

THE ADOPTION OF MOBILE BANKING IN MALAYSIA: THE CASE OF BANK ISLAM MALAYSIA BERHAD (BIMB)

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ABSTRACT

For several years, commercial banks in Malaysia have tried to introduce mobile banking systems to improve their operations and reduce transaction costs. Bank Islam Malaysia Berhad (BIMB) is one of the commercial banks in Malaysia introduced mobile banking systems to its customers. On the basis of this argument, this research examines the factors that determine intention to use mobile banking among BIMB's customers. This work extends technology acceptance model (TAM) to include perceived credibility, the amount of information on mobile banking and normative pressure. The results indicate that perceived usefulness and perceived ease of use are strong determinants of behavioral intention to adopt mobile banking. The results also further reveal that perceived credibility, the amount of information on mobile banking and normative pressure are significant factors in explaining the acceptance of mobile banking. Significant relationship between "perceived ease of use and perceived usefulness", and "perceived ease of use and perceived credibility" are also found. Furthermore, the findings of this study are useful in order to disseminate important guidelines for BIMB in promoting the use of mobile banking among its customers.

Keywords: Malaysia; Banking; Mobile banking; Communication technologies; Technology acceptance; Islam.

I. INTRODUCTION

The rapid technological advances in mobile-based technologies have created opportunities for new and innovative mobile services. Some of the most promising, while still marginally adopted, is mobile banking. Many commercial banks in Malaysia have tried to introduce mobile banking systems to improve their operations and reduce costs. BIMB is one of the commercial banks in Malaysia actively promotes the use of mobile banking. In the banking industry, bank branches alone are no longer adequate to provide banking services to cater the needs of demanding customers. Therefore, the provision of banking services through mobile banking has provided an alternative means to acquire banking services very convenience and timely to bank customers. Despite all the efforts aimed at developing better mobile banking, this system can easily be remained unnoticed by bank customers, despite its availability. Mobile banking is still new, leaving a great deal of room for development in Malaysia. There is a need, therefore, to understand bank customers' acceptance of mobile banking and to examine the factors affecting their intentions to use mobile banking. This information can assist commercial banks including BIMB in building of mobile banking that the bank customers want to use, thus assist them to attract potential users to use the system.

Nevertheless, the TAM is chosen in this study for two main reasons. First, choosing TAM is based on its parsimony and predictive power which make it easy to apply in different information system devices (Guriting and Ndubisi, 2006; Pikkarainen, *et al.*, 2004; Kleijnen, *et al.*, 2004; and Venkatesh and Morris, 2000). Second, TAM helps to better understand the relationship between five important constructs of the study, notably, perceived usefulness, perceived ease of use, perceived credibility, the amount of information on mobile banking, normative pressure with behavioral intention.

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The aim of this paper is to investigate factors that influence BIMB customers' adoption of mobile banking. For the purpose, TAM is used as the base model for the study and modified it to better reflect the mobile banking context. In the original TAM's model, perceived usefulness and perceived ease of use are addressed as the most important constructs in predicting information system (IS) acceptance. Many researchers have also investigated and agreed that these two constructs are valid in understanding individual's intention to adopt 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 be integrated to better reflect newly emerging technologies. In this study, perceived credibility, the amount of information on mobile banking and normative pressure are proposed to enhance the understanding of customer acceptance of mobile banking beyond the general constructs used in base TAM. Indeed, the results of this study will extend current knowledge on technology acceptance in mobile banking context, thus increasing the likelihood that the system will be utilised.

In the following, the paper will organize as follows: Section 2 will introduce an overview of BIMB and its mobile banking background. Section 3 will present the research framework. Section 4 will discuss the literature review and hypotheses development. Section 5 will present the research methodology. Section 6 will present the results of this study. Section 7 will present the discussion of results and practical implications. Finally, the paper will present conclusions, the study contributions and also the potential future research relevant in this area.

II. AN OVERVIEW OF BIMB AND ITS MOBILE BANKING BACKGROUND

BIMB was introduced in 1983 in order to provide *Shariah* compliant financial products and services to Malaysians, regardless their religion. In Malaysia, the first Islamic bank was introduced in 1983. At the same time, BIMB was the monopoly player in the country to offer *Shariah* compliant products and services. The conventional banks were not allowed to offer *Shariah* compliant products and services due to two main reasons. First, the government decided to give BIMB a lead period of 10 years before allowing another Islamic bank to be established. This was to enable the bank to fully focus on the development of Islamic banking. Second, it allows BIMB to create as many products as possible to provide Malaysian, particularly *Muslims*, with adequate Islamic banking products and services.

In early 1990s, the government introduced a concept of "Islamic window" which allows the existing conventional banks to offer Islamic banking products and services to customers. The concept of "Islamic window" started in March 1993 when the Central Bank of Malaysia or Bank Negara Malaysia (BNM) introduced the "Interest-Free Banking Scheme". The foreign financial institutions also participated in this scheme namely the Standard Chartered, OCBC, HSBC, Citibank, to name a few. As at end of 2004, the Islamic banking system in Malaysia was represented by three main Islamic banks namely BIMB, Bank Muamalat Malaysia Berhad (BMMB) and RHB Islamic Bank whereas Public Bank and Maybank still use Islamic window rather than Islamic subsidiary.

Due to the fierce competition in the banking industry in Malaysia, therefore each bank should be creative and innovative in order to remain competitive. Currently, offering *Shariah* compliant products may not sufficient to absorb that competition, there is a need, therefore to offer value added services. One of the value added services that the most promising is mobile banking or SMS banking. Prior studies have documented the need of mobile banking services in the society (for instance, Amin, *et al.*, 2006; Luarn and Lin, 2005; and Mattila, 2004). The previous study also helps to lay an understanding on "why mobile banking is important?" In essence, there were three main factors. First, mobile banking provides a new opportunity to banks to extend their services to customer and improve their competitiveness (Kohli, 2004). Second, mobile banking is considered to be one of the most value-added and important mobile services (Datamonitor 2000 as cited in Lee, *et al.*, 2003). Thirdly, mobile banking offers an interactive banking transaction (Mattila, 2004).

Mobile banking was introduced by BIMB in July 2004 for three main reasons. First, it offers better banking products and services by providing the bank customers with an added convenience, flexibility and cost-saving option in conducting their banking transactions. Second, this new service complements the purpose of BIMB existing e-banking channels, namely ATM network and Internet banking services. Third, BIMB also believes that mobile banking services will contribute towards cost-saving in its operations by diverting the bank customers from banking halls to this new service, thus enabling to save the operating cost or opening new service outlets. Consequently, mobile banking will further enhance its service efficiency to customers. At the moment, mobile

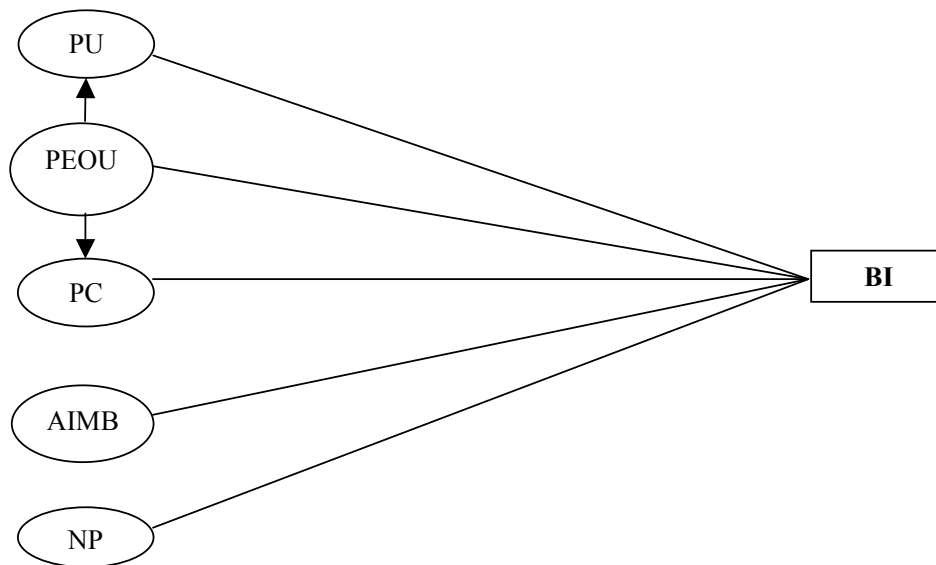
banking services include saving account transaction, current account transaction, credit card, transactions relevant to financing (i.e. personal financing) as well as *Mudarabah* account transaction.

III. RESEARCH FRAMEWORK

Theoretical framework of this study is based on the TAM model (Davis, 1989). Prior studies have extended the model by integrating other variables (Nysveen, *et al.*, 2005; Luarn and Lin, 2005; Pikkarainen, *et al.*, 2004; and Wang, *et al.*, 2003). In base TAM, a general explanation of the determinants of computer acceptance is given rather than for specific topic of behavioral intention to use mobile banking. The two measures popularized and included in the original TAM was perceived usefulness and perceived ease of use. Other variables are silent. In the context of mobile banking, the present study will apply TAM and includes three independent variables specific to mobile banking namely the perceived credibility (Luarn and Lin, 2005), the amount of information on mobile banking (Pikkarainen, *et al.*, 2004) and normative pressure (Nysveen, *et al.*, 2005). The measures of behavioral intention were adapted from the study of Shimp and Kavas (1984).

Accordingly, the theoretical framework consists of five antecedent constructs namely perceived usefulness, perceived ease of use, perceived credibility, the amount of information on mobile banking and normative pressure. These measures have direct influences on intention to use mobile banking. Furthermore, the model also examines the causal link between perceived ease of use and perceived usefulness. Extensive research over the past decade provides evidence of the significant effect perceived ease of use has on usage intention, whether affecting perceived usefulness directly or not (Kleijnen, *et al.*, 2004; Wang, *et al.*, 2003; and Davis, *et al.*, 1989). Finally, the model also investigates the relationship between perceived ease of use and perceived credibility. The proposed of this causal relationship is based on Luarn and Lin (2005) and Wang, *et al.* (2003). The final model is depicted in Figure 1.

Figure 1: Research Model



Notes: PU=Perceived usefulness, PEOU=Perceived ease of use, PC=Perceived credibility, AIMB=The amount of information on mobile banking, NP=Normative pressure and BI=Behavioral intention

IV. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Perceived Usefulness

With respect to TAM, one must understand that perceived usefulness and perceived ease of use are the fundamental elements for TAM. Perceived usefulness is strongly associated with productivity. It suggests that using computer in the workplace would increase user's productivity, improve job performance, enhance job effectiveness and be useful in the job. Indeed, perceived usefulness can be 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). Prior 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). Evidently, Luarn and Lin (2005) examined that perceived usefulness has significant impact in 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 the reason of why people using mobile banking is because they find it useful. On basis of these findings, the following hypothesis is proposed:

H1: Perceived usefulness will have a positive effect on the behavioral intention to use mobile banking.

Perceived Ease of Use

Perceived ease of use refers to the degree to which a person believes that using a particular system would be free of effort (Davis, 1989). Prior 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 of behavioral intention to use online banking in Malaysia. Moreover, Luarn and Lin (2005) also found that there exists a positive causality between perceived ease of use and usage intention. Similarly, in the study of Kleijnen, *et al.* (2004) about wireless finance in Netherlands, perceived ease of use was significant measure in the development of people's intention to use wireless finance. Ramayah, *et al.* (2003) examined that perceived ease of use has significant impact in 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). Indeed, bank customers are likely to adopt online banking when it is easy to use. In addition, Davis, *et al.* (1989) proposed that perceived ease of use is an antecedent of perceived usefulness. Results from previous research 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). On the basis of these mentioned studies, the following hypotheses are proposed:

H2: Perceived ease of use will have a positive effect on the behavioral intention to use mobile banking.

H3: Perceived ease of use will have a positive effect on the perceived usefulness of mobile banking.

Perceived Credibility

Since mobile banking is the new banking gadget, the issue of security and privacy become important in understanding mobile banking acceptance among bank customers. It is a necessary to argue that security and privacy are also important in explaining the acceptability of bank customers on mobile banking. This argument is based on the work of (Luarn and Lin, 2005; 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 the 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 the lack of security is recognized as an important factor impacting the acceptance. In the study of Luarn and Lin (2005) examined that perceived credibility has significant impact in the development of willingness to use mobile banking. Further, Wang, *et al.*

(2003) found perceived credibility is significantly related to the technology acceptance of internet banking. Obviously, the perceived credibility that people have in the system, to securely conclude their transactions and maintain the privacy of their personal information, affect their voluntary acceptance of mobile banking. Since mobile banking is relatively new, perceived credibility has the higher ability to predict and explains the intention of users to adopt mobile banking. In addition, the study is also planned to investigate the relationship between perceived ease of use and perceived credibility. The proposed relationship between perceived ease of use and perceived credibility is based on the work of Wang, *et al.* (2003). In order to continuously investigate the important of perceived credibility to technology acceptance, thus, the following hypotheses are proposed:

H4: Perceived ease of use will have a positive effect on the perceived credibility.

H5: Perceived credibility will have a positive effect on the behavioral intention to use mobile banking.

The Amount of Information on Mobile Banking

The amount of information consumers have about mobile banking is also identified as an important factor influencing the adoption. In terms of definition, information is a data whose form and content are appropriate for a particular use (Alter, 2002). There is empirical support for the causal link between knowledge about new technologies and usage intentions (Polatoglu and Ekin, 2001; Sathye, 1999; and Howard and Moore, 1982). These studies confirm the important of information on newly emerging technologies. Indeed, Polatoglu and Ekin (2001) found that there exists a significant relationship between knowledge possessed by consumers and internet banking adoption. Moreover, the low awareness of online banking is a major factor causing people ignore online banking because of their lack of knowledge of the system (Sathye, 1999). Thus, consumers must be aware of the new product prior to the adoption (Howard and Moore, 1982). In more recent study, Pikkarainen, *et al.* (2004) found information possessed by bank customers has a positive affect over online banking acceptance. Obviously, BIMB's customers have possibility to use mobile banking, if they are supplied with sufficient and concrete information on mobile banking, ranging from its concepts to applications. The amount of information on mobile banking is very important since mobile banking is relatively new in Malaysia, requiring more information to make bank customers aware, thus impacting adoption. On the basis of these findings, the following hypothesis is tested:

H6: The amount of information on mobile banking will have a positive effect on the behavioral intention to use mobile banking.

Normative Pressure

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 behavior in question. There is also 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). The reason people exploit mobile banking is that they encouraged by people surrounding them to use mobile banking. In the study of Nysveen, *et al.* (2005), normative pressure is found to be important construct that brings the success of IS. Obviously, the result demonstrates that, people consider using mobile chat services because these services to be important vehicles for displaying personal and social identity. Similarly, in the study of Kleijnen, *et al.* (2005) about wireless finance in Netherland, normative pressure was significant in the development of people's intention to use wireless finance. In more recent work, Amin, *et al.* (2006) examined that the normative pressure has significant impact in the development of initial willingness to use SMS banking. This result is consistent with the study of Venkatesh and Morris (2000). The work of Venkatesh and Morris (2000) was conducted in the context of technology usage in a workplace. Indeed, mobile banking is more often used as a new means of banking transaction where social pressure may be even more prominent among BIMB's customers to distinguish themselves from the other banking institutions. In the society at large, people can make them special, by employing mobile banking services. Thus, in sum, it is expected that the following hypothesis hold in the mobile banking context:

H7: Normative will have a positive effect on the behavioral intention to use mobile banking.

V. RESEARCH METHODOLOGY

Subjects

With respect to a sampling, a convenience sampling of bank customers was employed for the present study. The data collection method was based on personally administered questionnaire to the customers of the BIMB's branches. In addition, the study is only intended to investigate the bank customers' usage intentions for mobile banking in the future. The data were collected during working hours for three weeks of 5-working days. Every customer at the BIMB's branches was invited to complete the questionnaire. In total, 220 replies were collected and 62 replies were discarded due to insincere responses. Finally, total of 158 replies were obtained and used for the study. The demographic features of the subjects are presented in Table 1.

The demographic distribution shows that 47.5 percent of the respondents were male and while the rest figure (52.5 percent) were female. In terms of age, most of the respondents were aged 21-30 (63.9 percent). Further, the result indicates that those individuals at this age group have potential to become users for mobile banking. In terms of marital status, 53.2 percent of the respondents were single and 46.8 percent were married respondents. The educational background for respondents comprising 23.4 percent had primary and secondary education, 11.4 percent had diploma and 3.8 percent had post-graduate degree. Most of the respondents participated in the survey were degree's holders with 61.4 percent.

Table 1: Demographic Results

Attributes	Demographic distribution	
	Frequency	Percentile
Gender		
	Male	75
	Female	83
Age		
	<20	2
	21-30	101
	31-40	40
	41-50	13
	>51	2
Marital status		
	Single	84
	Married	74
Education level		
	Primary and secondary	37
	Diploma	18
	Degree (bachelor)	97
	Post-graduate degree	6

Measurement

The constituents of the questionnaire are a combination of previously used instruments (Luarn and Lin, 2005; Nysveen, *et al.*, 2005; Pikkarainen, *et al.*, 2004; Wang, *et al.*, 2003; Davis, 1989; and Shimp and Kavas, 1984). The questionnaire included two sections. The first section was on respondent's characteristics. The second section was on the measures employed in this study. Indeed, a formal discussion has been held to welcome comments from lecturers mastering in banking and marketing on the questionnaire. Further, the questionnaire has improved and modified by incorporating the comments received from the discussion session. In the questionnaire, respondents were asked to rate their level of agreement with statement using 5-point Likert scale with 1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4=Agree and 5=Strongly agree.

The measures of perceived usefulness were adapted from Davis (1989). The measures of perceived ease of use were adapted from Wang, *et al.* (2003). The measures of perceived credibility were adapted from Luarn and Lin (2005). The measures of the amount of information on mobile banking were adapted from Pikkarainen, *et al.* (2004). The measures of normative pressure were adapted from Nysveen, *et al.* (2005). Lastly, the measures of behavioral intention were adapted from the study of Shimp and Kavas (1984).

VI. RESULTS

Reliability Testing

The measures were initially examined to establish the reliability of scales. The first factor, perceived usefulness, was loaded with four variables ($\alpha=0.9082$). The second factor, perceived ease of use, was loaded with three variables ($\alpha=0.8583$). The third factor, perceived credibility, was loaded with two variables ($\alpha=0.8455$). The fourth factor, the amount of information on mobile banking, contained three variables ($\alpha=0.9070$). The fifth factor, normative pressure, was loaded with three variables ($\alpha=0.8945$). The dependent variable, behavioral intention was loaded with three variables ($\alpha=0.8568$). Totally, the Cronbach's alpha range from 0.8455-0.9082 that exceed recommended value of 0.50 (Hair, *et al.*, 1998). These values show good internal consistency among scales employed for the present study.

Validity of the Measurement Model

In this study, a factor analysis was conducted on the items comprising perceived usefulness, perceived ease of use, perceived credibility, the amount of information on mobile banking, normative pressure and behavioral intention. The factor analysis was conducted using principal components with varimax rotation as an extraction method. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy indicated a practical level of common variance (KMO=0.934). Thereby, the factor analysis was appropriate. The Barlett's test of sphericity confirmed that the variables within factors are correlated ($\chi^2=3275.60$, $sig=0.000$). Following Hair, *et al.*'s (1992) recommendation, factors loadings greater than 0.50 were considered to be very significant. As a result of factor analysis, the factor loading for each instrument exceeded 0.50 (see Table 2), had significant level of convergent validity.

Table 2: Reliability and Factor Analysis

		Cronbach alpha	Factor loadings
Perceived usefulness	PU1	0.9082	0.900
	PU2		0.892
	PU3		0.827
	PU4		0.924
Perceived ease of use	PEOU1	0.8583	0.891
	PEOU2		0.841
	PEOU3		0.915
Perceived credibility	PC1	0.8455	0.949
	PC2		0.949
The amount of information on mobile banking	AIMB1	0.9070	0.918
	AIMB2		0.925
	AIMB3		0.912
Normative pressure	NP1	0.8945	0.918
	NP2		0.896
	NP3		0.931
Behavioral intention	BI1	0.8568	0.900
	BI2		0.878
	BI3		0.838
			0.931

Hypothesis Testing

In order to test seven hypotheses, the study employed linear regression in order to reveal how different factors affect the use of mobile banking. Interestingly, the hypotheses were supported. In more details, perceived usefulness was found to have a significant effect on behavioral intention ($\beta=0.242$, $t=2.609$, $p\text{-value}=0.010$). Perceived ease of use was found to have a significant effect on behavioral intention ($\beta=0.353$, $t=2.946$, $p\text{-value}=0.004$). Details of the results show that perceived credibility ($\beta=0.254$, $t=2.787$, $p\text{-value}=0.006$), the amount

of information on mobile banking ($\beta=0.439$, $t=5.144$, $p\text{-value}=0.000$) and normative pressure ($\beta=0.264$, $t=2.102$, $p\text{-value}=0.037$) significantly determine behavioral intention. Altogether, they accounted for 0.80 of variance in behavioral intention. This indicates that 80 percent of the variation in behavioral intention is explained by perceived usefulness, perceived ease of use, perceived credibility, the amount of information on mobile banking and normative pressure.

Table 3 further shows that perceived ease of use was found to have a significant effect on perceived usefulness ($\beta=1.162$, $t=21.046$, $p\text{-value}=0.000$). The coefficient of determination for this model is 0.74 percent, indicating that 74 percent of the variation perceived usefulness is explained by perceived ease of use. Table 3 additionally shows that perceived ease of use was also found to have a significant effect on perceived credibility ($\beta=0.497$, $t=7.752$, $p\text{-value}=0.000$). The coefficient of determination for this model is 0.278 percent, indicating that 27.8 percent of the variation perceived credibility is explained by perceived ease of use. Overall, *H1*, *H2*, *H3*, *H4*, *H5*, *H6* and *H7* are supported.

Table 3: Model Results

Attributes	Model 1		Model 2		Model 3	
Constant	Behavioral intention		Perceived usefulness		Perceived credibility	
	0.381		0.857		0.2465	
	β	Sig.	β	Sig.	β	Sig.
PU	0.242	0.010**	--	--	--	--
PEOU	0.353	0.004***	1.162	0.000***	0.497	0.000***
PC	0.254	0.006***	--	--	--	--
AIMB	0.439	0.000***	--	--	--	--
NP	0.264	0.037**	--	--	--	--
<i>R</i>	0.895		0.860		0.527	
<i>R Square</i>	0.801		0.740		0.278	
<i>F-test</i>	122.320		442.941		60.094	
<i>Sig.</i>	0.000***		0.000***		0.000***	

Notes: *** Significant at 1 percent level, **Significant at 5 percent level.

VII. DISCUSSION OF RESULTS AND PRACTICAL IMPLICATIONS

Mobile banking is evolved from the mobile technologies. Although mobile banking is available and ready to use by individuals, there is a tendency that mobile banking unnoticed by customers or is under-used. Thus, there is a need to explore the level of acceptance among BIMB's customers. Additionally, this study is a pioneering effort in applying TAM to the newly emerging context of mobile banking, which has become available in Malaysia. The findings of this study strongly support the suitability of using extended TAM to understand mobile banking. Significant effects of perceived usefulness, perceived ease of use, perceived credibility, the amount of information on mobile banking and normative pressure on behavioral intention were observed. The study also found a significant effect of perceived ease of use on perceived usefulness was identified. Further, a significant effect of perceived ease of use on perceived credibility was also examined.

Furthermore, the results show the causal relationship between perceived usefulness and behavioral intention. These outcomes are consistent with the prior studies Luarn and Lin (2005), Cheong and Park (2005), Chiu, *et al.* (2005), Wang, *et al.* (2003), and Venkatesh and Morris (2000). Hence, when mobile banking is useful, bank customers' intention to adopt it would be greater. Indeed, bank customers are likely to adopt mobile banking when it is easy to use. Likewise, the results also show direct relationship between perceived ease of use and behavioral intention. These outcomes are consistent with the 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 perceived ease of use, the more likely that mobile banking is used by bank customers in Malaysia. Hence, the research confirms the appropriateness of the TAM model in predicting mobile banking adoption.

However, although bank customers may believe that mobile banking is useful and easy to use, they may think other concerns associated with the system. Consequently, this study introduced "perceived credibility", "the amount of information on mobile banking" and "normative pressure" as new TAM factors to better reflect mobile banking context. The results also show perceived credibility to have a strong influence on behavioral intention than TAM variables. Hence, when mobile banking is secure, bank customers' intention to adopt it would be

greater. Bank customers are likely to adopt mobile banking when security and privacy are properly developed within mobile banking system. The results are consistent with the previous studies (Luarn and Lin, 2005; and Wang, *et al.*, 2003). Given that mobile banking use is completely voluntary, the findings of this study suggest that in order to attract more users to mobile banking, it will require more than simply making the system easier to use. More works should look at the issue of developing more secure and reliable mobile banking.

Similarly, the amount of information on mobile banking has a stronger influence on behavioral intention than TAM variables (i.e. “perceived usefulness” and “perceived ease of use”). This explains that the amount of information available for mobile banking is a significant concern for customers when using mobile banking. Previous studies support the present results (Pikkarainen, *et al.*, 2004; Polatoglu and Ekin, 2001; Sathye, 1999; and Howard and Moore, 1982). Indeed, the bank customers are likely to adopt mobile banking when they have sufficient information on the system, which allow them to build a good perception on mobile banking and thus impacting for adoption.

Likewise, normative pressure also has a strong influence on behavioral intention. The result of this study is consistent with the previous studies (Amin, *et al.*, 2006; and Kleijnen, *et al.*, 2004) that claimed normative pressure is intentionally also important to affect an individual decision to apply and use mobile banking. This means that the greater the normative pressure, the more likely mobile banking will be employed by an individual.

The results show direct relationship between perceived ease of use and perceived usefulness. These results supported by previous research 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). This means that the greater perceived ease of use, the more likely mobile banking is useful, thus impacting adoption. The findings also reveal that, there is positive relationship between perceived ease of use and perceived credibility. The result is consistent with Luarn and Lin (2005) and Wang, *et al.* (2003). Indeed, the greater perceived ease of use, the more likely mobile banking is secured to use and thus impacting for mobile banking adoption.

This study provides important guidelines for the bank. The mobile banking adoption is relied on its usefulness and easy to use. The bank could organize training courses for mobile banking for free, and surely available at the bank branches anywhere in Malaysia. The study also found that the amount of information on mobile banking is the influential factor to affect an individual behavioral intention to use mobile banking. In response to this concern, it is encouraged for the bank management to release a manual that provides mobile banking information in more details. Indeed, we believe people with higher information on mobile banking will have a positive knowledge and skills on mobile banking system, thus impacting for adoption. It is also worth nothing that security and privacy are strongly associated with behavioral intention. Therefore, it is necessary for the bank develop mobile banking systems with valuable functions and a perceived trustworthiness to protect bank customers’ from any errors.

VIII. CONCLUSION

The aim of this study was to develop modified version of TAM that can explain the bank customers’ behavioral intention to use mobile banking. The study adds perceived credibility, the amount of information on mobile banking and normative pressure to TAM, in addition to perceived usefulness and perceived ease of use. Interestingly, the proposed measures significantly determine behavioral intention. Needless to say, the modified version of TAM for mobile banking is named as “Mobile Banking Acceptance Model (MBAM)”. This model is unique because it investigates consumer acceptance for mobile banking from the perspective of BIMB and draws useful inferences for BIMB, so extends its generalizability to other banking institutions in Malaysia.

The study also leads to several contributions. First, it successfully confirms the applicability of the TAM to mobile banking. In line with this statement, perceived usefulness and perceived ease of use were found to be significant factors of the behavioral intention to use mobile banking. Second, this study supports the valid argument on perceived credibility as previously examined by Luarn and Lin (2005) and Wang, *et al.* (2003), found intention to use mobile banking was influenced by security and privacy associated with mobile banking context. This result provides extra work for the bank to ensure mobile banking is free from errors and electronic threats. Third, this study supports Pikkarainen, *et al.*’s (2004) research that found a significant direct relationship between the amount of information on mobile banking and behavioral intention to use online banking, and so extends its generalizability to mobile banking. Fourth, this study supports Nysveen, *et al.*’s (2005) research that

found a significant direct relationship between normative pressure and behavioral intention to use online banking, and so extends its generalizability to mobile banking. Fifth, this study also reveals a significant direct relationship between perceived usefulness, perceived ease of use and perceived credibility. Overall, all of the proposed hypotheses are supported.

Furthermore, this study suffers from two limitations. The first limitation is related to the sample size. The sample size of this study is relatively small with 158 respondents only, somewhat limits the generalization of the research results. It would be reasonable to elevate sample size and testing this model more extensively, hence this future research would be more generalizable. The second limitation is related to the additional independent variables. There is a need to search for additional independent variables that can be able to predict usage intention more accurately. It would be necessary to add perceived self-efficacy and perceived financial cost in the model. However, depending on the banking environment, type of sampling, users and technological advances, different constructs could also be proposed beyond perceived self-efficacy and perceived financial cost.

Finally, this study at least has provided an overview on Malaysia bank customers' behavioral intention to use mobile banking. It is expected in the future, more research will be conducted in the area of mobile banking.

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