Labuan Bulletin
OF INTERNATIONAL BUSINESS & FINANCE
Volume 7, 2009 ISSN 1675-7262

MOBILE WALLET ACCEPTANCE IN SABAH: AN EMPIRICAL ANALYSIS

Hanudin Amin[1]

Labuan School of International Business and Finance,
Universiti Malaysia Sabah

Abstract

Purpose - Technological proliferation has changed the practice in which financial services are transacted, with mobile wallet being the latest development in this area. This paper aims at explaining the factors that encourage bank customers to adopt mobile wallet in Sabah. Design/methodology/approach – Extends the applicability of the technology acceptance model (TAM) in a mobile wallet context, by adding perceived expressiveness, knowledge about mobile wallet and perceived credibility in addition to perceived usefulness and perceived ease of use. Findings - Results suggest that perceived usefulness, perceived ease of use, perceived expressiveness and knowledge about mobile wallet are important determinants of mobile wallet acceptance. Research limitations/ implications - The relatively small size of the sample somewhat limits generalizations. However, this is not a serious limitation, as the author believes this sample size able to contribute significantly, at least at exploratory level. Moreover, there may be a need to add for additional independent variables to the extended TAM, further expanding the number of situations to which it applies. Practical implications - This study will be primarily beneficial to the commercial banks since they will understand the usable factors toward mobile wallet acceptance. Originality/value - Develops a specific version of TAM to better reflect mobile wallet context in Malaysia.

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[1] Universiti Malaysia Sabah - Labuan International Campus, Jalan Sungai Pagar, 87000 Labuan Federal Territory, MALAYSIA. Tel: +087-466718 Fax: + 087-460477

JEL Classifications: M15; C42; C52
***Keywords*:** Mobile wallet, TAM, bank customers, commercial banks, Sabah

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1. Introduction

The technology advances in mobile phones have created great opportunity for new banking instruments and services, the securing of banking operations, and the elimination of transaction costs (i.e. time and money) in banking system. Many banks consider mobile-based technologies as a path in the introduction of new innovations, and thus provide an opportunity to gain competitive advantage (Al-Ashban and Burney, 2001). One innovation related to mobile-based technology is mobile wallet or m-wallet, an alternative to traditional modes of payment. Various payment methods can be found previously, which included cash, credit card, and cheque book for conducting payment transactions, suitable for different individuals' need. Rapid technological advancements have changed the way customers pay their bills, goods and other stuffs. Alternatively, bank customers can do these tasks electronically by using mobile wallet. By definition, mobile wallet is a payment solution by which bank customers would be able to make payment and receive payment on account of purchase or sell goods via handheld mobile phone (Swartz, 2001). Indeed, mobile wallet allows bank customers to shop wirelessly and more flexible with their mobile phones (Swartz, 2001). More specifically, bank customers can use mobile wallet to pay their utility bills at their own convenience. Considering mobile wallet as a new innovation, therefore it is necessary for banks offer the system to their existing customers in order to remain competitive and innovative.

In Malaysia, commercial banks are comparatively better than their counterparts elsewhere in the world in terms of their technology investments (Damodaran, 2007). As such, electronic channels for bank are easily found in banking institutions in Malaysia ranging from Internet banking, mobile banking and recently mobile wallet. Technology investments in banking institutions in Malaysia are found in both conventional banks and Islamic banks. Mobile Wallet Sdn Bhd introduced the mobile wallet in 2004 and commercial banks in Malaysia become as partners for mobile wallet. There are three commercial banks offer the service to their customers namely Maybank, AmBank and Alliance Bank. Without information resources, mobile wallet can easily remain unnoticed by bank customers or is under-used despite its availability. Mobile wallet is still at its infancy stage, leaving a great deal of room for development in

Malaysia. Evidently, bank customers in Malaysia are relatively unaware on other functions that can be found within their mobile phone, which is mobile wallet. Considering its cost, not many banking institutions offer this facility to their customers. As noted earlier, only Maybank, AmBank and Alliance Bank offer the facility. Alternatively, bank customers can still use other methods to perform financial transactions such as Automated teller machine (ATM) and Internet banking, which are now ready to use, and they are available. In other South East Asia (SEA) countries, to the researcher's knowledge, Malaysia is among many countries introduced mobile wallet in banking transaction. There exists scarce study shown mobile wallet in other countries in SEA. Therefore, the current research will examine the factors affecting bank customers' decision to use mobile wallet. The current study can assist commercial banks to formulate appropriate strategies to persuade bank customers employ mobile wallet. This could be done by helping them discover the usable factors toward mobile wallet acceptance or help them discover why potential bank customers avoid using the system.

Previous studies have overlooked the mobile wallet acceptance in their focus of research (Guriting and Ndubisi, 2006; Cheong and Park, 2005; Nysveen *et al.*, 2005; Pikkarainen *et al.*, 2004; Kleijnen *et al.*, 2004; Ramayah *et al.* 2003 and Venkatesh and Morris, 2000). Moreover, Ramayah *et al.* (2003) investigated the internet banking acceptance in Penang, Malaysia without a reference to mobile wallet. Similarly, Guriting and Ndubisi (2006) also investigated technology acceptance model for internet banking in Kota Kinabalu, Sabah, East Malaysia, Malaysia without mentioning mobile wallet. Amin *et al.* (2006) and Kleijnen *et al.* (2004) examined technology acceptance model for SMS banking and wireless finance, respectively. These studies overlooked mobile wallet in their studies perhaps because it is relatively new. Therefore, the current study motivates to investigate mobile wallet in a Malaysia context. For this purpose, the TAM is chosen. There are two main reasons of selecting the theory. First, choosing TAM was 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 expressiveness, knowledge about mobile wallet and perceived credibility and usage intentions. The results of this study will extend current knowledge on technology acceptance to better reflect mobile wallet. Furthermore, the study provides a deeper insight into what is needed in order for bank customers to accept mobile wallet and will therefore allow

for improved application design and image of banking institutions in offering this banking gadget.

In the following the discussion of the literature review and hypotheses are provided. Section three of the paper will provide an overview of methodology that is used by the current study. Section four will present the research findings. The last section will deliver the contributions and limitations of the study.

2. Literature Review and Hypotheses

In this study, Technology Acceptance Model or TAM, as seen previously, is used as a point of departure. This model is based on an adaptation of the Theory of Reasoned Action (TRA) which was developed by Fishbein and Ajzen (1980). In more detail, TRA as developed by Fishben and Ajzen (1980) is more generic, while TAM is more specific. This is because TAM used to examine behavioral intention to use information technology applications such as mobile wallet. Evidently, many researchers around the globe use TAM model widely (Cheong and Park, 2005; Chiu *et al.*, 2005; Ramayah *et al.*, 2003; and Venkatesh Morris, 2000). It means this model is now easily available in many journals such as *Internet Research* and *Management Research News*, to name a few. There a number of studies have discussed deeply the applicability of TAM into different Information System (IS) devices (Nysveen *et al.*, 2005; Luarn and Lin, 2005; Pikkarainen *et al.*, 2004; Kleijnen *et al.,* 2004; Wang et al., 2003). Interestingly, there is a common agreement among researchers that TAM model was valid in explaining individual's acceptance of newly emerging technologies (Guriting and Ndubisi, 2006; Cheong and Park, 2005; Nysveen *et al.*, 2005; Pikkarainen *et al.*, 2004; and Kleijnen *et al.*, 2004). Briefly, TAM is easy to apply to different technologies. Hence, mobile wallet as one type of latest technologies is also feasible to adopt TAM to further examine factors affect mobile wallet acceptance. The following will provide the literature of TAM and followed by other constructs:

TAM: Perceived usefulness and perceived ease of use

Perceived usefulness and perceived ease of use are original constructs for TAM. Davis (1989) defined perceived usefulness as the degree to which a person believes that using a particular system would enhance his or her job performance. Empirical evidence on the effect of perceived usefulness on usage intentions has been documented (Cheong and Park, 2005; Chiu *et al.*, 2005; and Venkatesh Morris, 2000). Evidently, Cheong and Park (2005) and Chiu *et al.* (2005) found that perceived usefulness positively influences online purchase intentions and mobile internet respectively. Visibly,

perceived usefulness is a critical factor in developing usage intentions. 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 intentions (Guriting and Ndubisi, 2006; 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 Sabah. Likewise, bank customers are likely to adopt online banking when it is easy to use. 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 Adams *et al.* (1992), Davis *et al.* (1989) and Ramayah *et al.* (2002). On the basis of these findings, it is expected that the general causalities found in TAM are also applicable to mobile wallet. It is argued that, perceived usefulness and perceived ease of use are identified as factors influencing technology acceptance. 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). Thus, the following hypotheses are proposed:

H1. Perceived usefulness has a positive effect on bank customers' acceptance of mobile wallet;

H2. Perceived ease of use has a positive effect on bank customers' acceptance of mobile wallet;

H3. Perceived ease of use has a positive effect on the perceived usefulness of mobile wallet;

Perceived expressiveness

Cassidy *et al.* (1992) defined perceived expressiveness as individuals' ability to express their emotions or identity. There is empirical support for the causal link between perceived expressiveness and usage intentions (Amin *et al.*, 2006; Nysveen *et al.*, 2005; and Plant, 2000). These studies confirm the important effect of perceived expressiveness in understanding individual responses to technology acceptance. Furthermore, Amin *et al.* (2006) as noted earlier examined the perceived expressiveness has significant impact in predicting individual responses to SMS banking. Nysveen *et al.* (2005) in Norway found that, people in Norway tend to adopt mobile chat services because of its personal values and identity. Plant (2000) also found that there exists a significant causality between

perceived expressiveness and usage intentions. Obviously, the perceived expressiveness is one of utmost factors in explaining usage intentions. On the basis of these findings, it is expected the perceived expressiveness is also applicable to mobile wallet context. The following hypothesis is then evaluated:

> *H4.* Perceived expressiveness has a positive effect on bank customers' acceptance of mobile wallet;

Knowledge about mobile wallet

Knowledge refers as a combination of instincts, ideas, rules and procedures that guide actions and decisions (Alter, 2002). Apparently, knowledge of bank customers have about new technologies has been identified as an important factor influencing the acceptance. 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 knowledge about new technologies. 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. These studies suggest an important of knowledge as a factor affecting the acceptance. Therefore, the mobile wallet adoption is also based on the bank customers' knowledge on the system. On the basis of these findings, the following hypothesis is tested:

> *H5.* Knowledge about mobile wallet has a positive effect on bank customers' acceptance of mobile wallet; and

Perceived credibility

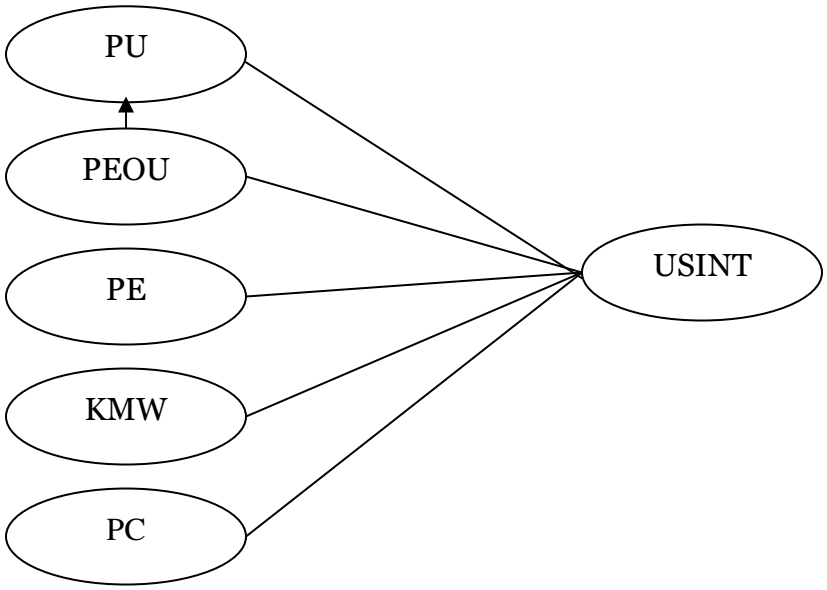
Perceived credibility refers to the two important dimensions namely security and privacy (Wang *et al.*, 2003). By definition, perceived credibility is one's judgment on the privacy and security issues of the mobile wallet system. The importance of security and privacy to the acceptance of banking technologies 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. Further, Wang *et al.* (2003) found perceived credibility is significantly related to the technology acceptance of

internet banking. Tan and Teo (2000) found risk to be a very significant factor in internet banking adoption. In contrast, Pikkarainen *et al.* (2004) found a weak relationship between perceived credibility and technology acceptance. Indeed, bank assurance over the security and privacy could explain the result. Since mobile wallet is relatively new, the issue of perceived credibility could be the factor of usage intentions among bank customers. On the basis of these studies, thus, the following hypothesis is then tested.

H6. Perceived credibility has a positive effect on bank customers' acceptance of mobile wallet.

Based on the above literature, the following research model is proposed:

Figure 1: Research model



Note: PU=Perceived usefulness, PEOU=Perceived ease of use, PE=Perceived expressiveness, KMW=Knowledge about mobile wallet, PC=Perceived credibility and USINT=Usage intentions.

The proposed model as illustrated above is based on the work of Davis in 1989. Davis (1989) introduced perceived usefulness and perceived ease of use. With regard to perceived usefulness, the current study extracts items from three studies notably Pikkarainen *et al.* (2004), Wang *et al.* (2003) and Davis (1989). With respect to perceived ease of use, there exists, a number of studies discuss a causal link between perceived ease of use and usage intentions (Nysveen *et al.*, 2005; and Wang *et al.*, 2003). Nevertheless, other factors are required in order to better reflect mobile

wallet acceptance. For this purpose, this study introduced three constructs namely perceived expressiveness, knowledge about mobile wallet and perceived credibility. As far as perceived expressiveness is concerned, this construct is generated from the work of Nysveen *et al.* (2005). The second proposed construct is knowledge about mobile wallet that is based on the work of Pikkarainen *et al.* (2004). With regard to perceived credibility, a special reference is made to the two works by Pikkarainen *et al.* (2004) and Wang *et al.* (2003). Usage intentions or behavioral intentions are based on the work of Shimp and Kavas (1984). On the basis of these studies, therefore, the model of this study is introduced as displayed in Figure 1.

3. Research Methodology

Subject

The data for this study is obtained through a survey questionnaire conducted in Sabah. The survey was conducted in February 2007. For the research purpose, a convenience sampling was used, since it is against the Banking and Financial Institution Act (BAFIA) 1989 and Islamic Banking Act (IBA) 1983 to acquire a list of bank customers and contact numbers and addresses from banking institutions (International Law Book Services, 2004 and International Law Book Services, 2002). The population of interest is customers of banks in Sabah who hold mobile phone but do not yet applying for mobile wallet. The data collection method was based on personally administered questionnaire to the customers of banks in Sabah. In this study, participation of bank customers was based on voluntary basis. Indeed, mobile wallet is relatively new phenomenon in Sabah, therefore the current study focused on the intention to use of mobile wallet among bank customers instead of actual use. This approach is similar to what Guriting and Ndubisi (2006) employed. A total of 150 questionnaires were distributed, but only 117 usable responses were usable. There is a 78 per cent response rate.

Measures

The questionnaire comprised two sections. The first section consists of respondent characteristics. The second section consists of the asked constructs. In the questionnaire, the respondents require to rate their level of agreement with statements using a 5-point Likert-type scale, ranging 1=strongly disagree, to 5=strongly agree. Questionnaire items were adapted from prior studies which are described as follows: perceived usefulness (Pikkarainen *et al.*, 2004; Wang *et al.*, 2003; and Davis, 1989), perceived ease of use (Nysveen *et al.*, 2005; and Wang *et al.*, 2003), perceived expressiveness (Nysveen *et al.*, 2005), knowledge about mobile wallet (Pikkarainen *et al.*, 2004) and perceived credibility (Pikkarainen *et*

al., 2004; and Wang *et al*., 2003) and usage intentions (Shimp and Kavas, 1984). Prior to the further study, the pilot test of measures was conducted by disseminating questionnaires to lecturers majoring in banking and marketing at the *Universiti Malaysia Sabah-Labuan International Campus*. Consequently, the measures were modified based on the pilot test outcomes in order to better reflect mobile wallet.

4. Results

The demographic results of the respondents are summarized in Table I. Among 117 respondents, 47 per cent were male and 53 per cent were female. Majority of the respondents were relatively young, with 69.2 per cent between 21-30 years of age. Majority of the respondents were Malay (72.6 per cent), and minority will be Chinese and Kadayan with 2 per cent each. In terms of marital status, 69.2 per cent were single and 30.8 per cent were married respondents. In terms of education, majority of the respondents had attained bachelor's degree, with 59.8 per cent, 19.7 per cent had attainted primary and secondary education, and 15.4 per cent had attainted a diploma and 5.1 per cent for master and higher. This result is consistent with previous research (Laforet and Li, 2005; and Karjaluoto *et al*., 2002) which found that users are mostly educated because mobile wallet required skills and knowledge of mobile-based technologies.

Table I: Demographic results

	Profile	*Description*	*Respondents*	*percentage*
1.	*Gender*	Male	55	47.0
		Female	62	53.0
2.	*Age*	Less than 20	2	1.7
		21-30	81	69.2
		31-40	25	21.4
		41-50	7	6.0
		Above 50	2	1.7
3.	*Race*	Kadazan-Dusun	11	9.4
		Bajau	6	5.1
		Malay	85	72.6
		Chinese	2	1.7
		Kedayan	2	1.7
		Others	11	9.4
4.	*Marital status*	Single	81	69.2
		Married	36	30.8
5.	*Education attained*	Primary and secondary school	23	19.7
		Diploma	18	15.4
		Bachelor	70	59.8
		Master and above	6	5.1

Reliability and validity testing

In this study, reliability test was conducted to evaluate Cronbach's Alpha values for all dimensions. The values are as follows: perceived usefulness (0.88), perceived ease of use (0.76), perceived expressiveness (0.80), knowledge about mobile wallet (0.88) and perceived credibility (0.83) and usage intentions (0.88). All reliabilities were above the 0.6 level, generally considered acceptable (Guriting and Ndubisi, 2006; Ndubisi and Sinti, 2006; and Hair *et al.*, 1998).

Table II: Mean, standard deviation, factor loadings and reliability

Items	*No. of items*	*Items*	*Mean*	*Standard deviation*	*Factor loadings*	*Reliability*
		PU1	2.85	1.084	0.861	0.88
PU	4	PU2	2.84	1.025	0.845	
		PU3	2.93	0.998	0.816	
		PU4	2.83	1.011	0.902	
		PEU1	3.13	0.987	0.851	0.76
PEOU	3	PEU2	2.97	0.991	0.750	
		PEU3	3.10	0.977	0.864	
		PE1	2.48	1.051	0.772	0.80
PE	3	PE2	2.37	1.072	0.918	
		PE3	2.54	1.134	0.846	
		KMW1	2.69	1.004	0.901	0.88
KMW	3	KMW2	2.74	1.029	0.909	
		KMW3	2.68	1.065	0.891	
		PC1	2.68	0.958	0.919	0.83
PC	2	PC2	2.58	0.897	0.919	
		IT1	2.74	1.054	0.847	0.88
USINT	3	IT2	2.98	1.012	0.754	
		IT3	2.85	0.976	0.901	

Note: PU=Perceived usefulness, PEOU=Perceived ease of use, PE=Perceived expressiveness, KMW=Knowledge about mobile wallet, PC=Perceived credibility and USINT=Usage intentions.

Factors analysis is also conducted in order to confirm the construct validity of the scales could be performed adequately by using principle component analysis. The minimum factor loading of 0.6 on its hypothesized constructs is proposed (Nunnally, 1978). An eigenvalue of more than 1.0 was used as a determinant criterion for each factor in the factor analysis. Factor loading values were obtained using varimax rotation. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy indicated that a practical level of common variance (KMO=0.909). Therefore, the factor analysis was appropriate. Table II shows the results of the factor analysis. As a result, most of the factor loading for each instrument exceeded 0.6, meeting the essentially significant level of convergent validity.

Relationship testing and discussion of results

The regression analysis was conducted to reveal how different factors affect the use of mobile wallet. Based on Table III, perceived usefulness, perceived ease of use, perceived expressiveness and knowledge about mobile wallet were found to affect mobile wallet acceptance among bank customers. At 5 % significant level, perceived usefulness is significantly associated with usage intentions at 0.05 (t=3.003, *p-value*=0.003). Consequently, *H1* is supported. This means, when mobile wallet is useful, bank customers' intention to adopt it would be greater. Indeed, bank customers are likely to adopt mobile wallet when it is useful. This positive result indicates that, the movement of perceived usefulness is parallel to usage intentions. Previous studies support the current result for perceived usefulness (Cheong and Park, 2005; Chiu *et al.*, 2005; and Davis, 1989). This explains that bank customer will use mobile wallet when it enables them to increase their performance in conducting financial transaction, mainly for payment purpose.

Table III: Results for relationship testing

	Model 1	*Model 2*
(Constant)	USINT	PU
	(1.062)	(1.382)
PU	0.318	
	(0.003***)	-
PEOU	0.321	1.095
	(0.027***)	(0.000***)
PE	0.271	-
	(0.007***)	
KMW	0.486	-
	(0.000***)	
PC	0.008373	-
	(0.641, n.s.)	
USINT	-	-
F statistic	49.571	151.741
	(0.000***)	(0.000***)
R	0.831	0.754
R Square	0.691	0.569
Adjusted R Square	0.677	0.565

Note: ***Significant at 5 per cent level, PU=Perceived usefulness, PEOU=Perceived ease of use, PE=Perceived expressiveness, KMW=Knowledge about mobile wallet, PC=Perceived credibility and USINT=Usage intentions.

Table III shows that perceived ease of use (*t*=2.246, *p-value*=0.027) is significantly related to usage intentions. Consequently, *H2* is supported. This explains that when mobile wallet is easy to use, bank customers feel that they need less effort to operate the system and easy to handle. In short, the two constructs (perceived ease of use and usage intentions) are moved in the same direction, which means the greater ease of use, the greater is the usage intentions. Table III further shows that perceived ease of use is significantly associated with perceived usefulness (*t*=12.318, *p-value*=0.000). Consequently, *H3* is supported. This is consistent with previous studies (Kleijnen *et al.*, 2004; Wang *et al.*, 2003; and Davis *et al.*, 1989) which found that perceived ease of use is highly associated with perceived usefulness of the adoption of technological products and services. Consequently, the greater perceived ease of use, the more likely that mobile wallet is useful for bank customers in Malaysia.

Perceived expressiveness is significantly associated with usage intentions at 0.05 (*t*=2.749, *p- value*=0.007) that explains its appropriateness in predicting Malaysian intention to use mobile wallet. Consequently, *H4* is supported. The current result is consistent with the previous research (Amin *et al.*, 2006; Nysveen *et al.*, 2005; and Plant, 2004). In short, the two constructs (perceived expressiveness and usage intentions) are moved in the same direction, which means the greater the expressiveness, the greater is the usage intentions. This result reveals that mobile wallet is very well be perceived as instrumental for expressing the bank customers' personal and social identity and thus important in determining adoption. In more detail, bank customers may perceive that mobile wallet as being highly instrumental in expressing personal identity and values. By using mobile wallet, bank customers can make themselves different in the society. This shows that perceived expressiveness would lead to more favorable behavioral intention of mobile wallet because of its personal values and identity.

The result also indicates that knowledge about mobile wallet that possessed by bank customers is positively correlated with use (*t*=4.483, *p-value*=0.000) which supported by the previous study findings (Pikkarainen *et al.*, 2004; and Sathye, 1999). Consequently, *H5* is supported. In this study, knowledge about mobile wallet has the higher ability to predict and explain the intention of bank customer to adopt mobile wallet. In short, the two constructs (knowledge about mobile wallet and usage intentions) are moved in the same direction, which mean the greater bank customers' knowledge, the greater is the usage intentions. As such, when bank customers possessed many information, the greater is the adoption. Therefore, it is an important effort that the banks are required to

create awareness on mobile wallet to the consumers in order to instill knowledge and thus adoption. The important of this construct is based on the argument that bank customers may choose not to use the service because they lack the required knowledge, skills, or ability to use the new mobile wallet.

The result also suggests insignificant relationship between perceived credibility and the intention of bank customers to adopt mobile wallet (t=0.468, *p-value*=0.641) that corroborates with the previous study findings (Ndubisi and Sinti, 2006; and Pikkarainen *et al*., 2004), thus, *H6* is not supported. This could be due to the assurance by banks over the security and privacy of mobile wallet in order to allay fears of security among bank consumers.

5. Conclusion and Practical Implications

The study is aimed at developing a modified model of TAM for mobile wallet, a theoretical framework to explain the factors influence bank customers acceptance of mobile wallet in Sabah. For the purpose, three new constructs are employed notably perceived expressiveness, knowledge about mobile wallet and perceived credibility in order to enhance the understanding of bank customers' acceptance of mobile wallet beyond the traditional TAM variables. The extended TAM model for mobile wallet is then named as *Mobile Wallet Acceptance Model* (MWAM).

The contributions of this study are three fold. First, it successfully applied TAM in mobile wallet that is quite different from the systems examined in prior studies (Guriting and Ndubisi, 2006; Cheong and Park, 2005; Nysveen *et al*., 2005; Pikkarainen *et al*., 2004; Kleijnen *et al*., 2004, Wang *et al*., 2003; and Ramayah *et al*., 2003). Consistent with previous studies, perceived usefulness and perceived ease of use were found to be significant antecedents of the usage intentions for mobile wallet. Second, the study result suggests that knowledge about mobile wallet is stronger factor in explaining usage intentions of bank customers. Since mobile wallet is still in an embryonic stage of commercial deployment, most bank customers have not yet had the chance to use it because of limited information available on mobile wallet. Thus, the information is essential for mobile wallet adoption. Third, this study supports Amin *et al*. (2006), Nysveen *et al*. (2005) and Plant (2001) research that found a significant direct relationship between perceived expressiveness and usage intentions for mobile-based technologies, and so extends its generalizability to mobile wallet.

The implications of this study to banking institutions are three fold. First, attention must be given to design usefulness and easy to use of mobile wallet by cultivating favorable beliefs of usefulness and ease of use in the bank customers regarding mobile wallet services. This could be done by activating the role of customer service of the bank in promoting the usefulness and ease of use of mobile wallet. Second, attention is also required for the issue of "expressiveness". In order to tackle this, a bank management must render hints about the personal values and identity brought by mobile wallet. The expressive quality and features of mobile wallet needs to be communicated particularly to bank customers through a proper brochure. Third, the information resources important to the usage of mobile wallet must be available in order to build knowledge about mobile wallet for bank customers. It is necessary for banks to provide a complete manual for mobile wallet that allows bank customers understand, analyze, thus influencing for adoption. Bank customers with higher knowledge about mobile wallet are more readily prepared to use the mobile wallet services because they have adequate views of the system including its ease of use, usefulness, expressiveness and credibility. Therefore, bank management needs to escalate the information base available for mobile wallet in Malaysia, mainly in Sabah.

The study suffers from two limitations. The first limitation is related to the sample size. The relatively small size of the sample confines generalization of the study results. In order to tackle this limitation, the future study must escalate the sample size and testing this model more extensively, this future study would be more generalizable. Second limitation is based on the fact that other possible factors influencing the acceptance of mobile wallet were not included in the model. Consequently, there is a need to search for additional variables that feasible to predict usage intentions more accurately. It would be reasonable to add perceived self-efficacy, perceived financial cost, perceived enjoyment and normative pressure to the extended TAM, further expanding the number of situations to which it applies.

Concisely, the results of this study show that the original TAM constructs are good in evaluating the intention of bank customers to adopt mobile wallet. More specifically, perceived usefulness and perceived ease of use are valid constructs in explaining usage intentions for mobile wallet. This study is consistent with previous studies (Guriting and Ndubisi, 2006; Cheong and Park, 2005; Nysveen *et al.*, 2005; Pikkarainen *et al.*, 2004; and Kleijnen *et al.*, 2004) confirm that TAM is easy to apply to different situations. On the contrary, the model has an obvious weakness since it is relied heavily on only two constructs notably perceived usefulness and

perceived ease of use. On the basis of this argument, therefore, many studies have added other constructs in TAM in order to make it more specific (Nysveen *et al.*, 2005; Pikkarainen *et al.*, 2004; and Kleijnen *et al.*, 2004). As such, the current study is also done the same.

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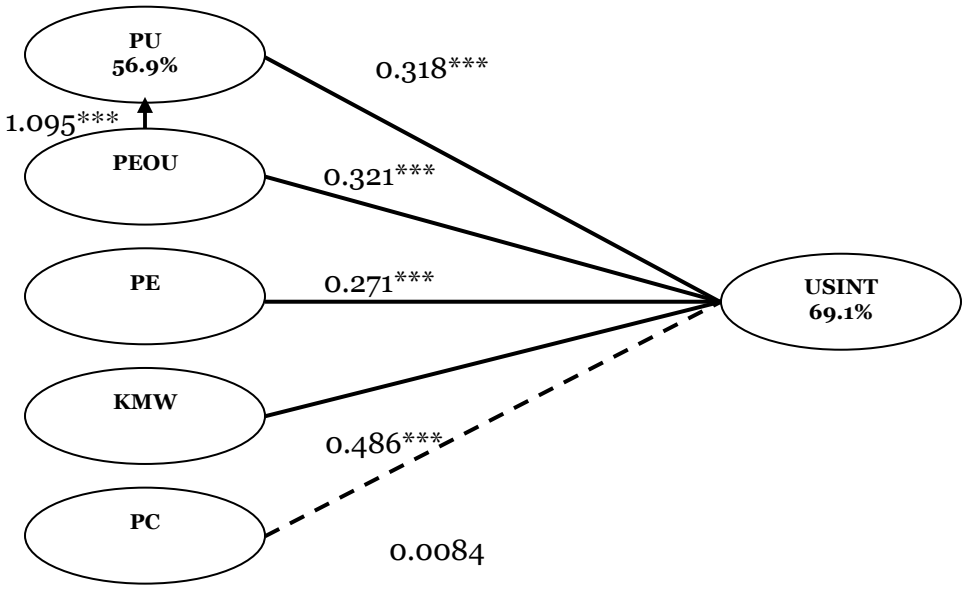
APPENDIX

Table IV: Survey measures

Source(s)	*Code*	*Research Items*
Perceived usefulness (Pikkarainen *et al.*, 2004; Wang *et al.*, 2003; and Davis, 1989)	PU1	Using mobile wallet would enhance my effectiveness in conducting payment transactions
	PU2	Using mobile wallet would improve my performance in conducting payment transactions
	PU3	Using mobile wallet makes it easier for me to conduct payment transactions
	PU4	I would find mobile wallet is useful in my payment transactions
Perceived ease of use (Nysveen *et al.*, 2005; and Wang *et al.*, 2003)	PEOU1	Learning mobile wallet is easy for me
	PEOU2	It would be easy for me to become skillful at using mobile wallet
	PEOU3	Since mobile wallet uses my mobile phone, hence mobile wallet is easy to use
Perceived expressiveness (Nysveen *et al.*, 2005)	PE1	Usually I am among of the first to try mobile wallet
	PE2	I express my personality by using mobile wallet
	PE3	Using mobile wallet tends to give me status
Knowledge on mobile wallet (Pikkarainen *et al.*, 2004)	KMW1	Generally, I know mobile wallet
	KMW2	I know the benefits of mobile wallet
	KMW3	I obtain information on mobile wallet via bank management
Perceived credibility (Pikkarainen *et al.*, 2004; and Wang *et al.*, 2003)	PC1	I trust in the ability of mobile wallet to protect my privacy
	PC2	Mobile wallet is really secure to use
Usage intentions (Shimp and Kavas, 1984)	USINT1	My general intention to use mobile wallet is very high
	USINT2	I will think about using mobile wallet
	USINT3	I will use mobile wallet in the future

Figure 2: Research model



Non significant path - - - - →

Significant path ——→

Note: ***Significant at 5 per cent level