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The Effect of the COVID-19 Pandemic on the Mobile Messaging Application Among Millennials in Public Universities in Malaysia

Normalini Md Kassim, Universiti Sains Malaysia, Malaysia*
Wan Normila Mohamad, Universiti Teknologi MARA, Seremban, Malaysia
Nor Hazlina Hashim, University of Malaya, Malaysia
https://orcid.org/0000-0003-4265-0557

ABSTRACT

Mobile messaging apps are currently a popular method in Malaysia for communicating while on the go, owing to its convenience, reliability, and contact-free feature of mobile application. Fueled by mobile internet and smartphone growth, mobile messaging apps have become a strong force in the mobile app sector, offering users an alternative to SMS-based texting paired with social media elements and enhanced features, such as group chats and photo sharing. The study was anchored using the unified theory of acceptance and use of technology 2 theory. A survey with 150 respondents and PLS analysis is used to determine the antecedents of mobile application continuance usage during the COVID-19 pandemic. The results revealed that there is an influence in the usage of mobile messaging apps among the younger generation in Malaysian public university students during the COVID-19 pandemic. The main implication shows that mobile application among young generations in public universities has become popular. The convenience usage of the internet has turned the world into a global village.

KEYWORDS

continuance intention, millennials, mobile messaging application

INTRODUCTION

The COVID-19 pandemic era, which started end of 2019, had affected people globally and locally. The pandemic has affected people psychologically and physically, with fear, suspicion, and anxiety rising in the community. As of 12 February 2021, the World Health Organization reported 106,991,090 confirmed cases of COVID-19 and 2,347,015 deaths worldwide (WHO, 2021). The messaging application or messaging app is software that allows users to send and receive messages. The main characteristic of mobile messaging apps is not only being able to send text, picture messaging, or voice recordings. However, users also can share files from their phones and computer.

Mobile messaging application activities create great potential among consumers and marketers, especially millennials, as these avenues have changed the traditional mobile business model into new mobile business opportunities. This growth is due to the smartphone industry, which is rapidly

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developing, both in terms of market size as well as in terms of models and suppliers. According to Holst (2018), 40% of the world population will own a smartphone by the year 2021. From the Millennial's perspective, smartphone usage gives the users the advantage of communicating through mobile apps at their own convenient time and place. Among the benefits of these mobile apps is the ability to get information at their fingertips through the accessible database collection, which is captured instantly, plus many more.

Data from the April 2019 report by Statista showed that 1.6 billion users were using What's App messenger, making it the most popular global mobile messenger app. This is followed by 1.3 billion users of Facebook messenger, 1.1 billion users of WeChat, and 807 million using QQ Mobile. While Skype, Snapchat, Viber, and Telegram users were at 300 million, 287 million, 260 million, and 200 million, respectively (Clement, 2019). In the context of Malaysia, statistics from January 2018 to January 2019 show that mobile subscribers are 205 thousand, and 88% are smartphone users. Global Web Index (Q2 & Q3, 2018) reported the percentage of local Internet users performing each activity on a mobile phone each month, 96% using mobile messengers, 95% on videos, and 73% on games. Meanwhile, 66% of users use mobile banking, and 85% use mobile map services. Another report showed that there were 1.021 billion users who downloaded mobile apps in 2018. Top mobile apps by an average of local active users throughout 2018 were What's App messenger, Facebook, Facebook Messenger, Instagram, and WeChat. These apps are followed by Waze, Lazada, Grab, Telegram, and Shoppe, respectively (Hootsuite & We Are Social, 2019). Therefore, it is expected that this number will increase through the innovation of smartphone technology and the users' intention to use smartphones.

Although mobile messaging apps enhance connectivity and provide accessibility for people, there are a few disadvantages; for example, users are so attentive (Chang & Tang, 2015), and addictive (Noë et al., 2019) in using mobile messaging apps. Based on the study by Huang and Zhang (2019), WeChat messenger in China was productive but at the same time was a problematic tool for work-related. WeChat contributed to the perception of paradoxes like organizational norms, co-worker expectations, and conflicts in personal understanding. Whilst, another study done on KakaoTalk, a famous mobile messaging app in Korea found that information and system features were overloaded (Cho, Lee & Kim, 2019), which led to a significant increase in burnout or emotional exhaustion, conflict, and turnover intention among employees. This will affect the millennial generation especially if they are employees. The third issue of the mobile messaging applications is cyber violence, abuse, and bullying regardless of using a word or text writing, audio, and video, especially on women and girls. According to Cardoso, Sorenson, Webb, and Landers (2019), among the highest usage of cyber violence is 63.2% of cyber-or in-person stalking, 58.4% from mobile telephones, and 43.9% through emails. The study advised women to adjust and relook at their online usage to avoid and defend against cyber abuse.

In the world of mobile environments, the use of mobile messaging apps has grown tremendously and has become an important business platform. Nevertheless, studies investigating individuals' use of mobile messaging apps and their continuation usage still leave room for improved understanding, especially in the situation of the pandemic. Previously in terms of theoretical framework, research on mobile applications has been established using Theory of Acceptance Model (TAM) by Davis (1989) to study variables of perceived ease of use, perceived informative usefulness, perceived social usefulness, and perceived enjoyment among undergraduates in Malaysian public universities (Normalini, Saravanan, & Arokiasamy, 2017). Their results revealed that perceived usefulness, perceived enjoyment, and attitude had a significant effect on the intention to use mobile apps among the undergraduates. The research on mobile messaging apps needs to be updated after a certain period, as technology evolves and innovates. Hence, this study would further extend the research to investigate the determinants that influence the continuance usage intention of mobile message applications among the Millennials during the COVID-19 pandemic. unified theory of acceptance (UTAUT) and use of technology 2 (UTAUT2) is the underlying research model used in this study. A

similar study was done by Nikolopoulou, Gialamas and Lavidas (2020) using UTAUT2 on mobile phones among university students in Greek. On the other hand, based on the study conducted by Hazlina et al. (2018), there were significant effects on entertainment, informativeness, irritation, credibility, and subjective norms except irritation and credibility that have no significant effects on attitudes and purchase intention. They proposed rigorous study with an extensive sample size to be done especially focusing on Gen-Y or young consumers as these segmentations are more influenced and active towards gadgets. Therefore, this study is using UTAUT2 variables, namely performance expectancy, effort expectancy, social influence, hedonic motivation, facilitating conditions, habits and price value to provide an insight into the components in building an understanding and value-added in terms of users' experiences, particularly on the intention towards the mobile messaging application usage among the millennial especially students in public universities in Malaysia during the ongoing COVID-19 pandemic situation.

Consequently, UTAUT2 was an extended model of the original UTAUT model where the focus was on the continuance usage intention (Venkatesh, Thong, Chan, Hu, & Brown, 2011; Venkatesh, Thong, & Xin, 2012). Incorporating UTAUT with the two-stage expectation confirmation theory of information systems continuance will have a more in-depth understanding of acceptance theory not only on pre-usage intention but to assess user's continuance behaviour. Hence, this research study uses the UTAUT2 model to have a better and more comprehensive understanding of users' acceptance and their continuous usage intention of the mobile messaging application in the COVID-19 pandemic era.

Review of Literature

COVID-19 is widely regarded as one of the most pressing crises in the world, with global economic and social consequences. Since COVID-19 is easily transmitted by respiratory droplets or physical contact, countries were put in lockdown, with multiple restrictions for businesses and citizens (WHO, 2021). "The enforcement of social distancing, lockdowns, and other measures in response to the COVID-19 pandemic have led consumers to ramp up online shopping, social media use, internet telephony, and teleconferencing, and streaming of videos and films" (Eger et al, 2021). Thus, the pandemic has led to multiple changes in consumer behavior due to widespread lockdowns, social distancing, limited shopping possibilities, and other precautions meant to minimize the spread of the virus.

Numerous models have been developed by previous researchers of an information system to understand and predict the factors that could impact the use and acceptance of an innovation or new technology by individuals (Dutot, 2015). Among the developed models, the technology acceptance model (TAM) is the most applied and robust model that explains the acceptance and use of information technology by individuals (Chuttur, 2009; Rabaai, 2015; Kabir et al., 2017). Hence, the previous study conducted by Sulaiman and Normalini (2019) to expands the technology acceptance model (TAM) in the context of the e-collection system explain the willingness of accounting staff to use the system in state-owned tertiary institutions in Nigeria. The result found that lack of sufficient training in the use of ICT devices among the accounting staff and which suggested that the government need to provide adequate training opportunities to the accounting staff on the use of ICT devices and most importantly, the e-collection system training. However, this study found that focusing on UTAUT2 based on a literature summary review (refer to Table 1) concluded are more relevant as compared to the extended TAM theory.

In line with the above literature, these study hypotheses were developed as follows.

Performance Expectancy

Performance expectancy is defined as the extent or degree an individual believes that will help him or her to attain gains in job performance using the system (Chaterine, Geofrey, Moya, & Aballo, 2017). According to Malhotra and Bansal (2017), students can effectively enhance the flow of information and idea sharing using WhatsApp. Based on Agrawal and Mittal (2019) the time has come to link WhatsApp with Customer Relationship Management (CRM) using the unique features and accessibility

of WhatsApp as its popularity and usage are wider than other social media tools. Consequently, its association with CRM as w-CRM can be linked to better service performance which has not been previously explored and lacks research. Besides, exploring the students' learning dynamics and their level of performance through the usage of mobile messaging apps will provide greater insights into the way teachers are administered, especially to first-year students (Nkhoma, et al., 2018). Hence, it is hypothesized that there is a positive relationship between performance expectancy and continuance intention towards usage of mobile messaging apps among public university students during the COVID-19 pandemic.

Effort Expectancy

Effort expectancy can be defined as the level of easiness in relation to system usage. This means that effort expectancy is the effort needed to use the system, be it simple or complicated (Chaterine, Geofrey, Moya & Aballo, 2017). According to Balapour, Reychav, Sabherwal and Ajuri (2019), hedonic motivation, performance expectancy, effort expectancy, price value, and trust are found to be the main predictors of users' intention in adopting mobile apps. Based on Hsiao, Chang, and Tang (2016), research on switching behaviours also supported that the more habitual the behaviour, the more the perceived effort necessary to change that behaviour. As Kwasitsu and Chiu (2019) reported, "the consequences of putting time and effort into finding optimal information solutions can be costly". Concurring with this perspective, Hamidi and Chavoshi (2018) also found that the ease of use of mobile messaging factor refers to the judgment of a person who uses a particular system with little requirements or no effort. Therefore, it is hypothesized that there is a positive relationship between effort expectancy and continuance intention towards usage of mobile messaging apps among public university students during the COVID-19 pandemic.

Social Influence

According to Sun, Zheng, and Sun (2020), social influence is defined as anything that changes a person's intellectual activities, emotions, or actions when a person has a relationship with other people. As such social influence will affect the thought of a person to do something. Consequently, the extent of social influence can also be measured by using density (Ishibashi & Yada, 2019). Social influence has a strong effect on how people make their decision and how people accept something (Zhang, et al., 2020). Social influence can further be defined as the interaction between people as well as influencing others or being influenced by others (Baabdullah, 2018). According to Vahdat, Alizadeh, Quach, and Hamelin (2020), social influence can affect purchase intention towards mobile app use as people feel their communities and peers view apps to be favourable, hence less perceived risk (Vahdat, Alizadeh, Quach & Hamelin, 2020). Thus, as hypothesized, 'the relationship between social influence and continuance intention towards usage of mobile messaging apps among university students is positive' during the COVID-19 pandemic.

Facilitating Conditions

Facilitating conditions and behavioural intention are two direct determinants of adoption behaviour. Thus, while one mobile messaging app has facilitating conditions for users, this will be the reason for users to continue using this mobile messaging app. Many factors build a facilitating condition for consumers when they use mobile messaging apps (Palmen & Schmidt, 2019). For example, WhatsApp helps users to auto download pictures and save it inside their gallery, thus, this creates a facilitating condition for users. According to Jachim, Gowen, and Warren (2017), facilitation has a strong relationship with the continuance intention toward the usage of mobile messaging apps. Thus, the following hypotheses can be assumed: 'the relationship between facilitating conditions and continuance intention towards usage of mobile messaging apps among public university students is positive' during the COVID-19 pandemic.

Hedonic Motivation

Hedonic motivation is defined as fun, or pleasure derived from using technology and is an important determinant of consumer technology acceptance (Tamilmani, Rana, Prakasam, & Dwivedi, 2019). Accordingly, users will also choose the mobile messaging apps which make them feel fun or pleasure. According to Choi and Johnson (2019), consumers will choose the product which meets their expectation and need. Hedonic motivation is also one of the factors which will attract consumers to choose the product as highlighted by Kim and Hall (2019) study which shows that hedonic motivation has an important role in fulfilling the consumer's needs of buying something. The fun experience of using the mobile messaging app has become the choice of consumers as it leads to overall satisfaction. Zheng, Men, Yang, and Gong (2019) highlighted that hedonic motivation can drive people to act in certain behaviour and is also the main driver of consumers' impulse buying behaviour. Thus, it is hypothesized that 'the relationship between hedonic motivation and continuance intention towards usage of mobile messaging apps among public university students is positive' during the COVID-19 pandemic.

Habit

Habit refers to the multiple results obtained from past experiences (Venkatesh, Thong, & Xu, 2012) and the belief that people often consult their past behaviour as a reference point for making future actions (Beza, et al., 2018). In another study, the habit was also defined as the extent to which users would use their mobile apps automatically (Shaw & Sergueeva, 2019). This is further reinforced by Correa, Cataluna, Gaitan, and Velicia (2019) who stated that the habit variable in the UTAUT2 model is directly related to the use of a particular technology. According to a study by Madahi and Sukati (2016), Malaysian consumers change channels from the Internet to brick-and-mortar stores, and vice versa, when a channel is not favourable. Conversely, the following hypothesis was proposed: 'the relationship between habit and continuance intention towards usage of mobile messaging apps among public university students is positive' during the COVID-19 pandemic.

Price Value

Verkijika (2018) stated that price value is the value in which consumers associate and compare mentally the perceived benefits of the system that can be gained and the costs paid to use them. It was also found that customers would compare different products mentally based on the quality of the product and their price. However, it is different if the price were zero as the tendency for the customer to select the product will be higher since they would feel no risk of making the wrong decision (Hsu & Lin, 2015; Chen, Rashidin, Song, Wang, Javed & Wang, 2021). Therefore, it can be concluded that price value positively impacts behavioural intention (Oliveira, Thomas, Baptista & Campos, 2016). Based on Beza, et al. (2018), it was also identified that the price value is positive when the benefits of using mobile messaging apps such as SMS are perceived to be higher than the cost. In conclusion, it is hypothesized that there is a positive relationship between price value and continuance intention towards usage of mobile messaging apps among public university students during the COVID-19 pandemic.

OBJECTIVES

This study aims to understand the millennial of public universities in Malaysia towards mobile messaging apps during the COVID-19 pandemic. By understanding the millennial response to mobile apps, application developers and marketers can better strategize their application variety to full fill the needs of the users. The main objectives of this study are to examine characteristics (performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, habit, price value) of mobile applications by millennials of public universities in Malaysia and to study the

relationship between these characteristics and the continuance intention mobile apps among public university students during the COVID-19 pandemic.

The Rationale of the Studies and Theoretical Framework

The development of the research model was done through revising the Unified Theory of Acceptance and Use of Technology 2 model or also known as UTAUT2 model previously developed by Venkatesh, Thong, and Xu (2012). As stated in Venkatesh, Thong, and Xu (2016), the baseline model for future research should investigate the main effects of UTAUT/UTAUT2 and should serve as the baseline model of future research for parsimony and refining current context effects and identifying new context effects. As per recommendation by Venkatesh, Thong, and Xu (2016), the use of UTAUT/UTAUT2 as the baseline model is pertinent to conceptualizing individual technology use at the feature level as well as to refining the conceptualization and measurement of the current context factors that have impacts on feature-level use. The studies included in the analysis process were collected through an extensive search of databases. The below table shows that 10 valid studies were retrieved (see Table 1).

Table 1. List of studies that extended UTAUT and UTAUT2 to examine mobile payment and application adoption

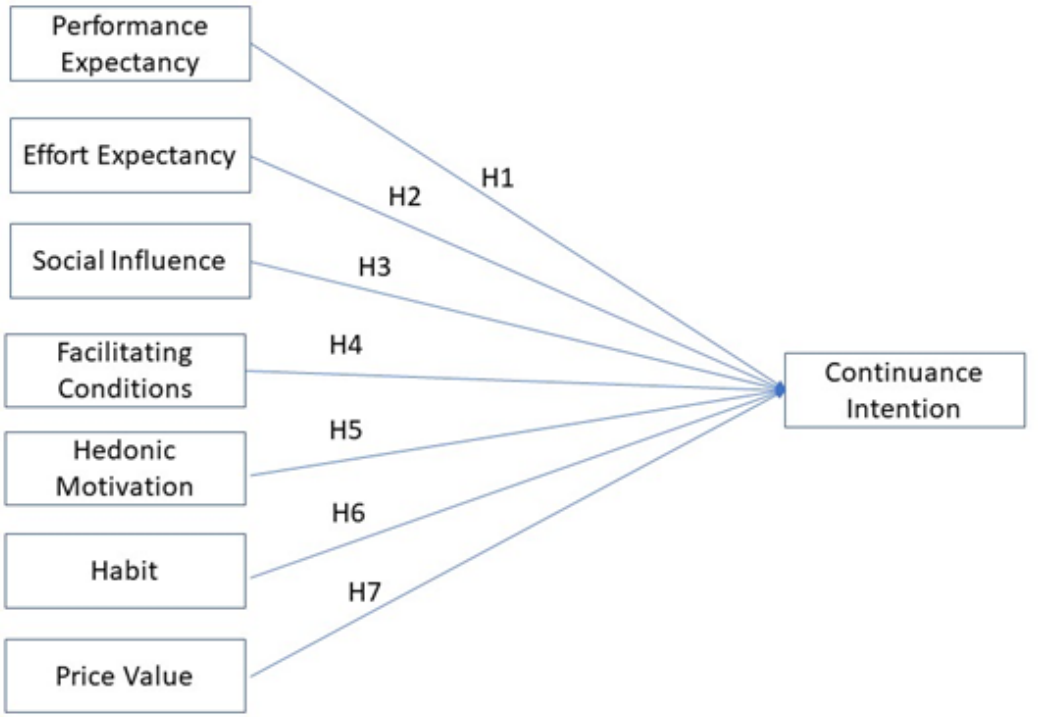
No.	Article Title	Source
1	"Why consumers adopt mobile payment? A partial least squares structural equation modeling (PLS-SEM) approach".	Teo, et al. (2015)
2	"Intention of adoption of mobile payment: An analysis in the light of the Unified of Acceptance and Use of Technology (UTAUT)".	Abrahao, Moriguchi, and Andrade (2016)
3	"Behavioral intention to adopt mobile wallet: a developing country perspective"	Madan and Yadav (2016)
4	"Security-related factors in extended UTAUT model for NFC based mobile payment in the restaurant industry".	Khalilzadeh, Ozturk and Bilgihan (2017)
5	"Understanding the usage of mobile payment systems- The impact of personality on the continuance usage,"	Almazroa and Gulliver (2018)
6	"Technological Factors of Mobile Payment: A Systematic Literature Review"	Karsen, Chandra and Juwitasary (2019)
7	"Developing a general extended UTAUT model for M-payment adoption"	Al-Saedi, Al-Emran, Ramayah, Abusham (2020)
8	"Young Generation's Mobile Payment Adoption Behavior: Analysis Based on an Extended UTAUT Model"	Wei, Luh, Huang, & Chang (2021).
9	"Using Unified Theory of Acceptance and Use of Technology to Evaluate the Impact of a Mobile Payment App on the Shopping Intention and Usage Behavior of Middle-Aged Customers"	Liu, Chen, Kittikowit, Hongsuchon & Chen, (2022).
10	"Sharīʿah-Compliant Fintech Usage Among Microentrepreneurs in Malaysia: An Extension of UTAUT Model"	Nik Azman, N. H., & Md Zabri, M. Z. (2022)

Source: Prepared by the authors.

Therefore, this research model is constructed to show the proposed relationship between the independent variables which are Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Hedonic Motivation, Habit as well as Price Value, and the dependent variable which is the continuance intention towards the usage of mobile messaging apps among public university students.

Recent research by Nikolopoulou, Gialamas and Lavidas (2020) used UTAUT2 among university students in Greek where results on mobile phone usage showed that the most significant reason for students to use mobile phones in their studies were habit, performance expectancy, and hedonic motivation. There were a few local studies done on mobile apps but not on mobile messaging apps. Moorthy, Loh, Kwong, Ang, Lee, Poon, and Tan (2020) studied mobile payment among Malaysian working adults, using UTAUT2 with perceived security as their theoretical framework in which their results showed that all were significant except for effort expectancy and social influence. Another local study done by Phang, Osman, and Chun (2018) also used UTAUT2 for shopping via mobile apps among young adults. Conversely, their results indicated that hedonic motivation, habits, and social influence played important roles in the young adult consumers toward online shopping via mobile shopping apps. Hence, this research study not only revisits previous research on mobile messaging apps among public university students that was done in 2017 but also explores UTAUT2 model as a theoretical framework (refer to Figure 1).

Figure 1. Research model Source: Prepared by the authors



METHODOLOGY

Data Collection and Sampling Method

This research was conducted in a non-contrived setting (natural environment) where the variables are neither controlled nor manipulated. In this cross-sectional study, data were gathered over 4 weeks period (from 1st January 2021 till 31st January 2021) online from the targeted respondents which are the

millennials in one of the public universities in Malaysia. To examine the research scope, the considered constructs (see Figure 1) were developed based on the existing literature. The eight reflective latent constructs are performance expectancy, social influence, facilitating conditions, hedonic motivation, habit, price value, and continuance intention extracted from Venkatesh et al (2012). The usable sample size collected was 150 respondents. Data collection was done through a non-probability snowballing sampling method due to the time and money constraints as it is more convenient as well as obtaining enough respondents. The unit of analysis for this study is the individual and the respondents were undergraduates and postgraduates, university students.

Questionnaire Design

The questionnaires have been developed based on the adopted and adapted sources as stated below in table 2.

Table 2. Item with variable names and respective sources

Item no.	Variable name	Source	No. of Items
PE1, PE2, PE3 and PE4	Performance Expectancy	Venkatesh et al. (2012)	4
EE1, EE2, EE3 and EE4	Effort Expectancy	Venkatesh et al. (2012)	4
SI1, SI2 and SI3	Social Influence	Venkatesh et al. (2012)	3
FC1, FC2, FC3 and FC4	Facilitating Conditions	Venkatesh et al. (2012)	4
HM1, HM2 and HM3	Hedonic Motivation	Venkatesh et al. (2012)	3
HT1. HT2 HT3 and HT4	Habit	Venkatesh et al. (2012)	4
PV1, PV2 and PV3	Price Value	Venkatesh et al. (2012)	3
CI1, CI2 and CI3	Continuance Intention	Venkatesh et al. (2012)	3

Source: Prepared by the authors

Sample Profile

A total of 150 undergraduate students been involved as respondents from one of the public universities in Malaysia regarding the use of mobile messaging apps among the younger generation. Among the 150 respondents, 80 respondents or 53.3% of them are male and there are also 70 female respondents totaling 46.7%. The respondent's age ranges from 19 to 27 years old and above with most of them currently between 22 to 24 years old. In terms of ethnicity, most of the respondents who answered the survey are Chinese which comprises 64 respondents (42.7%), followed by 62 Malay respondents (41.3%) and 24 Indian respondents (16.0%). In terms of nationality, all 150 respondents are Malaysian.

Consequently, in terms of year of study, 26 respondents (17.3%) are students in the first year and 83 respondents (55.3%) are second-year students. Third- and fourth-year students make up 31% and 20.7% respectively, whilst only one respondent is from fifth-year students. Furthermore, in terms of the brand of mobile phone, 36 respondents (24%) used Huawei, Xiaomi, VIVO, and Oppo, 53 respondents (35.3%) used iPhone, 51 respondents (34.0%) used Samsung while 10 respondents (6.7%) used Nokia, HTC, Sony Xperia and LG. In terms of the operating system of mobile phones run on, there are 91 respondents (60.7%) using Android while 55 respondents (36.7%) use the IOS system and 4 respondents (2.7%) use Windows.

Besides, out of all mobile messaging apps, WhatsApp is the most popular app being used, with 78 respondents (52%). There are 20 respondents (13.3%) who used Facebook Messenger, 22 respondents (14.7%) used WeChat, 25 respondents (16.7%) used Instagram, and 5 respondents (2%) used LINE,

Skype, and WEIBO respectively. In addition, most respondents totaling 46 (30.7%) subscribe to DiGi as mobile internet. On the other hand, 21 respondents (14%) subscribed to Maxis, 36 respondents (24.0%) subscribed to U-mobile, 42 respondents (28.0%) subscribed to Celcom and 5 respondents (3.3%) subscribed to other mobile internet lines such as RedOne or Tune Talk. The profiles of the respondents and Technology Usage is shown in Table 3.

Table 3. Profile of respondents and technology usage profile

Demographic	Categories	Frequency	Percentage (%)
Age	19-21	55	36.7
	22-24	85	56.7
	25-27	9	6.0
	Above 27	1	0.7
Gender	Male	80	53.3
	Female	70	46.7
Ethnicity	Malay	62	41.3
	Chinese	64	42.7
	Indian	24	16.0
Nationality	Malaysian	150	100.0
Year of Study	First Year	26	17.3
	Second Year	83	55.3
	Third Year	31	20.7
	Fourth Year	9	6.0
	Fifth Year	1	0.7
Mobile Phone Brand	Apple (iPhone)	53	35.3
	Samsung	51	34.0
	Nokia	3	2
	HTC	4	2.7
	Sony Xperia	1	0.7
	LG	2	1.3
	Others	36	24.0
Mobile Phone Operating System	iOS	55	36.7
	Android	91	60.7
	Windows	4	2.7

Table 3 continued on next page

Table 3 continued

Demographic	Categories	Frequency	Percentage (%)
Mobile Messaging Apps Use	WhatsApp	149	99.3
	Line	33	22.0
	Kakao Talk	13	8.7
	Viber	15	10.0
	Facebook Messenger	124	82.7
	WeChat	92	61.3
	Instagram	142	94.7
	Others	4	2.70
Mobile Messaging Apps the Most Use	WhatsApp	78	52.0
	Line	2	1.3
	Kakao Talk	0	0
	Viber	0	0
	Facebook Messenger	20	13.3
	WeChat	22	14.7
	Instagram	25	16.7
	Others	3	2.0
Mobile Internet Service Provider	Celcom	42	28.0
	Digi	46	30.7
	Maxis	21	14.0
	U-Mobile	36	24.0
	Others	5	3.3

Source: Prepared by the authors

ANALYSIS

We used SmartPLS 3.2.9 (Ringle et al., 2015) a second-generation structural equation modelling software to analyse the model developed. We followed a 2-step approach in the analysis by first assessing the measurement model (validity and reliability of the instruments) and then secondly the structural model to assess the hypothesis developed.

Measurement Model

Measurement model quality can be assessed by looking at the convergent and discriminant validity. As suggested by Hair et al. (2020) we used loadings, average variance extracted (AVE), and composite reliability (CR). The suggested cut-off values are loadings should be ^{3} 0.7, AVE ^{3} 0.5, and CR ^{3} 0.7 (Ramayah et al., 2018). As shown in Table 4, all the loadings were ^{3} 0.7, AVE ^{3} 0.5, and CR ^{3} 0.7 indicating that the measurement had convergent validity and reliability.

Table 4. Measurement model

Construct	Item	Loadings	CR	AVE
Performance Expectancy	PE1	0.772	0.882	0.652
	PE2	0.823		
	PE3	0.846		
	PE4	0.785		
Effort Expectancy	EE1	0.834	0.896	0.684
	EE2	0.800		
	EE3	0.848		
	EE4	0.825		
Social Influence	SI1	0.901	0.917	0.787
	SI2	0.856		
	SI3	0.903		
Facilitating Conditions	FC1	0.889	0.931	0.771
	FC2	0.876		
	FC3	0.899		
	FC4	0.847		
Hedonic Motivation	HM1	0.911	0.933	0.822
	HM2	0.864		
	HM3	0.943		
Habit	HT1	0.943	0.968	0.882
	HT2	0.932		
	HT3	0.946		
	HT4	0.934		
Price Value	PV1	0.942	0.959	0.886
	PV2	0.937		
	PV3	0.945		
Continuance Intention	CI1	0.908	0.909	0.769
	CI2	0.848		
	CI3	0.874		

Source: Prepared by the authors
Notes: AVE average variance extracted; CR, composite reliability

Next, we assessed discriminant validity following the suggestions of Franke and Sarstedt (2019) by looking at the HTMT ratio. If the HTMT ratios are lower than 0.85 or 0.90 then measures are distinct, if they are higher than the cut-off values then the measures are not distinct. As shown in Table 5, all the HTMT ratios are lower than 0.85 or 0.90 thus the conclusion is that the respondents clearly understood that we have 8 distinct constructs.

Table 5. Discriminant validity

Construct	1	2	3	4	5	6	7	8
1. Continuance Intention								
2. Effort Expectancy	0.662							
3. Facilitating Conditions	0.55	0.682						
4. Habit	0.64	0.599	0.497					
5. Hedonic Motivation	0.676	0.673	0.56	0.559				
6. Performance Expectancy	0.712	0.798	0.651	0.661	0.711			
7. Price Value	0.554	0.529	0.611	0.64	0.487	0.536		
8. Social Influence	0.601	0.664	0.569	0.749	0.603	0.705	0.599	

Source: Prepared by the authors

Table 6. Hypothesis testing

Hypothesis	Relationship	Std Beta	Std Error	t-values	p-values	BCI LL	BCI UL	f^2	VIF
H1	**Performance Expectancy -> Continuance Intention**	**0.189**	**0.096**	**1.966****	**0.025**	**0.032**	**0.349**	**0.03**	**2.417**
H2	**Effort Expectancy -> Continuance Intention**	**0.121**	**0.088**	**1.372***	**0.085**	**-0.004**	**0.291**	**0.013**	**2.297**
H3	Social Influence -> Continuance Intention	0.005	0.093	0.052	0.479	-0.149	0.153	0	2.309
H4	Facilitating Condition -> Continuance Intention	0.031	0.08	0.385	0.35	-0.104	0.158	0.001	2.000
H5	**Hedonic Motivation -> Continuance Intention**	**0.243**	**0.083**	**2.914*****	**0.002**	**0.109**	**0.379**	**0.064**	**1.88**
H6	**Habit -> Continuance Intention**	**0.2**	**0.12**	**1.666****	**0.048**	**0.032**	**0.405**	**0.034**	**2.398**
H7	Price Value -> Continuance Intention	0.098	0.079	1.248	0.106	-0.006	0.253	0.01	1.919

Source: Prepared by the authors
Note: ***p<0.01(2.33), **p<0.05(1.645), *p<0.10(1.28); (based on the one-tailed test)

Structural Model

To test the hypothesis developed we ran a bootstrap with 5,000 resamplings (Hair et al. 2020; Ramayah et al., 2018) to generate the beta values, standard errors, t-values, p-values, and confidence intervals. The R^2 was 0.509 ($Q^2 = 0.356$) for Continuance Intention which indicated that the predictors could explain 50.9% of the variance in Continuance.

First, we tested the predictors of Continuance Intention, Performance Expectancy ($\beta = 0.189$, $p< 0.05$), Effort Expectancy ($\beta = 0.121$, $p< 0.10$), Hedonic Motivation ($\beta = 0.243$, $p< 0.01$), Habit ($\beta = 0.02$, $p< 0.05$) were positively related to Continuance Intention while the other Social Influence, Facilitating Condition, and Price Value, were not significant. Thus, H1, H2, H5, and H6 were supported while H3, H4, and H7 were not supported (see Table 6).

DISCUSSION

The result showed that performance expectancy has a positive relationship (t-value =1.966**) with intention continuance towards continuance intention usage of mobile messaging apps. Performance expectancy is the degree to which the application of the technology would provide benefits to the

consumers in completing a certain activity (Herrero, Martin & Salmones, 2017). University students felt that using mobile messaging apps will enhance their performance in studies. As highlighted by Yeboah and Ewur (2014), WhatsApp usage can enhance the effective ñow of information and idea sharing among students. Effort expectancy was found to have a positive relationship (t-value=1.372*) with intention continuance towards usage of mobile messaging apps. Effort expectancy is the degree of ease associated with the use of the system (Venkatesh et al., 2003). As Utilitarian (performance and effort expectancy) and hedonic (innovativeness, hedonic value, and enjoyment) were found to be the key drivers of m-shopping, managers should pay attention to both utilitarian (performance expectancy and effort expectancy) and pleasure-seeking (hedonic value and enjoyment) aspects to stimulate m-shopping (Luceri, Bijmolt, Bellini and Aiolfi, 2022). The suitability and pleasantness of mobile websites and app could enhance the shopping experience of mobile shoppers (Luceri, Bijmolt, Bellini & Aiolfi, 2022).

Hedonic Motivation has a strong positive relationship (t-value= 2.914***) with the intention of continuance to usage of mobile messaging apps. Hedonic motivation is the feeling of fun, or pleasure derived through the usage of technology and is an important determinant of consumer technology acceptance (Tamilmani et al., 2019). Hedonic motivation is also the customer's want to consume something (Kim & Hall, 2019). Hedonic motivation has effects on customers to act in a certain behaviour (Zheng et al., 2019). Habits also have a positive relationship with intention continuance towards usage of mobile messaging apps. Habit refers to the multiple results obtained from past experiences (Venkatesh, Thong & Xu, 2012). The relationships related to hedonic aspects, quality, satisfaction, and previous experience have considerably changed over time due to the pandemic and endemic wave. In order to sustain in this era, companies should invest in hedonic value and quality variables by offering a more accessible and customized shopping experience through a new creation of special apps to improve satisfaction and m-shopping continuance.

Habit was also defined as the extension to which users would use their mobile apps automatically (Shaw & Sergueeva, 2019). Based on Sheikh, Islam, Rana, Hameed, and Saeed (2017), it was identified that the direct effect derived from the habit of the actual usage of the technology would result in an adequate effect towards habit towards intention. This shows that habit is positively correlated (t-value = 1.666**) with the continued use of mobile messaging apps.

Social influence was found to be necessary to adolescents as it helps them in maintaining a positive identity, as well as creating favourable self-influence over others (Baker & White, 2010). Nonetheless, the study findings revealed that it was not supported (t-value = 0.052) whereby social influence is found to wield the negative continuance usage of mobile messaging apps with an indirect effect. Further supported study by Liu, Min, and Ji (2011) highlighted that social influence (e.g., the importance of the opinion of others), a form of the subjective norm has a significant positive influence on adoption-related user intentions. In fact, a study by Amandeep, Puneet, and Risto (2018) found that social value is the third important factor in predicting users' continuation intentions with the provision of stickers or emoticons promoting a sense of belongingness and acceptability. Thus, further research is needed to investigate to justify these phenomena.

In addition, the formulation of an improved Unified Theory of Acceptance and Use of Technology (UTAUT) framework, adapted to m-shopping behavior by Luceri, Bijmolt, Bellini and Aiolfi (2022) highlighted the results where companies should focus on internal factors (usefulness and ease of use) to stimulate m-shopping intentions. Hence, marketing managers should create or exploit social communities and stimulate positive word-of-mouth and focus on mobile social commerce initiatives (Luceri, Bijmolt, Bellini and Aiolfi, 2022). In other words, it is paramount for mobile service providers to be attentive, creative, and innovative in implementing various strategies to ensure the satisfaction of users' social needs.

Venkatesh, Moris, Davis, and Davis (2003) define facilitating conditions as "the degree to which an individual perceives that a technical and organizational infrastructure exists to support the use of the system" (p. 453). Nevertheless, our results revealed that facilitating conditions have a negative

(t-value = 0.385) effect on continuance intention to use mobile apps among millennials. Technological characteristics (i.e., convenience, compatibility) along with individuals' personal characteristics (i.e., self-efficacy and facilitating conditions) act as the driving forces toward the continuance intention for digital content (Imdadullah, Akram, Aneela, Shamsul, Zeeshan & Khan, 2020). In fact, Naranjo-Zolotov, Oliveira, Cruz-Jesus, and Martin (2019) have postulated that proper facilitating conditions increase the usage intention and frequency of using electronic content. Hence, future research should look further at this side of the facilitation condition on the usage of mobile apps.

Price value is usually used as the key measure representing what users must sacrifice to obtain a product or service (Imdadullah, Akram, Aneela, Shamsul, Zeeshan & Khan, 2020). The results of this study showed that there is a negative relationship (t-value=1.248) between price value and continuance intention towards usage of mobile messaging apps among public university students. Therefore, our research findings have shown parallel findings by Tam, Santos, and Oliveira (2020) using the ECM framework and investigated the critical factors that influence the continuance intention to use mobile apps, in which they confirmed the effect of price value on continuance intention is not significant. Nevertheless, further research could be a good exploration to investigate this relationship during the endemic and post-covid era among public university students.

CONCLUSION

This study examines mobile app usage among millennials in public university continuance usage during the difficult circumstances generated by the worldwide COVID-19 pandemic. The scope of this research is to ascertain millennials' continuance usage to use mobile messaging apps based on the model that includes seven main determinants (performance expectancy, social influence, facilitating conditions, hedonic motivation, habit, price value). The current study adds to the body of knowledge in several ways.

This research acknowledges and responds to calls for studying UTAUT2 in various settings. The research model for mobile messaging apps examines seven hypotheses based on the UTAUT2 theoretical framework. Building on the revised Theory of Unified Theory of Acceptance and Use of Technology 2 model, this study enhances the proposed relationship between the independent variables of Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Hedonic Motivation, Habit as well as Price Value and the continuance intention on the usage of mobile messaging apps among public university students. Thus, one of the most notable conceptual contributions is that it expands prior UTAUT2 mobile messaging app research. UTAUT2 components have been shown to be accurate predictors of mobile messaging app continuance usage during the COVID-19 pandemic. Derived from this empirical analysis, we can state that performance expectancy along with effort expectancy, habit, and hedonic motivation act as a driving force toward the continuance of usage of mobile apps. Namely, the empirical evidence also suggests that social influence, facilitating conditions and price value have a negative contribution showing their insignificant impact on the usage of mobile apps among public university students. During the pandemic, our study highlights the need to examine the effect of social influences not effectively impact on the continuance usage of mobile messaging apps as they feel the importance of mobile messaging apps usage is a norm during the COVID-19 pandemic.

Conclusively, the contribution of this study revealed that millennials the lens of Malaysian public university students outline vital implications of mobile apps as convenient and important application activity as smartphone usage gives them the ability to inspect their social media applications and communicate at their convenience and their own benefits. Moreover, realizing those enticements is helpful for managers to plan effective strategies and develop advanced apps in promoting the continuance usage of mobile applications among university students.

Managerial Implications

This study extant three significant contributions to the literature. Despite the tremendous growth of mobile shopping across the globe, there is a minimal understanding of the impact of the continuance usage of mobile shopping among university students. Hence, in addressing the above research gap this study disseminates a clearer understanding of the mobile application usage among young generations in public universities in Malaysia during the COVID-19 pandemic. It has been discussed in the literature that mobile application has become popular among millennials. Secondly, the utilization of the revised Theory of Unified Theory of Acceptance and Use of Technology 2 model, enhances the proposed relationship between the six independent variables (Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Hedonic Motivation, Habit, and Price Value) as the theoretical lens for a finer cognizance on the continuance intention usage of mobile messaging apps.

The convenient usage of the internet has turned the world into a global village. In fact, technological advancements have changed the way people live their life. The Internet user population has been increasing over the years globally and its revolution has grown in Asia as well. As the internet is significantly an important tool among millennials, they spend most of their time online on social networking sites or shopping websites especially with the Conditional Movement Control Order (CMCO) in place during the COVID-19 pandemic. Owing to this, our findings have yielded a new perspective on continuance usage of mobile shopping apps, thus contributing uniquely, not just to the mobile shopping literature, but also to consumer behaviour in general.

Lastly, building on these two revised theories of Unified Theory of Acceptance and Use of Technology 2 model, the current study contributes immensely to the theoretical advancement of mobile shopping literature by extending empirical evidence on the influence of the six variables on the continuance usage of mobile shopping behaviour, especially among younger generations in universities. Namely, this understanding could further be of help to managers in developing apps that would provide customers with fascinating experiences and decision-making processes in their purchases with the current blooming of online businesses during and after the pandemic. Once a customer feels happy with the shopping and service environment, he/she tends to spend additional time in the online store and purchase more, due to the pleasing environment. Capturing the younger generations' interests could also give rise to boundaryless businesses like Lazada, Shoppe, and many more online business platforms, thus leading to global and local purchases by the consumers.

Suggestions for Future Research

While this study has accomplished the research objectives, several limitations are recognized and should be taken into consideration for future research. A larger sample size, Internet coverage, and a wider scope of area (cities) should be a good exploration for future research. Due to the ongoing COVID-19 pandemic, most of the university students were in their hometowns and due to their low internet coverage limit their performance to involve in this research survey. Nevertheless, with the post-covid scenario, universities are opening back to normal classes hence would be a good time to have a further investigation on the student attitudes towards mobile shopping.

Future researchers should also develop new scales to measure overall attitudes towards mobile applications. Practitioners may use the findings to develop new applications that respond to the specific needs and desires of the users, thus increasing positive habits. It is hoped that this conceptual model will initiate new dialogue pertaining to the multiple issues concerning the mobile application industry and user needs amongst researchers, marketers, and application developers. This study can be enhanced so that future researchers could gain a deeper understanding of mobile applications and give more insights into the application industry globally and for a clearer picture to emerge.

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Normalini Md Kassim is currently senior lecturer at the School of Management, University Science of Malaysia and Visiting Professor Management & Science University (Malaysia). She is Chartered Member of Chartered Institute of Logistics & Transport (CMILT) and Malaysia Chapter of the Association for Information Systems (MyAIS). Her publications have appeared in IGI Global Handbook, Procedia- Social and Behavioral Sciences (Elsevier), International Journal of Productivity and Performance Management (Emerald), Global Business Review (SAGE), Taylor and Francis, Social Indicators Research, International Journal of Communication Systems, International Journal of Enterprise Information Systems, Industrial Engineering & Management Systems, Global Business and Management Research and Springer. She has passed experience with industry like Maybank Berhad as system engineer for 4 years and Hewlett Packard Singapore as Project Manager for Asia Pacific Project for 10 years. She was completed her Master of Business Administration (MBA) in University Science of Malaysia (2005) and completed her PhD in Technology Management from the same university (2012). Now she has embarked to new research area which is smart community, smart cities and business analytics. With experience in banking, manufacturing, communication and financial industry, she would like to collaborate and share her experience in technology management, business analytic and risk management area. Her full profile can be accessed from www.som.usm.my.

Wan Normila Mohamad is currently a Coordinator and Senior Lecturer at the Faculty of Business and Management, University Teknologi MARA Cawangan Negeri Sembilan. She received her doctoral degree from the School of Management, Universiti Sains Malaysia and her research addresses service quality and management, companion's satisfaction and delight, patient's satisfaction in healthcare, medical tourism and other service industries. Dr Nor Hazlina Hashim (Lina) commenced her Doctor of Philosophy in year 2010 at University of Wollongong (UOW), Australia. Earlier, Lina graduated Masters of Arts in Communication at Universiti Sains Malaysia (USM) in 2003 and Bachelors of Arts (in Public Relations) at Universiti of Techonologi MARA (UiTM) in 1997. Lina also has 4.5 years of working experience as Supply Management Analysts (SMA) at Intel Technology Sdn. Bhd., Penang (1997-2001) and was a senior lecturer for 8 years at School of Communication, USM, Penang (2010-2018). Lina has taught Message and Design, and Digital Marketing for Master in Integrated Marketing Communication (IMC) at USM@KL, Wisma Sejarah, K.Lumpur from 2013 until 2018. Lina went for her Industrial Training at McCann-Erickson (M) Sdn. Bhd. and exposed on advertising and copy writing. Her research interest is on websites and online studies especially Integrated Marketing Communication (IMC), Digital Marketing, Product Development and Innovations and Q-Methodology.