

ADOPTION OF MOBILE COMMERCE IN MALAYSIA: AN EXPLORATORY STUDY ON EXTENSION OF THEORY OF PLANNED BEHAVIOUR

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Mobile Commerce also known as M-commerce is thought to be the next big phase in technologically dependent society after following E-commerce era. Mobile commerce has been a huge success in terms of individuals' adoption in some markets like Korea, Hong Kong, and Japan while surprisingly, not as flourishing in others. However, its adoption and level of use is low in Malaysia compared to others nations such as Korea, Singapore and Japan. Prior studies have been conducted using traditional adoption models and theories (such as TAM) that mainly focus on technology aspects. This study aims to identify some factors that affect the adoption of M-commerce in Malaysia by developing M-commerce adoption Model based on traditional technology model such as Theory of Reason Action (TRA), Theory of Planned Behavior (TPB), Technology Acceptance Model (TAM) and Diffusion Innovation theory (DOI). The findings revealed that Perceived Usefulness, Perceived Ease of Use, Perceived trust are positively associated with consumer attitude towards use M-commerce which is affecting consumer intention to use. Personal innovativeness and perceived cost were found to have insignificant effect on consumer attitude towards use. In addition, Social Influence and self-control are affecting subjective norm which has significant affect consumer intention to use m-commerce. Self-efficacy and facilitating condition are also affecting perceived behavioral control which has strong relationship with consumer intention to use m-commerce. The findings made a contribution, allowing us to understand the factors that can affect the adoption of m-commerce. The study successfully extended TPB and TAM model with Subjective norm and personal behavioral control to represent a model for the adoption of m-commerce in Malaysia.

Keywords: Mobile commerce, Theory of Planned Behavior, Adoption of innovation, Malaysia.

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Introduction

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. Considerable advances have been made in the telecommunications and related industries to deliver content, applications and services to consumers using mobile telephones and other wireless devices (Charles, 2007). 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.

Research Motivation

The use of mobile device has become wide spread and continues to grow significantly each year. The mobile cellular market is the fastest growing telecommunication market and is unequalled 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 (Measuring the Information Society, 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. The financial estimate of the value of M-commerce industry is also growing positively.

Research Problem

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 study the adoption of M-commerce in Malaysian context. The specific objectives of this research are:

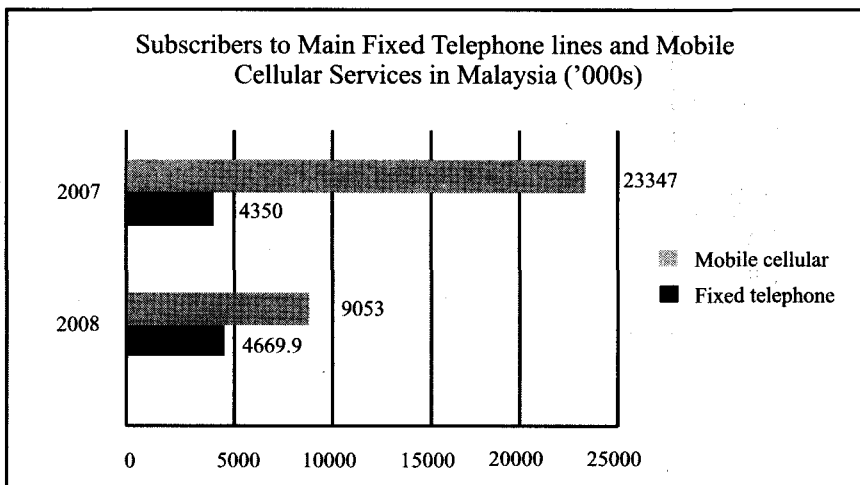
- To investigate the factors affecting the adoption of M-commerce by consumer (User) in Malaysia.
- To test empirically the proposed adoption model's constructs for M-commerce in Malaysia.

LITERATURE REVIEW

M-commerce in Malaysia

According to ITU (2009), Malaysia had 23.3 million mobile subscribers in 2007 with a growth rate of 20.9%. In the time span of 5 years marked between year 2002 and year 2007, number of mobile subscribers has increased more than two times reaching 23.3 million. On the other hand, fixed line subscribers have decreased by 319000 during that period (Figure 1).

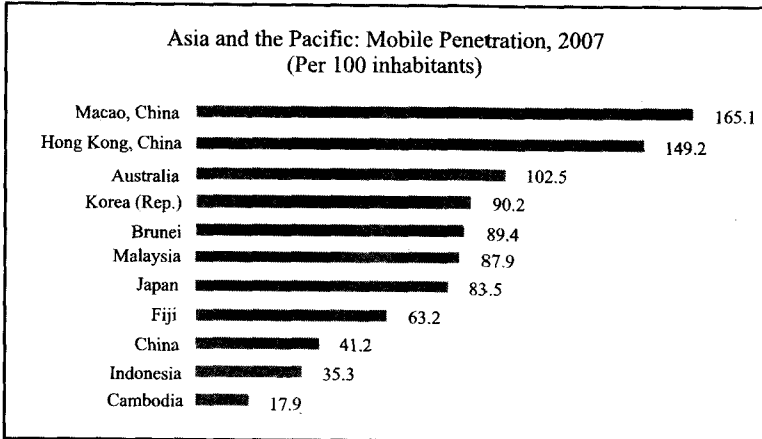
Figure 1: Fixed Telephone lines and Mobile subscribers in Malaysia



Source: ITU World Telecommunication Indicators Database (2009)

In Figure 2 shows Mobile penetration in Malaysia is approximately 87.9% which is witnessed a high degree of mobile penetration rate compared to others Asian and the pacific countries.

Figure 2: Mobile Penetration in Asia and the Pacific, 2007



Source: ITU World Telecommunication Indicators Database (2009)

M-commerce is still very much in an infancy stage in Malaysia. Consumers in Malaysia and Singapore are the most open to using their mobile devices to make monetary transactions, according to a new study of 14 countries. Slightly more than a quarter of the 872 respondents in Malaysia indicated that they would consider using a mobile phone or PDA to pay bills, perform banking transactions or shop online -the highest percentage in all the countries (Unisys Security Index, 2008).

Adoption of M-commerce Study in the Literature:

Table 1 summarized the most recent studies which are indentified factors influencing the adoption of M-commerce, model used and their results.

Table 1: Factors influencing the adoption of M-commerce in the current Literature

Author	Model /Framework Studied	Factors- Variables/ Constructs	Results/ Comments
Y. Li, Z.TFU and H.Li (2007)	Technology Acceptance Model (TAM)	Perceived Usefulness, Perceived Ease of Use, Personal Innovativeness, Compatibility, Perceived Reliability, Cost	All six variables are significantly affected user attitude to adopt of M-commerce and Key factors for influencing uptake and to offer more effective, relevant and successful M-commerce products.
Wei <i>et al.</i> (2009)	Technology Acceptance Model (TAM)	Perceived Usefulness, Perceived Ease of Use, Social Influence, Perceived Cost and Trust	The findings revealed that PU, SI, perceived cost and trust are positively associated with consumer IU m-commerce in Malaysia. In addition, PEOU and trust were found to have an insignificant effect on consumer IU m-commerce in Malaysia

Lee K.S. Lee HS, and Kim S. Y. (2007)	Technology Acceptance Model (TAM)	Perceived Risk, Trust (Online), Perceived Usefulness,	In this research found that both perceived usefulness and trust had important effects on the adoption behavior of mobile banking. Consumer's trust in and the perceived usefulness of the mobile banking service had direct effects on their adoption behavior. Perceived risk had an indirect effect on adoption behavior even though it had an insignificant direct relationship with adoption behavior.
Khalifa M. and Shen K.N. (2008)	Technology Acceptance Model (TAM) & Theory of Planned Behavior (TPB)	Perceived Usefulness, Ease of use, Subjective norms, Self-efficacy, and Intention to adopt	The empirical results provide strong support for the integrative approach, shedding light on the significance and relative importance of specific technological characteristics. The theoretical and empirical implications of these results are discussed.
Khalifa M. & Shen K.N. (2006)	Technology Acceptance Model (TAM) & Theory of Planned Behavior (TPB)	Subjective Norm, Perceived Usefulness, Ease of Use, and Self-efficacy	The empirical results indicated an important role of perceived usefulness and self-efficacy in influencing intentions to adopt m-commerce, both subjective norms and self-efficacy is confirmed as important additions to TAM.
Tariq Bhatti (2007)	Technology Acceptance Model (TAM) & Theory of Planned Behavior (TPB) Innovation diffusion Theory (IDT)	Subjective Norm, Perceived Usefulness, Perceived Ease of Use, Personal Innovativeness, Perceived Behavioral Control	In this studies, Subjective Norm, Perceived Usefulness, Perceived Ease of Use and Behavioral control are strong determinants of intention to adopt M-commerce.
Chew A.A. (2006)	Technology Acceptance Model (TAM) & Theory of Reasoned Action (TRA)	Perceived Usefulness, Perceived Ease of Use, Perceived Trust /Privacy Innovativeness, Subjective Norm	The findings presented in this study were the additional paths linking perceived usefulness, perceived ease of use, perceived trust and privacy, and innovativeness to subjective norm. The influence of those four antecedent constructs on the subjective norm make the subjective norm construct an even greater determinate in the behavioral intention to adopt M-Commerce.
Per E. Pedersen (2002)	Technology Acceptance Model (TAM) & Theory of Planned Behavior (TPB), Theory of Reasoned Action (TRA)	User friendliness, Usefulness, Attitude towards use, Interpersonal influence, Self-control, Subjective Norm, Self-efficacy, Facilitating Conditions, Behavioral Control, Actual Use, Intention to use.	The traditional models of ICT adoption may be applied improving our understanding of the adoption of these services. However, studies of the use and adoption of mobile services indicate that traditional adoption models need to be extended and modified when applied to mobile services.
Mohamed Khalifa & Sammi K.N. (2002)	Theory of Planned Behavior (TPB)	Subjective Norms, Perceived Behavioral Control, Trial, Communication, Observation, Exposure	Trial, communication and observation explained 67% of the variance in exposure. The effect of trial and communication on exposure was found to be significant.
Paul A. Trig L. & Angelika D. (2007)	Theory of Planned Behavior (TPB)	Attitude towards use Subjective Norms, Perceived Behavioral Control. Intention to use	This study views M-commerce adoption as a process consisting of three distinct, yet interrelated behaviors: Getting information, Giving Information, and purchasing product and services using mobile devices. These three behaviors are integrated using the theory of planned behavior, ease behavioral intention is predicted through its attitude, subjective norm, and perceived behavioral control

THEORETICAL DEVELOPMENT AND RESEARCH MODEL

Technology Adoption Models

Several behavioral models for explaining the adoption and usage of information technology have been proposed in the IS literature. These models include the Theory of Reasoned Action, the Technology Acceptance Model, the Theory of Planned Behavior, the Decomposed Theory of Planned Behavior, and the Diffusion of Innovation Theory. In all of these models, the beliefs and attitude of the individual towards a certain behavior are important determinants of the individual's intention towards the adoption of that behavior, for example, using M-commerce. The below sections discuss these model.

Diffusion of innovations theory by Roger is a multidisciplinary theory frequently applied in IS adoption research. The theory determines five innovation characteristics which affect the adoption of the innovation: relative advantage, complexity, compatibility, trialability, and observability (Rogers, 1995).

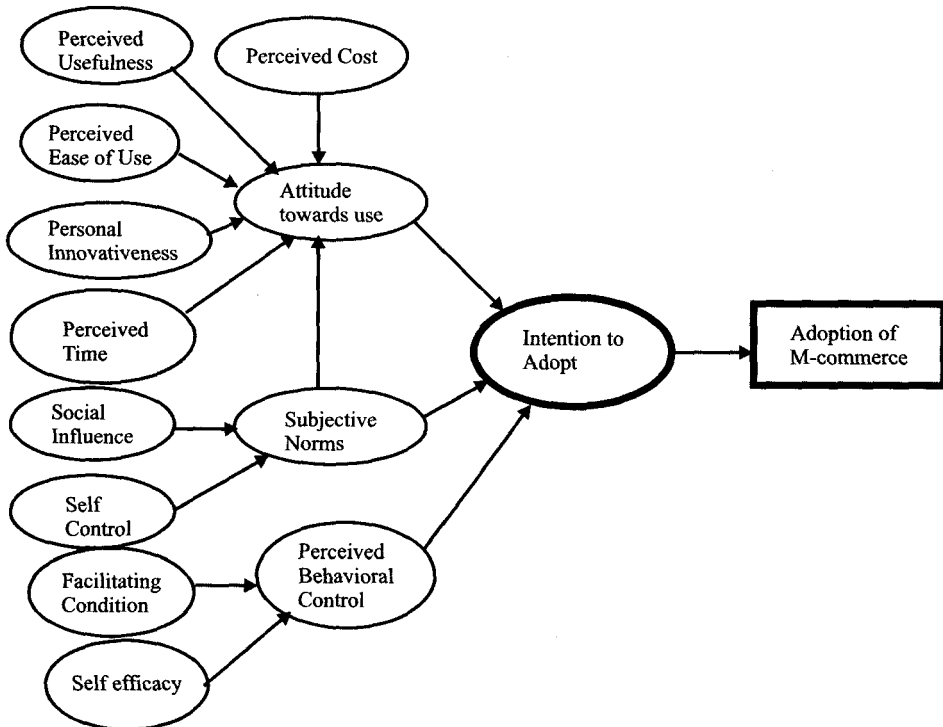
Technology acceptance model (TAM) is an Information systems theory that models how users come to accept and use a technology. The TAM was developed to predict end-user acceptance of information systems within organizations (Davis, Bagozzi and Warshaw, 1989). TAM originates from theory of reasoned action (TRA) (Fishbein and Ajzen, 1975), and proposes a behavioral model where two beliefs, perceived ease of use and perceived usefulness, are the primary predictors of use intentions. TAM postulates that these two beliefs determine the attitude toward using the system and that attitude, together with perceived usefulness, determines use intention. Use intention then predicts the actual system use.

The Theory of Planned Behavior (TPB) is an extension of TRA theory by Ajzen (1985) to study the adoption intention of people on innovation. Similarly to TRA, TPB accept an additional construct, Perceived Behavioral Control has been added. In fact, TPB was derived with the knowledge from TRA, namely that the behavior of a person is affected by his or her intention to perform something. TPB defines intentions in terms of three beliefs structure: attitude which is predisposition towards a particular object, event, or act that is subsequently manifested in actual behavior, and behavior control which is perception of internal or external constrains affecting the behavior (Battachjee, 2000). TPB postulates that individual' behavior results first from the intention to perform a given behavior. This intention is in turn caused by the three central factors described by Ajzen (1991): 1. Attitude towards behavior, 2. Subjective norms on the perception an individual has about normative beliefs of other norms related to the behavior, and 3. Perceived behavioral controls or the factors believed to be constraining or facilitating an individual's behavior.

Proposed Research Model

This research model is constructed based on the literature concerning technology acceptance model, theory of planned behavior and diffusion of innovation; and presents an integrated model to explore the factors which influence consumer usage intention of mobile commerce.

Figure 3: Proposed M-commerce Adoption Model (MCAM)



Conceptualization and Hypothesis Development

The rest of this section elaborates on the rationale for the constructs to be included in our research model and the hypothesized relationship among these constructs.

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 for the proposition 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.

H₁ Perceived Usefulness has direct influence on attitude towards use M-commerce.

Perceived Ease of Use

According 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 few 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.

H₂ Perceived Ease of Use has direct influence on attitude towards use 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). Thus, the hypothesis is constructed as:

H₃ Personal Innovativeness has direct influence on attitude towards use M-commerce.

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) Researchers found that perceived risk is influenced by trust towards the transaction and trust works as a mechanism for reducing consumer’s perceived risk in Internet shopping (Lee and Kim, 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). Trust is not only an important factor to E-Commerce, “trust is emerging as a potentially important antecedent of IT adoption” (Gefen, 2002). Because of this, it is hypothesized that one who trusts using M-commerce services will have positive attitudes towards using M-commerce.

H₄ Perceived Trust has direct influence on attitude towards use M-commerce.

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. Total cost is regarded as equipment cost, access cost and transaction cost. They are the essentials in the setting up and delivery of M-commerce. Compared with traditional business, users must be able to meet these new expenses. If they cannot make up the new expense from increased profits to obtain a net financial benefit, they will not be potential and loyal users. Researchers recommend M-commerce providers should consider reducing the cost which has a negative effect on the M-commerce adoption (Constantinides 2002; Eastin 2002). Therefore, the following hypotheses can be deduced:

H₅ Perceived Cost has negative effect on consumer attitude towards use M-commerce.

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). The importance of subjective norms on intention to adopt mobile commerce is revealed in studies that are based on the information systems perspective. The relative influence of subjective norm on intentions is expected to be stronger for potential users with no prior experience since they are more likely to rely on the reactions of others in forming their intentions (Hartwick and Barki, 1994). If mobile commerce services are believed hard to learn and hard to use, unavoidably it will more or less affect a member's intention toward adopting. The purpose is to predict whether social influence is an important consideration in people's intention to use M-commerce.

H₆ Social Influence has direct influence on Subjective Norms

H₇ Self-Control has direct influence on Subjective Norms

H₈ Subjective Norms has direct influence on attitude towards use M-commerce.

H₉ Subjective Norms has direct influence on intention to adopt M-commerce.

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 constraints 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; Pedersen, 2005; Khalifa & Shen, 2008).

Taylor and Todd (1995) found a similar pattern of results. However, the effect of control on intention over and above what is explained by the TAM constructs of perceived ease of use and perceived usefulness is not known. As mentioned earlier, the final model of TAM excludes the attitude construct and helps understand the explanatory power of perceived ease of use and perceived usefulness on intention. Another point related to control is worthy of note-in IS research, perceived ease of use has been seen to be a determinant of attitude consistent with TPB (Davis *et al.* 1989, Taylor and Todd 1995), while internal and external control have been related to perceived behavioral control in TPB. The current work relates control to perceived ease of use, thus departing from the basic framework of TPB. However, such "crossover effects" have been observed in prior research (Venkatesh and Davis 1996).

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 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).

- H₁₀ Facilitating Condition has direct influence on Perceived Behavioral Control.
- H₁₁ Self Efficacy has direct influence on Perceived Behavioral Control.
- H₁₂ Perceived Behavioral Control has direct influence on intention to adopt M-commerce.

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. Another perspective to the 'usefulness' construct is that an information system is useful 'to which a potential adopter views the innovation as offering value over alternative ways of performing the same' (Agarwal and Prasad, 1999). 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.

- H₁₃ Attitude towards use has direct influence on intention to adopt M-commerce.

RESEARCH METHODOLOGY

The Survey Instrument Development

The data for this research was collected from the field using a questionnaire survey during January to March 2010. The instrument gathered information about the demographic characteristics of respondents, and the research constructs. Most of the constructs in the model are used to operationalize from existing relevant previous studies with the necessary validation and wording changes being made. To measure the constructs, a questionnaire was designed where each construct consists of multiple items. In the questionnaire, 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).

Selection of Measures

In order to ensure measurement reliability in the operationalization of the constructs, we tried to choose items that had been validated in previous research. This research model contains 13 constructs are well founded in either the adoption literature or the domestication literature. Consequently, the construct validity of these concepts is considered acceptable.

Perceived Usefulness was measured using five items indicating the original dimensions of time saving, improvement, efficiency, usefulness and quality (Davis 1989). Because the setting of mobile commerce services is an everyday life situation, the original items of Davis had to be converted into "everyday life" terms. The measurement of Perceived usefulness also found Pedersen, 2005. Perceived ease of use was measured using five items developed from adapting the original items of Davis et al. (1989) to our setting. Similar operations are found also in Taylor and Todd (1995) and in Pedersen (2005). Attitude towards use was measured using five bipolar adjectives indicating different aspects of the attitude towards use. The items are very similar to those used by Davis (1989), Taylor and Todd (1995), Battacherjee (2000) and Pedersen (2005). Consequently, little adjustment was necessary to adapt the original measures used by studies applying the TAM or TPB model to our setting. Personal Innovativeness was measured adapting from Pedersen (2005) innovativeness measure to our setting of mobile commerce. Pedersen (2005) has also applied this innovativeness measure to Mobile services as a measure to identify innovators, majority users and laggards. The measure has also been used by Agarwal and Prasad (1998) studying the innovativeness of Internet users. Perceived Trust was measured adapting from Anthony (2006) to our setting of mobile commerce. Anthony (2006) has also applied six statements to respondents rating their perceptions of trust in using M-Commerce. Three of the statements assessed the respondents' level of trust. To ensure consumer trust during transactions, it is important to have transactions and payments that are handled both smoothly and securely (Gefen 2002). Perceived Cost is measured adapting from Wei et al. (2009) to our setting of mobile commerce. The Author has applied 3 statements. We have adopted two statements and another two statements we make our own. The measure of Social Influence was based on three sources of influence - media, society and profession. Thus it includes, integrates and extends the measures used by Battacherjee (2000) and Taylor and Todd (1995) and Pedersen (2005). Self-control is measured by items reflecting some of the indicators of self-control such as resisting group pressure, superior influence and group conformity. It is based upon a subsection of the self-control measure suggested by Rosenbaum (1980) and Pedersen (2005). Subjective norm was measured using three items almost identical to the items used by Mathieson (1991) and Battacherjee (2000). A somewhat simpler version of the measure was used by Venkatesh and Davis (2000) and

Pedersen (2005). The measure of facilitating conditions is designed in the same way, and was based upon Pedersen (2005). It also extends these measures with specific items related to the infrastructure of mobile services and the facilitation of service usage by the user's provider or operator. The measure of Perceived behavioral control is almost identical to the measure applied by Battacherjee (2000) and Taylor and Todd (1995) and Pedersen (2001). The self-efficacy measure is based upon Battacherjee (2000), Taylor and Todd (1995) and Pedersen (2005). Finally, intention to use and actual use was measured by asking to indicate whether they had used any of these services and whether they intended to use any of these services within the next six months. To comply more fully with the measures of adoption research, intention to use was also measured with a three item scale adapted from Battacherjee (2000) and Pedersen (2005).

In addition to the concepts of our adoption model, we measured gender, age, education, occupation and monthly income. Age was measured using a five point scale ranging from less than equal 20 years to 51 years and above. Education was measured using a four point scale. Occupation and monthly income was measured using a five point scale. Mobile Internet, type of mobile phone, usage experience, frequency of use and online transaction use also measured in this study.

Sampling Design and Data collection Procedures

A random sampling method is used for data collection in this research. The respondents are across multi disciplines of colleges and universities students and staffs in the state of Selangor and federal territory of Kuala Lumpur were asked to participate in this study. The main reasons for selecting students and staff from universities are as follows:

First, the high degrees of mobile devices penetration rates among colleges and universities student in Kuala Lumpur. Student sample belong to the Cellular Generation (ComScore, 2006). Students were a key demographic segment that mobile advertisers target, and they familiar with mobile devices as early adopters and heavy users. Second, it is predicted that m-commerce growth will be driven by the young adults and professional. M-commerce growth is likely to come from 20-35 years old consumers (Consumer Affairs, 2004). According to Pew Internet and American Life Project , the users who utilize the most non-voice mobile services such as SMS, email, downloading music, or logging on the Internet are 18 to 29 years old (Pounds, 2008).

Although, it is difficult to generalize to the general population from a student sample, but this sample can be a good surrogate for professionals (King & He, 2006). Therefore, the use of a student sample is somewhat appropriate for an m-commerce study in that it can present young people and can be applied to the adoption behavioral research. Third,

students are heavy internet users and are familiar with making purchase online (Feller, 2003). An internet shopping study conducted by Lee and Tan (2003) concluded that 56% of the Internet users are in the 15-29 years of age groups. According to (Modahl, 2000) student consumers are an appropriate sample because they represent the younger end of the market for online buying (M-commerce) that cyber marketers want to attract owing to their long-term potential as affluent customers. Fourth, students are typically homogeneous that permit the precise prediction and a strong test of theories (Schepers & Wetzels, 2007). Fifth, students are more technology-driven or technology-ready and younger people are more easily influenced by the technology characteristics and peer opinions than non-students and elder users. M-commerce is a new trend and innovative project and services, therefore, students sample are appropriate in this study.

Self-administered survey method is used in the study. A total number of 250 questionnaires were distributed randomly and 190 usable questionnaires returned after 11 questionnaires omitted due to the missing data found. Respondents were assured of anonymity and confidentiality. The participants were given a nice pen as a gift of appreciation and they were voluntary. The response rate is 76%. The sample is consisting both male and female. Ages ranged from less than or equal to 20 to 65 years. Questionnaires were administered in the classroom and the campus.

Data Analysis Technique

Two-stage data analysis approach has been applied in this research - First, the cronbach's alpha and factor analysis were used to test whether the constructs possessed sufficient validation and reliability. Second, the structural model that best fit the data has identified, and the hypotheses were tested between constructs using this model (Anderson and Gerbing, 1988). Descriptive statistics, scale reliability analyses, factor analysis and regression analysis were performed in SPSS. Before sending the questionnaire to the mass for data collection we conducted pilot study. 25 questionnaires are distributed among 5 PhD holders, 10 Masters and 10 undergraduate students. 21 questionnaires were returned. On the basis of pilot study some questions are modified.

DATA ANALYSIS AND DISCUSSION

Profile of the Respondents

The demographic profile of the surveyed respondents is presented in table 2, with respect to their gender, age group, educational background, occupation, and monthly income. The total collected sample for the survey consists of 190 respondents. It is observed that majority of the respondents are male which is 67.4%, and 32.6 percent are female. It is

Table 2: Demographic Profile of the Respondents

Variables	Classification	Frequency	Percentage	
Gender	Male	128	67.4	
	Female	62	32.6	
	Total	190	100%	
Age Group	Less than equal 20 years	38	20.0	
	21-25 years	90	47.4	
	26-30 years	31	16.3	
	31-35 years	15	7.9	
	36-40 years	9	4.7	
	41 years and above	7	3.7	
	Total	190	100%	
	Educational Background	Higher Secondary and Lower Diploma and Advanced Diploma	29	15.3
Bachelors Degree and Professional Qualification		106	55.8	
Master Degree		28	14.7	
PhD Degree		21	11.1	
Total		190	100%	
Occupation		Student	174	91.6
		Academician	8	4.2
	Administrative/Support Staff	2	4.2	
	Upper/Middle Management	1	0.5	
	Businessman	3	1.6	
	Others	2	1.1	
	Total	190	100%	
Monthly Income	No Income	27	14.2	
	Less than RM 1000	122	64.2	
	RM 1001- RM 2000	14	7.4	
	RM 2001- RM 4000	17	8.9	
	RM 4001- RM 6000	5	2.6	
	RM 6001-RM 10000	4	2.1	
	RM 10001- RM 15000	1	0.5	
	Total	190	100%	

also noted that 47.4% of respondents are with in the age group between 21-25 years. Majority of the respondents have college or higher education level: 3.2 % are diploma and advanced diploma, 55.8% have bachelors' degree and professional qualification, and 25.8% have postgraduate level of education. Only 15.3% 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 91.6 percent. Therefore, the monthly income of respondents is low, 78.2% having less than RM 1000 and no income category

Reliability and Factor Analysis

The reliability of the questionnaire was tested using Cronbach's Alpha (α) measurements. The reliability for each construct is shown in table (5). The reliability coefficients (α) of each construct or latent variable are as follows: Perceived Usefulness (0.91); Perceived ease of use (0.87); Personal Innovativeness (0.84); Perceived Trust (0.87); Perceived Cost (0.79); Subjective Norm (0.87); Social Influence (0.82); Self-Control (0.78); Perceived Behavioral Control (0.84); Facilitating condition (0.89); Self-Efficacy (0.79); Attitude Towards Use (0.88); and Intention to use M-commerce (0.86).

Table 5: Cronbach's Alpha for constructs

Factors	Mean	Std. Deviation	Cronbach's Alpha, α
Intention to use M-commerce	3.1829	.80699	0.86
Perceived Usefulness	3.4884	.90792	0.91
Perceived Ease of Use	3.4147	.78275	0.87
Personal Innovativeness	3.0281	.80641	0.84
Perceived Trust	3.2307	.81424	0.87
Perceived Cost	3.3211	.75125	0.79
Subjective Norm	3.1298	.86379	0.87
Social Influence	3.0711	.80068	0.82
Self-Control	3.2079	.77507	0.78
Perceived Behavioral Control	3.2684	.83353	0.84
Facilitating condition	3.1649	.77966	0.89
Self-Efficacy	2.9947	.89053	0.79
Attitude Towards Use	3.5242	.78622	0.88

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. Bartlett'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 0.882, which is above the threshold of 0.5 (Field, 2005). The Bartlett's test is significant in this study with $\chi^2=8269.595$ (p -value $< .001$). Therefore, the KMO value of .882 and significant of Bartlett's statistic confirm the meaningfulness of factor analysis for this study.

Table 6: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.882
Bartlett's Test of Sphericity	Approx. Chi-Square
	8269.595
	Df
	1653
	Sig.
	.000

Table 7: Mean, Standard Deviation and Factor Loadings for Variables

Factors	Scales Items	Mean	Std. Deviation	Factor Loadings
Perceived Usefulness	PU1	3.68	1.140	.716
	PU2	3.34	1.015	.742
	PU3	3.41	1.018	.741
	PU4	3.44	1.025	.797
	PU5	3.56	1.061	.747
Perceived Ease of Use	PEU1	3.64	.975	.746
	PEU2	3.43	.961	.670
	PEU3	3.47	.946	.705
	PEU4	3.29	1.007	.689
	PEU5	3.24	.932	.725
Personal Innovativeness	PI1	2.96	1.088	.674
	PI2	3.26	1.091	.582
	PI3	2.88	1.063	.764
	PI4	2.91	1.089	.697
	PI5	2.83	1.072	.680
	PI6	3.33	1.079	.717

Perceived Trust	PT1	3.09	.991	.735
	PT2	3.26	1.005	.819
	PT3	3.17	.990	.742
	PT4	3.16	1.120	.738
	PT5	3.45	1.091	.656
	PT6	3.25	1.018	.606
Perceived Cost	PC1	3.37	.960	.714
	PC2	3.44	.962	.737
	PC3	3.32	.962	.769
	PC4	3.16	.948	.594
Subjective Norm	SN1	3.12	.938	.724
	SN2	3.12	.980	.799
	SN3	3.15	.972	.763
Social Influence	SI1	3.18	.916	.623
	SI2	3.17	1.082	.699
	SI3	2.86	1.032	.748
	SI4	3.07	.926	.710
Self-Control	SC1	3.04	.999	.655
	SC2	3.17	.967	.629
	SC3	3.26	1.015	.740
	SC4	3.36	.981	.769
Perceived Behavioral Control	PBC1	3.33	.948	.743
	PBC2	3.23	.937	.701
	PBC3	3.25	.969	.716
Facilitating condition	FC1	3.14	.923	.670
	FC2	3.13	.973	.620
	FC3	3.19	1.038	.676
	FC4	3.16	.990	.745
	FC5	3.22	.932	.751
	FC6	3.15	.933	.719
Self-Efficacy	SE1	2.97	1.071	.774
	SE2	3.01	1.089	.744
	SE3	3.00	1.003	.715
Intention to Adopt M-commerce	IAM1	3.11	.879	.762
	IAM2	3.13	.908	.743
	IAM3	3.09	.936	.774
	IAM4	3.41	1.107	.686
Attitude towards Use	ATU1	3.43	.933	.722
	ATU2	3.48	.889	.764
	ATU3	3.56	.922	.669
	ATU4	3.55	1.016	.720
	ATU5	3.59	.964	.779

Correlation Analysis:

Pearson correlation analysis has conducted to determine the relationship between the construct or latent variables. In the questionnaire, each construct has been measured by multiple items. Therefore, the average score of the multi-items for a construct has computed and used for further analysis such as correction and multiple regression analysis. (Wei et al., 2009) As cited in Wei et al. 2009 and Wong and Heiw, 2008, the correlation coefficient value range from 0.10 to 0.29 is considered weak, from 0.30 to 0.49 is considered medium and from 0.50 to 1.0 is considered strong. However, Field (2005) indicated that Multicollinearity problem may occurred if correlation coefficient go beyond 0.8. In this study, the highest correlation coefficient is 0.749 which is less than 0.8, so there is no multicollinearity problem in the research.

Table 9: Pearson correlation coefficient between latent variables

	IAM	PU	PEU	PI	PTP	PC	SN	SI	SC	PBC	FC	SE	ATU
IAM	1												
PU	.422**	1											
PEU	.398**	.749**	1										
PI	.520**	.481**	.457**	1									
PTP	.503**	.496**	.455**	.583**	1								
PC	.238**	.210**	.193**	.231**	.261**	1							
SN	.515**	.392**	.387**	.502**	.542**	.354**	1						
SI	.510**	.394**	.377**	.568**	.561**	.348**	.663**	1					
SC	.554**	.462**	.492**	.475**	.535**	.261**	.476**	.577**	1				
PBC	.508**	.428**	.480**	.433**	.483**	.259**	.492**	.518**	.756**	1			
FC	.571**	.324**	.396**	.383**	.523**	.215**	.581**	.561**	.580**	.718**	1		
SE	.477**	.244**	.217**	.334**	.345**	.144*	.490**	.490**	.377**	.404**	.556**	1	
ATU	.211**	.371**	.383**	.240**	.361**	.137	.217**	.215**	.250**	.287**	.259**	.145*	1

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

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

Most of the associated pairs of variables were significant at the level 0.01, except for the relationship between perceived cost and self-efficacy and attitude towards use and self-efficacy were found significant at the level 0.05. Only the relationship between perceived cost and attitude towards use found to be not significant. However, all the

hypothesized relationships developed were found to be statistically significant at level $p < 0.01$.

Pearson correlation coefficients were computed in order to test the relationships between each factor. The correlation coefficient between perceived usefulness and attitude towards use m-commerce was found to be $r = 0.371$ with $p = 0.000$ which is significant at the 0.01 level. Therefore, the research hypothesis H_1 is accepted. The correlation coefficient between perceived ease of use and attitude towards use m-commerce was found to be $r = 0.383$ with $p = 0.000$ which is significant at the 0.01 level. Therefore, the research hypothesis H_2 is accepted. The correlation coefficient between personal innovativeness and attitude towards use m-commerce was found to be $r = 0.240$ with $p = 0.000$ which is significant at the 0.01 level. Therefore, the research hypothesis H_3 is accepted. The correlation coefficient between perceived trust and attitude towards use m-commerce was found to be $r = 0.361$ with $p = 0.000$ which is significant at the 0.01 level. Therefore, the research hypothesis H_4 is accepted. The correlation coefficient between perceived cost and attitude towards use m-commerce was found to be $r = 0.137$ with $p = 0.060$ which is not significant at the 0.05 level. Therefore, the research hypothesis H_5 is not accepted. The correlation coefficient between social influence and Subjective norms which lead towards use m-commerce was found to be $r = 0.663$ with $p = 0.000$ which is significant at the 0.01 level. Therefore, the research hypothesis H_6 is accepted. The correlation coefficient between social influence and subjective norms which lead towards use m-commerce was found to be $r = 0.476$ with $p = 0.000$ which is significant at the 0.01 level. Therefore, the research hypothesis H_7 is accepted. The correlation coefficient between subjective norms and attitude towards use m-commerce was found to be $r = 0.217$ with $p = 0.003$ which is significant at the 0.01 level. Therefore, the research hypothesis H_8 is accepted. The correlation coefficient between subjective norms and intention to adopt m-commerce was found to be $r = 0.515$ with $p = 0.000$ which is significant at the 0.01 level. Therefore, the research hypothesis H_9 is accepted. The correlation coefficient between facilitating condition and perceived behavioral control towards use m-commerce was found to be $r = 0.718$ with $p = 0.000$ which is significant at the 0.01 level. Therefore, the research hypothesis H_{10} is accepted. The correlation coefficient between self-efficacy and perceived behavioral control towards use m-commerce was found to be $r = 0.404$ with $p = 0.000$ which is significant at the 0.01 level. Therefore, the research hypothesis H_{11} is accepted. The correlation coefficient between perceived behavioral control and intention to adopt m-commerce was found to be $r = 0.508$ with $p = 0.000$ which is significant at the 0.01 level. Therefore, the research hypothesis H_{12} is accepted. The correlation coefficient between attitude towards use and intention to adopt m-commerce was found to be $r = 0.211$ with $p = 0.030$ which is significant at the 0.01 level. Therefore, the research hypothesis H_{13} is accepted.

Multiple Regression Analysis

Multiple regression analysis was used to test the hypotheses. Multiple regression analysis is applied to analyze the relationship between a single dependent variable and several independent variables (Wei et al., 2009). Multiple regression analysis was therefore selected as it is viewed as an appropriate method for this study. The summary of results analysis is shown in table 10.

In TAM part of the model, the F-statistics produced ($F=51.561$) was significant at $p<.01$, thus confirming the fitness for the model. Therefore, there is a statistically significant relationship between the adoption factor attitude towards use and the consumer intention to adopt or use m-commerce. The coefficient of determination R^2 was 46.9 percent which is significantly account consumer intention to adoption m-commerce. Subjective norms part of the model, $F=77.383$ which is significant at $p<0.01$ and R^2 was 45.3 percent indicating that there is a significant relationship with consumer intention to use m-commerce. The last part of the model, perceived behavioral control, $F = 99.36$ and R^2 was 51.5 percent and significant at $p<0.01$ which is indicating significant relation with consumer intention to use M-commerce. The overall model, $F=43.733$ and R^2 was 45.2 percent significant at $p<0.01$ which is confirming the fitness of the model. Therefore, there is a statistically significant relationship between the adoption factors and the consumer intention to adopt or use m-commerce.

Table 10: Multiple Regression Analysis

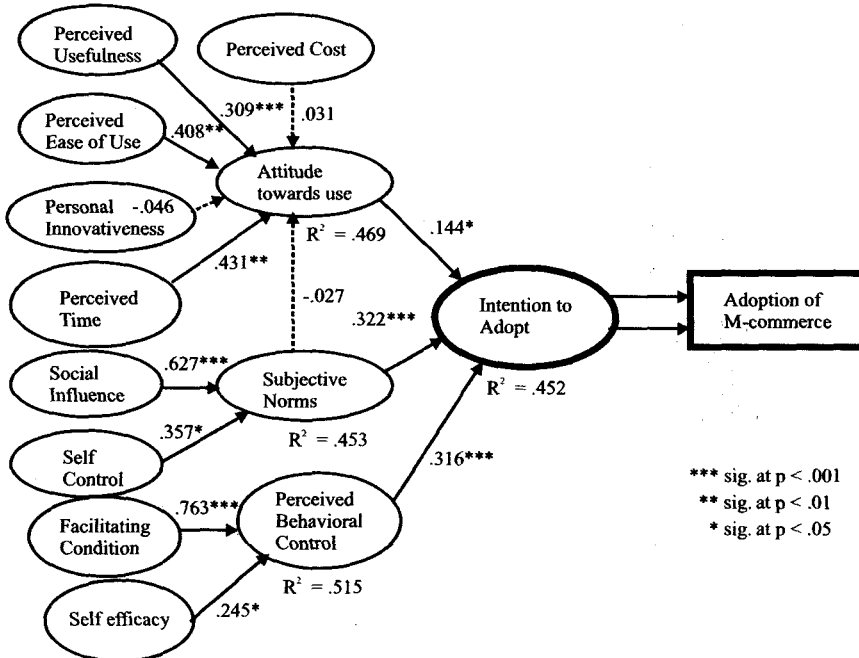
Predictor Variables	β	t-value	Std. Error	Sig.	Overall Model
Perceived Usefulness	.309	3.204	.090	.000	F= 51.561; $p<0.01$; $R^2 = 0.469$; adjusted $R^2 = .462$
Perceived Ease of Use	.408	2.028	.087	.014	
Personal Innovativeness	-.046	-.535	.085	.593	
Perceived Trust	.431	3.655	.087	.009	
Perceived Cost	.031	.410	.074	.682	
Subjective Norm	-.027	-.346	.077	.729	
Social Influence	.627	8.785	.071	.000	F=77.383; $p<0.01$; $R^2 = .453$; Adjusted $R^2 = .447$
Self-Control	.357	3.131	.074	.034	

cont.

Facilitating Condition	.763	11.645	.065	.000	F=99.36; p<0.01;R ² = .515; Adjusted R ² = .510
Self-efficacy	.245	3.126	.067	.021	
Perceived Behavioral Control	.316	4.700	.067	.000	F=43.733; p<0.01;R ² = .452; Adjusted R ² = .442
Subjective Norm	.322	5.072	.064	.000	
Attitude to Use	.144	2.695	.063	.048	

The results of regression analysis for structural model are presented in figure 4. The path coefficients are specified next to the corresponding links between the various constructs. Perceived usefulness was found to be the most important factor for predicting behavioral intention to use M-commerce with a significant path coefficient of 0.309. Social Influence was found to be most significant with subjective norm which is a significant path coefficient of .627. Facilitating condition is one of most significant and important factor which has a path coefficient of .763 with perceived behavioral control. Subjective norms and perceived behavioral control found to have significant path coefficient with intention to adopt m-commerce with respectively .316 and .322.

Figure 4: Structural Model for M-commerce Adoption



There are three factors which are found to be not significant in this model. The first, perceived cost has no significant effect on attitude towards use mobile commerce. Second, Subjective norm was found to have no significant effect on attitude towards use m-commerce. Third, the personal innovativeness factor also found insignificant path coefficient with attitude towards use m-commerce. The rest of all hypotheses were found significant factor for intention to use or adopt m-commerce in Malaysia.

DISCUSSION OF THE FINDINGS

Factors affecting the adoption of M-commerce

This study reports empirical test of adoption of M-commerce in Malaysia. In this study, we have followed the concept of TAM, TPB, TRA, and DOI model. Based on these models we have modified and developed new model in the context of M-commerce. The study introduced Perceived risk, perceived cost in this research model to reflect a consumer's needs to use m-commerce.

Perceived Usefulness (PU) was found to be the significant determinant (0.309, $p < 0.001$) to predict consumer attitude towards use or adopt m-commerce in Malaysia. This result is supported by the prior researches that extended TAM in the context of m-commerce (Wei et. al., 2009; Khalifa and Shen, 2008). These studies have indicated that Perceived Usefulness played a crucial role in influence the consumer intention of adopting M-commerce. Because of Consumer intention to use new technology such as m-commerce will increase when they find it useful and save time. One of the important reasons is that m-commerce has unique characteristics such as ubiquity and immediacy, which allows user to access information and conduct online transaction in anytime and anywhere.

Perceived ease of use (PEU) was found to have significant effect on consumer attitude and intention to use M-commerce. But PEU has less significant then perceived usefulness in this research. However, this result has supported by the prior studies (Lin and Wang, 2005; Jahangir and Begum, 2008) but inconsistent with (Wei et. al., 2009). Most of the prior studies also support that PEU is an important factor which is affecting user attitude towards use a new innovation or technology. If any technology can be learn or use easily by the user, then the consumer will get encourage to use the technology. As mentioned earlier that PEU has less significant then PU, because of the younger generation are more aware of about the new innovation and they are interested to use new technology. Thus the perceived ease of use or difficulty level of using M-commerce would not influence much as PU has influenced their attitude to use m-commerce.

Perceived cost factor has considered being part of the model as only few prior research studies have incorporated. The result shows that perceived cost (PC) found to be

insignificant to attitude to use m-commerce in Malaysian context. This result found consistent with previous studies on m-commerce and 3G adoption (Mallat et al. 2008; Li et al., 2007; Hung et al., 2003). These studies, perceived cost was not considered or proved in explaining the adoption of m-commerce. But this result is not consistent with (Cho et al., 2007 and Wei et al., 2009) although, cost is believed to be an important predictor of m-commerce adoption. Therefore, it is a good indication that most of the respondents intend to use m-commerce if the cost of m-commerce services is reasonable.

Perceived trust was found to have an important factor which is influencing the consumer attitude to use m-commerce in Malaysia. This result also support by the previous studies (Cho et. al 2007; Wei et al, 2009). It shows that there is a strong positive relationship between perceived trust and consumer attitude to use or adopt m-commerce. This demonstrated that the perceived trust directly influenced the adoption of m-commerce. If the consumer feels that the systems they are using is safe which protect personal information and build trust on it, and then consumer will be positive attitude to use or adopt m-commerce.

Personal Innovativeness found to be not a major determinant of user attitude towards use m-commerce. This result is consistent with some prior studies (Pedersen, 2005; Hung et al., 2003). Where as social influence and self-control are significantly affecting users' subjective norm which is ultimately influencing the consumer intention to adopt m-commerce. These result is consistent with Pedersen, 2005; Hung et al., 2003)

Facilitating condition leads to significantly influencing perceived behavioral control towards intention to use m-commerce. This result is also supported by the prior studies (Pedersen, 2005). M-commerce users suffer from current hardware limitations such as small screen size, low speed. Rapid technological development can be overcome this limitation.

Development of adoption model for M-commerce

The theoretical part of this study concluded that it seems to be a lack of studies applying traditional ICT-adoption theory to the adoption of m-commerce. Instead, domestication research provides the dominating theoretical perspective in studies of m-commerce adoption. However, findings from domestication research may be used to extend and modify current adoption models to better explain the adoption of m-commerce. This study suggested extending the TAM model with subjective norm and behavioral control into a decomposed theory of planned behavior.

The modifications consisted of adding relationships in the model from subjective norm to attitude towards use, adding relationships between perceived usefulness, perceived ease of use, personal innovativeness, perceived trust, perceived cost to attitudes towards use,

and of introducing the concept of self-control, and social influence as a determinant of subjective norm, and of facilitating condition and self efficacy as a determinant of perceived behavioral control. These modifications were based upon findings in domestication research indicating that subjective norm is an important determinant both of intentions to use and attitudes towards use. Further, the modifications were based upon findings in domestication and diffusion research that expectations are important in determining perceptions, and are generally communicated through media and interpersonal channels of communication. In general, perceptual and social mechanisms harmonize sources of perceptual influence.

Attitude towards Use: Attitude towards use has a significant relationship with intention to use m-commerce. The TAM part of the model explained 46.9% of the variance in attitude to use m-commerce. Perceived usefulness, perceived ease of use and perceived trust are significantly affecting user attitude towards use mobile commerce, whereas perceived cost and personal innovativeness is not significant.

Subjective Norms: Subjective norm is represented by self-control and social influence. Both of the factors was a very important determinant of subjective norm and significantly affecting consumer subjective norm which is contributing significantly to the model explaining 45.3% of variance in subjective norm.

Perceived Behavioral Control: Self efficacy and facilitating condition are significantly affecting consumer perceived behavioral control which is explained 51.5% of variance.

Intention to Use: Attitude towards use, subjective norm, and perceived behavioral control are significantly affecting user intention to use m-commerce. The over all model, 45.2% of the total variance in the intention to use m-commerce is explained by the attitude to use, subjective norm, and perceived behavioral control.

Thus, in conclusion, subjective norms, attitude to use and perceived behavioral control improve model fit and add to the explanatory power of the model when being combined all factors. The study concludes that the simple TAM model should be extended with both subjective norm and behavioral control when explaining the adoption of m-commerce.

CONCLUSION

This study entails important theoretical and practical implications. Therefore, the study extended the TAM model with subjective norm and perceived behavioral control in to a decomposed theory of planned behavior. This extension and modification has been done to current adoption models to better explain the adoption of m-commerce. The modification consisted of adding relationship in the model from subjective norm to attitude towards

use, adding perceived cost and perceived trust to attitude towards use and also self-control as a determination to subjective norm. Facilitating condition and self-efficacy was added to perceived behavioral control. These modifications were based upon findings and traditional IT adoption model. According the theory of planned behavior, intention is explained by the attitude, subjective norm and behavioral control. The result of this study also supported that individual intentions towards m-commerce adoption can be explained by attitude towards use, subjective norm, and perceived behavioral control. The results are especially beneficial for understanding influences on m-commerce adoption in Malaysia.

In terms of practical implications, the findings provide mobile operators and content developers with various strategies to sustain the use of m-commerce. First, mobile operators and content developers should look into ways to inculcate favorable attitude among consumers, design appropriate pricing mechanisms for the m-commerce, develop the technical infrastructure to support true mobility and make appropriate use of the media to influence consumers and their social network. Second, mobile operators and content developers should look into improving the ease of use and usability of mobile phones and their service offerings, and develop useful and enjoyable m-commerce services. Third, the different patterns of usage intention development across different service categories suggest that mobile operators should design their products and marketing activities based on the nature of service categories. Finally, this extended model of M-commerce is developed to achieve the greater understanding of user acceptance of m-commerce in Malaysia while remaining the parsimony of the model in the same time. In conclusion, the model in this study presents a considerable improvement in explanatory power.

Recommendations

According to Wei et al., 2009, M-commerce is relatively immature and at an 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 and privacy issues 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 less significant to influence the consumer intention to use m-commerce in the study. Hence, the main attention of management should be focused on development of usefulness of the system, trust building and cost reduction, instead of focusing on making system easy-to-use or interact with. Although, there was no strong relationship found the between perceived cost and m-commerce adoption in the study, but the perceived cost is 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.

Limitation and Future Studies

The result of this study suggests several limitations and possibilities for future research directions on M-commerce. Because m-commerce is such a fast and evolving industry, the possibilities for future research are endless. Even between the times this survey was distributed and the time writing, mobile devices such as iphone by Apple and Nokia also have series of new phone that become more popular and readily available. This research was conducted in Kuala Lumpur, Malaysia and whether the results from this research would be consistent with other countries' mobile users would need to be verified through further research. Future studies can focus on conducting a multi-country comparison to test the influence of moderating factors such as the national culture from the countries.

This study has demographic profiles of the respondents' relatively young age which is 83.7% of the respondents are 20 years to 30 years of age. Thus, it is possible that results taken from a different age group might have different result. For example, respondents from the older age group might find it more difficult to use m-commerce thus ease-of-use might be a factor influencing the adoption m-commerce. It would therefore be useful to make a comparison study between users from different age group in future study. A

comparative study can be made to investigate if there are any differences in the adoption of m-commerce between these different mobile service providers. Research challenges in security for new generation mobile networks are limitless with the rapid development of mobile devices and m-commerce application. As with many adoption model, there is a risk that additional significant factors have not been included in this model.

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