Factors Affecting Malaysian Behavioral Intention to Use Mobile Banking With Mediating Effects of Attitude

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ABSTRACT

The purpose of this study is to examine the factors that influence Malaysian to adopt mobile banking as the tool for their banking purpose where attitude as a mediator. From the literature, five determinant factors are identifies. Each variable is measured using 7-point Likert-scale or interval scale. Using primary data collection method, questionnaires were distributed to target respondents of lecturer, administrative staff, postgraduate students and undergraduate students of Universiti Utara Malaysia, Wawasan Open University and AIMST University located in North Malaysia. This study is based on The technology acceptance model (TAM, 1993) specifies the causal relationships between system design features, perceived usefulness, perceived ease of use, attitude toward using, and actual usage behaviour. The data were analyzed using structural equation modeling (SEM) using AMOS version 21. The findings of this study revealed that perceived usefulness, perceived benefit and perceived credibility were the factors affecting users having intention to adopt mobile banking. Meanwhile, the perceived ease of use and perceived financial cost were found to be insignificant in this study. Furthermore, this study also manage to present five mediating effects: (1) attitude towards using mobile banking mediates relationship between perceived usefulness and behavioral intention to use mobile banking; (2) attitude towards using mobile banking mediates relationship between perceived ease of use and behavioral intention to use mobile banking; (3) attitude towards using mobile banking mediates relationship between perceived benefit and behavioral intention to use mobile banking; (4) attitude towards using mobile banking mediates relationship between perceived credibility and behavioral intention to use mobile banking; (5) attitude towards using mobile banking mediates relationship between perceived financial cost and behavioral intention to use mobile banking. The findings are discussed in the perspective of bank customers.

Keywords: Behavioral intention, mobile banking, structural equation modeling

INTRODUCTION

Mobile banking is an activity of banking transaction carried out via a mobile phone. Mobile banking is also defined as "a channel whereby the consumer interacts with a bank via a mobile device, such as a mobile phone or personal digital assistant. In 2011, survey conducted by InMobi the world's largest independent mobile ad network, found that out of 1,091 Malaysians, 57 per cent of the respondents primarily or exclusively accessed the web via their mobile devices.This study also shown that the mobile was the top media choice for Malaysians using the web, and mobile banking in particular was expected to increase all across demographics. According to Central Bank of Malaysia, the total banks that offer mobile banking in Malaysia is thirteen which included Al Rajhi Banking & Investment Corporation (Malaysia) Berhad,AmBank (M) Berhad, Bank Islam Malaysia Berhad, Bank Simpanan Nasional, CIMB Bank Berhad, Citibank Berhad, Hong Leong Bank Berhad,HSBC Bank Malaysia Berhad, Malayan Banking Berhad, OCBC Bank (Malaysia) Berhad, Public Bank Berhad, RHB Bank Berhad and Standard Chartered Bank Malaysia Berhad.

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In developing countries, such as Malaysia, mobile banking has just been embraced by the banking industry. Banks have pursued strategies to encourage their clients to engage in using mobile banking (Guriting and Ndubisi, 2006). Mobile banking is relatively new in Malaysia compared to Internet banking, thus it is important for the banks to examine the usefulness factor affecting customers' intention to adopt and to take the necessary steps to literature search shows a gap of knowledge in intention to use mobile banking measurement method. Therefore, the theoretical model and research findings of this study will help to examine the relationship between perceived usefulness (PU), perceived ease of use (PeoU), perceived benefit (PB), perceived credibility (PC), perceived financial cost (PFC) towards consumers' attitude and behavioral intention on mobile banking.

LITERATURE REVIEW

Theoretical Underpinning of Study

This study is based on the Technology Acceptance Model (TAM, 1993) which specifies the causal relationships between system design features, perceived usefulness, perceived ease of use, attitude toward using, and actual usage behaviour. This model was originally proposed by Fred Davis in 1985. In 1993, Davis suggested that in contrast to what he initially predicted whereby perceived usefulness could also have direct influence on the actual system use. Besides that, he also found that system characteristics could directly influence the attitude of a person to adopt the system. The new relationship formulation in TAM is shown in Figure 1.

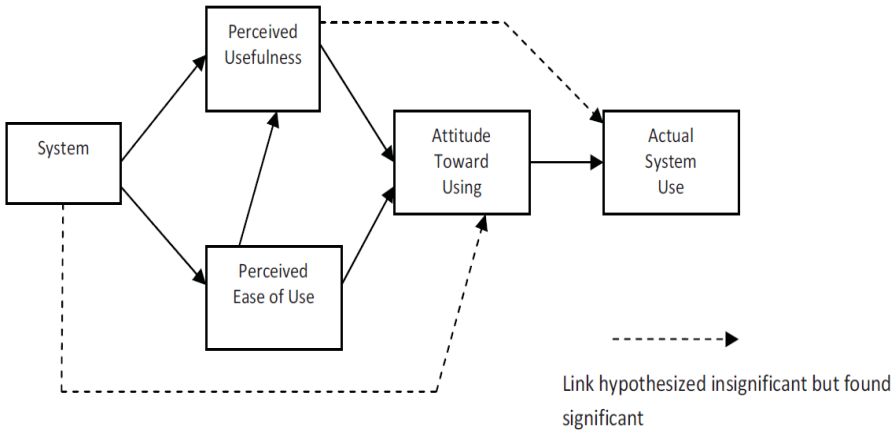

Figure 1. Technology Acceptance Model (Davis, 1993)

Perceived Usefulness

Perceived usefulness (PU) is defined as "the prospective user's subjective probability that using a particular system would enhance his or her job performance. Based on Schultz and Slevin (1975), who conducted an exploratory study concluded that perceived usefulness provided a reliable prediction for self-predicted use of a decision model. This model has been extended by Robey (1979), and confirmed that there was high correlation existed between perceived usefulness and system usage. Earlier studies have indicated that there is a positive relationship between perceived usefulness and intention to use (Yang, 2004; O'Cass et al., 2003 as cited in Norzaidi, Noorly Ezalin, Wan Seri Rahayu, & Mona Maria, 2011; Karahanna, Straub, & Chervany, 1999; Taylor & Todd, 1995; Guriting and Ndubisi , 2006 ; Ramayah and Norazah, 2006. Furthermore, Chen, Gillenson, and Sherrell (2002), found that perceived usefulness is the main antecedent of intention to use online retailer and its websites.

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Perceived Ease of Use

Perceived ease of use (PEoU) refers to "the degree to which the prospective user expects the target system to be free of effort" (Davis, Bagozzi, & Warshaw, 1989, p. 985). According to Karahanna et al. (1999), concluded that perceived ease of use had a significant positive effect on intention to adopt the software among the potential adopters. Similarly, bank customers are likely to adopt online banking when it is easy to use the technology (Guriting & Ndubisi, 2006). Likewise, based on Lau (2002), concluded that perceived ease of use was significantly correlated with intention towards using the online trading system. Ramayah, Jantan Muhamad, Nasser, Koay, and Razli (2003) examined that perceived ease of use had significant impact in the development of initial willingness to use Internet banking. Similar study has been carried out by Luarn and Lin (2005), whereby they found that there is a positive causality between perceived ease of use and usage intention.

Perceived Benefit

Consumers generally engage in "cost-benefit" analysis when selecting a decision-making procedure (Wright, 1975), long before the internet it was known. Furthermore, in studying mobile banking it has been suggested that the customer is considering cognitive and affective evaluation in purchasing a product and this is a part of hedonistic benefits (Kim, Chan, & Gupta, 2007). In line to that, Perceived benefit is found as an important factor in understanding online banking. Lee (2009) figured out that the intention to use online banking is primarily and positively affected by perceived benefit. Furthermore, according to Laforet and Li (2005) found that if there is a lack of grasping these benefits is an important barrier to adopt an activity.

Perceived Credibility

Perceived credibility is broadly defined as the belief that a partner is trustworthy and has the required expertise to carry out transactions (Erdem & Swait, 2004). Luarn and Lin (2005) found that the lack of perceived credibility is evident in potential consumers' worries that personal information and/or money might be transferred to third parties without their knowledge whilst using mobile-banking. In this study we will apply the concept of perceived credibility based on Wang, Wang, Lin, & Tang (2003) who defined it as the degree to which a potential user believes that the service will be free of security and privacy threats. Research has suggested that credibility has a significant positive effect on the adoption of online banking (Wang et al., 2003) and mobile-banking (Luarn & Lin, 2005). According to Brown, Cajee, Davies, and Stroebel (2003); Riquelme & Rios (2010); and Natarjan, Balasubramaniam, and Manickavasagam (2010); Amin, Rizal Abdul Hamid, Suddin Lada, and Zuraidah Anis (2008), indicated that mobile banking adoption studies have supported that people refuse or unwilling to use mobile banking mainly because of perceived credibility.

Perceived Financial Cost

Perceived Financial Cost is defined as "the extent to which a person believes that using mobile banking will cost certain amount of money". Based on a research carried out by (Kleijnen, Wetzels, & Ruyter, 2004; Luarn & Lin, 2005; Wang et al., 2006). Empirical evidence has also revealed that mobile banking adoption is highly encouraged by economic factors such as advantageous transaction service fees or discouraged by economic considerations such as concerns on basic fees for connecting mobile banking (Yang, 2009). This was supported with research conducted by Cruz, Neto, Munnoz-Gallego, and Laukkanen (2010); and Yao, and Zhong (2011). Besides that according to Sadi, Imran Azad, and Noorudin (2010) noted that high cost was crucial factor for adopting mobile banking.

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Mediating Effect – Attitude towards Using Mobile Banking

Attitude refers to an individual's positive or a negative evaluative effect about performing a particular behavior. In terms of mobile banking, most customers are exposed to current technology which will engage them performing online business transactions. According to previous empirical studies have shown the existence of such generalize attitude and its influences on the evaluation of new technology (Moon & Kim, 2001; Norazah & Norbayah, 2009; Norazah, Ramayah, & Norbayah, 2008; O'Cass & Fenech, 2003; Vijayasarathy, 2004). In this research, attitudes is hypothesized to the influences of the behavioral Intention to use mobile banking and also mediates the relationship between independent variables (perceived usefulness, perceived ease of use, perceived benefit, perceived credibility and perceived financial cost) and dependent variable (behavioral Intention to use mobile banking).

Behavioral Intention to Use Mobile Banking

Behavioral Intention to use is defined as a measure of the likelihood that a person will adopt the application, where as the TAM uses actual usage to represent a self-report measure of time or frequency of adopting the application (Davis et al., 1989). However, in practical point of view, it is not easy to obtain an objective measurement of an individual's intention to participate in a behavior. Several researches have shown that both theoretical and empirical support exists for the powerful correlation between intention to participate in a behavior and actual behavior (Dabholkar & Bagozzi, 2002; Lucas & Spitler, 1999; Vijayasarathy, 2004).

METHODOLOGY

An aim of this study was to examine the factors that influence Malaysian to adopt mobile banking as the tool for their banking purpose where attitude as a mediator as shown in Figure 2. Therefore, the methodology employed in this study was predominantly quantitative. When this research framework is translated into hypothesized model (see Figure 3), the manifesting variables are drawn with the error terms for each latent variables. The endogenous variables of attitude towards using mobile banking and behavioral intention to use mobile banking, each of the endogenous variables contain four manifesting (observed) variables for attitude and five manifesting variables for behavioral intention. The subsequent error terms are labeled as in the diagram. Each endogenous variable is attached with a unique error (R1 and R2). There are 5 exogenous variables in this study included perceived usefulness, perceived ease of use, perceived benefit, perceived credibility and perceived financial cost. The manifesting variables are six, six, seven, seven and four respectively. For structural equation modeling, the error of each item is drawn as unobserved variables in round circles and labeled e1 to e30.

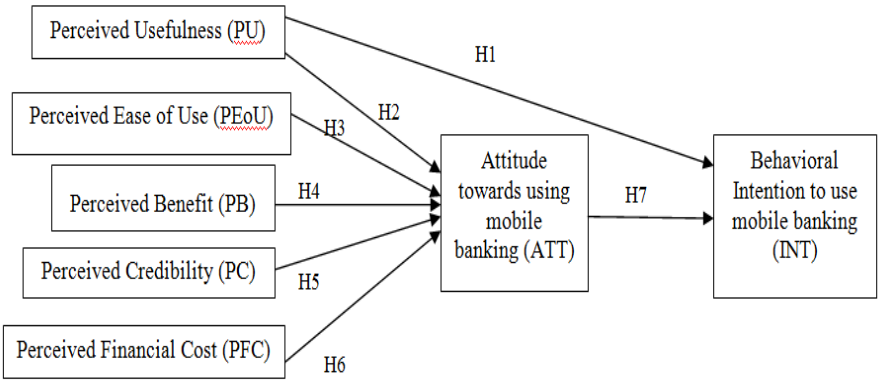

Figure 2. Research Framework

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Table 1. Hypotheses Formulation

H1	Perceived usefulness positively affects the behavioral intention to use mobile banking.
H2	Perceived usefulness positively affects the attitude towards using mobile banking.
H3	Perceived ease of use positively affects the attitude toward using mobile banking.
H4	Perceived benefit positively affects the attitude towards using mobile banking.
H5	Perceived credibility positively affects the attitude towards using mobile banking.
H6	Perceived financial negatively affects the attitude towards using mobile banking.
H7	Attitude towards using mobile banking positively affects the behavioral intention to use mobile banking.
H8	Attitude towards using mobile banking mediates the relationship between perceived usefulness and behavioral intention to use mobile banking.
H9	Attitude towards using mobile banking mediates the relationship between perceived ease of use and behavioral intention to use mobile banking.
H10	Attitude towards using mobile banking mediates the relationship between perceived benefit and behavioral intention to use mobile banking.
H11	Attitude towards using mobile banking mediates the relationship between perceived credibility and behavioral intention to use mobile banking.
H12	Attitude towards using mobile banking mediates the relationship between perceived financial cost and behavioral intention to use mobile banking.

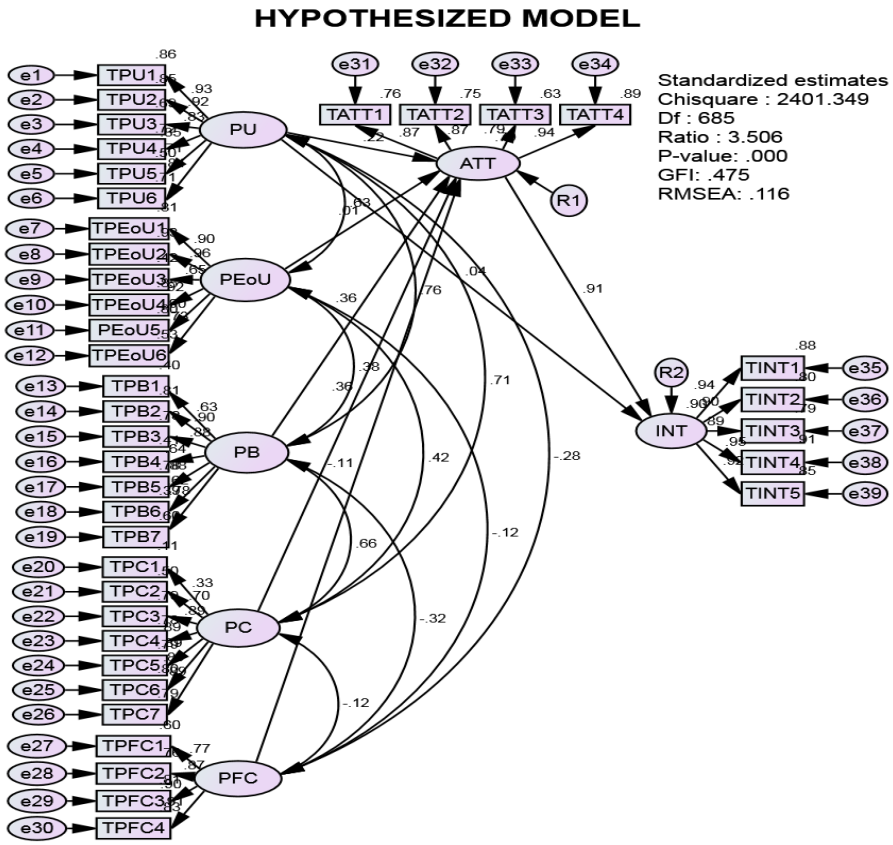

Figure 3. Hypothesized Model

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Sampling and Instrument

Data for this study was collected during March and April 2013 using an online survey questionnaire. For this study, the online survey questionnaire link was distributed through three university located at northern Malaysia (Penang and Kedah). The three university included AIMST University, Wawasan Open University and Universiti Utara Malaysia (UUM). An email will be sent out to reach all students and staffs of the university. A total of 202 respondents participated in the survey. A structured instrument was used to collect data and the questionnaire use 7-point Likert scale which ranging from 1(strongly disagree) to 7 (strong agree).

Data Screening and Analysis

The 202 dataset were coded and saved into SPSS version 21 and analyzed using AMOS version 21. During the process of data screening for outliers, sixteen cases were deleted due to Mahalanobis (D2) values more than the χ^2 value ($\chi^2 = 72.06$; n=39, p<.001) leaving a final 186 dataset to be analyzed.

RESULTS ANALYSIS

Demographic Profile of the Respondents

The sample consists of more females (55.4%) than males (44.6%). The respondents' age ranging from twenty years old to fifty year old with the average of twenty-nine years old. Out of 202 respondents, 82.7% respondents are internet banking user and 17.3% respondents are not internet banking user. Whereas there are 85.1% respondents are smart phone users and 67.3% respondents are mobile banking user. (Refer Table 2 below)

Table 2. Profile of Respondents

Demographics		*Frequency*	*Valid Percent*
Gender	Male	90	44.6
	Female	112	55.4
Have you use internet banking?	Yes	167	82.7
	No	35	17.3
Have you use smart phone?	Yes	172	85.1
	No	30	14.9
Have you use mobile banking?	Yes	136	67.3
	No	66	32.7
		Min	*Max*	*Average*
Age		20	50	29

Descriptive Analysis of Variables

The research framework consists of five exogenous and two endogenous variables (refer Table 3). According to Nunnally (1978), the reliability coefficient of variables are acceptable

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and showing a good reliability if the Alpha values is above 0.7. In addition, all Cronbach's alpha values in this study are greater than 0.9 which well above the recommendation of 0.7. Therefore, the instruments that measure the behavioral intention to adopt mobile banking were reliable.

Table 3. Descriptive Statistics of Variables

Variable Name	*No. of Items*	*Mean (Std. Deviation)*	*Cronbach Alpha*
Perceived Usefulness	6	5.485 (1.235)	0.949
Perceived Ease of Use	6	5.184 (1.286)	0.939
Perceived Benefit	7	5.564 (1.253)	0.908
Perceived Credibility	7	4.409 (1.488)	0.921
Perceived Financial Cost	4	3.410 (1.370)	0.933
Attitude towards using mobile banking	4	5.433 (1.200)	0.946
Behavioral Intention to use mobile banking	5	5.366 (1.322)	0.964
Total Items	39		

Goodness of Fit of Structural Model

Confirmatory factor analysis (CFA) is a SEM procedure which suitable of a single-group measurement model. A model is considered suitable if the covariance structure implied by the model is similar to the covariance structure of the sample data, as indicated by an acceptable value of goodness-of-fit index (GFI) (Cheung & Rensvold, 2002). The structural model for this study is evaluated through confirmatory factor analysis (CFA). Goodness-of-fit statistics (GFI) was created by Jöreskog and Sorbom. It is an alternative to the Chi-Square test and calculates the proportion of variance that is accounted for by estimated population covariance (Tabachnik & Fidell, 2007). In addition, root mean square error of approximation (RMSEA) tells us how well the model would fit the populations' covariance matrix with unknown but optimally chosen parameter estimates (Byrne, 1998). The more recent recommended cut-off value for RMSEA are close to .06 (Hu & Bentler, 1999) or an upper limit of .07 (Steiger, 2007). The fit indices and acceptable threshold levels are shown in table 4 for each fit index.

The goodness-of-fit statistics (refer Table 4), in general, support the integrity of the generated or revised model as compared to the hypothesized model. GFI of revised model is 0.917 as compared to hypothesized model of 0.475. In addition, root mean square error of approximation showing a better reading of 0.033 for revised model compared to 0.116 for hypothesized model.

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Table 4. Goodness of Fit Analysis – Confirmatory Factor Analysis (CFA) of Models (N=186)

Finals Models	*Perceived Usefulness*	*Perceived Ease of Use*	*Perceived Benefit*	*Perceived Credibility*	*Perceived Financial Cost*	*Attitude towards using mobile banking*	*Behavioral Intention to use mobile banking*	*Exogenous: Perceived Usefulness, Perceived Ease of Use, Perceived Benefit, Perceived Credibility & Perceived Financial Cost*	*Endogenous: Attitude towards using mobile banking & Behavioral Intention to use mobile banking*	*Hypothesized Model*	*Revised Model*
Original Items	6	6	7	7	4	4	5	30	9		
Items remain	4	4	4	4	4	4	4	12	6	39	19
CMIN	2.387	1.238	1.285	0.136	8.491	21.913	0.340	54.860	11.522	2401.349	162.494
Df	2	2	2	2	2	2	2	44	8	685	135
CMIN/df	1.193	0.619	0.642	0.068	4.246	10.956	0.170	1.247	1.440	3.506	1.204
p-value	0.303	0.538	0.526	0.934	0.014	0.000	0.843	0.126	0.174	0.000	0.054
GFI	0.994	0.997	0.997	1.000	0.978	0.941	0.999	0.956	0.979	0.475	0.917
CFI	0.999	1.000	1.000	1.000	0.989	0.968	1.000	0.993	0.997	0.804	0.992
TLI	0.997	1.003	1.001	1.011	0.966	0.904	1.007	0.990	0.995	0.788	0.989
PNFI	0.332	0.333	0.333	0.333	0.328	0.322	0.333	0.644	0.529	0.691	0.783
RMSEA	0.032	0.000	0.000	0.000	0.132	0.232	0.000	0.037	0.049	0.116	0.033

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Hypothesis Results

Perceived usefulness has a positive effect on behavioral intention to use mobile banking (β=0.207, C.R.=2.758, p=0.006), and is statistically significant at the p<0.01 level, supporting H1. The significant positive impact on perceived usefulness on attitude towards using mobile banking supports H2 (β=0.235, C.R.=1.993, p=0.046) where it is significant at p<0.05 level. Similarly, perceived benefit and perceived credibility are positively affect the attitudes towards using mobile banking (β=0.342, C.R.=3.652, p<0.001) providing support for H4 and (β=0.327, C.R.=4.35, p<0.001) supporting H5. Attitude towards using mobile banking has a positive effect on behavioral intention to use mobile banking (β=0.772, C.R.=9.71, p<0.001) providing support for H7. Alternatively, hypotheses H3 and H6 are not supported due to insignificant Beta. Hence, hypotheses are rejected (refer table 5 below).

Table 5. Direct Impact of Revised Model: Standardized Regression Weights

H	*Endogenous*		*Exogenous*	*Std. Estimate*	*S.E.*	*C.R.*	*P-value*	*Status*
H1	INT	<---	PU	0.207	0.078	2.758	0.006	Sig
H2	ATT	<---	PU	0.235	0.117	1.993	0.046	Sig
H3	ATT	<---	PEoU	0.065	0.046	1.115	0.265	Not Sig
H4	ATT	<---	PB	0.342	0.085	3.652	***	Sig
H5	ATT	<---	PC	0.327	0.075	4.35	***	Sig
H6	ATT	<---	PFC	-0.085	0.049	-1.72	0.085	Not Sig
H7	INT	<---	ATT	0.772	0.084	9.71	***	Sig

Table 6 below indicates the amount of variance explained by the exogenous variables in the revised model. Perceived usefulness, perceived ease of use, perceived benefit, perceived credibility and perceived financial cost explains 73.2% variance in attitude towards using mobile banking. In addition, the one exogenous variable (perceived usefulness) and one endogenous variable (attitude towards using mobile banking) explain 89% variance in behavioral intention to use mobile banking.

Table 6. Square Multiple Correlation Results

Endogenous	*Square Multiple Correlation*
Variable	*(SMC) = R^2*
Attitude towards using mobile banking	0.732
Behavioral intention to use mobile banking	0.89

Mediating Effects Analysis of Revised Model

Indirect effect estimates to test the mediating effects of attitude towards using mobile banking on the five relationships as hypothesized in hypotheses H8 to H12 are shown in Table 7. From the result, all hypotheses are supported with H8 is only partially mediates compare to remaining H9, H10, H11 are indicating full mediation. There are significant increases of

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indirect effects for these relationships compared to direct impacts. There is mediation when indirect effect is larger than direct effect. Therefore, all the mediation hypotheses are supported.

Table 7. Indirect Effect of Variables Interaction

H	*Exogenous*		*Mediated*		*Endogenous*	*Direct Effects Estimate - No Link*	*Direct Effects Estimate - Link*	*Mediating Hypothesis*
H8	Perceived Usefulness	-->	Attitude towards using mobile banking	-->	Behavioral Intention to use mobile banking	0.285	0.181	Partial Mediation
H9	Perceived Ease of Use	-->	Attitude towards using mobile banking	-->	Behavioral Intention to use mobile banking	0.05	0.044	Full Mediation
H10	Perceived Benefit	-->	Attitude towards using mobile banking	-->	Behavioral Intention to use mobile banking	0.264	0.275	Full Mediation
H11	Perceived Credibility	-->	Attitude towards using mobile banking	-->	Behavioral Intention to use mobile banking	0.252	0.219	Full Mediation
H12	Perceived Financial Cost	-->	Attitude towards using mobile banking	-->	Behavioral Intention to use mobile banking	-0.066	-0.061	Full Mediation

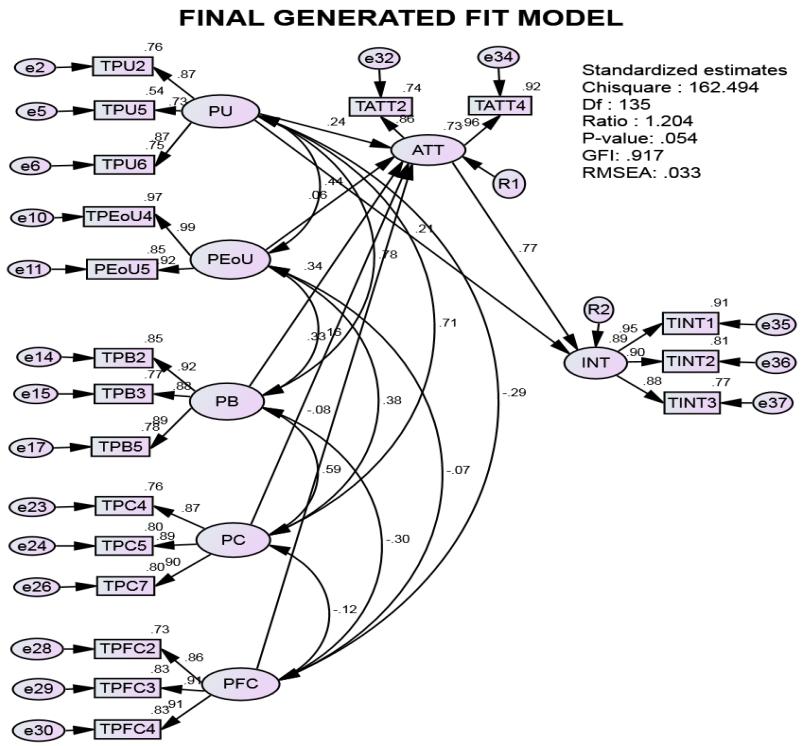

Figure 4. Generated Model (AMOS Graphics)

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DISCUSSION

This study attempts to the factors which influence Malaysian to adopt mobile banking as the tool for their banking transactions purpose whereby attitude present as a mediator in connecting independent variables and the dependent variable. The conceptual underpinning used in this study is the Technology Acceptance model (Davis, 1993). As expected, the hypothesized model do not achieve model fit (p value=0.000, p <0.001). Therefore, the hypothesized model could not be generalized to the population because the sample was focused in the Northern region of Malaysia only.

Based on the results analysis, the revised model produces five significant direct impacts with five significant indirect effects. As per the hypothesized model, the perceived usefulness is not influencing the behavioral intention to use mobile banking compare to the revised model whereby it is affected with p<0.01. This finding is supported previous studies by Cheah, Teo, Sim, Oon, and Tan (2011); Chung and Kwon (2009); Lee, Lim, Jolly and Lee (2009); and Luarn and Lin (2005). This result indicates that if mobile banking is useful and beneficial, customers are likely to adopt mobile banking services. However, perceived ease of use is not affecting the user significantly in adopting mobile banking.

Secondly, perceived benefit and perceived credibility are positively affecting the intention to use mobile banking with p<0.001. As for perceived benefit, a study by Kim et al. (2007), suggesting that user is considering cognitive and affective evaluation is purchasing a product through mobile banking. Moreover, a study by Lee (2009) also supported perceived benefit is positively affecting online banking. As for perceived credibility, the finding is supported by several mobile banking adoption studies, whereby people refuse or are unwilling to adopt mobile banking mainly because of perceived risk (Brown et al., 2003; Riquelme & Rios, 2010; Natarjan et al., 2010; Dasgupta et al., 2011) or perceived credibility (Luarn & Lin, 2005; Dasgupta et al., 2011; Amin et al., 2008] empirically concluded that perceived credibility significantly affected human intention to use mobile banking.

The factor perceived financial cost is affected the attitude towards using mobile banking in the hypothesized model but it is not in the revised model. Since perceived financial costs is being assumed as an additional charges for the user to adopt mobile banking, thus it negatively affecting the mobile banking adoption. This is supported by Cruz et al. (2010); Yao and Zhong (2011); and Luarn and Lin (2005).

CONCLUSION

This study can be concluded that there are five direct impacts with five significant indirect impacts in the revised model. The findings of this study revealed that perceived usefulness, perceived benefit and perceived credibility were the factors affecting users having intention to adopt mobile banking. Meanwhile, the perceived ease of use and perceived financial cost were found to be insignificant in this study. Furthermore, this study also manage to present findings on mediating effects: : (1) attitude partially mediates the relationship between perceived usefulness and behavioral intention to use mobile banking; (2) attitude partially mediates the relationship between perceived ease of use and perceived financial cost with behavioral intention to use mobile banking; (3) attitude mediates the relationship between perceived benefit and behavioral intention to use mobile banking; (4) attitude mediates the relationship between perceived credibility and behavioral intention to use mobile banking. Since, this study was only conducted in the Northern region of Malaysia, it is suggested that the same study should be conducted in a different time frame to obtain more reliable data.

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