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Factors influencing the adoption of M-commerce: An exploratory Analysis

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ABSTRACT

Mobile Commerce, also known as, M-commerce is thought to be the next big phase in this technologically dependent society after E-commerce era. However, its adoption and level of use is low in Malaysia compared to others nations such as Korea, Singapore, and Japan. This study aims to identify some factors that affect the adoption of M-commerce in Malaysia based on traditional technology models such as Theory of Reason Action (TRA), Theory of Planned Behavior (TPB),Technology Acceptance Model (TAM) and Diffusion Innovation theory (DOI). In this research, an exploratory factor analysis was conducted on different measures to identify the underlying factors influencing the adoption of M-commerce. The findings revealed that all the thirteen (13) factors were statistically significant and can affect the adoption of m-commerce.

Keywords: Mobile commerce, Factors, Adoption of Innovation, Malaysia.

INTRODUCTION

The use of mobile device has become wide spread and continues to grow significantly in recent years. The mobile cellular market is the fastest growing telecommunication market in terms of subscriber numbers and popularity. ITU estimates that by the end of 2009 there were some 4.6 billion mobile cellular subscriptions worldwide. No other ICT service has been able to reach the same number of subscriptions, particularly in the developing world, in so little time (ITU, 2010). With the explosion and development of the wireless networks and technology such as 3G (Third Generation) M-commerce is becoming a new issue in Information System (IS) research agenda.

M-commerce refers to Mobile Commerce which is defined as the use of a wireless terminal, such as a cellular telephone, smart phone or Personal Digital Assistant (PDA), and a network to access information and conduct transactions that result in the transfer of value in exchange for information, services or goods, is likely to test the regulatory structures that are in place to deal with traditional transactions. United Nations Conference on Trade and Development defined M-Commerce as buying and selling of goods and services using wireless hand-held devices (UNCTAD, 2004). Mobile commerce (M-commerce) is a natural extension of electronic commerce (e-commerce) that allows users to interact with other users or businesses in a wireless mode, anytime/anywhere (Coursaris and Hassanein, 2003). The recent trend of e-commerce involves expanding its services and reaching its customer through new powerful affordable computing such as two-ways pager, Portable Digital Assistants (PDAs) and cellular phones. As a result, new name has been identified as M-commerce. M-commerce acts as another channel through which value can be added to e-commerce processes. It is obvious that M-commerce is thought to be the next big phase in technology involvement following the E-commerce era. However, its adoption and level of use is low in Malaysia compared to others nations such as Korea, Singapore, and Japan.

Mobile commerce is experiencing rapid growth in terms of capabilities of mobile devices, services, applications, standards and network implementation (Sugianto et al., 2007). However, this rapid development of mobile technology and the emergence of M-commerce models are reflected comparatively low in M-commerce adoption rate in Malaysia. Although there are lots of potential for businesses in m-commerce, when compared to developed countries such as Japan and South Korea, M-commerce in Malaysia is still at its infancy stage (Wong and Hiew,

2005) The adoption of technologies such as 3G and WiMax are still relatively low in Malaysia when compared to these developed countries (Wei *et al*., 2009). The main purpose of this research is to investigate the factors affecting the adoption of M-commerce by consumer (User) in Malaysia.

LITERATURE REVIEW

Factors Influencing the adoption of M- Commerce

The factors are mentioned below are based on the literature concerning technology acceptance model, theory of planned behavior and diffusion of innovation. The following section elaborates the rationale for the factors to be included in this research.

Perceived Usefulness

The perceived usefulness is a prominent factor which is widely used in explaining consumer behaviour in a recent M-commerce adoption model studies (Hong et al., 2008). According to Davis (1989), the perceived usefulness of a system is defined as the extent to which individuals believe that using the new technology will enhance their task performance. There is extensive research in the Information Systems and M-commerce that provides evidence of the significant effect of perceived usefulness on usage or adoption intention (Davis et al, 1989; Kim & Garrison, 2009; Khalifa & Shen, 2008). Therefore, perceived usefulness will influence user intention to accept or adopt mobile commerce. Recently numbers of empirical studies have provided support that perceived usefulness is the primary predictor of M-commerce adoption and it captures the perceived benefits associated with using mobile commerce (Wei *et al.,* 2009; Khalifa & Shen, 2008; Kim & Garrison, 2009). This construct assess the extrinsic characteristics of mobile commerce as well as shows how mobile commerce can help the users to achieve task-related goals, such as effectiveness and efficiency (Wei *et al.*, 2008). It is also believed that one who believes M-commerce to be useful and convenient will have positive attitudes towards using M-commerce.

Perceived Ease of Use

Accroding to Davis (1989), the perceived ease of use for a system is defined as the degree to which an individual believes that using a particular technology will be free of effort. The perceived ease of use has been incorporated as an important factor in adopting Mobile commerce (Davis, 1989; Li et al., 2007; Wei et al., 2009; Bhatti, 2007) Many prior empirical studies have demonstrated that perceived ease of use has a positive influence to adopt mobile commerce (Wei *et al.,* 2008; Khalifa & Shen, 2008; Kim & Garrison, 2009) Thus, perceived ease of use reflects the perceived efforts in using mobile commerce (Khalifa & Shen, 2008). A number of empirical studies tested ease of use as a predominant determinant of intention to adopt (Agarwal and Karahanna, 2000). Some found that this construct exerting a mediation effect. It is one of the major behavioral beliefs influencing user intention to technology acceptance in both original and the revised TAM models. Furthermore, one who perceives M-commerce technology to be easy to use will have positive attitudes towards using M-commerce.

Personal Innovativeness

Personal Innovativeness is defined as the willingness of an individual to try out any new information systems. The personal innovativeness is expected to have a strong influence to adopt innovation such as mobile commerce (Bhatti, 2007; Li *et al.*, 2007). Innovative individuals have been also found to be dynamic, communicative, curious, venturesome, and stimulation–seeking. It has been recognized that highly innovative individuals are active information seekers about new ideas. Given the relative infancy of the mobile services it is appropriate to test innovativeness as an influencing variable under new circumstances. A recent study shows that the personal innovativeness can predict the adoption of mobile commerce (Li *et al.*, 2007). M-commerce is in its early stages of development in Malaysia; therefore, it can be considered new technology. The person who is innovative will have more positive attitudes towards using M-commerce and more likely to adopt the new technology (Anthony, 2007).

Perceived Trust

According to Rousseau et. al. (1998), trust is defined as "a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another". Perceived Trust is an important construct which is affecting consumer behavior and it determines the success of M-commerce (Wei et al., 2009). It is an important predictor to explain the adoption of M-commerce in many existing technology adoption studies (Wei et al., 2009; Cho et al., 2007) Trust is important because it helps consumers overcome perceptions of uncertainty and risk (McKnight 2002) and helps build appropriate favorable expectations of performance and other desired benefits (Gefen, 2000). Furthermore, for trust to exist, "consumers must believe that the sellers have the

ability and motivation to reliably deliver goods and services of the quality expected by the consumers" (Jarvenpaa, 2000).

Perceived Cost
Perceived Cost is the essentials in the setting up and delivery of M-commerce. Unlike others constructs, the perceived cost is also an important consideration for consumers to decide whether to use M-commerce or not (Hong et al., 2008). Wei et al., 2009 stated that cost factor is one of the reasons that could slow down the development of M-commerce. He also mentioned that cost factor may consist of initial purchase price such as hand set fee, ongoing usage cost such as subscription fee, service fee and communication fee, and maintenance cost or upgrade cost. In this study, Perceived cost construct has been incorporated and defined as the extent to which an individual believes that using m-commerce is costly. Cost was not considered or proved by some researchers in explaining the adoption of M-commerce (Liu and Wei 2003 and Turel et.al., 2007). Li et al (2007) found that cost is believed to be an important predictor of M-commerce adoption.

Subjective norms
A person's subjective norm is determined by his or her perception that salient social referents think he/she should or should not perform a particular behavior (Ajzen and Fishbein, 1980). That person is motivated to comply with the referents even if he/she does not favor the behavior. The referents may be superiors (e.g., parents or teachers) or peers (e.g., friends or classmates) (Taylor and Todd, 1995). In theory reasoned action (Ajzen and Fishbein, 1980) and theory planned behavior (Ajzen, 1991) social influence is modeled as subjective norms on behavioral intention. Though the effect of subjective norms (SN) on intention is inconclusive, from prior research there is a significant body of theoretical and empirical evidence regarding the importance of the role of subjective norm on technology use, directly or indirectly (Taylor and Todd, 1995; Venkatesh and Davis, 2000).

Perceived Behavioral Control
According to the theory of planned behavior, perceived behavioral control is defined as individual perceptions of how easy or difficult it is to perform a specific behavior. The perceived behavior is an important determinant of behavioral intentions by reducing perception of control, confidence, and effortlessness in executing a behavior. (Pavlou *et.al.,* 2007). Pedersen (2005) argued that PBC reflects the internal and external constrains on behavior, and is directly related to both intention to use and actual use of Mobile commerce services. Behavioral control has been shown to have an effect on key dependent variables such as intention and behavior in a variety of domains (Ajzen 1991). A significant number of researches in mobile commerce have highlighted the importance of Perceived Behavioral Control by demonstrating its influence on key dependent variables (Pavlou et. Al., 2007; Perdersen, 2005; Khalifa & Shen, 2008).

Facilitating Conditions
Facilitating conditions is defined as the external environment of helping users overcome barriers and hurdles to use a new IT or M-commerce (J.C. Gu et al., 2009). Users will perceive mobile commerce service when they will feel how easy or difficult it is to perform a specific behavior.

Self-Efficacy
Self-Efficacy is an important component of perceived behavioral control and refers to an individual's belief in his/her capacity to perform a behavior Self-efficacy develops from multiple sources of information that include in particular vicarious experience and verbal persuasion. (Khalifa & Cheng 2002).

Attitude towards Use
Attitude towards using the system is defined as 'the degree of evaluative affect that an individual associate with using the target system in his job'. (Davis et al., 1989) have modified this definition somewhat. They argue that information systems will be useful in general if they 'contribute to accomplishing the end-user's purpose. According to the TRA, the most important determinant of a person's behavior is behavioral intention. Behavioral intention is defined as the strength of one's intention to perform a specified behavior. A person's intention to perform a behavior is a combination of (1) the attitude towards performing the behavior and (2) his or her subjective norm. Attitudes can be defined as the positive or negative feelings a person has towards performing a target behavior (Anthony, 2006). If a person perceives that the outcome from performing a behavior is positive, then he or she will have a positive attitude towards performing the behavior. Likewise, if a person perceives that the outcome from performing a behavior is negative, he or she will have negative attitudes towards performing the behavior.

RESEARCH METHODOLOGY

The Survey Instrument Development

A total number of 600 questionnaires were distributed and 349 usable questionnaires returned after 28 questionnaires omitted due to the missing data found. Respondents were assured of anonymity and confidentiality. A convenient sampling method is used for data collection in this research. The respondents are across multi disciplines of colleges and universities students and staff in the state of Selangor, Penang and Johor and federal territory of Kuala Lumpur were asked to participate in this study. Questionnaires were administered in the classroom and the campus. Most of the constructs included in this research are used to operationalize from existing relevant previous studies with the necessary validation and wording changes. The constructs were measured by the subjects indicating their agreement with a set of statements using a 5 point Likert scale (5-strongly agree, 4-agree, 3-neither agree nor disagree, 2-disagree, 1-strongly disagree) (Y.Li et. al., 2007). Some concepts were measured using five-point scales of bipolar adjectives (as in Pedersen, 2005)

DATA ANALYSIS AND DISCUSSION

Profile of the Respondents

The demographic profile of the surveyed respondents is presented with respect to their gender, age group, educational background, occupation, and monthly income. It is observed that male respondents are more than female which is 55.0 percent and 45.0 percent are female. It is also noted that 51.3 percent of respondents are within the age group between 21-25 years. Majority of the respondents have college or higher education level: 3.2 percent are diploma and advanced diploma, 57.6 percent have bachelors' degree and professional qualification, and 24.1 percent have postgraduate level of education. Only 15.2 percent of respondents have attained high school level education. The study is biased towards the educated respondents only. However, most of the respondents are students, which is 91.7 percent. Therefore, the monthly income of respondents is low, 80.5 percent having less than RM 1000 and no income category.

Factor Analysis

In this research, an exploratory factor analysis was conducted on the different measures to purify the instrument. A factor loading is statistically significant depends on the size of the sample. The practical significance indicates that the factor loading must be at least .50 before a variable may be assigned to a certain factor and the rules requires a minimum sample size of 100 (Janssen et al., 2008). In this research, 349 sample size is considered for factor analysis. According to Janssen et al., (2008) a factor loading is statistically significant if it is greater than or equal 0.35. Therefore, all the variables have considered for factor analysis. The data from respondents were examined using principal component method. A total of 13 factors were indentified from principal component analysis with varimax rotation, with thirteen Eigen values greater than one. The results confirmed the existence of thirteen factors with eigenvalues greater than 1.0 that accounted for 73.54 percent of the total variance. The reliability of the questionnaire was tested using Cronbach's Alpha (α) measurements. The reliability coefficients (α) of each construct or latent variable are as follows: Perceived Usefulness (0.86); Perceived ease of use (0.87); Personal Innovativeness (0.87); Perceived Trust (0.89); Perceived Cost (0.79); Subjective Norm (0.95); Social Influence (0.85); Self-Control (0.83); Perceived Behavioral Control (0.75); Facilitating condition (0.91); Self-Efficacy (0.84); Attitude Towards Use (0.88); and Intention to use M-commerce (0.86).

We also ran Bartlett's test for sphericity and Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy. KMO and Bartlett's Test is conducted to determine the meaningfulness of performing a factor analysis. A factor analysis is only significant if the variables involved are sufficient correlated to one another. Bartett's test of sphericity and Kaiser-Meyer-Olkin measure of sampling adequacy provides insight into the degree of correlation (Janssen et al., 2008). Bartlett's test of sphericity attempts to determine whether there is a high enough degree of correlation between at least a numbers of the variables included. In this case, the Kaiser-Meyer-Olkin (KMO) has a measure of 0.886, which is above the threshold of 0.5 (Field, 2005). If the Kaiser-Meer-Olkin measure of Sampling adequacy value is less than .50 then it is unacceptable for factor analysis (Janssen et al., 2008). The Bartlett's test is significant in this research with χ^2=8269.595 (p-value < .001). Therefore, the KMO value of .882 and significant of Bartlett's statistic confirm the meaningfulness of factor analysis for this research. We have also checked the anti-image correction matrix to validate factor analysis to perform.

Factor analysis which is factor extraction as well as varimax factor rotation was conducted to identify the underlying factors influencing the adoption of M-commerce Services. In this research, we have considered all the 58 items for

13 factors which is analyzed by using principal component analysis. "Total Variance Explained" shows the extent to which total variance of the observed variables is explain by each of the principal components. Initial factor extraction revealed 13 components with an absolute magnitude of eigenvalue greater than 1. The first principal component, which relate to Facilitating Conditions (FC) of m-commerce services which is the largest part of the total variance, has an eigenvalue of 17.3 amounting to 29.89% of the total variance. The second principal component, which relate to Personal Innovativeness has eigenvalue of 4.31 and accounted for a further 7.44% of the total variance. The third principal component, which relates to Perceived Trust has eigenvalue of about 3.13 and accounted for a further 5.41% of the total variance. The forth principal component, which is Perceived Ease of Use has an eigenvalue of about 2.78 and accounted for 4.80% of the total variance. The fifth principal component, which is Attitude Towards Use has an eigenvalue of about 2.62 and accounted for 4.53% of the total variance. The sixth principal component, which is Intention to Adopt M-commerce has an eigenvalue of about 2.22 and accounted for 3.83% of the total variance. The seventh principal component, which is Perceived Usefulness has an eigenvalue of about 1.94 and accounted for 3.35% of the total variance. The eighth principal component has an eigenvalue of about 1.85 and accounted for 3.19% of the total variance. The ninth principal component has an eigenvalue of about 1.48 and accounted for 2.56% of the total variance. The tenth principal component has an eigenvalue of about 1.46 and accounted for 2.51% of the total variance. The eleventh principal component has an eigenvalue of about 1.26 and accounted for 2.18% of the total variance. The twelveth principal component has an eigenvalue of about 1.16 and accounted for 2.00% of the total variance. The thirteenth principal component has an eigenvalue of about 1.04 and accounted for 1.80% of the total variance. However, all the thirteen (13) principal components together accounted for 73.54% of the total variance in the original 58 items.

Table (1) shows the six items measuring facilitating conditions construct with factors loading values ranging between .632 and .775. Personal innovativeness items with factors loadings ranges between .456 and .870. Perceived trust was measured with six items with factors loadings ranging between .452 and .827. Perceived ease of use was formed with factor loadings ranging between .648 and .805. Attitude towards use was formed with a factor loadings ranging between .759 and .811. Intention to adopt M-commerce was measured with four items with factor loadings ranging between .637 and .799. Perceived usefulness was loaded ranging between .658 and .755. Self-control was measured with factor loading ranging between .602 and .877. Self efficacy construct was loaded between .727 and .790. Social Influence construct was loaded ranging between .565 and .751. Perceived cost was loaded ranging between .513 and .851. A Subjective norm was loaded with ranging between .739 and .768. Three items relevant to perceived behavioral control was loaded with a factor loading between .526 and .666. The factor loading table also shows that all items loaded fairly on to each respective factor. There are 13 factors have indentified from 58 observed variables.

CONCLUSION

According to Wei et al., 2009, M-commerce is relatively immature and early stage in Malaysia. Therefore, in order to attract more users and encourage the use of m-commerce in Malaysia, it is believed that merely introducing m-commerce to Malaysian may not be sufficient, the service providers and vendors may focus on the improvement of constructs or attributes that affecting user intention to use m-commerce (Wong and Hiew, 2005). Since the Perceived usefulness found to be one of the critical factors, the service providers should develop the content and applications which users will find valuable and usable to keep up with their fast-paced life style. Design of the services and contents should be focused on the important and unique characteristics of m-commerce, such as ubiquity, personalization and so on. Besides, the usefulness of m-commerce, the findings also reflects the overwhelming importance of trust in m-commerce. This implies that trust building between the customers and vendors should be another major concern for the service providers while improving the usefulness of the system. Without proper security and privacy protection, users will not use the services provided by m-commerce. Perceived ease of use is found to be important factor to influence the consumer intention to use m-commerce. Hence, the main attention of management should be focused on development of usefulness of the system, trust building and cost reduction. Perceived cost is also an important factor; therefore, this study suggests that the creative promotional and pricing strategies, including cost reduction should be implemented to attract more price-conscious customers. The social influence should be taken into account to encourage the adoption of m-commerce in Malaysia too. For instance, the service providers should attract customers via various social networks and channels, such as word of mouth and informal seminars (Lu et al., 2008). Facilitating condition was an important determination of consumer behavioral control towards intention to use, therefore, it is necessary to improve facilitating condition of mobile devices and m-commerce application especially, connection speed, secure systems, and easy transaction method.

This research paper has tested all 13 factors for factor analysis and future research is needed to further develop the model outlined in this paper.

Table (1): Measurement properties for multi-item construct (Factor Loadings)

	Factors												
	1	2	3	4	5	6	7	8	9	10	11	12	13
FC5	.776												
FC6	.729												
FC2	.708												
FC3	.678												
FC4	.640												
FC1	.632												
PI4		.870											
PI1		.827											
PI2		.747											
PI3		.744											
PI5		.722											
PI6		.456											
PT3			.827										
PT2			.780										
PT6			.676										
PT1			.667										
PT4			.556										
PT5			.452										
PEU3				.805									
PEU4				.741									
PEU2				.721									
PEU5				.655									
PEU1				.648									
ATU4					.811								
ATU2					.801								
ATU1					.786								
ATU3					.779								
ATU5					.759								
IAM3						.799							
IAM2						.792							
IAM1						.724							
IAM4						.637							
PU2							.755						
PU4							.718						
PU5							.715						
PU1							.706						
PU3							.658						
SC4								.877					
SC1								.817					
SC3								.796					
SC2								.602					
SE2									.790				
SE1									.741				
SE3									.727				
SI2										.751			
SI1										.723			
SI3										.648			
SI4										.565			
PC2											.851		
PC3											.817		
PC1											.687		
PC4											.513		
SN2												.768	
SN1												.754	
SN3												.739	
PBC1													.666
PBC2													.663
PBC3													.526

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a Rotation converged in 8 iterations.

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