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An Investigation into the Adoption of Mobile Banking in Malaysia

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Abstract This study extends the applicability of Technology Acceptance Model (TAM) and Theory of Planned Behavior (TPB) constructs to investigate the significant factors influencing users' adoption of mobile banking services in one of the Malaysian public universities. The research model was empirically tested through a survey. Data collected from 125 respondents were analyzed by means of multiple regression. Findings showed that perceived usefulness and social influence have significant impact on mobile banking adoption. In contrast with previous studies, perceived ease of use, perceived credibility, image, perceived financial cost, and computer/internet experience were not significant in explaining mobile banking adoption. In summary, perceived usefulness contributed the most in explaining mobile banking adoption. Implications of findings and suggestions for future research are given.

Keywords Mobile Banking, Adoption, Technology Acceptance Model, Theory of Planned Behavior

1. Introduction

Mobile banking (m-banking) is a technology that has emerged in recent times to augment the shortfalls of e-banking and extend the reach of financial services across all socio-economic groups and geographical boundaries. M-banking is defined as a system used to perform banking (financial) transactions through customers' handheld mobile phones (Amin, 2007). M-Banking refers to provision and availment of banking and financial services with the help of mobile telecommunication devices. The scope of services offered may include facilities to conduct bank and stock market transactions, to administer accounts and to access customized information (Tiwari & Buse, 2006). Customers can now perform their banking transactions from the comfort of their beds; pay their bills, transfer funds, check account balance and monitor their finances in a risk free environment. The fear of theft, robbery during the days of hard currency no longer exist now, money now travels in digital space.

The business world today is highly turbulent; waves of change are experienced in high proportion. Consumers of today are highly sophisticated and their need for personalized service is ever increasing by the day. The digital age customers now require banking services to be rendered to them anywhere they are, around the clock. Despite all the benefits of mobile banking, it is yet to gain acceptance on a wide scale, especially in the developing world and adoption level is marginally insignificant (Amin, 2007; & Luarn & Lin, 2005), hence, the need to understand the factors influencing the adoption of mobile banking services. The present study employs a model based on constructs from Technology Acceptance Model (TAM) and Theory of Planned Behavior (TPB) to investigate and validate the dominant factors influencing the adoption of m-banking in one of the public universities in Malaysia. It is hoped that the findings of the study will add to the body of knowledge in the technology adoption literature, particularly mobile banking. Also, the findings may prove relevant to banking institutions in devising strategies around the model proposed to capture potential customers and also retain old ones.

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2. Literature Review

This section will explore the previous research works done in the field of IT adoption and usage. It will specifically explore the previous models developed to explain user acceptance and use of technology. Also, literatures on m-banking will be explored to gain an in depth understanding of the concept.

2.1. Mobile Banking

Technological advancements particularly in the area of telecommunications have made it a dream come true for businesses to provide ground-breaking, location-sensitive services on ubiquitous ("anytime, anywhere") basis to customers on the move (Tiwari et al., 2007). One of such promising service that is steadily gaining momentum in

today's business and financial world is the mobile banking technology (m-banking). Mobile banking or m-banking is an offshoot and an integral part of mobile commerce; it serves as the cornerstone of mobile commerce. Mobile banking entails the provision and availment of banking and financial services via mobile telecommunication devices (Tiwari & Buse, 2006). Recent trends and development showed an increase in the deployment of mobile banking solutions by banks around the world. Banks now employ mobile banking solutions to make extra income, cut costs, and also boost customer satisfaction level. Results from such efforts have often proven positive (Tiwari et al., 2006a). An indication of this success could be inferred from the growing amount of demand for mobile banking services and its usage by customers in some regions of the world (Tiwari et al., 2006b). For example, in South Korea, the rate of financial transactions done through mobile devices reached 287,000 per day on an average, an increment of 104 percent as compared to the year earlier, according to the Bank of Korea (Korea Times, 2006 in Tiwari et al., 2006b).

2.2. Information Technology Adoption

Understanding what drives consumers and end-users to adopt and use a certain technology has become of increasing interest in the IT research field (Taylor & Todd, 1995a; Davis, 1989; Mathieson, 1991; Teo & Pok, 2003; and Al-Somali et al., 2009). Quite a number of theoretical models have been developed and employed in understanding IT/IS adoption and usage. Among the models developed, three stand out to enjoy the most popularity in the IS/IT field; namely: Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB), and Innovation Diffusion Theory (IDT). These models have been employed separately (Davis, 1989; Davis et al., 1989; Venkatesh & Morris, 2000; Wang et al., 2003; Luarn & Lin, 2005; Mattila, 2003; & Al-Somali et al., 2009), compared (Mathieson, 1991; Taylor & Todd, 1995a; Taylor & Todd, 1995b; & Chau & Hu, 2001) and integrated (Wu & Wang, 2005; & Yi et al., 2006) to explain technology adoption and use.

2.2.1. Technology Acceptance Model (TAM)

A significant number of researchers have examined the process and determinants of information technology adoption/usage by end-users (Tan & Teo, 2000; Wang et al., 2003; Luarn & Lin, 2005; Jones & Hubona, 2006; and Al-Somali et al., 2009). Most of these research works were based on the Technology Acceptance Model (TAM) proposed by Davis (1989). TAM has been widely used and tested across a wide range of information systems to explain adoption of an information system (IS). TAM adapts from the Theory of Reasoned Action developed by Fishbein and Ajzen (1975) which explains individual's behavioral intention and actual behavior as products of attitude and subjective norm. TAM postulates that behavioral intention to use an information system and its actual usage is determined by individual's attitude towards the system which is further determined by user beliefs (Jones & Hubona, 2006). Furthermore, the indirect influence of external variables on attitude through user beliefs has been advanced in TAM (Davis, 1989; Jones & Hubona, 2006; and Legris et al., 2003). TAM (Fig.1) proposes a four-stage procedure in explaining IS adoption and usage thus:

TAM has been extended by addition of other variables /constructs (Luarn &Lin, 2005; Al-Somali et al., 2009; Venkatesh & Morris, 2000; Lucas & Spitler, 1999; Porter & Donthu, 2006; Vijayasarathy, 2004; and Amin, 2007) and tested over a wide range of information systems (Jones & Hubona, 2006) and has proven to have reliable and valid constructs for predicting about 40% of adoption and use of information systems (Legris et al, 2003). Perceived usefulness and perceived ease of use are the two key belief constructs of TAM. Thus, in this study other attitudinal belief constructs have been added to the original belief constructs of TAM to enhance the robustness and predictive power of the research model. Perceived credibility, perceived financial cost and image have been included in the attitudinal belief dimension.

2.2.2. Theory of Planned Behavior

Another renowned theory that has been widely applied to study IS acceptance and use is TPB. This theory has its root in social psychology. TPB was postulated by Ajzen (1985) as an extension of Theory of Reasoned Action (TRA). The theory argues that actual behavior is determined by behavioral intention which in turn is influenced by individual's attitude, subjective norm and perceived behavioral control (Ajzen, 1991; in Teo & Pok, 2003). TPB was developed to augment the limitations of TRA in predicting and understanding behavior under incomplete volitional control.

TPB, unlike TAM is not specific to IS field and therefore a more general theory of explaining behavior. In addition to attitudinal beliefs, TPB adds two more important constructs in explaining behavior; subjective norm (normative beliefs) and perceived behavioral control (control beliefs). Subjective norm refers to the influence of others (reference group) in determining individual's adoption and use of technology. Subjective norm which is analogous with social influence has been found to be a significant factor in influencing the adoption and use of IS (Venkatesh & Morris, 2000; Teo & Pok, 2003; Taylor & Todd, 1995a; and Al-Somali et al., 2009). Man being a social being is positively or negatively influenced towards a particular thing by those that are important to him (significant others). In the mobile banking context, social influence can play a significant role in deterring or facilitating the adoption and use of m-banking services. Hence, this construct is included in the research model to test its applicability and validity.

3. Research Model and Hypotheses

The research model for this study was adapted from previous research works, specifically the Technology

Acceptance model (TAM) and the Theory of Planned behavior (TPB) are the underpinning theories of this research work.

3.1. Attitudinal Beliefs

Attitudinal belief refers to an individual's belief that a given technology possesses a particular quality or that performing a certain behavior results to a specific outcome (Taylor & Todd, 1995a). Attitudinal belief is multi-dimensional and consists of numerous belief dimensions. In this study, the attitudinal belief is decomposed into five specific belief constructs, namely; perceived usefulness (PU), perceived ease of use (PEOU), perceived credibility (PC), image, and perceived financial cost (PFC).

3.1.1. Perceived Usefulness

Perceived usefulness (PU) refers to the degree to which an individual believes that use of technology will enhance his performance (Davis, 1989). Previous research findings have shown the significance of PU towards the adoption and usage of an information system (Davis et al., 1989; Taylor & Todd, 1995; Luarn & Lin, 2005, and Wang et al., 2003). This construct was adapted from the original TAM developed by Davis (1989). The more people perceive m-banking as useful, the more likelihood of them adopting it. Thus, the following hypothesis is tested:

H1. Perceived usefulness positively affects m-banking adoption.

3.1.2. Perceived Ease of Use

Perceived ease of use (PEOU) refers to the degree to which one believes that using an information system is free from effort (Davis, 1989). Earlier research works have found that PEOU has significant influence on adoption and use of technology (Wang et al., 2003; Davis et al., 1989; Luarn & Lin, 2005; and Al-Somali et al., 2009). Luarn and Lin (2005) found that PEOU was significant in determining intention to adopt m-banking. In the same vein, this construct will be validated further in this study. Individuals will adopt and use m-banking services if they perceive it as easy to learn and use. Hence, the following hypothesis is proposed:

H2. Perceived ease of use positively affects m-banking adoption.

3.1.3. Perceived Credibility

Wang et al. (2003) defined perceived credibility as the degree to which a person believes that use of an information system is free from security and privacy breach. Perceived credibility consist of two elements (Wang et al., 2003)-security and privacy. Security entails the protection of an information system from unauthorized access. Privacy entails the protection of user personal information from unsanctioned intrusion while using internet banking (Wang et al., 2003). The findings of Wang et al. (2003) show the importance of PC towards the acceptance of internet banking. Considering the similarities between internet banking and m-banking, this construct was added to the research model. The perceived belief of m-banking being secured and confidential affects the level of adoption and usage. Therefore, the following hypothesis is tested:

H3. Perceived credibility positively affects m-banking adoption.

3.1.4. Perceived Image

Perceived image refers to the extent to which the use of technology is believed to promote one's status in the social ladder (Moore & Benbasat, 1991). A study by Teo and Pok (2003) found a strong relationship between image and the adoption of WAP-enabled mobile phones. Consequently, the more one believes that using m-banking will enhance his social status, the more the probability of him adopting and using it. To verify this, the following hypothesis is proposed:

H4. Perceived image positively affects m-banking adoption.

3.1.5. Perceived Financial Cost

Perceived financial cost (PFC) refers to the degree which an individual believes that use of m-banking services is costly (Luarn & Lin, 2005). Mathieson et al. (2001) pointed out the significance of economic motivations and outcomes in influencing information system acceptance (IS). In the context of m-banking, Luarn & Lin (2005) found out that PFC plays a vital role in m-banking adoption and subsequent usage. Arguably, consumers will readily adopt m-banking if the perceived financial cost is acceptable to them and will not adopt it if the perceived financial cost is high. To confirm this, the following hypothesis is proposed:

H5. Perceived financial cost negatively affects m-banking adoption.

3.2. Social Influence

Social influence can be defined as the extent of influence of reference groups (significant others) towards the adoption and use of technology (Teo & Pok, 2003). Al-Somali et al. (2009) confirmed the importance of social influence in determining the acceptance and usage of online banking in Saudi Arabia. Individuals may adopt and use a technology just to be in conformity with their reference groups rather than their own beliefs (Davis et al., 1989). Social influence is equivalent to subjective norm and entails other people's opinion, superior influence, and peer influence (Taylor & Todd, 1995a). Hence, in the context of m-banking, social influence can play a significant role in promoting or deterring adoption and usage of m-banking. To validate this, the following hypothesis is proposed:

H6. Social influence positively affects m-banking adoption.

3.3. Computer/Internet Experience

The direct impact of external variables on behavioral intention to adopt an information system has been confirmed

in earlier studies (Jones & Hubona, 2006; and Compeau et al., 1999). Jones & Hubona (2006) found out that system experience has a significant and direct effect on intention to adopt and use an information system. Computer/internet experience refers to the level of expertise and frequency of usage of an information system by an individual. Thus, people that are experienced and skilled in the use of computer and internet will be more inclined to use m-banking than those that have no prior skill or experience. To verify this claim, the following hypothesis is tested:

H7. Computer/internet experience positively affects m-banking adoption.

4. Research Methodology

4.1. Data Collection Procedure

A survey questionnaire was used as the instrument for data collection. This choice is based on several factors such as cost considerations, nature of population, level of privacy and anonymity, and the response rate required. A total of 150 questionnaires were distributed and 130 responses were collected, of which 5 were found invalid due to incomplete data. Overall, 125 usable responses were analyzed, yielding a response rate of 83.3% (125/150). The questionnaires were delivered directly to participants and data was collected over a period of two weeks. 55.2% of the respondents were males; the remaining 44.8% were females. About 58% of the respondents were in the age group of 16-29. The general educational level of the respondents was high, with about 50%having first degree. More than half of the respondents were students. Overall, the income level is low with half of the respondents living on a monthly income/allowance of <RM, 1000.

4.2. Measurement Development

The measurement items of the survey variables were adapted from previous validated measures of past research studies (Luarn & Lin, 2005; Wang et al., 2003; Moore & Benbasat, 1991; Taylor & Todd, 1995a, Teo & Pok, 2003; and Al-Somali et al., 2009) and modified to suite the research context. Overall, the questionnaire instrument used in this study consists of 35 items, excluding the demographic items which comprises of 5 items. Attitudinal belief which is a multidimensional construct was measured with 23 items. Specifically, perceived usefulness (PU) was measured with 6 items, 5 items to measure perceived ease of use (PEOU), 4 items to measure perceived credibility (PC), 5 items to measure image, and 3 items to measure perceived financial cost (PFC). Social influence was measured by 6 items, and the last construct, computer and internet experience was measured by 3 items. A five-point Likert scale ranging from (1) "strongly disagree" to (5) "strongly agree" were employed to measure responses, except for items measuring computer and internet experience, which has the range of (1) "none" to (5) "expert". The interval scale was used in this study because it is more suitable for measuring the magnitude of preference among individuals (Sekaran, 2003). Furthermore, a pilot test was conducted on a selected sample of 30 students to verify the reliability of the measurements, and the questionnaire was modified based on the pilot test result.

5. Findings

5.1. Reliability Test

To ascertain the reliability of the measurement scales and to check the degree to which the items that make up the scale "hang together", Cronbach alpha coefficient was calculated. The Cronbach alpha value for all variables ranged from 0.703 to 0.922, satisfying and even surpassing the recommended value of 0.70 (Pallant, 2001; & George & Mallery, 2003). Thus, the measurement items for the constructs in this study are deemed reliable and therefore accepted as true measures of the variables they represent.

5.2. Multiple Regression Analysis

To test the hypotheses advanced, multiple regression analysis was used. Multiple regression gives us information about the model as a whole and the relative significance (contribution) of each factor that form the model. Based on the Standardized Beta Coefficient, its value tells us the unique contribution of each independent variable to the model when other predictor variables are controlled for. Looking at the Standardized Beta column, we can see that only two variables; perceived usefulness (Beta= .373) and social influence (Beta= .345) made significant contribution to the model. Overall, perceived usefulness made the largest contribution in explaining the dependent variable. The t and Sig (p) values indicate the statistical significance of each independent variable in predicting the dependent variable. A large absolute t value and a small p value ($p< .05$) points out that a predictor variable is significant in predicting the dependent variable. From the result of the analysis (Table 4.15) only perceived usefulness ($t = 4.222$ and $p = .000$) and social influence ($t = 3.762$ and $p = .000$) are significant factors in predicting m-banking adoption. From the results obtained in the multiple regression analysis, only perceived usefulness and social influence are significant and they explain 44.2% of the variance in the dependent variable (m-banking adoption). Thus, hypotheses H1 and H6 are accepted. On the other hand, hypotheses H2, H3, H4, H5, and H7 were not supported and thus rejected in this study. Perceived ease of use, perceived credibility, perceived image, perceived financial cost, and computer and internet experience were found to be insignificant in explaining the variation in the dependent variable. Computer/internet experience was found to have a 0 correlation with the dependent variable ($r = .000$ where $p = .998$).

6. Discussion of Findings

The findings obtained from this study are quite interesting and intriguing; attitudinal belief factors and social influence were found to impact on m-banking adoption. These findings corroborate with the results of Teo and Pok (2003). Also, contrary to the popular findings in the field of IS adoption, the study findings indicate that only two factors significantly influence m-banking adoption. One of this factors is an attitudinal factor (perceived usefulness), and the other a normative factor (social influence). Perceived usefulness has received tremendous support from past research works (Davis, 1989; Davis et al., 1989; Subramanian, 1994; Keil et al., 1995; & Hu et al., 1999) as a dominant factor in explaining adoption of an IS. Thus, if mobile banking is perceived to be useful, the tendency to adopt it will be greater than if it is perceived otherwise. By and large, perceived usefulness had the most significant effect on adoption intention.

With regards to social influence (a normative factor), prior researches have confirmed its significance in explaining IS adoption (Taylor & Todd, 1995; Teo & Pok, 2003; Al-Somali et al., 2009; & Kleijnen et al., 2004). Social influence plays a significant role in influencing adoption of an IS particularly at the early periods where one does not have full information about the technology. Specifically, potential adopters have to rely on their reference group (significant others) to form an opinion about a given IS. Thus, m-banking adoption is significantly influenced by the social group opinion about it. The remaining attitudinal belief factors (i.e. PEOU, PFC, PC, and perceived image) were not supported in the findings of this study.

7. Conclusions

The intent of this study was to investigate and validate the factors that motivate the adoption of mobile banking services in UUM. By drawing upon the strength of established theories in the IS/IT acceptance literature, the study extends the applicability of TAM and TPB constructs in examining the adoption of a relatively new technology (mobile banking) in a new environment. The results obtained have shown that TAM constructs (specifically perceived usefulness) and TPB constructs (specifically social influence) are valid and applicable in other contexts. Understanding what influences users (customers) to accept mobile banking can be beneficial to banks, system developers, and marketing practitioners in developing and marketing m-banking services that will be acceptable by the target market.

The findings of this study have both theoretical and practical significance. In the practical aspect, the research findings of this study will provide banking institutions and mobile banking practitioners useful information in formulating strategies that can enhance the adoption of mobile banking services. Additionally, since social influence have been found to be a driving force in influencing adoption; banks can use celebrities, leaders, and people that are respected and revered in the society to correct any misconception about mobile banking services. Theoretically, the study findings contributes to the body of literature in the field of IS adoption. Specifically, it contributes to the understanding of mobile banking adoption. Furthermore, the study has shown that applying TAM and TPB does not necessarily gain support in every circumstance; environmental and cultural factors can also play a significant role in influencing adoption.

As it is with all research works, this study is not without some shortcomings. First, this study employs a cross-sectional method that is data was measured at a single point in time. Other, studies could employ a longitudinal approach. Second, the findings of this study and its associated implications were gotten from one study that is confined to a single technology and a particular environment. To further generalize the study findings, more research is required to test it on other technologies and environments. . Environmental factors and cultural factors can be integrated to further enhance understanding of adoption intention.

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