

AN ANALYSIS OF MOBILE BANKING ACCEPTANCE BY MALAYSIAN CUSTOMERS

HANUDIN AMIN^a
RICARDO BABA
MOHD ZULKIFLI MUHAMMAD
Universiti Malaysia Sabah

ABSTRACT

Today, the advancement of mobile technologies has provided an opportunity for financial providers in introducing new financial innovations. One of the emerging financial innovations introduced by financial providers is mobile banking. This study adopts a technology acceptance model (TAM) to investigate factors that determine an individual's intention to use mobile banking among bank customers in Labuan and Kota Kinabalu. The TAM includes perceived credibility, perceived self-efficacy and normative pressure. Our results support the extended TAM in predicting bank customers' behavioural intention to use mobile banking. Determinants are perceived usefulness, perceived ease of use, perceived credibility and perceived self-efficacy. Normative pressure was found to be a weak determinant in explaining bank customers' intention to use mobile banking. The study also demonstrates the significant effect of perceived ease of use on behavioural intention through perceived usefulness.

Key words: Mobile Banking, Technology Adoption, Regression, Technology Acceptance Model (TAM), Banks, Malaysia

INTRODUCTION

The rapid development of information technology has affected the banking industry globally. An impact of information technology in the banking sector is the introduction of mobile banking. Earlier studies have shown the usefulness of mobile banking in facilitating the financial transactions between banks and their customers (Kleijnen *et al.*, 2004; Luarn and Lin, 2005; and Mattila, 2003). However, these earlier studies on mobile banking and factors influencing its usage have produced mixed results. Kleijnen *et al.* (2004) found perceived usefulness to be less significant in explaining the adoption of mobile financial services. On the other hand, Luarn and Lin (2005) concluded that perceived usefulness to be a significant factor in mobile banking. Also, Mattila (2003) found risk to be a very significant factor in adopting mobile banking. Due to these differences, research on mobile banking remains inconclusive and needs further investigation.

By definition, mobile banking is a form of banking transaction carried out via a mobile phone. Mobile banking allows bank customers to check their account balances, perform credit card transaction as well as provide information on the latest transaction made by

E-mail: ^a hanudin@mailkal.ums.edu.my.

customers. It is a fact that mobile banking is still in its infancy and relatively alien to Malaysians. Hence, there is a possibility that mobile banking remains unknown to and under utilized by bank customers. There is a need, therefore, to understand the extent of acceptance of mobile banking by customers and to examine the factors affecting intentions to use it for financial transactions. In order to determine the factors influencing the acceptance of mobile banking by customers, this study adopts the Technology Acceptance Model (TAM) as one of its research instruments. TAM is an adaptation of the Theory of Reasoned Action (TRA) which was developed by Fishbein and Ajzen (1980). Comparatively, TRA is more generic whereas TAM is more specific. TAM was chosen in this study for two main reasons. First, TAM is based on its predictive power which makes it easy to apply in different information system devices (Nysveen *et al.*, 2005; Luarn and Lin, 2005; Pikkarainen *et al.*, 2004; Kleijnen *et al.*, 2004; Wang *et al.*, 2003). Second, TAM helps to better understand the relationship between six important constructs of the study, notably, perceived usefulness, perceived ease of use, perceived credibility, perceived self-efficacy, normative pressure and behavioural intention.

Many researchers have investigated and agreed that 'perceived usefulness' and 'perceived ease of use' are valid constructs in understanding an individual's intention to adopt Information System (IS) (Guriting and Ndubisi, 2006; Luarn and Lin, 2005; and Wang *et al.*, 2003). However, depending on the specific technology context, additional constructs are required to better reflect the application of emerging technologies. In this study, perceived credibility, perceived self-efficacy and normative pressure are added to enhance the understanding of customer acceptance of mobile banking beyond the general constructs used in TAM. Indeed, the importance of perceived credibility towards behavioural intention to use IS has been given attention to by Luarn and Lin (2005) and Wang *et al.* (2003). Moreover, perceived self-efficacy is also important in understanding behavioural intention to use IS, as expressed by Venkatesh (2000) and Compeau and Higgins (1995). Normative pressure is also found to be an essential variable in many IS research (Amin *et al.*, 2006; and Nysveen *et al.*, 2005).

Thus, the present study aims to obtain insights into the factors that can influence the adoption of mobile banking among bank customers in Malaysia. It is hoped that the results of this study will extend current knowledge on technology acceptance in mobile banking, in particular. Furthermore, the study may provide deeper insights into what is needed in order for bank customers to accept this emerging technology and, thus, allow for improvement in bank strategies to attract potential users of mobile banking.

LITERATURE REVIEW

Perceived Usefulness and Perceived Ease of Use

Perceived usefulness and perceived ease of use are the fundamental elements of TAM. Perceived usefulness is strongly associated with productivity. It suggests that using computers in the workplace would increase user's productivity, improve job performance, and enhance job effectiveness and usefulness. By definition, perceived usefulness is defined

as the degree to which a person believes that using a particular system would enhance his or her job performance (Davis *et al.*, 1989). Earlier studies have shown that there is a positive relationship between perceived usefulness and usage intention (Luarn and Lin, 2005; Cheong and Park, 2005; Chiu *et al.*, 2005; Wang *et al.*, 2003; and Venkatesh and Morris, 2000). Luarn and Lin (2005) indicated that perceived usefulness has a significant impact on the development of initial willingness to use mobile banking. Similarly, Cheong and Park (2005) also found that there exists a positive causality between perceived usefulness and online purchase intentions. The result corroborates the findings by Chiu *et al.* (2005), Wang *et al.* (2003) and Venkatesh and Morris (2000). These studies confirm the important effect of perceived usefulness in understanding individual responses to information technology. Therefore, it is highly predictable that people use mobile banking because they find it useful.

With respect to perceived ease of use, it is defined as the degree to which a person believes that using a particular system would be free of effort (Davis, 1989). Earlier studies have shown that there is a positive relationship between perceived ease of use and usage intention (Guriting and Ndubisi, 2006; Luarn and Lin, 2005; Kleijnen *et al.*, 2004; Wang *et al.*, 2003 and Ramayah *et al.*, 2003). Guriting and Ndubisi (2006) found that perceived ease of use had a significant positive effect on behavioural intention to use online banking in Malaysia. Similarly, in the study of Kleijnen *et al.* (2004) about wireless finance in Netherlands, they concluded that perceived ease of use was a significant measure in the development of people's intention to use wireless finance. Ramayah *et al.* (2003) showed that perceived ease of use has a significant impact on the development of initial willingness to use internet banking. The result corroborates the findings by Wang *et al.* (2003), Adams *et al.* (1992), Davis *et al.* (1989) and Ramayah *et al.* (2002). Bank customers are likely to adopt online banking when they find it easy to use the technology. In addition, Davis *et al.* (1989) proposed that perceived ease of use is an antecedent of perceived usefulness. Results from previous research revealed a significant relationship between perceived ease of use and perceived usefulness (Kleijnen *et al.*, 2004; Wang *et al.*, 2003; and Davis *et al.*, 1989). Based on these findings, it is highly predictable that the general causalities found in TAM are also applicable to mobile banking. Thus, the following hypotheses are tested:

- H₁: Perceived usefulness will not have a positive effect on the behavioural intention to use mobile banking.
- H₂: Perceived ease of use will not have a positive effect on the behavioural intention to use mobile banking.
- H₃: Perceived ease of use will not have a positive effect on the perceived usefulness of mobile banking.

Perceived Credibility

Besides the perceived usefulness and perceived ease of use, the usage intention of mobile banking can also be affected by the security and privacy concerns of the users. This

argument is based on the work of Luarn and Lin (2005) and Wang *et al.* (2003). According to Wang *et al.* (2003), security and privacy are the two important dimensions in perceived credibility. Perceived credibility is usually impersonal and relies on reputation, information and economic reasoning (Ba and Pavlou, 2002). By definition, perceived credibility is one's judgment on the privacy and security issues of mobile banking. The importance of security and privacy to the acceptance of banking technologies has been noted in many banking studies (Howcroft *et al.*, 2002; Polatoglu and Ekin, 2001; and Sathye, 1999). Basically, fear of a lack of security is recognized as an important factor impacting the acceptance of mobile banking. In the study of Luarn and Lin (2005), they found that perceived credibility has a significant impact on the development of willingness to use mobile banking. Furthermore, Wang *et al.* (2003) found perceived credibility to be significantly related to the technology acceptance of internet banking. Obviously, the perceived credibility that people have in a system which concludes financial transactions securely and maintain the confidentiality of their personal information will affect their voluntary acceptance of mobile banking. Since mobile banking is somewhat new, perceived credibility has the higher ability to predict and explain the intention of users to adopt mobile banking. To investigate this issue, the following hypothesis is then tested:

- H₄: Perceived credibility will not have a positive effect on the behavioural intention to use mobile banking.

Perceived Self-efficacy

Compeau and Higgins (1995) defined self-efficacy as the belief that one has the capability to perform a particular function. In the context of mobile banking, therefore, perceived self-efficacy can be defined as the judgment of one's ability to use mobile banking. Furthermore, there is empirical support for the causal relationship between perceived self-efficacy and behavioural intention (Agarwal *et al.*, 2000; Venkatesh, 2000; and Compeau and Higgins, 1995). In a recent study, Luarn and Lin (2005) found that perceived self-efficacy had a significant positive influence on behavioural intention to use an Information System (IS). The result is also corroborated by the study of Wang *et al.* (2003) who found that computer self-efficacy had a significant positive influence on behavioural intention. Bank customers are likely to adopt mobile banking when they have the ability to use it. Thus, the following hypothesis may hold in the context of mobile banking:

- H₅: Perceived self-efficacy will not have a positive effect on behavioural intention to use mobile banking.

Normative Pressure

There is extensive research in the IS community that provides evidence of the significant effect of normative pressure on usage intention (Amin *et al.*, 2006; Nysveen *et al.*, 2005; Kleijnen *et al.*, 2004; Venkatesh and Morris, 2000). Nysveen *et al.* (2005) defined normative pressure as the person's perception that most people who are important to her or

him should or should not perform the behaviour in question. The reason people exploit mobile banking is that they are encouraged to use mobile banking by the people around them. In the study of Nysveen *et al.* (2005), normative pressure is found to be an important construct that accounts for the success of IS. The result demonstrates that people will consider using mobile chat services because these services are important tools in displaying personal and social identity. Similarly, in the study of Kleijnen *et al.* (2005) on wireless finance in the Netherlands, normative pressure was significant in the development of people's intention to use it. The work of Venkatesh and Morris (2000) was conducted in the context of technology usage in a workplace. Mobile banking is more often used as a new means of banking transaction where social pressure may be even more prominent among customers to distinguish themselves from the others. In society at large, there is the assumption that people will be seen to be special and gain a personal and social identity with the adoption of mobile banking (Nysveen *et al.*, 2005). Thus, the following hypothesis is tested:

H₆: Normative pressure will not have a positive effect on the behavioural intention to use mobile banking.

RESEARCH METHODOLOGY

Subjects

Purposive sampling is used in selecting the sample subjects. This is to comply with the Islamic Banking Act (IBA) 1983 and the Banking and Financial Institution Act (BAFIA) 1989 which prohibit the acquisition of lists of bank customers and their contact numbers and addresses from banking institutions. The respondents are customers of banks in Labuan and Kota Kinabalu who have mobile phones but yet to adopt mobile banking. The data collected was based on personally administered questionnaires to bank customers in September-October 2006. Since mobile banking is relatively new in Malaysia, this research focuses on the intention of bank customers to use it for financial transactions. The data were collected during working hours (5 days per week) over six weeks. The respondents were randomly selected from bank customers in the banking halls and invited to complete the questionnaires. A total of 250 customers responded to the questionnaire survey and 11 were invalid due to incomplete data. The data analyzed, using SPSS, were from 239 respondents. The demographic features of the subjects are shown in Table 1.

The demographic distribution shows that 44.8 percent of the respondents were male and the remaining 55.2 percent were female. With respect to age, most of the respondents (67.4 percent) were between 21 to 30 years. This age group has potential to become users of mobile banking because of its familiarity with the latest mobile technologies (Mattila, 2003). In terms of marital status, 48.1 percent of the respondents were single and 51.9 percent of them were married. With regards to educational attainment, 22.2 percent had primary and secondary education, 11.7 percent were diploma holders, 63.2 percent had undergraduate degrees and 2.9 percent had postgraduate degrees.

Table 1. Demographic Features of Study Respondents

Attributes	Demographic Distribution	
	Frequency	Percentile
Gender:		
Male	107	44.8
Female	132	55.2
Age:		
<20	6	2.5
21-30	161	67.4
31-40	53	22.2
41-50	17	7.1
>51	2	0.8
Marital Status:		
Single	115	48.1
Married	124	51.9
Education Attained:		
Primary and secondary	53	22.2
Diploma	28	11.7
Degree (bachelor)	151	63.2
Postgraduate degree	7	2.9

Measurement

The questionnaire was adapted from earlier studies (Luarn and Lin, 2005; Nysveen *et al.*, 2005; Pikkarainen *et al.*, 2004; Wang *et al.*, 2003; Davis, 1989; and Shimp and Kavas, 1984). One of the advantages in using the TAM was that it had a well-validated measurement inventory (Guriting and Ndubisi, 2006; and Wang *et al.*, 2003). While the measures of perceived usefulness were adapted from the study of Davis (1989), those of perceived ease of use were adapted from the two studies of Pikkarainen *et al.* (2004) and Davis (1989). Perceived credibility with two items was adapted from Luarn and Lin (2005). The measures of perceived self-efficacy were adapted from Wang *et al.* (2003). Normative pressure was adapted from Nysveen *et al.* (2005). Lastly, the measures of behavioural intention were adapted from the study of Shimp and Kavas (1984). A five-point Likert-type scale, ranking from 1 (*Strongly disagree*) to 5 (*Strongly agree*), was used for all the constructs.

FINDINGS

Reliability Testing and Validity of the Measurement Model

The alpha values were calculated to evaluate the internal consistency reliabilities of the scales. The first factor, perceived usefulness, was loaded with four variables ($\alpha=0.8613$). The second factor, perceived ease of use, was loaded with three variables ($\alpha=0.8228$). The third factor, perceived credibility, contained two variables ($\alpha=0.8034$). The fourth factor,

perceived self-efficacy, was loaded with three variables ($\alpha=0.8369$). The fifth factor, normative pressure, was loaded with three variables ($\alpha=0.9014$). The dependent variable, behavioural intention was loaded with three variables ($\alpha=0.8243$). Overall, Cronbach's alpha ranges from 0.8034 to 0.9014, exceeding the recommended value of 0.50 (Hair *et al.*, 1998; Peterson, 1994). These values show good internal consistency among scales used for the study.

Hypotheses testing and discussion of results

With regards to data analysis, the dependent variable (behavioural intention) was aggregated. Similar approach was also applied for the independent variables (i.e. PU, PEOU, PC, PSE and SN). In order to test the 6 hypotheses, the study used linear regression to find out the value of different factors affecting the usage of mobile banking.

Table 2. Results of Linear Regression for Behavioural Intentions to Use Mobile Banking

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	T	Level of Significance
1	(Constant)	.420	.387		1.085	.279
	PU	.156	.074	.140	2.115	.035**
	PEOU	.455	.100	.302	4.549	.000***
	PC	.345	.074	.205	4.677	.000***
	PSE	.457	.066	.294	6.885	.000***
	SN	.162	.095	.105	1.697	.091 n.s.

Notes: The dependent variable is behavioural intention to use mobile banking where $R^2=0.832$, $F=230.338$ Sig. $F=0.000$; ***1 % level, **5 % level, n.s. = not significant.

As depicted in Table 2, perceived usefulness was found to have a significant effect on behavioural intention ($t=2.115$, $p\text{-value}=0.035$) at 5 percent. Perceived ease of use was found to have a significant effect on behavioural intention ($t=4.549$, $p\text{-value}=0.000$). These outcomes are consistent with previous studies of Cheong and Park (2005), Chiu *et al.* (2005), Wang *et al.* (2003), and Venkatesh and Morris (2000). Hence, when mobile banking is shown to be useful, bank customers' intention to adopt it will be greater than otherwise. The result also shows a direct relationship between perceived ease of use and behavioural intention. These outcomes are consistent with previous studies (Guriting and Ndubisi, 2006; Luarn and Lin, 2005; Kleijnen *et al.*, 2004; Wang *et al.*, 2003 and Ramayah *et al.*, 2003). Thus, the greater the perceived ease of use, the more likely that mobile banking will be adopted by bank customers in Malaysia. Overall, the results indicated the appropriateness of fundamental elements of TAM in the Malaysian mobile banking context. Consequently, null hypotheses for *H1* and *H2* are rejected, and it is confirmed that perceived usefulness and

perceived ease of use have a strong influence over the behavioural intention to use mobile banking.

With respect to perceived credibility, Table 2 shows it to be a significant factor in explaining behavioural intention of bank customers. Consequently, null hypothesis for *H4* is rejected. In addition, the result shows perceived credibility to have a strong influence on behavioural intention to use mobile banking. Hence, when mobile banking is secure, bank customers' intention to adopt it will be greater. Bank customers are likely to adopt mobile banking when security and privacy are adequately developed within the mobile banking system. The result is consistent with previous studies (Luarn and Lin, 2005; and Wang *et al.*, 2003). Given that the use of mobile banking is on a voluntary basis, the findings of this study suggest that in order to attract more users to its usage, it will require much more than making the system easier to use. More effort should be devoted to the issue of developing better security and reliability in mobile banking.

Perceived self-efficacy was also found to be a significant factor in determining behavioural intention ($t=5.517$, $p\text{-value}=0.000$). The result is consistent with previous results (Agarwal *et al.*, 2000; Venkatesh, 2000; and Compeau and Higgins, 1995). Moreover, perceived self-efficacy has a stronger influence on behavioural intention than the base TAM constructs ('perceived usefulness' and 'perceived ease of use'). Luarn and Lin (2004) and Wang *et al.* (2003) argued that perceived self-efficacy can influence the decision of customers of banks to use technology innovation. The current result is also consistent with that of Luarn and Lin (2004) and Wang *et al.* (2003). Null hypothesis for *H5* is thus rejected. It is concluded that perceived self-efficacy has a positive effect on the behavioural intention to use mobile banking.

With respect to normative pressure, the study found this factor to be insignificant in explaining behavioural intention of bank customers ($t=1.697$, $p\text{-value}=0.091$ n.s.). Consequently, null hypothesis *H6* cannot be rejected as normative pressure does not have a positive effect on the behavioural intention to use mobile banking. The result is not consistent with the findings of Nysveen *et al.* (2005) and Kleijnen *et al.* (2005).

Variance in behavioural intention is 0.832. This indicates that 83.2 percent of the variation in behavioural intention is explained by perceived usefulness, perceived ease of use, perceived credibility, perceived self-efficacy and normative pressure.

Table 3. Results of Linear Regression for Perceived Ease of Use and Perceived Usefulness

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Level of Significance
2	(Constant)	.551	.343		1.605	.110
	PEOU	1.207	.039	.896	31.142	.000

Notes: The dependent variable is behavioural intention to use mobile banking where $R^2=0.804$, $F=969.801$, $\text{Sig. } F=0.000$; ***1 % level, **5 % level, n.s. = not significant.

The current study also revealed the relationship between perceived ease of use and perceived usefulness. As shown in Table 3, perceived ease of use was found to have a significant effect on perceived usefulness ($t=31.142$, $p\text{-value}=0.000$). Consequently, the null hypothesis for $H3$ is rejected. The coefficient of determination for this model is 0.804 percent, indicating that 80.4 percent of the variation of perceived usefulness is explained by perceived ease of use. The result is supported by previous research which revealed the significant relationship between perceived ease of use and perceived usefulness (Kleijnen *et al.*, 2004; Wang *et al.*, 2003; and Davis *et al.*, 1989). Thus, the greater the perceived ease of use, the more likely mobile banking is useful, thus influencing decisions to adopt it as a means of financial transactions.

CONCLUSION

This study was undertaken to create a better understanding of bank customers' motivation concerning the use of mobile banking services. The results indicate that 5 out of 6 null hypotheses were rejected. As mobile banking is still relatively new in Malaysia, an understanding of the factors affecting behavioural intention to use mobile banking may influence its acceptance. The findings in this study offer insights to commercial banks in Malaysia in promoting the use of mobile banking among bank customers. In order to achieve this, it is important for commercial banks to take into account the factors that this study had found to impact on the use of mobile banking. These very factors can be utilized to formulate good promotional strategies in enhancing the use of mobile banking among the clientele of Malaysian banks.

The study also leads to three conclusions:

1. First, it successfully confirms the applicability of the TAM to mobile banking. Traditional TAM measures were found to be significant factors of the behavioural intention to use mobile banking, these being 'perceived usefulness' and 'perceived ease of use'.
2. Second, this study supports Wang *et al.*'s (2003) research findings that there is a significant direct relationship between perceived self efficacy and behavioural intention to use online banking, and may extend its generalizability to mobile banking; and
3. Third, this study also supports the valid argument on perceived credibility as previously examined by Luarn and Lin (2005) and Wang *et al.* (2003). They found that the intention to use mobile banking was influenced by the extent of security and privacy associated within the context of mobile banking.

The findings of this study have implications for developing usable mobile banking systems. Research and development (R and D) associated with mobile banking systems involves investments of millions of dollars. It is important to ensure that bank customers use mobile banking as a new form of banking. In order to achieve this goal, the following suggestions may render ways to attract bank customers to utilize mobile banking in the future:

1. Banks should develop the belief of usefulness and ease of use by providing sufficient information on the benefits of mobile banking. In order to achieve this, banks should provide user manual that contains details on mobile banking, including usefulness and ease of use. Banks should also have counters for mobile banking customers. These counters can offer advice and assistance to bank customers, focusing on the usefulness and ease of use of mobile banking. By having these counters, bank customers will be able to learn about mobile banking. This, in turn, will influence customers' decision to adopt mobile banking.
2. Banks should ensure safety measures such as firewalls, intrusion detection and other related security devices are properly developed and enforced in the mobile banking systems. In addition, banks should also stress the importance of confidentiality of personal identification number (PIN) in mobile banking.
3. Banks can be more focused on the development of self-efficacy. In order to promote a bank customer's perception of self efficacy in mobile banking, banks should organize training courses in various mobile commerce applications. This will increase bank customers' familiarity and understanding of mobile banking.

A number of issues remain to be addressed. First, the investigation of mobile banking acceptance in this study suggests five constructs only to gauge customers' intention to use the relatively new mode of financial transactions. However, these constructs can be integrated with others to provide a more comprehensive understanding of mobile banking acceptance. The extended TAM model itself did not incorporate other constructs than the five indicated earlier on. There is a need, therefore, to explore additional independent variables that can predict usage intention more accurately. For a suggestion, new measures such as perceived financial costs and prior computing experience can be applied in the model for future research. The location of this study is only confined to Labuan and Kota Kinabalu. Thus, the sample and its responses may not be a representation of the beliefs and intention of Malaysians towards using mobile banking. Future research can improve on this limitation by increasing the sample size and performing future research across different cities in Peninsular Malaysia, Sabah and Sarawak. Despite these limitations, the present study serves as a pilot study to explore bank customers' behavioural intention to use mobile banking. The study will be able to add to the limited knowledge available on mobile banking studies in Malaysia.

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