Information Management and Business Review (ISSN 2220-3796)
Vol. 16, No. 2, pp. 53-62, June 2024

Factors influencing patients' intention to use the Health Clinic Online Appointment System app

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Abstract: Online mobile appointment systems have become important for the patient and the clinics. This research attempts to look into the variables that influence patients' intentions to use the app "Sistem Janji Temu Klinik KKM' through the development of a research framework according to the Unified Theory of Acceptance and Use of Technology (UTAUT). Information was gathered from 238 patients across Selangor. The results suggest that governments must implement suitable strategies to foster patients' motivation in using the mobile application apps could be raised. In summary, this study concludes that the main results, as determined by the regression analysis, support that subjective norms have a significant influence on individuals' intention to use Health Clinic Online Appointment System apps.

Keywords: *Behavioral intention, social influence, facilitating conditions, mobile appointment, UTAUT*

1. Introduction and Background

Health apps are becoming more vital in patients' lives which has resulted in the creation of online apps for the appointment system. The Ministry of Health of Malaysia (MOH) has given an option for patients to use the Health Clinic Online Appointment System. What influences patients' propensity to utilize this app is debatable. It is essential to comprehend the patients' behavioral intentions to facilitate the improvement and engagement of mobile app usage for appointments. According to Anastasiadou et al. (2019), the adoption of health applications is still low. Furthermore, Latif et al. (2017) added, that mobile health adoption in underdeveloped nations is still falling behind. Hoque & Sorwar (2017) added The Unified Theory of Acceptance and Use of Technology (UTAUT) is commonly applied as the theoretical framework in IT, with applicability to electronic health services. Tavares & Oliveira (2018) emphasized that social influence, effort expectancy, and performance expectancy are the primary factors influencing behavioral intention, as per UTAUT. Moreover, facilitating conditions and behavioral intentions directly influence user behavior.

The Ministry of Health (MOH) must comprehend the elements that influence patients' intent to use the app to enhance its design and encourage its use. On the other hand, it is undetermined which factors influence patients' intent to use apps. Numerous studies used umbrella theoretical models to figure out the factors that influence intentions for using mobile health (mHealth) applications (Deng et al., 2018, and Hoque et. al., 2017) or health information technology (Kijsanayotin et al., 2009). To gain a comprehensive understanding of how technology is adopted, it is necessary to identify and assess a theoretical model that applies to various technologies and user groups. (Venkatesh et al., 2003). The Health Clinic Online Appointment System has unique features for people with special needs. As a result, a unified theoretical framework must be used to investigate the elements impacting the intention to use patient management apps. A pertinent theoretical framework has not been applied to the realm of this appointment system, to our knowledge.

Based on the discussion, this research aims to analyze the factors that influence patients' intention to use Health Clinic Online Appointment System apps. This study embraces UTAUT as its underpinning theory to gauge patient performance expectancy, social influence, effort expectancy, perceived disease threat and perceived privacy risks toward behavioral intention to utilize the online application.

2. Literature Review

The Relationship between Performance Expectancy and behavioral intention of patients to use Health Clinic Online Appointment System apps

Performance expectation, also known as perceived usefulness, relates to the extent to which individuals perceive that the utilization of information technology could enhance their job effectiveness (Venkatesh et. al., 2003). Many scholars have investigated the relationship between performance expectancy with users' behavioral intention regarding various forms of technology. Furthermore, this study was conducted in the context of Health Clinic Online Appointment System app usage. Within this context, according to Lee et al. (2021), patients' intention to use the system apps depends on their satisfaction and how they perceive the effectiveness of the service.

In the work of Lee et al. (2020), performance expectancy exerts the greatest effect on user intention relating to hospital e-appointment systems. The findings in this research suggest that patients claim that scheduling appointments online is more effective and can shorten wait times. Furthermore, patients can expedite the registration process by utilizing an e-appointment system. Patients will use the system continually as a result of this experience (Lee et al., 2020). Similar outcomes in the area of mobile health services that also mark the significant attribute of performance expectancy on users' adoption intention can be found in the studies conducted by Moudud et al. (2021); Almegbel & Aloud (2021); Solangi et al. (2021) and Suroso & Sukmoro (2021). From the above review, the following hypothesis is derived:

H1: *Performance expectancy positively influences the behavioral intention of patients to use Health Clinic Online Appointment System apps.*

The Relationship between effort expectancy and behavioral intention of patients to use Health Clinic Online Appointment System apps.

Effort expectancy pertains to the level of exertion required by an individual to utilize the system. The role of effort expectancy in positively influencing users' behavioral intention is profound in the perspectives of online learning, banking, and shopping. Analogous to mobile health services, a study by Solangi et al. (2021) empirically verified when using IoT-based Smart Healthcare systems. Effort expectancy and behavioral intention to utilize services showed a positive relationship, which means users consider the effort required before and while using mobile health services (Almegbel & Aloud, 2021). Another study also marks the significant attributes of effort expectancy concerning users' willingness to adopt mobile health services (Moudud et. al., 2021). Furthermore, another study identifies the notable characteristics of effort expectancy concerning users' willingness to adopt mobile health services.

Users are more likely to feel satisfied when they consider mobile health applications as user-friendly during their initial interactions (Lee et al., 2021). Therefore, information technologies tend to be embraced and used only if they possess a well-designed, interactive and easy-to-use, as well as a straightforward operating system (Lee et al., 2020). Therefore, within the context of Health Clinic Online Appointment System apps, we proposed another hypothesis:

H2: *Effort expectancy positively influences the behavioral intention of patients to use Health Clinic Online Appointment System apps.*

The Relationship between facilitating conditions and behavioral intention of patients to use Health Clinic Online Appointment System apps.

In the Theory of Planned Behavior (TPB), facilitating conditions or perceived behavioral control refers to the extent to which an individual perceives support from the organization and technology-related equipment. This includes support for computer hardware and software, as well as assistance in operating the technology or system (Lee et al., 2020). As stated by Venkatesh et al (2003), facilitating conditions may be determined by an individual's perception of the presence of organizational and technological infrastructure support to use the method. This is supported by Suki & Suki (2017) and Suroso & Sukmoro (2021).

Facilitating conditions, in the context of adopting an e-appointment system, pertain to the available resources that users possess, such as internet connectivity and devices that enable them to use the system. Furthermore, the user's inclination toward the e-appointment system may be influenced by the compatibility of their devices

and their computing skills (Lee et al, 2020). Alike studies also concur with this finding (Haron et al., 2021; Janssen et al., 2021; Solangi et. al, 2021; Almegbel & Aloud, 2021).

Thus, the facilitating conditions variable is strongly correlated with behavioral intention. Bamufleh et al. (2021) stated that individuals utilizing e-government health applications hold the belief that the health ministry aids in the event they encounter any difficulties while using the applications. Consequently, they possess a strong inclination to utilize those applications. From the above review, this hypothesis is formulated:
H3: *Facilitating conditions positively influence the behavioral intention of patients to use Health Clinic Online Appointment System apps.*

The Relationship between social influence and behavioral intention of patients to use Health Clinic Online Appointment System apps.
Social influence is about how people perceive others' opinions regarding the utilization of certain technology (Venkatesh et. al., 2012). Mobile technologies and apps in the health industry facilitate illness monitoring and provide consumers with access to their health information. Furthermore, Semiz & Semiz (2021) explanation aligned with the UTAUT model the research found that social influence positively affects people's intentions to use the applications. This indicates that the consumer uses mHealth applications because of the social influence around them. Alam et. al (2020) concurred that a crucial factor that contributes to the use intention of mHealth applications is social influence. Meanwhile, Yu et al. (2021) investigated social influence as the most significant factor in facilitating conditions, habit and performance expectancy towards behavior intention of using apps. It shows that the opinions of the people close to the patients will influence their intention to use mobile education websites. According to Tian & Wu (2022) older people with chronic diseases tend to use mHealth by recommendation of the people around them and the results proved that social influence significantly influences the continuance intention of using the mHealth application system. Therefore, the next hypothesis is proposed:
H4: *Social influence positively influences the behavioral intention of patients to use Health Clinic Online Appointment System apps.*

The Relationship between perceived disease threats positively influences the behavioral intention of patients to use Health Clinic Online Appointment System apps.
According to Zhu et al. (2018) in China the user of an application who uses it for chronic disease prevention, perceived disease threat has a positive impact on the intention to use the application. Young people especially realized the importance of the perceived disease threat more than older users. Lee et al. (2017) highlighted that people who have a high perceived health threat will be stimulated to adopt the mHealth application. Moreover, Zhang et al. (2019) discovered the perceived disease threat had a significant impact on behavioral intention about the utilization of diabetes management apps. Furthermore, the study suggests that the level of intention of using the application can be increased if the patient has a high awareness about the disease. Meanwhile, Dou et al. (2017) added that perceived health threats have positively influenced the patient's intention to use smartphone health applications for hypertension management. As a result, the subsequent hypothesis is posited:
H5: *Perceived disease threat influences the behavioral intention of patients to use Health Clinic Online Appointment System apps.*

The Relationship between perceived privacy risks negatively influences the behavioral intention of patients to use Health Clinic Online Appointment System apps.
According to Deng et. al. (2018), privacy risk refers to the people who might feel that personal information leakage may arise as a result of using the mHealth application system. On top of that, Klaver et al. (2021) attributed privacy risk which involves the confidentiality of personal health information data was negatively associated with participant intention to use mHealth. Meanwhile Akdur et al. (2020) highlighted that there is no correlation between perceived risk and behavioral intention in using dietetic mobile health applications in Turkey. Furthermore, they stated the patient chose to use the application if they discovered it manageable, trustworthy and useful. Hence the hypothesis proposed:
H6: *Perceived privacy risks negatively influence the behavioral intention of patients to use Health Clinic Online Appointment System apps.*

3. Research Methodology

Measures

The research utilized an online self-administered survey to gather the data. Three sections of a closed-ended questionnaire served as the basis for the survey's framework. The demographic characteristics detail of age, gender, income, employment and education were questioned in Section A. The intention to use the appointment system for the health clinic was investigated in Section B. The initial measurements from Zhang et. al. (2019) have undergone several adjustments to suit the current study's setting. Five-point Likert scales, with one denoting "strongly disagree" and five denoting "strongly agree," were used to rate the items.

Data Collection

The survey was posted on social media sites that serve patients throughout Selangor. The patients with prior experience with these online applications were invited to fill out the questionnaires. A total of 238 usable questionnaires were collected over three months from September 2022 to December 2022. The respondents' participation was entirely voluntary, and personal information about them was maintained anonymously. A patient invitation was disseminated to all of Selangor on Facebook. Individuals who offered their time to partake in research were directed to an online survey platform called Google Form.

Data Analysis

The computer software Statistical Package for the Social Sciences (SPSS) version 26 was used to do several empirical analyses. The conducted tests included correlation analysis, reliability test, multiple regression analysis and principal component analysis (PCA).

4. Results

Demographic Profile of Respondents

Table 1 shows the demographic of the participants. The data reveals that the female respondents constituted the majority, accounting for 78.6 percent of the total 238 respondents. Out of the entire sample size of 238 participants, the majority (58.4 percent) were classified as students. The survey participants included individuals who were self-employed (1.3%), public servants (34.9%), and unemployed (2.1%). Most of the respondents had a monthly income below RM 2500, accounting for 60.1 percent. 23.5 percent earned between RM 5001 and RM 10000, while 8 percent had a monthly income of RM 10001 or above. The majority of respondents, namely 60 percent, had completed their college degree. Approximately 34.9 percent of respondents had achieved a postgraduate level of study, while just 2.5 percent had a high school education or below. Finally, most of the 238 participants were between the age range of 21 to 30 years old.

Table 1: Demographic

		Frequency	Per cent
Gender	Female	187	78.6
	Male	51	21.4
Age	≤ 20 years	42	17.6
	21- 30 years	107	45.0
	31 – 40 years	39	16.4
	41 – 50 years	28	11.8
	51 – 60 years	22	9.2
Education	High school	6	2.5
	Degree	147	61.8
	Masters/ PhD	83	34.9
Marital status	Single	159	66.8
	Married	79	33.2
Career	Students	139	58.4

	Unemployed	5	2.1
	Self-employed	3	1.3
	Civil servants	83	34.9
	Others	8	3.4
Monthly income	Less than RM 2,500	143	60.1
	RM 2,501 – RM 5,000	20	8.4
	RM 5,001 – RM 10,000	56	23.5
	RM 10,001 and above/ dan ke atas	19	8.0
Are you suffering from chronic diseases?	No	227	95.4
	Yes	11	4.6
	Total	**238**	**100.0**

Descriptive Analysis of the Variable
Table 2 shows the mean for variables measured by a 5-point Likert scale.

Table 2: Descriptive Analysis

ID	Construct	Mean	Std. Deviation	Level
PE	Performance expectancy	3.91	0.65	High
EE	Effort expectancy	3.84	0.60	High
PEA	Facilitating conditions	3.91	0.53	High
SI	Social influence	3.66	0.68	High
PDT	Perceived disease threat	4.18	0.56	High
PPR	Perceived privacy risk	3.60	0.81	Moderate
BI	Behavioral intention	3.73	0.72	High

In the study, PCA with Varimax rotation was used to identify the shared variance or common factors of the dimensions of each variable under study. Varimax rotation is commonly used in the Orthogonal Rotation Method. The main goal of any rotation method is to assess some theoretically meaningful factors and to gain the simplest factor structure (Hair et. al., 2006). Kaiser's criteria, specifically the eigenvalue > 1 rule, are used to determine factor extraction in this study. The analysis revealed that the component was extracted with Eigenvalues greater than one. As represented in Table 3 and Table 4, all the items remained unchanged because factor loading values, cross-factor loadings, commonalities values, and eigenvalues are fine.

Table 3: KMO and Bartlett's Test

	Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	Bartlett's Test of Sphericity		
		Approx. Chi-Square	df	Sig.
PE	0.86	8.44.07	10	0.000
EE	0.78	362.38	6	0.000
PEA	0.83	1305.92	36	0.000
SI	0.82	599.08	6	0.000
PDT	0.67	272.69	3	0.000
PPR	0.72	288.90	3	0.000
BI	0.60	239.00	3	0.000

Table 4: Initial Eigenvalues

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
PE	3.75	74.92	74.92
EE	2.65	66.25	66.25
PEA	4.71	52.29	52.29
SI	3.03	75.66	75.66
PHT	2.19	73.03	73.03
PPR	2.28	75.98	75.98
BI	2.07	68.87	68.87

Analysis of Reliability

The study employed Cronbach's Alpha as a reliability coefficient to precisely assess the consistency of the utilized scales. Table 5 demonstrates that Cronbach's alpha values for variables in the research are at an acceptable level exceeding 0.70. Consequently, all of the items are suitable for measuring the variables of interest.

Table 5: Analysis of reliability

ID	Construct	Cronbach's Alpha
PE	Performance expectancy	0.92
EE	Effort expectancy	0.83
PEA	Facilitating conditions	0.88
SI	Social influence	0.89
PDT	Perceived disease threat	0.81
PPR	Perceived privacy risk	0.84
BI	Behavioral intention	0.77

Correlation Analysis

Table 6 is a representation of the correlation matrix, which is made up of Pearson correlations. These correlations reflect the inter-correlation that exists between the variables that were investigated. It is clear from the table that there is a significant correlation between each of the factors that were investigated in this study. According to these findings, the constructs have a discriminant validity, which means that although they are connected, they do not overlap with one another. Health appointment online clinic system intention is most strongly correlated with facilitating condition ($r = 0.565$, $p < 0.01$), followed by social influence ($r = 0.547$, $p < 0.01$), effort expectancy ($r=0.517$, $p<0.01$) performance expectancy ($r=0.479$, $p<0.01$) and perceived disease threat ($r=.388$, $p<0.01$) and perceived privacy risk ($r=0.029$, $p<0.01$).

Table 6: Pearson Correlation

	Behavioral intention
Performance expectancy	.479**
Effort expectancy	.517**
Facilitating conditions	.565**
Social influence	.547**
Perceived disease threat	.388**
Perceived privacy risk	0.029
Behavioral intention	.668**

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

Regression Analysis

The study employed multiple regression analysis to evaluate the given hypotheses since it enables the investigation of the predictors' impact on the dependent variable. All variables have variance inflation factor (VIF) values below 10 (1.00), and the tolerance values for each variable are above 0.10. This suggests that there is no issue of multicollinearity in the study. Based on the regression analysis shown in Table 5 the analysis shows that Facilitating conditions (β = 0.56) Social influence (β = 0.55) Effort expectancy (β = 0.52) perceived disease threat (β = 0.39), perceived privacy risk (β = 0.03) performance expectancy (β = 0.48) significantly influenced the behavioral intention to use mobile health application system. Hence, HI, H2, H3, H4, H5 and H6 are supported. Table 7 shows the hypothesis testing outcomes.

Table 7: Regression analysis

				95.0% Confidence Interval for B		Collinearity Statistics			
Factors	B	Beta	P	Lower Bound	Upper Bound	Tolerance	VIF	R Square	Adjusted R Square
Behavioral intention	0.75	0.67	0.001*	0.64	0.86	1.00	1.00	0.45	0.44
Facilitating conditions	0.77	0.56	0.001*	0.63	0.92	1.00	1.00	0.32	0.32
Social influence	0.58	0.55	0.001*	0.46	0.69	1.00	1.00	0.30	0.30
Effort expectancy	0.62	0.52	0.001*	0.49	0.75	1.00	1.00	0.27	0.26
Perceived disease threat	0.50	0.39	0.001*	0.35	0.65	1.00	1.00	0.15	0.15
Perceived privacy risk	0.03	0.03	0.658	-0.09	0.14	1.00	1.00	0.08	0.08
Performance expectancy	0.53	0.48	0.001*	0.41	0.65	1.00	1.00	0.23	0.23

Discussion

This study investigates the determinants that influence patients' intention to use mobile health application systems. The factors that were examined in evaluating their impact on the intention to utilize the application were derived from UTAUT. The regression analysis conducted on a sample of 238 participants validated that social influence, effort expectancy, facilitating conditions, perceived disease threat and performance expectancy have a significant impact on people's intention to use mobile health application systems. This finding aligns with previous studies by Lee et. al. (2020) and Solangi et. al. (2021) concluded that the expectation of individuals regarding their performance has the greatest influence on their propensity to use hospital e-appointment systems. Research has established that the level of expected performance can directly impact the intention of patients to utilize online appointment system applications for health clinics.

The findings revealed that effort expectancy has a considerable influence on behavioral intention to use mobile health services. This study is in line with Moudud et. al. (2021) stated that the significant attributes of effort expectancy on users' intention to adopt mobile health services. In addition, Lee et. al. (2021) found that users may be satisfied when they consider mobile health applications to be user-friendly during their early encounters.

The study investigates the relationship between facilitating conditions and the behavioral intention of patients to use Health Clinic Online Appointment System apps. The result shows that facilitating conditions are positively associated with the behavioral intention of patients to use Health Clinic Online Appointment System apps. Similarly, previous studies conducted by Bamufleh et. al. (2021) stated that users of e-government health applications have a high intention to use the application because they believe that the health ministry provides support if they face any difficulties using the applications. Facilitating conditions in this study refer to the

resource's user which includes the internet, or gadgets used to access it. Lee et. al. (2021) highlighted that user device compatibility and computing skills have a positive impact on user intention toward the e-appointment system.

The results also show that the relationship between social influence and behavioral intention is consistent with Alam et. al. (2021) conclusion that social influence positively influences the behavioral intention of patients to use Health Clinic Online Appointment System apps. Yu et. al. (2021) added social influence had the largest effect on behavioral intention to use mobile education websites than performance expectancy, facilitating conditions and habit.

The present study also revealed that the effect of perceived disease threat is significant and positive relationship with patient intention to use the health clinic appointment system. The result implied that the more the disease threat patients perceived, the more these patients engaged in behavioral intention to use the system. The findings also concur with Lee et. al. (2017) and Zhu et. al. (2018) emphasized that people who have a high perceived health threat will be stimulated to adopt the mHealth application.

Lastly, based on the regression results, the finding revealed that perceived privacy risks negatively influence the behavioral intention of patients to use Health Clinic Online Appointment System apps. Similarly, Klaver et. al. (2020) demonstrated that attributed privacy risk was significantly and negatively associated with participant intention to use mHealth which involves the confidentiality of personal health information data. Furthermore, according to Akdur et. al. (2020), patients are more likely to utilize a mobile app if they see it as easy to use, reliable, and beneficial.

5. Conclusion, Implications and Future Direction

This article used UTAUT to analyze patients' MOH Appointment system intention. According to the regression study, subjective norms strongly impact people's inclination to use Health Clinic Online Appointment System applications. The findings of this study offer a significant theoretical contribution to the literature**.** The study concluded that facilitating conditions are the most influential factor in determining the intention to use Health Clinic Online Appointment System apps. The result proved that when patients perceive themselves as having resources such as the Internet to use the services and support, they are capable of adopting the appointment system.

The study revealed that social influence was the second most significant factor impacting patients' intention to use Health Clinic Online Appointment System apps. This finding confirms that the opinions of the people close to the patients influence their intention to use mHealth. As a result of this study, it was discovered that patients' intentions to use mobile health care are highly influenced by their expectations regarding performance expectancy, effort expectancy, and perceived disease threat. Based on the findings of the regression analysis, there is no correlation between the patient's perception of the danger to their privacy and their desire to use the online application system provided by the Health Clinic.

Practically, to encourage the adoption of Health Clinic Online Appointment System applications it is important to study the factors that influence individuals' motivation to adopt the system. Promoting the values of the online appointment system through relevant government agencies via different mediums to reach patients will attract the public to use the system.

This study's findings have practical implications for the benefits of improving the implementation of mHealth in Malaysia. The empirical findings we have obtained offer practical guidelines for effectively implementing health services in developing nations. By gaining a deeper understanding of how users perceive mHealth services, developers and providers of mHealth technology can expect to gain insights into the challenges and issues related to designing and implementing successful mHealth services. Moreover, the results of this study can be readily adapted to support the implementation and adoption of mHealth services in other developing nations.

In general, although the research findings indicate certain limits, there is room for development in addressing these constraints. Therefore, we suggest several crucial aspects to consider for future research endeavors. To boost generalizability, future studies should consider expanding the sample size. Researchers might also broaden their research to encompass other national and regional contexts to gain a more comprehensive understanding of the entire phenomenon. Furthermore, due to the exclusive reliance on an online, self-administered survey as the data collection technique for this research, there is no assurance of the respondents' veracity and comprehension in completing the questionnaire. Therefore, exploring other methods of data gathering for future study might improve the data's quality.

Acknowledgment: The authors express their gratitude to Universiti Teknologi MARA (UiTM) for providing financial support through the Geran Dalaman Fakulti Pengurusan Perniagaan, Project File No: 600-TNCPI 5/3/DDF (FPP) (007/2021). In addition, the writers highly appreciate the faculty and team members who provided invaluable assistance in completing this study.

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