & Quatraro, 2018). Firm age is measured by the number of years from the time the firm was incorporated and that firm age has been linked to many decisions of the firm (Bathula, 2008; Brown, 2008. Düztas, (2008) stresses that firms go through a financial growth and their capital structures vary with the age. Thus, as firms grow, board composition also changes in response to the increasing needs.

However, the magnitude of these relationships may differ. For example, founder members that start by serving both roles (CEO/Board chairman) may with time surrender one especially as the firm grows in age (Munir, & Li, 2018). This may reflect a trade-off between specific benefits of monitoring and costs of such monitoring (Freeman, 2008). Relatively younger firms are expected to earn less in terms of revenue turnover and overall profitability than older ones (Bathula, 2008; Baisi, 2008). This is because they are under the leadership of dual CEOs with less experience in the market and spend a lot of excess funds (Aktas et al., 2018) in market penetration programmes so as to build a sustainable market position (Boone et al., 2007; Bathula, 2008). As a result, they normally have a high costs structure and low return on investment, something that may hamper the overall financial performance of the firm. Further, Boone et al. (2007) also suggest that complexity in board composition in terms of CEO duality increases with firm age as well as financial performance. It is thus hypothesized that; **H2:** Firm age has a significant moderating effect on the relationship between the CEO duality and financial performance.

3. Methodology

Our study adopted a cross-sectional survey approach because the specific and observable fact in question was studied at a particular period in time. We also considered a population of 146 manufacturing firms, which had boards and at the same time registered under their umbrella body; the Uganda Manufacturers Association. Using the Krejcie and Morgan (1970)'s table of sample size determination, a sample size of only 108 firms were considered for this study and these were chosen using the MS Excel random selector. Data was collected using self-administered questionnaire, while financial performance was ascertained by way of reviewing hard data from these firms. However, out of the 108 firms that were studied, only 78 firms responded, making a response rate of 72 percent. We distributed five copies of the questionnaire to the board chairman, and four other board members. Out of which, we considered an average of three per firm for analysis purposes.

Sample Characteristics

Table 1: Descriptive Statistics – Respondents' Demographics

Variables	Frequency	Percentage (%)
Education levels		
Uganda Advanced Certificate of Education	29	12
Diploma	19	8
Degree	102	43
Masters	54	23
Ph.D	31	13
Total	235	100
Age groups		
26-33	6	3
34-41	51	22
42-49	48	20
50-57	85	36
58+	45	19

Total	235	100
Marital status		
Single	29	12
Married	201	86
Divorced	5	2
Total	235	100
Gender		
Male	162	69
Female	73	31
Total	235	100

Results in table 1 indicate that, the mainstream of most boards that were studied composed of board members with a bachelor's degree as their highest education level (43%); were in the age group of 50-57 (36%); were married (86%) and were males (69%). Results regarding the nature of boards are presented in Table 2 below.

Table 2: Nature of Boards in the Sample

		Frequency	Percent
Number of directors on the board	3 – 6	14	17.9
	6 – 9	59	75.6
	Over 9	5	6.4
Total		78	100.0
Number of female directors do you have on the board	Less than 2	1	1.3
	2 – 5	75	96.2
	5 – 10	2	2.6
Total		78	100.0
Number of male directors do you have on the board	2 – 5	60	76.9
	5 – 10	18	23.1
Total		78	100.0
Gender of the board chairperson	Male	72	92.3
	Female	6	7.7
Total		78	100.0
Is the CEO the same as Board chairman?	Yes	43	55.1
	No	35	44.9
Total		78	100.0

Most boards had 6-9 directors (42.6%) while the least number is represented by board members less than 3 (1.7%). This would imply that most the boards of manufacturing firms in Uganda are composed of board members who are at the same time directors or owner of the same firms.

Operationalization and Measurement of Variables

Global Variable	Operationalization	Measurement	Sample Questions
Financial performance	Financial performance was measured in terms of revenue, return on assets, return on equity, return on investment and profit after tax (Hofmann& Lampe, 2013; Bathula, 2008; Tumwine et al., 2015).	Respondents rank items included in the questionnaire on a 5-point scale (**1=** "Less than 2%", **2=** "2 - 5%", **3=** "5 - 8%", **4=** "8 - 11%", **5=** "Over 11")	Data was captured from the financial reports of companies. Sample questions included; Return on investment has increased by…. And return on equity has increased by….
CEO Duality	CEO duality is arguably seen as an important board control mechanism in mitigating agency conflicts, where owner managers have a tendency of performing a dual roles with the aim of	Independent variable was a categorical variable and was measured using a single question requiring a response	Respondents were asked whether the board chairman doubled as the CEO or not.

	managing succession and negotiations (Bathula, 2008; Munir, & Li, 2018).	of either 'yes' or 'no'	
Firm age	This captured as moderating variable was captured by considering the number of years the firm has been in existence and this was achieved by referring to the certificates of incorporation. (Peng, Li, Xie & Zhongfeng, 2010)	Respondents rank items included in the questionnaire on a 5-point scale	Respondents were asked the number of years the firm has been operation and this was confirmed by referring to the certificates of incorporation

Data Analysis: The data collected was screened for outliers and missing values. This was followed by testing the parametric assumptions with an objective of establishing whether to perform parametric tests or non-parametric tests. Descriptive statistics were used to describe the demographic characteristics of the study sample and summarize the data using frequencies, means and standard deviations. Pearson correlation analysis was performed to test the associations between the study variables. In order to test the moderation effects of firm age, a hierarchical regression was conducted to obtain the relationships between CEO Duality, firm age, financial performance and the interaction term. The results were used for a graphical presentation of interaction effects using Jose (2008)'s modgraph software.

4. Results

Zero Order Correlation Analysis: A Pearson correlation coefficient (r) analysis was conducted to test the associations between, CEO Chainman Duality and firm financial performance. Results are presented as shown in the table 3 below.

Table 3: Correlation Results

	1	2	3	4	5	6	7
CEO Duality-1	1.000						
Firm Revenue-2	-.065	1.000					
Asset Base-3	-.074	.517**	1.000				
Return On Investment-4	-.036	.485**	.631**	1.000			
Return On Assets-5	-.071	.475**	.379**	.496**	1.000		
Profits After Tax-6	.120	.296**	.136	.231*	.433**	1.000	
Financial Performance-7	-.031	.753**	.736**	.767**	.771**	.598**	1.000

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

The results in table 5 show that there is an insignificant relationship between CEO Chairman Duality and overall financial performance (r=-.031, *p>.05*) and all indicators of financial performance. This implies that CEO does not have a significant impact on financial performance among the Ugandan manufacturing firms. These findings contradict with those of Bathula (2008) who posits that holding two positions creates a powerful individual and thus makes the board less effective in exercising its governance roles. Given all these powers, the CEO who doubles as the board chairman tends to possess a lot of dominance (Munir & Li, 2018) and is more likely to undermine the decisions taken by the board (Bathula, 2008). To achieve this, it is observed that the CEO/chairman purposively appoints mainly friend and family members to perform both top management and board duties. Even when such fundamental decisions are taken by the board, implementation of such decisions fall on the deaf ears of the same CEO that already has assumed such supreme powers (Nkundabanyanga et al., 2015; Melyoki, 2005). Accordingly, the study findings provide no support for hypothesis 1.

Moderation Effect of Firm Age: The moderating effect of firm age in the relationship between CEO Duality, and financial performance was tested using a hierarchical regression and confirmed using the Modgraph software by Jose (2008). The results are as follows.

Table 4: Hierarchical Regression Results

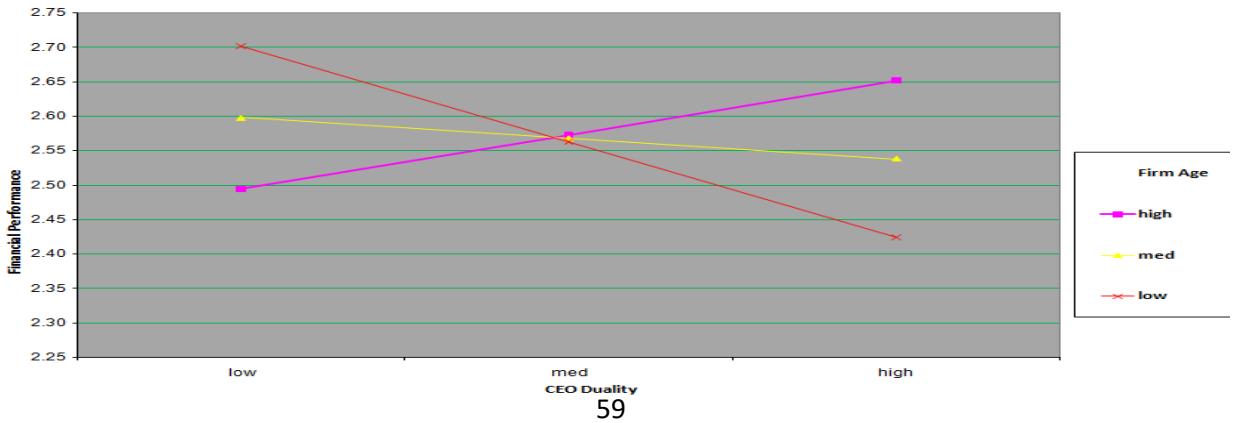
	Model 1	Model 2	Model 3
(Constant)	2.640**	2.719**	5.575**
CEO Duality	-.048	-.047	.180*
Firm Age		-.024	-.859*
Interaction Term			.623*
R	.031	.042	.233
R Square	.001	.002	.054
Std. Error of the Estimate	.485	.488	.478
R Square Change	.001	.001	.053
F Change	.075	.057	4.120
Sig.	.786	.812	.046

Dependent Variable: Financial Performance
*. p< .05 and **. p< .01

The models in table 6 are defined by the following regression equations:
Model 1: FP = a + b1CD+e
Model 2: FP = a + b1CD+ b2FA + e
Model 3: FP = a + b1CD+ b2FA + b3CDFA + e
Where:
FP – Financial performance
a - is a constant, b1, b2, b3 are – unstandarised coefficient
CD & FA represent centered values of CEO Duality and Firm age respectively
CDFA represent the interaction term (CEO Duality x firm age)

Results in models 1 and 2 above, show that there is an insignificant relationship between CEO Duality and financial performance. However, with the introduction of the interaction term (CEO duality x Firm age) in model 3, the results reveal significant inverse relationships between CEO duality and financial performance; while the relationship between the interactive term and financial performance was found to be significant (β = .623, p<.05). Moreover, the inclusion of the interactive term in model 3 increased the predictive power of the main effects by 5 percent (R Square change = .053), from 0.1 percent to 5.3 percent. Since the interactive term (CEO duality x firm age) significantly added an extra variance of 5 percent, it means that the interactive term boosts the explanatory power of the main effects, thereby causing better results than what the main effects would have registered. On the basis of Peng et al. (2010), the result signifies that CEO duality and firm age significantly interact or fuse to cause better financial performance of manufacturing firms. The results provide support for hypothesis H2. However, Jose (2008) argued that the complementary effect of variables can be appropriately confirmed and interpreted basing on the slopes of the graphs. Thus, the means and standard deviations of both main effects (centered variables) as well as the un-standardized regression coefficients (the Bs for the third model) in the Table 6 were used as inputs to ModGraph Program to generate the graph shown in Figure 1.

Figure1: Moderation Effect of Firm Age on the Relationship between CEO Duality and Financial Performance



From figure 1 above, simple slopes for the association between distance and satisfaction were tested for low (-1 SD below the mean), moderate (mean), and high (+1 SD above the mean) levels of firm age. Each of the simple slope tests revealed a significant negative association between CEO duality and financial performance, but the CEO duality was more strongly related to financial performance with increased levels of firm age.

Discussion

The debate about CEO duality is not yet definitive because it has not yet exhausted all the contexts both methodologically and philosophically. What we found in this study extends the scholarly buildup of the debate by introducing the manufacturing sector in Uganda. An insignificant but negative relationship between CEO Chairman Duality was observed with financial performance. This means that whether the CEO is the same person chairing the board or not, this has nothing to do with level of financial performance among manufacturing firms. The justification of this is that, unlike in the public sector where CEOs are mere employees doing the agents' role and in most cases act with self-interests, the contextual situation in the private sector is different because most CEO are indeed the owners of the firms and therefore have a special attachment to the success or failure of the firm. Considering the role of firm age in moderating the relationship between CEO duality and financial performance, it is surprising to note that whereas the direct relationship between CEO duality and financial performance was found to be insignificant, the introduction of the interaction term (CEO duality x Firm age) reversed the predictive power and showed significant results. This means that for CEO duality to cause variations in a firm's financial performance, there must a moderating factor, in this case firm age. The findings lend support to those of Mori, Randøy and Golesorkhi (2011) who posit that founder CEOs have a tendency of treating.

The organization as their "baby" and want to hold on to and control it as long as possible. Findings are also consistent with the observations of Bathula (2008) whose contentions are in support of a significant interactive effect of firm age on CEO duality and financial performance. Important to note is that; as these manufacturing firms grow in age and operation increase, they tend evolve overtime and finally get to a point that requires the separation of the two duties for governance controls to prevail. Certainly, this was found to be a common practice among the Ugandan manufacturing firms with 55.1% of the firms with dual CEOs. Empirically, the initial proprietors of these firms were found to have a tendency of holding the two powerful positions because of the fear to surrender power as well as achieving strong but ambiguous leadership (Nkundabanyanga, 2016). As a result, most firms were found to merely appoint board members just to embrace the adoption of governance practices but when in the actual sense, the oversight function is performed by CEOs. According to our findings, the CEOs were found to perform more of the operational activities by conducting supervisory actions with judicious use of strategies to accomplish certain goals of their interests. Our findings concur with those of Bathula (2008) who posits that holding two positions creates a powerful individual and thus makes the board less effective in exercising its governance roles. Given all these powers, the CEO who doubles as the board chairman tends to possess a lot of hegemony.

Is more likely to undermine the decisions taken by the board as suggested by the managerial hegemony theory (Huse, 2005; Mace, 1971). We equally concur with the arguments of Nkundabanyanga et al. (2015) and Melyoki, (2005) who posit that; when such fundamental decisions are taken by the board. Implementation of such decisions fall on the deaf ears of the same CEO that already has assumed such supreme powers. Similarly, Jensen, (1993) also contends that vesting the board roles under the headship of the CEO that is a member of management would undermine the oversight functions of the board and finally endangers the checks and balances which are essential ingredient of good internal controls. From the managerial hegemony theory perspective, CEO duality is on the contrary seen to carry bad performance consequences since it is assumed to undermine board function (Fama, 1980; Boyd, 1995; Clark, 1984). And because the board of directors is the apex of the decision making or control process of the firm, entrusting the CEO with the board chairman position exemplifies the ultimate conflict of interest (Adams et al., 2005; Bernard, 2012). Ideally, combining the two sensitive roles could have far reaching implications on accountability. This is especially true when the person in charge does not have the organization mission and vision at heart especially where the person serving the dual role is not the original proprietor of the business (Ugwoke et al., 2013). However, our school of thought stands to agree the augments of the upper echelons theory which support CEO duality.

This ideology lends similar facts like what was found to empirically transpire with in some of the manufacturing, firms in Uganda especially those whose dual role was in the hands of the proprietors. And because both management and the board members were appointed by the same CEO/Chairman, it is reportedly trouble-free to have both parties operating as a one strong team under the headship of a single person. To achieve this, it is observed that the CEO/chairman purposively appoints mainly friend and family members to perform both top management and board duties. Ideally, combining two positions offers a single focal point for the firm leadership because a powerful CEO/board chairman creates an image of stability and instills wellbeing of the employees as well as the shareholders (Bernard, 2012). Interestingly, findings indicate that most of the decisions made in most manufacturing firms in Uganda are aligned to the interest and perceptions of the top managers especially in situations of CEO duality.

At a macroeconomic perspective, the strategies and direction in which firms view governance ideas is highly influenced by the corporate governance systems present in an economy (Nkundabanyanga et al., 2015; UNIDO, 2007). Adding to this, our findings indicate that the introduction and operationalization of the Institute of Corporate Governance in Uganda in 2008 and the resurrections of the Uganda Manufacturers Association have of recent greatly improved the adoption and ideology of effective corporate governance practices among the Ugandan manufacturing firms. This therefore presents a valid justification for the paradigm shift from the historical norms of "micromanagement" within which industrial enterprises were governed to the recent adoption of governance practice. Owing to our findings, it is worth contending that as the firm grows in age, founder CEOs who serve dual roles tend to gain more experience and thus are in a better position to add value to the firm.

5. Conclusion and Implications

Owing to our findings and the subsequent discussion above, we thus conclude that; whether firms are managed by dual CEOs or not, it has no significant impact on the performance levels of manufacturing firms in Uganda. Our study makes a deep rooted theoretical contribution by presenting considerable support to the upper echelons theory, with less support to the managerial hegemony theory. We further add to the body of knowledge by testing the moderating role of firm age. The introduction of firm age as a moderating variable reversed the predictive power and showed significant results. This means that, for CEO duality to cause variations in a firm's financial performance, there must a moderating factor; in this case firm age. Perhaps, this is because these firms operate in a private sector setting where most CEOs were found to act with judicious use of means to accomplish certain goals of their interests. Most firms were majorly family owned with owner mangers playing the duo role and most of their boards were composed of members of management. Some boards were found to be formed for formality purposes with most of their processes under the ambiguous leadership of a duo CEO. And yet, a board room is a place where strategic decisions are made, risk overseen and governance issues reviewed. We thus contend that; it is imperative for proprietors to have these boards as independent as possible if independent decisions are to be taken overtime especially as these firms grow and expand.

This would ultimately mitigate challenges of dominance as well as lessen issues of conflict of interest on the board. In fact, this would fundamentally help to manage the succession plan as well as the going concern of the business especially where the "young cadres" are mentored into the system. From the managerial perspective, since the board is at the apex of the decision making or control process of the firm, the current study observed that entrusting the CEO with the board chairman position creates a crisis of "who evaluate who". We thus recommend a considerable segregation of the two duties especially as the firm grows in age and where underperforming CEOs may take advantage of the system and its operation. Once these positions are separated, it is highly probable that the board under the headship of an independent chairman will set key performance indicators for the CEO and his management teams something that may help. To achieve sustainable performance as the firm grows in age and expand overtime. Otherwise, combining the two sensitive roles could have far reaching implications on stewardship accounting especially when the person in charge does not have the organization mission and vision at heart. And because findings indicate that most firms are still in their early stages of development, deliberate efforts as suggested by Melyoki, (2005) must be devised to evolve effective governance practice that fit a developing economy (Uganda) context. Thus, it is reasonable to suggest that; for manufacturing firm in their start up stage.

CEO duality may not be a paramount prerequisite though a shift may come by as the firm grows in age. This is because of the earlier observation that CEO duality mitigate bureaucratic procedures and escalates the efficiency in the decision making process, something that help the firm to undertake sensitive accomplishment especially at the point of commencement and market penetration. At policy level, it was observed that the introduction and operationalization of the Institute of Corporate Governance. In Uganda in 2008 and the resurrection of the Uganda manufacturers association (UMA) have of recent greatly improved the adoption and ideology of effective corporate governance practices among the Ugandan manufacturing firms. However, there is still need for policy makers through the Ministry of Trade, Industry and Comparatives, UMA, the Institute of Corporate Governance (ICGU) and others to revise practical governance mechanisms that contextually fit in a private sector setting especially the manufacturing firms. The firms in the study were found to operate in a turbulent and dynamic business environment characterized by numerous business challenges. Some of these firms were found to operate with "micromanagement" style especially those under the leadership of dual CEOs.

There is therefore need for the policy makers to create and conduct sensitization programme country wide to have the manufacturing firm owners more aware of the continued adoption to the corporate governance practice especially on how they structure. Their boards under the leadership of independent chairmen especially as these firms grow in age. In fact, as it was earlier put; most firms were found to adopt governance practices to depict a good image when in reality, internal operations are different. There is further need to have these firms aware of the benefit of having good governance mechanisms especially having boards that are well composed with clear and segregated duties, and how this in the end result into sustainable firm financial performance. Conclusively, our study adopted a single methodological research approach that was limited to quantitative approach. Future research could adopt a mixed approach and triangulate data. Our study was also limited to a cross sectional approach, a longitudinal approach could also be adopted to understand the financial performance trends among manufacturing firms in Uganda overtime. Lastly, by virtue of our findings, there are other factors that were not part of this study and therefore may require future consideration.

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A Conceptual Framework on the Financial Statement Disclosure in Indonesia Local Government

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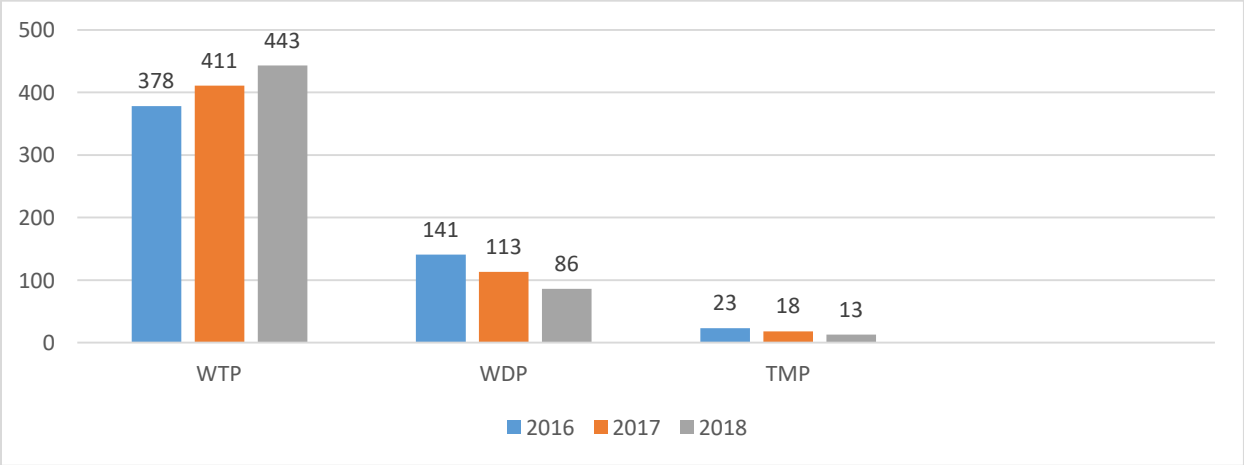
Abstract: This research begins with the problem of the Indonesian Minister of Finance recognizing cities and districts in Indonesia have a low level of compliance regarding financial reports and the Supreme Audit Board (BPK) has published a report that highlights compliance issues in the local government of Indonesia based on the Summary of First Semester Examination Results in 2019 there is a problem of the level of compliance of local government related to the disclosure of financial statements in Indonesia. The purpose of this study was to determine the factors influencing the degree of mandatory disclosure to local governments in Java and Sumatra Islands. This study has three objectives namely to find out the number of local parliamentarians, local government budget spending, existence of an assistance and training program for disclosure financial statement. Therefore, this research contributes to provide an illustration for local governments in measuring financial statement disclosures.

Keywords: *Disclosure*, *number of local parliamentarians, budget expenditure, assistance and training program.*

1. Introduction

Disclosure shall be deemed to be a communication of financial and non-financial, quantitative or otherwise economic information, regarding the position and financial performance of companies (Healy & Palepu, 2001). A significant issue relating to this research is the acknowledgment by the Indonesian Ministry of Finance that Indonesia's cities and municipalities have a low level of compliance with financial reports (Kompas, 2010) and the Issue of Law no. 22 of 1999 on local government which calls for better accountability. In addition, the Supreme Audit Board of Indonesia (BPK) in 2019 believes that regional financial reports in Indonesia have not met expectations (BPK, 2019). They stated that many local of Indonesia did not prepare thoroughly financial reports based on the standards and regulations. BPK has published a series of reports that highlight compliance issues in Indonesia's local government presented in a graph below:

Figure 1: Compliance Issues in Indonesia



In Figure 1 based on the above explains that the 2019 Semester Examination Results (IHPS) 1, namely the Audit Board of Indonesia (BPK) has examined 542 approximately (100%) LKPD in 2018. Of these, the BPK gave an unqualified opinion (WTP) namely 443 LKPD around (82%), fair opinion with the exception (WDP) that is 86 LKPD around (16%), opinion does not give an opinion (2%). Based on the level of governance the achievement of WTP opinion has exceeded the target of regional financial performance in the field of strengthening local government governance set in the 2015-2019 RPJMN. Based on the results of the First

Semester Examination Results (IHPS) in 2019, there is issue with the degree of regional government enforcement related to the extent of transparency of the financial statements in Indonesia. Based on WDP and TMP, as many as 99 LKPD did not receive an opinion from WTP in 2018, because there are accounts in a financial statement that are not reported.

In compliance with the government accounting standard and are not backed by adequate evidence including current assets (19%) in 48 regional governments, fixed assets (31%) in 78 LGs, other assets (9%) in 24 LGs, revenue (3%) in 7 LGs, operating expenditure (14%) in 34 LGs, capital expenditure (14%) in 34 LGs, accounts others, (10%) in 26 local governments. In addition, the results of BPK's examination revealed that 7,398 findings that contained 12,117 for 2 problems were (1internal control system issues of 5,858 consisting of deficiencies in the internal control mechanism of 1,279, flaws in the reporting and accounting control system of 1,826 and deficiencies in the management system of expenditure and revenue budget execution of 2,753 and (2) 6,259 non-compliance with legislative requirements of the Rp. 2.19 trillion, consisting of 2,642 loss problems, 2,258 administrative irregularities, 426 potential loss problems, and 933 revenue shortages. The level of disclosure also received support for a number of International studies including the average score of mandatory disclosure practices compared to other previous research in different business organizations such as Glaum and Matsusaka (2001) in Germany (84.0%, with 153 items); Wallace and Naser (1995) in Hong Kong (73%, with 142 items); Ali, Ahmed and Henry (2004) in India, Pakistan and Bangladesh (80%, with 131 items); Owusu-Ansah (1998) in Zimbabwe (75.0%, with 214 items); Hasan, Karim and Quayes (2008) in Bangladesh (85%, with 57 items). The level of local financial statements disclosure varies.

In general, disclosure of Indonesia local financial reports is still small. According to Hendriyani and Tahar (2015) the average level of disclosure during 2012 to 2014 was 41.7663%, Suhardjanto and Yulianingtyas (2011) the average level of disclosure was 30.85%, Martani and Lestiani, (2012) found that the level of disclosure had an average of 35.45%, and Suhardjanto and Lesmana, (2010) average mandatory disclosure rate of 22%. Meanwhile Marsella and Aswar (2019) conducted study in Sumatera and found that the level of disclosure was 82,7%. Similar to the financial statements disclosure, there are several studies that show factors affecting on the disclosure of financial statements, namely the number of local parliamentarians (Arifin, 2014; Gilligan & Matsusaka, 2001; Hix, Noury & Roland, 2005; Laswad, Fisher & Oyelere, 2005; Suhardjanto & Yulianingtyas, 2011), local government budget expenditure (Hilmi & Martani 2012; Patrick 2007; Friedman 2013), and the existence of an assist and training program (Bushman & Smith, 2001; Ball, 2001; Lambert, Leuz & Verrecchia, 2007). This study is intended to contribute to the literature on the factors affecting the disclosure of financial statements in the accounting and public sectors. This research is a form of development from Arifin, (2014) where the research suggests to researchers that future research can be explored by investigating and adding variables such as the number of local governments.

2. Literature Review and Hypothesis Development

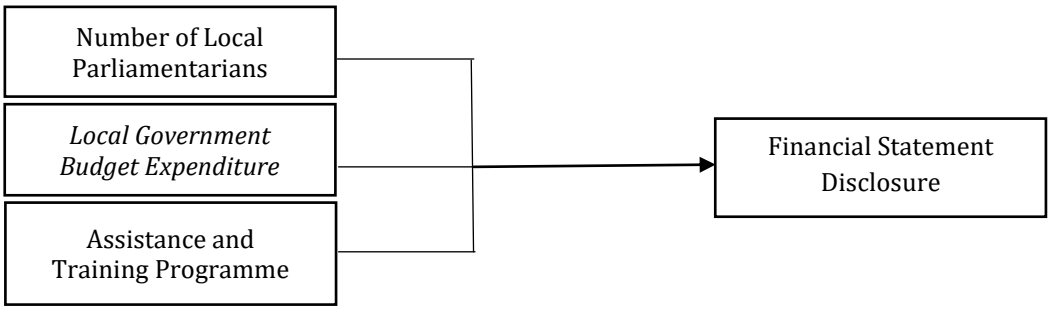
Effect of Number of Local Parliamentarians on Financial Statement Disclosure: The legislative board or also called the legislature, in language is an advisory body usually elected or electively empowered to make, change or revoke laws from the State or region or branch of government that has power to make laws that are distinguished from the executive and judiciary. The position of a legislative member can be seen as an individual who represents the interests of the voters as well as the interests of his political party (Stigler, 1976). Suhardjanto and Yulianingtyas (2011), Laupe & Saleh (2018), Gilligan and Matsusaka (2001), Arifin, Tower and Porter (2013) found that there was a positive relationship with financial statement disclosure. This results gives evidence that coercive pressure still needed in Indonesia to increase transparency so it is consistent with the arguments of that coercive pressure is effective in developing countries (Graham & Woods, 2006). Based on the above explanation, then the hypothesis can be formulated as follows:
H1: Number of local parliamentarians significantly and positively influences financial statement disclosure.

Effect of Local Government Budget Expenditure on Financial Statement Disclosure: Mulyadi (2008: 69) states that the government budget is quantitatively expressed work plan, measured in standard monetary units and other units of measurement spanning a one-year cycle. Patrick (2007), Friedman (2013), Hendriyani and Tahar (2015), Hilmi and Martani (2012), Ingram and DeJong (1984), Gore (2004), Puspita and Martani (2012) found that there was a positive relationship with disclosure of financial statements. So

that municipal government spending has the ability to force mandatory disclosure practices in financial reporting from regional government. Moreover, this research takes regional government spending as a possible factor in understanding the volatility of mandatory disclosure. Based on the above presumptions, the below hypothesis is formulated:
H2: Local government budget expenditure significantly and positively influences financial statement disclosure.

Effect of Presence of an Assistance and Training Program on Financial Statement Disclosure: According to Kaswan (2012), assistance is a partnership between trainers and employees that focuses on continuous learning, growth and improvement, results in the development of the internal resource needs. This study examines the size of the independent variable presence and training program within the framework of mimetic isomorphism. In the local government the research by Aswar and Saidin, (2018a; 2018b) found that training has a significant with the adoption of accrual accounting. Furthermore, Arifin, (2014), Ramandei Rohman, Ratmono, and Ghozali (2019), Suhardjanto and Yulianingtyas (2011), found that there was a positive relationship with financial statement disclosure. Therefore, based on the above deductions, the below hypothesis is postulated:
H3: The Presence of assistance and training program significantly and positively influences the disclosure of financial statements.

Figure 1: Research Framework



3. Proposed Method

This study recommends an appropriate method for testing the factors influencing the level of mandatory disclosure. This study using secondary data from local government financial statements in Indonesia. Data in this study are in the form of financial statements audited by the BPK in 2018. Furthermore, the sample in this study is 80 local governments in Java and Sumatra, and total of sample this study are 80 samples. Java and Sumatera as samples of this study because not all local governments in Java and Sumatra have strong financial accountability at the district and city level. Furthermore, data analysis in this study proposed with using multiple regression analysis.

Table 1: List of Java and Sumatera Islands

Islands	Province	Total District and City
Java	West Jawa	8
	Central Jawa	9
	DI Yogyakarta	5
	East Jawa	10
	Banten	8
Sumatra	Aceh	4
	North Sumatera	4
	West Sumatera	5
	Riau	4
	Kepulauan Riau	4
	Jambi	4
	South Sumatera	5

	Bengkulu	3
	Lampung	4
	Bangka Belitung	3
Total		**80**

4. Conclusion

The conceptual paper in this study aims to investigate the influencing factors on the level of local government disclosure, especially local governments in Java and Sumatra. This is important because many local governments in Indonesia have not fully prepared financial reports regarding with regulations and standards so that there is a problem regarding the level of local government compliance with the level of financial statement disclosure in Indonesia. In addition, the Supreme Audit Board of Indonesia (BPK) is responsible for auditing the state's financial statements, including the execution of central and regional budgets, state-owned enterprises (SOEs), and local government owned companies. Factors that influence the level of financial statement disclosure are measured by 50 items of financial statement disclosure. This result is expected the three hypotheses are significantly and positively influences the financial government disclosure. The findings of this study are expected to contribute significantly to the local governments, especially local governments in Java and Sumatra islands in implementing government accounting based on accrual accounting systems and by providing empirical evidence related to much information that must be disclosed as a form of government accountability also can increase disclosure of financial statements in full, enough and reasonable.

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The Importance of Behavioral Economics during COVID-19

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Abstract: Behavioral Economics seeks to understand the environments where decisions are made and to build proposals to optimize them. It offers the possibility to improve the design of public policies and, therefore, to enhance their results. The appearance of COVID-19 has caused thousands of deaths and millions of infected people around the world. This article describes the main behavioral biases that people exhibit during this pandemic. In order to curb the number of infections and stop the panic, it is essential to use Behavioral Economics tools, such as those proposed in this paper, to design messages that are simple and that motivate appropriate changes in human behavior. This work shows the importance of transmitting information correctly, of being aware of our own biases and that individual responsibility is fundamental to get out of this crisis.

Keywords: *Behavioral Economics; COVID-19; human behavior; public policies.*

1. Introduction

Man moves in an environment where there is asymmetric information, self-interest is not always sought and sometimes there are unusual preferences (Cárdenas et al., 2003). Daily observations show that man, does not always behave rationally. Economic agents are sometimes willing to sacrifice their own interest to satisfy different forms of social preferences (Fatás, 2004). Behavioral Economics is related to the fact that human beings seek to optimize their behavioral efficiency within the limits defined by internal and external constraints (Battmann & Klumb, 1993; Michie, & Johnston, 2012; Samson, 2014). It derives from reflections on the theory of rational choice by developing a systemic way of analyzing elements such as will power, self-interest and rationality in decision making (Heshmat, 2011). Thus, with the use of economic reflections and analysis from psychological assumptions, it can be seen that the individual's decisions are loaded with errors of judgment that are programmed by our human condition (Kahneman, 2013). In this sense, the proposal of Behavioral Economics is to understand the environments where decisions are developed and to build proposals to optimize them. Although it follows the tradition of the free choice as a deliberative exercise.

It is sought that, with small pushes, or the so called "Nudge" (Thaler & Sunstein, 2008), the individuals choose with help, but without restricting or limiting the options. The discussion on free choice is maintained under the theory of rational choice, seeking to promote citizens with the capacity to decide on what is appropriate for their lives. The human mind has restrictions to process information, since it does not have unlimited capacities of storage nor of analysis of the information (Kahneman, 2013). Many of the biases in human behavior result from immediate impressions, while others are part of a system already automatic, constituting themselves as habits, product of repetitions and associative learning (Duhigg, 2012). The pandemic caused by COVID-19 has meant that Behavioral Economics has taken on a very important role in stopping the pandemic. It is necessary to change people's behavior by changing the way possible options are presented at the time of making a decision. An example of this strategy during COVID-19 can be found in the markings on the floor that indicate the distance we should keep from the next person in line at a supermarket. Through the design of simple tools and messages, appropriate changes in human behavior should be promoted.

2. Literature Review: Biases in Human Behavior

Changing certain habits is very difficult among human beings, even with the necessary information. However, the whole population, with the help of government institutions, must try to change wrong behaviors during this pandemic. Effective hygiene and prevention measures should be promoted. Since one person infected with COVID-19 can infect many others, the challenge for government authorities is even greater. People rarely behave rationally and impartially when making decisions that affect the whole population and often use mental shortcuts that affect their perception of risk and reaction. For example, despite recommendations

not to touch eyes, nose and mouth to prevent the spread of the corona virus, we touch our faces, on average, up to 23 times per hour (Kwok et al., 2015). In this regard, Haushofer and Metcalf (2020) have highlighted the importance of behavioral economics intervention.

In the effectiveness of promoting measures such as hand washing to reduce the number of infections. However, many times the population is not really aware of the need to carry out these practices. An epidemic such as COVID-19 creates an environment of excessive uncertainty under which human risk perception is driven by a strong sense of lack of control. The recent purchase of masks, disinfectant gels, and essential items along with the spread of false news, rumors, and misinformation encourages the emergence of two main biases:

- The retrospective bias. Once people know that an event has occurred, they delude themselves into thinking that they knew it was going to happen in the first place. With government decisions constantly evolving, bias in hindsight can make people perceive any new information about the fight against COVID-19 as inevitable. This may lead them to believe that policy makers should already have known where the situation was heading, making them question the credibility of the government's efforts.
- The availability bias. The probability of an outcome is judged by how quickly it comes to mind. If fear-inducing images are continually presented and associated with COVID-19, people will not assess risk by the morbidity of the virus but by pre-existing beliefs, popularly called confirmation bias, and will judge the risks to be greater when they provoke stronger emotions.

In addition to these biases, it is also possible to identify the optimism bias and the illusion of control bias, which lead many people to engage in misconduct during the pandemic. The first bias is due to the fact that part of the population thinks that COVID-19 will not affect them, and they skip the restrictions, putting many vulnerable people around them in danger. The bias of the illusion of control will make us think that some concrete actions, such as hoarding toilet paper or making compulsive purchases in the supermarket, allow us to control the situation. Thus, for example, in order to carry out certain behaviors or actions there has to be a Motivation, a Capacity and a Stimulus (Fogg; 2009). The central idea of Fogg's model is based on the fact that if you want things to be done you must make them simple and easy for people. And it is in that quest for simplicity, speed and ease that the design of behavior is largely centered. For example, in the case of tasks, such as hand-washing, if the person is poorly motivated, the behavior will not occur.

3. Methodology

In this work, a review of the different behavioral biases and how they affect the human being during the situation caused by COVID-19 has been carried out, with the aim of reducing the impact of the pandemic, indicating solutions focused on Behavioral Economics to be applied by governments.

4. Results and Discussion

Government Measures to Reduce Bias during COVID-19: Behavioral Economics should encourage governments to eliminate the presence of behavioral biases in humans, so as to reduce the impact of the pandemic. The following are possible actions that should be taken by the government:

- Address availability bias and retrospective bias by communicating facts, action plans and the expected role of citizens in a clear and timely manner. The government must provide information on an ongoing basis and disprove fake news.
- Make it easier for citizens to find information about COVID-19 through official sources, and provide hotlines during the pandemic.
- Build a correct mental model for citizens, giving more publicity on government websites to the COVID-19 recovery cases than to the number of infected cases and victims, without downplaying the seriousness of the situation.

- Showing videos of trusted public figures, who encourage self-care, express empathy and solidarity with patients, appreciate frontline health workers and destroy myths related to the virus.
- Continually demonstrate the need for precautionary measures such as hand washing and encouraging people to stay home.
- Make it mandatory to place soap and disinfectant dispensers by the entrance doors of offices, supermarkets, shopping centres and public buildings. These efforts towards effective risk communication by public authorities will help build the credibility of government measures, provide people with early guidance and allow uncertainty to be normalized. The communication strategy is key and it is best to report the seriousness of the situation with transparency and clarity, but without creating any kind of scaremongering. Behavioral Economics indicates that the response of citizens to the advice of the authorities on preventive measures is fundamental to get out of this crisis.

Sending simple and clear messages is essential to generate the necessary public reaction and reduce the health and economic costs of the epidemic. Therefore, we recommend during this crisis to follow these guideline:

- Inform in a clear and simple way, without causing panic or social alarm. The human being is not prepared to adapt psychologically to rapidly changing information and therefore needs to be aware that he or she will have to review information about the disease, its expansion and about the different treatments to combat it, so he or she must be prepared to assume changes.
- Unlike politicians, scientists and health professionals are among the most trusted professions among citizens. That is why it is important to centralize epidemiological information, and to some extent decisions, in health authorities, as they are the ones who may have the greatest epidemiological knowledge. The existence of emergency committees made up of scientific experts is necessary, not only to decide, but also to inform.
- Political confrontation should be avoided and the greatest possible coordination between institutions should be sought. To build trust, governing institutions should not take advantage of the situation to boast about good measures, nor should opposition criticize bad management.
- The media should transmit realistic information without taking advantage of the sensationalist vein that can lead them to attract attention. The focus should not be exclusively on the numbers of people affected and killed, but on what can and should be done to prevent the pandemic.
- Citizens must not create panic or spread misinformation, especially with the current degree of connectivity allowed by social networks.

Human beings are incapable of processing information in situations of stress and panic. Therefore, the messages conveyed must be simple and clear. Thus, massive purchases have been seen, which, although they can momentarily calm the human being, can collectively contribute to create shortages of health products or basic needs. Actions must be taken to avoid promoting misconduct among citizens that would further aggravate the situation.

Actions to Promote Desired Behavior among Citizens during the Pandemic: To date, we do not know, for example, many aspects of the origin and evolution of the epidemic, whether a vaccine will be available quickly or how our individual and group behavior affects the probability of contagion. In the face of uncertainty, the heterogeneity of individual attitudes to risk makes it difficult for us to coordinate the best preventive measures and eventually comply with them. An additional problem is our limited cognitive capacity to understand the probabilities of uncertain situations, which makes it difficult to inform in a clear and precise manner. One of the greatest difficulties in encouraging preventive behavior in the population.

In the face of an epidemic is that we pay the cost of prevention (increased hygiene, confinement to the home, etc.) now, while the possible benefits, which are also uncertain, will only be enjoyed in the future. The individual cost of taking preventive measures is higher for us individually than the benefit we derive from it. If each person does not have individual incentives to behave in a way that favors the collective, it will be more complex to stop the pandemic and will harm the whole population. It is therefore necessary to incorporate individual responsibility if we are to halt the spread of the disease. Therefore, from Behavioral Economics we

must promote certain behaviors among the population from specific actions, such as those we have designed in Table 1.

Table 1: Tools Offered by Behavioral Design to Promote Certain Behaviors in the Population

Conduct to be Promoted	Action to Encourage Desired Behavior
Use of protective masks	Incorporate testimonials from epimemiologists or physicians, as well as first patients in prevention campaigns.
Hand wash	At home: put up panels or posters at home that remind people of the need to wash their hands, along with graphic instructions on how to do so correctly. At work: place alcoholic sanitizing solution dispensers in strategic locations (at the entrance to the office, in the bathroom, etc.).
Avoiding crowds and unnecessary purchases in supermarkets	Restrict entries and exits, as well as the number of meals per person in order to avoid shortage
Avoiding panic among the population	Testimony from popular and influential figures who recommend the use and monitoring of protective measures could be used
Confinement of young people	Promote public campaigns in the media about cases of young people with COVID-19. This helps to break down the belief among this population group that the disease attacks only the elderly (an idea favored by control and optimism biases).
Do not touch your face	You can wear a bracelet or a colored rubber band. This will not stop the transmission of the disease, but it will remind your brain to stop touching your eyes, nose, or mouth. An external object can act as a sensory clue to convert an unconscious habit into a conscious one. It's a way of asking your brain to pay attention to this strange phenomenon that happens with your hand.

Source: Own elaboration

Thus, an intervention based on Behavioral Economics would imply on the one hand the opportunity to provoke permanent changes that would translate into new habits with greater health benefits in the long term and on the other hand the reduction of the risk of overloading the health systems in the case of COVID-19.

5. Conclusion and Recommendations

Without vaccination or preventive treatment against COVID-19 and the massive uncertainty associated with its risks, the corona virus has become a common threat to the entire population, and since fear represents a key human emotion, Behavioral Economics can be useful in minimizing the impact of this health and economic crisis. Even with the necessary information, changing certain habits is very difficult. However, the public sector and government institutions must try to change wrong behaviors. These behaviors must be effective and efficient, and require institutional and population-wide support. Behavioral Economy interventions that lead to better hygiene and prevention practices, in combination with what we know about the epidemiology of infectious diseases and the lessons we learn from the COVID-19 pandemic, will be part of the tools needed to seek solutions to curb the pandemic. We must normalize our psychological reactions in these days of uncertainty so that, understanding where they come from, we do not contribute to exacerbating the problem.

The correct transmission of information, trust in institutions that put public health before other interests, and awareness of our own biases and the importance of our individual responsibility are fundamental to getting out of this crisis. To help slow down the spread of the epidemic and to achieve a rapid recovery, it is essential to promote socially responsible behavior from Behavioral Economics, taking actions, such as those designed to promote, among other things, the use of masks or hand washing. Furthermore, given our tendency to imitate the behavior of others, solidarity-based behaviors must be implemented, such as collaborating in

hygiene awareness campaigns or offering to care for the elderly or children. To this end, government institutions must promote awareness campaigns so that the population can put these effective measures into practice. Behavioral Economics is a key tool to face this health, social and economic crisis.

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