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FACTORS INFLUENCING THE USE OF M-COMMERCE: AN EXTENDED TECHNOLOGY ACCEPTANCE MODEL PERSPECTIVE

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ABSTRACT

The application of m-commerce activities among smartphone users in Malaysia has become one of the major challenges for companies involved in m-commerce. The present study aims at identifying the factors influencing m-commerce use in Malaysia. An extended Technology Acceptance Model (TAM) is employed. A total of 350 questionnaires were distributed among smartphone users in the Klang Valley area of Malaysia. Two-stage Structural Equation Modelling (SEM) was employed to test the model of the study. The findings of the study reveal that behavioral intention has a significant positive influence on m-commerce use. The findings further reveal that perceived usefulness, perceived enjoyment, and privacy and security have significant positive influence on behavioral intention. These findings will benefit stakeholders involved in m-commerce activities such as providers, retailers, brands, and consumers. In addition, academicians and students can also benefit from this study in the context of m-commerce use in Malaysia.

JEL Classifications: M1, M150, M3

Key words: M-commerce, TAM, Privacy, Security, Malaysia

1. INTRODUCTION

Mobile phone adoption has positively affected consumer market demand as it forms a new dimension of virtual mobility to a continuing trend for geographically extended, faster and more personalized social interaction (Hooi et al., 2011; Wei and Lo, 2006). In the last few decades, the mobile phone has evolved from an interpersonal communication device to a more advanced multimedia device known as smartphone. A smartphone device offers more advanced features

that help individuals in their daily life (Hooi et al., 2011). A report from the International Telecommunication Union (ITU, 2016) indicates that the mobile phone market is the fastest growing telecommunication market in terms of subscribers and popularity. It further indicates that the number of subscriptions has reached seven (7) billion worldwide representing 95 percent of the world population. The mobile broadband network (3G or above) subscriptions has covered 84 percent of the world population. Moreover, according to the ITU, no other ICT service has been able to surpass mobile cellular subscriptions, especially in the developing countries. A report from the Malaysia Communication and Multimedia Commission (MCMC, 2015) indicates that Malaysia has recorded a penetration rate of 144.8 percent in mobile cellular in quarter two of 2015.

Similarly, the adoption of m-commerce is becoming very popular among online consumers worldwide. The advanced and rapid development of wireless network and technology such as 3G, 4G, and LTE has made m-commerce a new issue in the Information System (IS) study agenda. M-commerce may be defined as any transaction conducted via terminal equipment such as personal digital assistant (PDA) and smartphone, and so forth using paid service (Jiang, 2001). The related services and applications include image and music downloading, mobile advertising, and mobile monetary control (Jiang, 2001). According to the United Nations Conferences on Trade and Development (UNCTAD, 2004), m-commerce refers to buying and selling of goods and services using a wireless device. Similarly, Wu and Wang (2005) define m-commerce as any transaction with monetary value conducted either directly or indirectly through a wireless network.

Many scholars consider m-commerce as an extension of electronic commerce that employs wireless devices and telecommunication networks to access anywhere and anytime the exchange of goods, services, and information (see e.g., Coursari and Hassanein, 2003; Gil-Lafuente and Arroyo-Canada, 2011). Furthermore, Sadi and Noordin (2011) are of the opinion that m-commerce refers to the use of a wireless terminal, such as a PDA or smartphone, a cellular telephone, and a network to access information and conduct business transactions resulting in the transfer of value in exchange for information, services or goods.

M-commerce offers various benefits and opportunities to its users including communication, transaction of goods, services, and information. Most of the studies in m-commerce carried out in Malaysia involve information-based activities rather than transaction-

based activities (Chong, Chan, and Ooi, 2012). Therefore, the purpose of this paper is to determine the factors influencing the adoption of m-commerce among smartphone users in Malaysia.

The present study fills the gaps by using the extended Technology Acceptance Model (TAM) developed by Davis (1989) which is derived from the Theory of Reasoned Action (TRA) developed by Fishbein and Ajzen (1975). The variables of TAM include perceived usefulness (PU), perceived ease of use (PEU), intention and actual use (AU) to predict the use of information system (IS). Therefore, the present study extended the TAM model to advance further critical factors. The following sections will highlight the objectives of the study, in-depth literature review, development of the proposed model, methodology, and suggestions for further study and conclusion.

The main objective of this paper is to find out factors influencing m-commerce use among smartphone users in Malaysia. The specific objectives of this paper include determining the influence of perceived usefulness, perceived ease of use, privacy and security, and perceived enjoyment (PE) on behavioral intention (BI).

2. LITERATURE REVIEW

Smartphones are progressively accepted by online consumers to connect to their online and offline markets. In recent decades, people are increasingly using their smartphones to search for product information, compare prices and even make online purchase through their wireless devices. Customers hesitate to conduct online transaction through technology because they first have to learn the technology before conducting any transaction (Mols et al., 1999). A study conducted by Mattila, Karjaluoto, and Pento (2003) reveals that smartphone users do not prefer online transaction because face to face service is better than online service.

Building upon the Theory of Reasoned Action (TRA), the TAM theory is proposed to explain user acceptance of a new technology such as m-commerce (Davis, 1989). It was also developed to explain and predict consumers' intention toward adopting an information system. Therefore, the authors added privacy and security into the original TAM theory to determine the antecedents of m-commerce use in Malaysia. These dimensions significantly influence consumer intention to use m-commerce, and may provide effective means to predict consumer intention when purchasing goods or

services through wireless devices (Ahmad, Khan, and Jan, 2010; Gitau and Nzuki, 2014; Islam et al., 2011).

In the past few decades, various studies have been carried out on technology acceptance (Davis, 1989; Davis et al., 1989; Giovannini et al., 2015; Sadi and Noordin, 2011; Noor, Sreenivasan and Ismail, 2013; Screenivasan and Noor, 2010). Thus, the development of m-commerce technology will be determined by the smartphone users' acceptance (Trivedi and Kumar, 2014). In the TAM theory, the actual use will be determined by users' intention to use a system (Davis et al., 1989). Moreover, the actual use is determined by behavioral intention, which is jointly predicted by perceived usefulness and perceived ease of use. In this paper actual use is the dependent variable and in the context of m-commerce technology it refers to the frequency of using m-commerce and the estimated number of time the users use m-commerce in a specific period (Wu and Wang, 2005).

2.1 EXTENDED TECHNOLOGY ACCEPTANCE MODEL

Various studies confirmed the validity of TAM as a stingy model in many technology-related contexts (Davis, 1989; Davis et al., 1989). The literature notes TAM's stinginess as a key limitation (Venkatesh, 2000; Vijayarathy, 2004). Ha and Stoel (2008) opine that it is obvious that the original TAM variable may not well capture key beliefs influencing consumers' intention to use m-commerce. Similarly, Vijayarathy (2004) was of the view that the TAM variables are more suitable in studies relating to decisions involving technology acceptance choice than to situations involving users' voluntary choices such as e-shopping. Thus, the original TAM variables may not adequately capture key beliefs influencing consumers' attitude toward e-shopping. Due to the key limitation of TAM it is appropriate to include some additional variables in order to strengthen the model (Jaradat, 2013; Legris, Ingham, and Collerette, 2003). In this paper privacy and security are added to the TAM model as one variable and it is believed that privacy and security will have a positive influence on behavioral intention to use m-commerce.

2.2 M-COMMERCE USE

Despite its huge popularity, m-commerce is still in its early stage and can continue its growth into any field that could affect human life in this world (Jahanshahi, Mirzaie, and Asadollahi, 2011). Although m-commerce is a relatively new concept previous studies have offered

various definitions of m-commerce. M-commerce refers to the use of wireless device such as personal digital assistant (PDA), cellular or smartphone and a network to access information and conduct transaction of information, goods, or services (Sadi and Noordin, 2011; Wei et al., 2009). In addition, Sadi and Noordin (2011) emphasized that m-commerce is a natural extension of electronic commerce (e-commerce) that allow consumers to cooperate among themselves or with businesses in a wireless approach, anytime and anywhere. M-commerce can also be defined as any transaction conducted via a wireless network either in word or speech leading to transfer of value in exchange for goods, services or information (Hung et al., 2004; Skiba et al., 2000).

However, Yang (2005) is of the opinion that m-commerce refers to any transaction conducted either directly or indirectly via a wireless telecommunication network. According to Khalifa and Shen (2008) m-commerce takes place from the moment consumers use their smartphone or any other device such as iPhone, iPad, or Android to perform a transaction. They also opine that m-commerce is a subset of electronic commerce. In contrast, Wong and Hiew (2005) view that m-commerce differs from electronic commerce due to certain features, characteristics, and limitations of mobile devices. Feng, Hoegler, and Stucky (2006) suggest that m-commerce is beyond electronic commerce due to its style, different interaction, usage pattern, and value chain. Feng et al. (2006) further explain that m-commerce is an innovative and new business opportunity with its unique features, characteristics, and functionalities such as mobility and broadband accessibility.

In this paper, the authors agree that m-commerce refers to any transaction conducted via a smartphone or any other wireless device that may result in transfer of value in exchange for goods, services, or information.

2.3 BEHAVIORAL INTENTION

Behavioral Intention (BI) can be defined as something that an individual aims to achieve (Zhao and Othman, 2010). Ajzen (1988) believes that intention is a behavioral disposition of an act that is intended to be achieved within a time period. It refers to how an individual will behave in the future (Fishbein and Ajzen, 1975). In terms of m-commerce, it can be defined as the user's likelihood to engage in online transaction via a mobile device. Many scholars find

a significant positive relationship between BI and m-commerce use (Faqih and Jaradat, 2015; Jaradat, 2013; Lee, Cheung and Chen, 2005; Venkatesh Speier, and Morris 2002).

Moreover, Lee et al. (2005) find a significant relationship between PU and BI. They also find that PE has a significant relationship with BI. In predicting the use of web-based information system, Mun and Hwang (2003) find that BI has a significant positive effect on AU. Venkatesh and Davis (2000) extended the Technology Acceptance Model in four longitudinal field studies; their findings reveal that intention to use has a significant positive influence on usage behavior. Therefore, based on the abovementioned studies, the authors proposed the following hypothesis:

H1: Behavioral intention will have a positive influence on m-commerce use.

2.4 PERCEIVED USEFULNESS

According to the Technology Acceptance Model (TAM) perceived usefulness (PU) is the strongest factor that has a significant influence on an information system (Davis, Bagozzi, and Warshaw, 1989). PU is defined as the degree to which an individual believes that using a system will enhance his or her job performance (Davis, 1989). PU is also defined as the degree to which a person believes that engaging in the online transaction, such as m-commerce, would enhance his or her job performance.

Various studies confirmed that BI to use m-commerce is positively and significantly related to PU (Chau and Hu, 2001; Davis, 1989; Davis et al., 1992; Ha and Stoel, 2008; Hung et al., 2004; Lee et al., 2005). Davis finds that PU is the strongest factor determining the acceptance of information system among end-users. Shih (2004) also reveals that user acceptance of e-shopping is significantly predicted by PU. However, it can be noted that PU has a significant positive relationship with BI to use m-commerce.

In predicting the use of web-based information system, Mun and Hwang (2003) find that PU has a significant positive effect on BI. In addition, their findings also reveal that PU is the strongest factor in predicting BI to use a web-based information system. According to Agarwal and Karahanna (2000) PU has a significant positive influence on BI to use information system. Venkatesh and Davis (2000) extended the TAM theory in four longitudinal field studies; their findings show that PU has a significant influence on BI and PU is one

of the strongest factors to predict intention to use. Therefore, based on the abovementioned literature, the authors proposed the following hypothesis:

H2: Perceived usefulness will have a positive influence on behavioral intention to use m-commerce.

2.5 PERCEIVED EASE OF USE

The TAM model reveals that perceived ease of use (PEU) is one of the major factors that have a positive influence on technology use (Davis et al., 1989). Davis (1989) agrees that PEU refers to the degree to which individuals believe that using a technology would be free of their own effort. Consumers tend to engage with a technology when it is not only useful but also easy to use.

BI to use an information system is significantly and positively predicted by PEU (Jackson, Chow, and Leitch, 1997). A study conducted by Venkatesh et al. (2002) reveals that PEU and BI are significantly and positively related. Similarly, Eze, Ten, and Poong (2011) find that PEU and BI to use m-commerce are significantly correlated. In predicting the use of web-based information system, Mun and Hwang (2003) found that PEU has a significant positive effect on BI. According to Agarwal and Karahanna (2000) PEU has a significant positive influence on BI to use IS. Venkatesh and Davis (2000) extended the TAM theory in four longitudinal field studies and they find that PEU has a significant influence on both PU and BI to use. In addition, Gefen, Karahanna, and Straub (2003) who conducted a study on trust and TAM on online shopping found a significant positive relationship between PEU and PU. Therefore, based on the literature, the authors proposed the following hypotheses:

H3: Perceived ease of use will have a positive influence on behavioral intention to use m-commerce.

H4: Perceived ease of use will have a positive influence on perceived usefulness toward m-commerce use.

2.6 PRIVACY AND SECURITY

Privacy is defined as “the ability of an individual to personally control information about one’s self” (Cliquet et al., 2015; Milberg, Smith,

and Burk, 2000). The need for ensuring privacy in managing personal data has placed increasing pressure on firms. However, the consideration of information privacy issues must increasingly be seen in a global context because people in 240 of 250 countries are now connected to the internet (Milberg et al., 2000). In addition, lack of safety is one of the main reasons consumers connect online but do not purchase goods over the internet (Gefen et al., 2003).

According to Pennanen, Kaapu, and Paakki (2006) privacy in m-commerce refers to a claim from a person, group of people or institution to request their approval before revealing their financial information to a third party. Without a proper privacy and security, smartphone users may not trust m-commerce providers and also may not conduct any m-commerce transaction (Gitau and Nzuki, 2014). Security in m-commerce however refers to the extent to which consumers believe that using a system will be secure (Pantano and Di Pietro, 2012). Further, security concern, privacy and perceived risk in business transaction occur when customers have no experience with the technology. Because of rapid technology advancement smartphone users are becoming more concerned about privacy and security issues and this has driven their unwillingness to give away their financial information such as credit card details over the internet or telephone (Ahmad et al., 2010).

According to Islam et al. (2011) privacy and security have a significant effect on m-commerce acceptance. Similarly, a study by Dinev, Hart, and Mullen (2008) reveals that appeasing privacy concerns has positive effect on the willingness to disclose consumers' information necessary to transact online. Moreover, privacy and security are two components of perceived risk which could have a greater influence on consumers' intention to reveal their financial information through a non-face-to-face purchase such as m-commerce transactions. Privacy and security is tested as single variable in many studies to determine the intention to use m-commerce (Ahmad et al., 2010; Gitau and Nzuki, 2014; Islam et al., 2011). Therefore, based on the literature, the authors proposed the following hypothesis:

H5: Privacy and security will have a positive influence on behavioral intention to use m-commerce.

2.7 PERCEIVED ENJOYMENT

Perceived enjoyment (PE) is defined as the degree to which an individual believes that using a particular system such as m-commerce

would be pleasant on its own (Davis, 1992). It is an intrinsic motivation to use a system that is different to the PU, which can be seen as an extrinsic motivation (Ahmad et al., 2010). In addition, Argawal and Karahanna (2000) are of the view that “pleasure and enjoyment” resulted from using the smartphone while shopping is a driving force. This view is supported by Cliquet et al. (2015). Various studies find that PE is a significant predictor of BI to use a system (Davis et al., 1992; Igbaria, Livari, and Maragahh, 1995; Teo, Lim, and Lai, 1999). According to Giovannini et al. (2015), PE is the degree to which one believes that the activities of using a product or services are perceived as pleasing in their own right, without any performance consequence that may be predicted.

According to Jan and Haque (2014) PE has a positive effect on online banking use. BI to use m-commerce has a significant positive relationship with PE (Lee et al., 2005; Zhan, Zhu, and Liu, 2012). Phua, Wong, and Abu (2012) find a significant relationship between PE and BI to use m-commerce. Mun and Hwang (2003) conducted a study on predicting the use of web-based information systems; their findings show that PE has indirect positive effect on BI through ease of use. In addition, their findings also reveal that PE has indirect positive effect on BI through PU. According to Agarwal and Karahanna (2000) playfulness has an indirect positive influence on BI to use information system through cognitive absorption. Their findings also reveal that playfulness has indirect positive influence on BI through PU on one hand, and through PEU on the other hand. Therefore, based on the abovementioned literature, the authors proposed the following hypothesis:

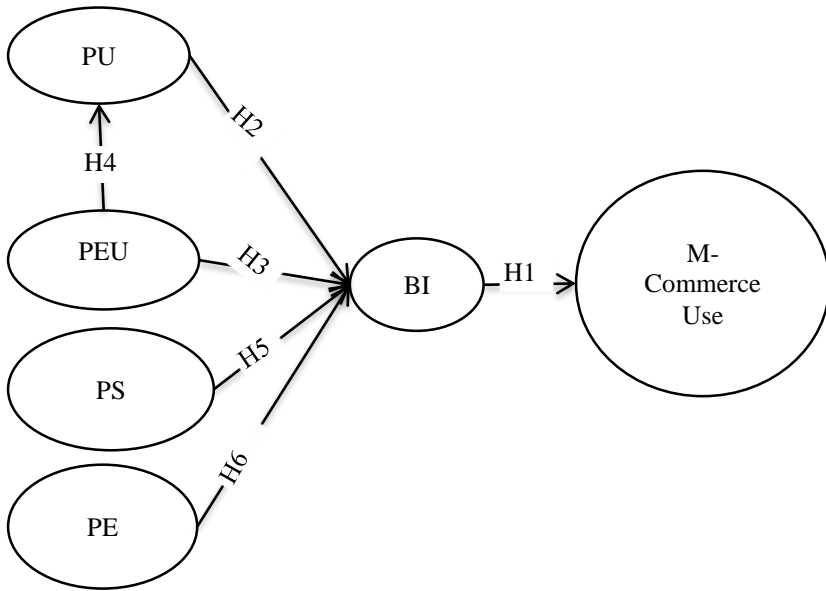
H6: Perceived enjoyment will have a positive influence on behavioral intention to use m-commerce

2.8 CONCEPTUAL FRAMEWORK

A thorough investigation of the existing literature on m-commerce use brought up five main dimensions: perceived usefulness, perceived ease of use, privacy and security, perceived enjoyment, and behavioral intention. These aspects are carefully measured by the authors in bringing together the framework of m-commerce use. In the model (see Figure 1) the five main constructs are treated as exogenous variables; all these variables are supported by the literature and are

testified to have a positive influence on intention which also has a positive influence on m-commerce use.

FIGURE 1
The Proposed Conceptual Model



Previous studies found that PU and PEU could not only assess other technological use behavior due to its stinginess; it is therefore, suggested that TAM needs to be given some additional dimensions (Jaradat, 2013; Legris et al., 2003) to strengthen it. This is one of the reasons that PE and privacy and security are included in TAM for this paper to determine factors influencing the use of m-commerce among Malaysian consumers. PE is recently included in TAM (Davis, Bagozzi, and Warshaw, 1992). Many scholars tested PE as determinant of intention to use technology (Giovannini et al, 2015; Jan and Haque, 2014; Phua et al., 2012; Zhan et al., 2012). Moreover, privacy and security is chosen as a single variable because this has been done in previous studies related to new technology adoption (Huei, 2004; Jillbert and Ahmad, 2003; Islam et al., 2011; Mariga, 2003).

3. METHODOLOGY

3.1 INSTRUMENT

The survey questionnaire for this study is designed based on the TAM theory items, adopted from previous researches (Davis et al., 1989; Gil-Lafuente and Arroyo-Canada, 2011; Sadi and Noordin, 2011; Wu and Wang, 2005). However, the items are modified to suit the current study as suggested by Abdullah, Jan, and Manaf (2012) and Parasuraman, Zeithaml, and Berry (1988). The respondents are asked to indicate how much they agree on the criteria items on a scale of '1' (strongly agree) to '5' (strongly disagree). The last section of the questionnaire focuses on the background information of respondents namely: gender, age, nationality, marital status and level of education.

The valid items, their loadings, mean, standard deviation and Cronbach's alpha are highlighted in Table 3. It is important to mention that the instruments of this study do not contain any common method biases (Lindell and Whitney, 2001; Podsakoff et al., 2003) since the survey instruments are adapted from previous studies and modified to suit the context of the present study (Ajzen and Fishbein, 1990; Davis, 1989; Davis et al., 1989; Faqih and Jaradat, 2015; Giovannini et al., 2015; Wang, and Jin, 2014).

3.2 DATA COLLECTION

A total of 350 questionnaires are collected from Klang valley in Malaysia, out of which only 310 were deemed appropriate for inclusion in the data analysis process. The questionnaires were administered face-to-face, yielding a response rate of 88.57 percent. The survey questions include 36 items adopted from previous studies. However, it is important to mention that the study's population cover the smartphone users in Malaysia, whereas the study's target respondents are those who have purchased goods and services through their smartphones.

In depicting the sample respondents' characteristics, descriptive statistics of frequencies and percentages are calculated. Female represents the majority (56.8%) of respondents while the male represents 43.2 percent. Most of respondents (76.1 %) are in the age group between 21 and 25. The majority of respondents (87.4%) are Malaysian and the rest (12.6%) are non-Malaysian. More than two-thirds of the respondents (92.3%) are single and the rest (7.7%) are

married. The majority of the respondents (85.5%) are highly educated with a bachelor degree; followed by master degree (8.4%). Detailed demographic statistics are presented in Table 1.

TABLE 1
Demographic Profile of the Respondents

Demographic Variables		Research Sample (n = 310)	
		Frequency	Percentage (%)
Gender	Male	134	43.2
	Female	176	56.8
Age	18 – 20	53	17.1
	21 – 25	236	76.1
	26 – 30	15	4.8
	31 – 35	6	1.9
Nationality	Malaysian	271	87.4
	Non-Malaysian	39	12.6
Marital Status	Single	286	92.3
	Married	24	7.7
Level of Education	High School	5	1.6
	Diploma	8	2.6
	Bachelor	266	85.8
	Master	26	8.4
	PhD	5	1.6

4. ANALYSIS AND RESULTS

Structural equation modelling (SEM) is used for the data analysis because it has distinct advantages over other techniques. SEM is more likely the best statistical tool to examine the relationship between the independent variables and the dependent variables simultaneously. It is also a tool that can substitute factor analysis, path analysis, and multiple regression analysis (Byrne, 2010). It is employed to assess the measurement model and to further assess the structural model. SEM can also be used to determine the validity of the result (Hair et al., 2010). Therefore, the reliability analysis is first employed using Cronbach's alpha; this is to ensure the stability and consistency of the research instrument (Hair et al., 2010; Sekaran, 2003). Although the instruments are adopted from previous studies it is deemed necessary to check their consistency. The minimum requirement for Cronbach's alpha is a value of 0.60 (Nunnally, 1978). The reliability statistics of the constructs ranges between 0.742 and 0.916 which is above the minimum requirement (Hair et al., 2010; Nunnally, 1978; Sekaran,

2003). In addition, the result of the overall items (36) reliability shows a value of 0.914, indicating an acceptable consistency and stability of the research instrument. The reliability for each construct is shown in the Table 2.

TABLE 2
Reliability Statistics

Constructs	Cronbach's alpha	N of Items
Perceived Usefulness (PU)	0.896	7
Perceived Ease of Use (PEU)	0.771	5
Privacy and Security (PS)	0.742	9
Perceived Enjoyment (PE)	0.916	7
Behavioural Intention (BI)	0.846	5
Actual Use (AU)	0.783	3

Confirmatory factor analysis is adopted to validate the measurement model of this study. The results from the confirmatory factor analysis (CFA) have shown that the model does not fulfil all requirements. Therefore, due to higher modification indices, some correlations among the error terms are needed in order to get a good model fit (Byrne, 2010; Lomax and Schumacker, 2010). After correlating some error terms, the results showed a good model fit and also fulfilled all requirements for confirmatory factor analysis (CFA) with Normed Chi square (χ^2/df) value of 1.684, the Chi square (χ^2) value of 639.950, the degree of freedom (DF) value of 380, Comparative Fit Index (CFI) value of 0.946, Tucker-Lewis Index (TLI) value of 0.938, IFI value of 0.947 and the Root Mean Square Error of Approximation (RMSEA) value of 0.047 which is less than the cut-off point of 0.08. Further, it is also important to mention that the factor loadings from the measurement model range between .61 and .92, indicating that the loadings fulfil the requirement of above .50 (Byrne, 2010; Lomax and Schumacker, 2010).

4.1 RELIABILITY AND VALIDITY TEST

After CFA, reliability and validity analysis are conducted before testing the hypotheses and structural model fit. The results show that convergent validity and discriminant validity criteria are satisfactorily met, as suggested by Hair and Anderson (2010) (See Table 3).

TABLE 3
Reliability and Validity Test

	CR	AVE	MSV	ASV	1	2	3	4	5	6
PEU	0.851	0.594	0.275	0.216	0.771					
PE	0.913	0.601	0.256	0.184	0.506	0.775				
PU	0.894	0.55	0.275	0.162	0.524	0.494	0.742			
PS	0.803	0.506	0.304	0.154	0.396	0.322	0.148	0.711		
BI	0.855	0.544	0.382	0.248	0.453	0.44	0.393	0.551	0.738	
AU	0.783	0.546	0.382	0.197	0.432	0.348	0.339	0.427	0.618	0.739

Notes:

Composite Reliability (CR) is higher than 0.7

Average Variance Extracted (AVE) is higher than 0.5

Convergent Validity: CR > AVE

Discriminant Validity: AVE > MSV > ASV

4.2 TESTING THE STRUCTURAL MODEL

The five (5) hypotheses employed in this study are tested to examine the causal paths. The correlation of the abovementioned error terms are due to their high modification indices which is suggested by Byrne (2010), Lomax and Schumacker (2010). The results showed that all the fit indices of the model are above the threshold, resulting in a good model fit. In this case, the normed Chi square ($\chi^2/df=1.751$) is in the range between 1 and 5, RMSEA (0.049) is less than the cut-off point 0.08, CFI value is 0.940, IFI value is 0.940 and TLI value is 0.932, all of which are above the cut-off value of 0.90.

Based on the hypothesised structural model, the results of hypotheses testing are shown in Table 4. Among the six tested hypotheses, five are statistically significant ($p < 0.05$) and the remaining one failed to be significant. The model explained substantial variance in PU ($R^2 = 0.34$), BI ($R^2 = 0.45$) and AU ($R^2 = 0.41$). It is, therefore, important to highlight that the factor loadings in the hypothesized model range between .63 and .92, exceeding the threshold of .50 (Byrne, 2010; Hair et al., 2010; Lomax and Schumacker, 2010).

The results of hypotheses testing reveal that H1 which states that behavioral intention will have a positive influence on actual use is supported based on $\beta = 0.867$; $SE = 0.104$; $CR = 8.361$; $p < 0.001$. This result is supported by previous studies such as Faqih and Jaradat (2015); Jaradat (2013); Lee et al. (2005); Venkatesh et al. (2002); Venkatesh and Davis (2000). Similarly, H2 (perceived usefulness will have a positive influence on behavioral intention to use m-commerce)

is also supported keeping in mind $\beta = 0.207$; $SE = 0.082$; $CR = 2.511$; $p = 0.012$. This result is congruent with that in previous studies (Davis, 1989; Gefen et al., 2003; Ha and Stoel, 2008; Hung et al., 2004; Lee et al, 2005; Venkatesh and Davis, 2000; Mun and Hwang, 2003).

TABLE 4
Estimate of the Hypothesized Model

	Std. Reg. Weight	SE	CR	<i>p</i>	Decision
AU <--BI	0.867	0.104	8.361	***	Supported
BI <-- PEU	0.153	0.079	1.942	0.052	Not Supported
PU <---PEU	0.453	0.070	6.447	***	Supported
BI <---PS	0.310	0.051	6.042	***	Supported
BI <---PE	0.150	0.069	2.189	0.029	Supported

Notes:

Std. Reg. Weight = Standardized regression weight

SE = Standard error of regression weight

CR = Critical ratio of regression weight

p = Level of significance of regression weight (***) $p < 0.001$

H3 which states that perceived ease of use will have a positive influence on behavioral intention to use m-commerce is rejected because of $\beta = 0.153$; $SE = 0.079$; $CR = 1.942$; $p = 0.052$. The result contradicts studies by Eze et al. (2011) and Venkatesh et al. (2002). Further, H4 (perceived ease of use will have a positive influence on perceived usefulness towards m-commerce use) is supported based on the values of $\beta = 0.453$; $SE = 0.070$; $CR = 6.447$; $p < 0.001$. This finding is in line with previous studies (Davis, 1989; Davis et al., 1989; Faqih and Jaradat, 2015; Gefen et al., 2003; Venkatesh and Davis, 2000). Furthermore, H5 stating that privacy and security will have a positive influence on behavioral intention to use m-commerce is also supported ($\beta = 0.310$; $SE = 0.051$; $CR = 6.042$; $p < 0.001$). This result is aligned with Islam et al. (2011) and Dinev et al. (2008). Lastly, H6 which states that perceived enjoyment will have a positive influence on behavioral intention to use m-commerce is supported too ($\beta = 0.150$; $SE = 0.069$; $CR = 2.189$; $p = 0.029$). This result is congruent with Zhan et al. (2012); Lee et al., (2005); Jan and Haque (2014); Phua et al. (2012); Mun and Hwang (2003).

5. DISCUSSION AND CONCLUSION

5.1 DISCUSSION

This study proposes a m-commerce usage intention model based on the technology acceptance model. In addition to examining the applicability of TAM in the actual use of m-commerce in a Malaysian perspective, the current study also examined the influence of behavioral intention on actual use, as well as, the influence of perceived usefulness, perceived ease of use, privacy and security, and perceived enjoyment on behavioral intention.

The findings of this study clearly highlight the important role of perceived usefulness, perceived enjoyment and privacy and security in positively influencing consumers' behavioral intention to use m-commerce in Malaysia. This confirms that potential smartphone users would only conduct m-commerce when they find it not only useful but also secure and enjoyable. Thus the usage intention rate of the technology will further increase if using the technology will bring more tangible and practical benefits to consumers. In addition, the model shows the underlying relationships between these variables and the existing TAM variables provide understanding of how behavioral intention to use m-commerce can be further emphasized.

It is very important to note that the findings of this study validate previous studies employing TAM theory in the context of m-commerce use. Further, the findings reveal that the factors influencing m-commerce use among smartphone users in Malaysia are perceived usefulness, privacy and security, perceived enjoyment, and behavioral intention. It is also revealed that privacy and security is the strongest determinant of behavioral intention to use m-commerce in Malaysia. Therefore, to create a favorable intention in the mind of smartphone users, m-commerce providers should focus more on providing applications that are very easy to use and pleasing. Furthermore, they should closely examine privacy and security issues vis-à-vis consumers' intention to use m-commerce which may influence acceptance. Since perceived usefulness, perceived enjoyment, and privacy and security are prerequisites to creating a favorable intention, m-commerce providers should closely focus on these determinants to boost m-commerce usage among smartphone users in Malaysia. M-commerce retailers should also improve the quality of consumers' purchasing process to generate a greater favorable intention in using the system.

In contrast, perceived ease of use was found to have an insignificant influence on behavioral intention to use m-commerce. This result contradicts previous studies (Davis, 1989; Eze et al., 2011; Jahangir and Begum, 2008; Venkatesh et al., 2002). It is however in line with the findings of Cho et al. (2007) and Wei et al. (2009) in suggesting that there is no significant influence of PEU on BI to use m-commerce. Nevertheless, it is surprising that PEU was found to have no significant influence on BI in the study, even though PEU has been validated as a major factor influencing users' intention to adopt various technologies in both the original and the extended TAM. It can be inferred that since the majority of the respondents are young consumers (between age 20 and 35), it is possible that they easily learn m-commerce and thus the ease of use has no influence on whether they will use m-commerce or not. Since the youth are more aware of new innovations, they may have experience of various technologies and therefore have a good foundation of knowledge on using it. Therefore, the ease of use or difficulty level of using m-commerce would not influence their decision to use it.

5.2 CONCLUSION

This study provides some important implications for m-commerce providers, retailers and brands. First, in order to attract Malaysian smartphone users to involve in m-commerce, it is believed that introducing m-commerce to them may be insufficient. By using the results of the analysis m-commerce providers may focus on improving the constructs or attributes that have positive impact on m-commerce use (Wong and Hiew, 2005).

Second, since behavioral intention and privacy and security are found to be the strongest influencing factors, m-commerce providers may focus more on protecting consumers' financial information such as their credit card details to enhance m-commerce use in Malaysia. In order to create a positive intention in the consumers, privacy and security is one of the pre-requisite dimensions that m-commerce providers should emphasize. Without proper privacy and security protection consumers will be sceptical in using m-commerce technology (Wei et al., 2009).

Third, the significance of perceived usefulness and perceived enjoyment on behavioural intention means that m-commerce providers should not only implement m-commerce but also develop

highly usable mobile applications and useful mobile websites that consumers can enjoy while performing online purchase through their smartphones. These applications, however, must be carefully designed to account for such limitation. M-commerce applications should also be capable of meeting customer requirements, and should be perceived as marketable and beneficial to consumers. This would create a favourable competitive image among the m-commerce service providers and would further enhance the smartphone users' intention to perform online transactions through smartphones. M-commerce retailers should also facilitate m-commerce transactions for consumers to increase m-commerce use among smartphone owners; this could be achieved by taking into consideration the privacy and security issues and also the enjoyment and usefulness factors. Therefore, m-commerce retailers could enhance Malaysian smartphone users' intention to use m-commerce transactions in their daily life.

Lastly, this paper provides several implications for scholars and academicians. This study successfully extends the Technology Acceptance Model (TAM) in the context of m-commerce by incorporating the privacy and security construct (PS). This extended TAM model is developed to achieve an understanding of user acceptance of m-commerce in Malaysia. The paper also adds to the body of literature on behavioral intention to use m-commerce and on actual use of m-commerce among Malaysian smartphone users.

Every study has its limitations, as is the case in the present analysis. First of all, the data were collected only from smartphone users in Klang Valley area of Malaysia which may not be generalized to the whole of Malaysia. Therefore, future study could replicate the same study in different contexts or conduct a comparative study. Future study could include representatives of all states in Malaysia. Perhaps, some other factors which may affect m-commerce use but are not included in this study such as perceived trust, perceived cost, subjective norm and innovativeness may be considered in the future. In addition, culture, religiosity or other cognitive instrumental processes such as job relevance or result demonstrability could also be some other factors that influence smartphone users to use m-commerce. Further study should also adopt a longitudinal approach to provide a more complete perspective and full understanding of consumers' intention to use m-commerce. Future study will hopefully paint a more complete picture of why and when consumers are willing to purchase from their smartphone.

In conclusion, m-commerce providers should develop mobile applications and build mobile websites that are not only useful and enjoyable, as TAM suggests, but that also include privacy and security-building mechanisms. Developing a secure application may enhance m-commerce usage and increase consumer involvement in m-commerce.

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APPENDIX

The following table highlights the measurement of the variables of the revised model

Constructs	Items	Items Measure	L	M	SD	CA
Perceived Usefulness (PU)	PU1	.. is time-saving for me.	0.61	4.26	0.77	0.90
	PU2	..is efficient for me	0.77	4.21	0.73	
	PU3	The m-commerce application is useful for me.	0.84	4.27	0.69	
Using m-commerce	PU4	The m-commerce application is convenient for me.	0.86	4.26	0.68	
	PU5	.. improves my effectiveness as a consumer.	0.70	4.14	0.77	
	PU6	..makes it easier to accomplish business transaction.	0.63	4.26	0.72	
	PU7	Overall, I find m-commerce useful.	0.75	4.29	0.68	

APPENDIX (*continued*)

Constructs	Items	Items Measure	L	M	SD	CA
Perceived Ease of Use (PEU)	PEU2	I find it easy to get the m-commerce system to do what I want to do.	0.91	3.84	0.75	0.74
	PEU4	It is easy for me to remember how to perform tasks using the m-commerce system.	0.67	3.85	0.72	
	PEU5	My interaction with the m-commerce system is clear and understandable.	0.65	3.83	0.74	
	PEU6	Overall, I find the m-commerce system easy to use.	0.81	4.01	0.71	
Privacy and Security (PS)	PS1	I think my private information is not exposed to other people.	0.76	3.37	1.02	0.80
	PS2	I trust the ability of the telecommunication and internet industry to protect my privacy.	0.77	3.20	0.97	
	PS3	I feel safe when I release my credit card information in m-commerce.	0.62	2.65	0.99	
	PS5	Using m-commerce is financially secure.	0.68	3.23	0.81	

APPENDIX (*continued*)

Constructs	Items	Items Measure	L	M	SD	CA
Perceived Enjoyment (PE)	PE1	... exciting.	0.76	3.91	0.71	0.92
	PE2	... pleasant.	0.75	3.91	0.71	
Using m- commerce is...	PE3	... fun.	0.85	3.88	0.77	
	PE4	... amusing.	0.72	3.71	0.76	
	PE5	... enjoyable.	0.80	3.94	0.73	
	PE6	... entertaining.	0.79	3.93	0.78	
	PE7	... great.	0.75	4.03	0.71	
Behavioural Intention (BI)	BI1	... use m-commerce whenever possible.	0.72	3.83	0.79	0.85
	BI2	... increase the use of m-commerce in the near future.	0.79	3.82	0.79	
I intend to	BI3	I would conduct m- commerce in the near future.	0.71	3.73	0.84	
	BI4	I will recommend others to use m- commerce.	0.83	3.91	0.74	
	BI5	... buy products using mobile phone.	0.61	3.83	0.89	
Actual Use (AU)	AU1	I regularly use m- commerce.	0.74	3.43	1.05	0.78
	AU2	I use m-commerce in my daily purchase transaction.	0.76	2.74	1.03	
	AU3	I always use m- commerce in my business transaction.	0.71	2.91	1.04	

Notes:

L = Loadings

M = Mean

SD = Standard deviation

CA = Cronbach's Alpha