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Consumers' Perceived Interactivity and Intention to use Mobile Banking in Structural Equation Modeling

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ABSTRACT

A fair amount studies has been carried out on mobile banking adoption but limited number of studies focused on perceived interactivity. In reality, literatures on the key motivations of the intention to use mobile banking are no common standard of measurement. Therefore, there is a need to evaluate the factors influencing the Malaysian consumers' intention to use mobile banking services. This research fills the gap by integrating technology acceptance model with perceived risk, perceived cost and perceived interactivity aspects are incorporated. This study's foremost ambition is to analyze empirically the Malaysian consumers' intention to use mobile banking services via structural equation modeling approach. The findings indicated usefulness, perceived cost, perceived interactivity, perceived risk, relative advantage and easefulness are significant determinants of consumers' attitude towards using mobile banking which effects the consumers' intention to use mobile banking. A critique of the destiny of mobile banking concludes this paper.

Keywords: Consumers' Perceived Interactivity, Mobile Banking Usage, Structural Equation Modeling Approach
JEL Classifications: G21, M31, O33

1. INTRODUCTION

Mobile banking is an imminent technology that will illuminate the peoples' lifestyle across the world. Interestingly, mobile banking is defined in various approaches. However, these various definitions have a common rendition that mobile banking is a system that allows customers of a financial institution to conduct a number of financial transactions through a mobile device such as a mobile phone or tablet, as elucidated in Wikipedia. In relation to that, Drexelius and Herzig (2001) instituted mobile banking as the ability to conduct bank transactions via a mobile device. Basically, is about conducting financial transactions by the means of a mobile terminal. Analogously, Barnes and Corbitt (2003), posits that mobile banking is a channel in which the customer interacts with a bank via mobile device such as a mobile phone or personal digital assistant. Despite the fact of various researchers' interpretation of mobile banking, in short, mobile banking is about doing monetary undertakings using a mobile phone or tablet.

Innovative mobile applications are developed in connection with the development of mobile banking. In Malaysia, Maybank was the first financial institution to introduce a free banking application, M2UMap, on the iPhone (Maybank2u, 2009). Homogeneously, CIMB Bank Berhad infused CIMB Clicks which became the most popular and widely used banking app in Malaysia. Accordingly, almost all the banks in Malaysia such as Al Rajhi Banking and Investment Corporation (Malaysia) Berhad, AmBank (M) Berhad, Bank Islam Malaysia Berhad, Bank Simpanan Nasional, CIMB Bank Berhad, Citibank Berhad, Hong Leong Bank Berhad, Malayan Banking Berhad, OCBC Bank (Malaysia) Berhad, Public Bank Berhad, RHB Bank Berhad, and Standard Chartered Bank Malaysia Berhad offers mobile banking services (Masrek et al., 2012). Later in 2014, Maybank launched Maybank2u App which was a huge success with more than one million downloads. In 2015, Maybank launched another App known as Quick Balance which accommodates customers who purely want to check balances (Thestar.com.my, 2015).

Numerous researchers have studied the technology adoption but not many studies are carried out on the consumers' perceived interactivity and intention to use mobile banking within the Malaysian perspective. Mobile banking in Malaysia is still in its infancy stages and unpopular to Malaysians that leads to underutilization of this feature (Amin et al., 2007). This is consistent with the findings of Bank Negara Malaysia in 2015 that reported that there are 7,278.8 million subscribers of mobile banking services' in Malaysia while Malaysian Communications and Multimedia Commission reported that Malaysia's mobile phone penetration rate is as high as 143.8% in the Q4 2015. Comparing the mobile banking services' subscribers to the mobile phone penetration rate, the former is relatively low. Reciprocally, the transaction volume via mobile banking per capita is comparatively low with other payments methods (Bank Negara Malaysia, 2016).

The main objective of the study is to determine the factors that influence the consumers' intention to use mobile banking services. Additionally, the relationship between usefulness, easefulness, relative advantage, perceived interactivity, perceived cost and perceived risk with the attitude towards using mobile banking services elements are to be discovered. Moreover, the relationships between attitude towards using mobile banking services and intention to use mobile banking are to be explored.

2. LITERATURE REVIEWS

2.1. Technology Acceptance Model (TAM)

TAM was proposed by Fred Davis that champions that external stimulus comprises actual system's features and capabilities govern the users' motivation to use the system which predicts the usage of the system. He further inculcated that users' motivation of actual usage were regulated by three factors that were perceived ease of use, perceived usefulness and attitude towards using a system which was mediated by users' behavioral intention. Perceived usefulness was the degree to which a person believed that using a particular system would enhance his or her job performance while perceived ease of use was explained as the degree to which a person believes that using a particular system would be free of effort (Davis et al., 1989).

In 2007, Amin analyzed the mobile credit card usage intentions in Sabah, Malaysia which uncovered that perceived ease of use has a significant effect on the perceived usefulness of mobile credit card. On other hand, both these variables effects the customers' usage intentions of mobile credit card. Gu et al. (2009) investigated users' behavioral intention to mobile banking in Korea. The result shows that perceived usefulness and perceived ease-of-use influences behavioral intention in mobile banking significantly. Selamat et al. (2009) examined the determinant factors and acceptance of information technology in the Malaysian banking industry which found that that perceived usefulness and perceived ease of use influences bankers' acceptance of new technology.

Riquelme and Rios (2010) investigated the moderating effect of gender in the adoption of mobile banking in Singapore and found that perceived ease of use and perceived usefulness has a significant influence on the intention to adopt mobile banking. Consistently, Yousafzai and Yani-de-Soriano (2012) found that intention to use internet banking significantly predicts its actual use. The results also revealed that perceived usefulness significantly influences the intention to use internet banking. Besides that, Moorthy et al. (2014) revealed that perceived use of use and perceived usefulness influences the academic's e-filing adoption intention in their study of e-filing behaviour among academics in Perak state in Malaysia.

In addition, perceived ease of use and perceived usefulness has great impact on users' intention to adopt mobile self-service technologies (Yang et al., 2014). Furthermore, Xiao et al. (2014) found that perceived ease of use and perceived usefulness influences attitude towards use while perceived ease of use effects significantly perceived usefulness in relation to continuing the reception of existing e-book reading in northern Taiwan. Moreover, Özbek et al. (2015) found that both perceived ease of use and perceived usefulness displayed significant effect on behavioral intention to use online booking among Russian tourists visiting Antalya, Turkey. Jafari et al. (2016) examined the factors influencing the mobile advertising acceptance in Mashhad, Iran that revealed that perceived ease of use and perceived usefulness significantly impacts consumers' attitude towards mobile advertising. Simultaneously, intention to accept mobile advertising is significantly influenced by consumers' attitude towards advertisement.

2.2. Relative Advantage of Mobile Banking

Püschel et al. (2010) investigated the adoption intention of mobile banking technology in Brazil which revealed that relative advantage and compatibility are the most important factors that influence the consumer to adopt mobile banking. Arvidsson (2014) found that relative advantage as a significant predictor of consumers' attitudes to adopt the mobile payment services in Sweden. Furthermore, Amaro and Duarte (2015) examined the determinants of intentions to purchase travel online among internet users that revealed that relative advantage influences the attitudes towards online travel shopping significantly.

2.3. Perceived Risk of Mobile Banking

Li (2013) found that perceived risk affects attitude toward using the internet banking. Hsieh (2015) examined the physicians' acceptance of electronic medical records exchange system in Taiwan that revealed that perceived risk is a significant predictor of physicians' intention to use an electronic medical records exchange system. On the other hand, physicians' attitudes toward using the system influence their intention to use it. Furthermore, both perceived usefulness and perceived ease of use of the exchange system correlates significantly with the physicians' attitude toward using it.

2.4. Perceived Cost of Mobile Banking

Cruz et al. (2010) found that perceived cost is a significant barrier on the Brazilian's adoption intention of mobile banking services. The behavioral intention to use the internet banking is effected by the perceived financial cost (Tung et al., 2014). Amberg et al. (2015) investigated the user acceptance for web based aptitude tests among university students in Germany and found

that perceived costs induces the users' acceptance of web based aptitude tests. Additionally, perceived usefulness and perceived ease of use influences users' acceptance of web based aptitude tests too.

2.5. Perceived Interactivity of Mobile Banking

Wu (1999) examined the perceived interactivity and attitude toward web sites among university students which found a positive significant influence of perceived interactivity on the attitude toward web sites. Teo et al. (2003) investigated the effects of interactivity level on web user's attitude towards commercial web site among undergraduate students of National University of Singapore which found interactivity on a web site exhibited positive effects on user's attitude towards a web site.

3. RESEARCH MODEL DEVELOPMENT

3.1. Model Specification

Based on established relationship found by Wu et al. (2015), Arvidsson (2014), Hsieh (2015), Tung et al. (2014) and Li et al. (2015), a conceptual framework is developed for these variables involved in this study which consists of usefulness, easefulness, relative advantage, perceived interactivity, perceived risk and perceived cost as the independent variables, attitude towards using mobile banking as the indirectly mediating effect and intention to use mobile banking as the dependent variable as shown in Figure 1.

Simultaneously, seven hypotheses are devised as below:

H_1: There is a relationship between usefulness and attitude towards using mobile banking.
H_2: There is a relationship between easefulness and attitude towards using mobile banking.
H_3: There is a relationship between relative advantage and attitude towards using mobile banking.
H_4: There is a relationship between perceived risk and attitude towards using mobile banking.
H_5: There is a relationship between perceived cost and attitude towards using mobile banking.
H_6: There is a relationship between perceived interactivity and attitude towards using mobile banking.
H_7: There is a relationship between attitude towards using and intention to use mobile banking.

In this research, stratified sampling method was adopted whereby Malaysian age structure is used as the base to categorize the population is into different subgroups (Sekaran and Bougie, 2009). In this least biased probability sampling method, the findings are immensely generalizable. Additionally, it saves time, money and energy resources given the limited budget available for this research. In this study, personally administered paper-based survey questionnaire is used as a data collection method to churn data from respondents which enables me to introduce my research topic as well as encouraging them to be candid in their responses due to the fact that it is less expensive and employs less time.

The questionnaire is a combination of dichotomous scale, interval scale, category scale and Likert scale questions. In addition, to that, respondents' doubts are clarified on the spot (Sekaran and Bougie, 2009). Items measuring the variables constructs is adapted from credible literatures and refashioned to be pertinent with this research. Items constructs of usefulness and easefulness is adapted from Luarn and Lin (2005), Venkatesh and Morris (2000), Ong and Lai (2006) and Lee (2009). Measures of relative advantage is restyled from Al-Jabri and Sohail (2012). Moreover, items of perceived cost is redesigned from Luarn and Lin (2005), Yu (2009) and Alsheikh and Bojei (2014). Additionally, items of perceived risk is refined from Lee (2009) and Alsheikh and Bojei (2014). Besides that, items of perceived interactivity is assimilated from McMillan and Hwang (2002). Moreover, items of attitude and Intention to use is adapted from Lee (2009), Schierz et al. (2010), Luarn and Lin (2005), Ong and Lai (2006) and Alsheikh and Bojei (2014).

Data was collected within 7 weeks conducted during Dec 2015-Feb 2016 within Klang Valley. Out of 1000 questionnaires distributed, 389 usable data was used for analysis. In this study, structural equation modeling (SEM) approach is adopted.

3.2. Model Estimation

3.2.1. Exploratory factor analysis

A factor analysis was administered on the items comprising usefulness, easefulness, relative advantage, perceived interactivity, perceived risk, perceived cost, attitude towards using mobile banking and intention to use mobile banking. The factor analysis was conducted using Principal components analysis. Table 1 indicates the Kaiser-Meyer-Olkin (KMO) and Bartlett's test values whereby the KMO value is 0.938 which is adjudged as superb (Hutcheson and Sofroniou, 1999).

3.2.2. Reliability analysis

Reliability analysis is executed to test the internal consistency of the data set based on Cronbach's alpha value. The Cronbach's Alpha

Figure 1: Research framework of factor influencing the consumers' perceived interactivity of mobile banking usage

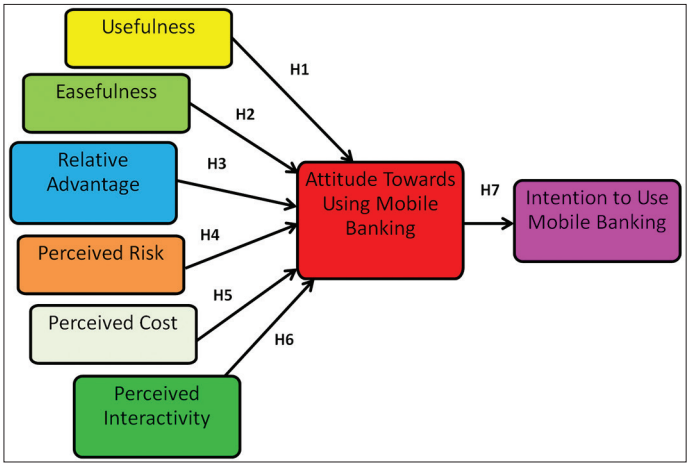


Table 1: KMO and Bartlett's test

Kaiser-Meyer-Olkin measure of sampling adequacy	0.938
Bartlett's test of sphericity	
Approximate chi-square	16516.738
df	741
Significant	0.000

of the constructs are above 0.7 which are within the acceptable magnitude. Hence, reliability of the constructs is corroborated as provided in Table 2 (Nunnally and Bernstein, 1994).

3.2.3. Confirmatory factor analysis (CFA)

3.2.3.1. Usefulness

Accordingly, CFA is conducted for the usefulness. Upon inspection of the modification indices, it's observed that the association of e1 and e5 is more than 15. Hence, it is imperative to respecify the model correlating these residuals by designating a double-headed arrow. Therefore, the modified measurement model is examined that revealed a more significant model fit indices as shown in Figure 2. The modified measurement model for usefulness construct is acceptable (Chi-square/df <5, CFI>0.9, RMSEA<0.08). All the factor loadings are >0.7 and AVE is 78%.

3.2.3.2. Easefulness

Consistently, CFA is conducted for easefulness in Figure 3. Upon inspection of the modification indices, it's observed that the association of e1 and e2 is more than 15. Hence, it is essential to do the respecification of the model correlating these residuals by tagging a double-headed arrow. Therefore, the modified measurement model is examined that revealed a significant absolute fit as shown in Figure 4. The modified measurement model for Easefulness construct is acceptable (Chi-square/df <5, CFI>0.9, RMSEA<0.08). All the factor loadings are >0.7 and AVE is 75%.

Table 2: Reliability analysis

Variable	Cronbach's alpha	Number of items
Usefulness	0.941	5
Easefulness	0.939	5
Relative advantage	0.953	5
Perceived cost	0.919	5
Perceived risk	0.947	5
Perceived interactivity	0.757	4
Attitude towards using mobile banking	0.948	5
Intention to use mobile banking	0.962	5

Figure 2: Confirmatory factor analysis of usefulness

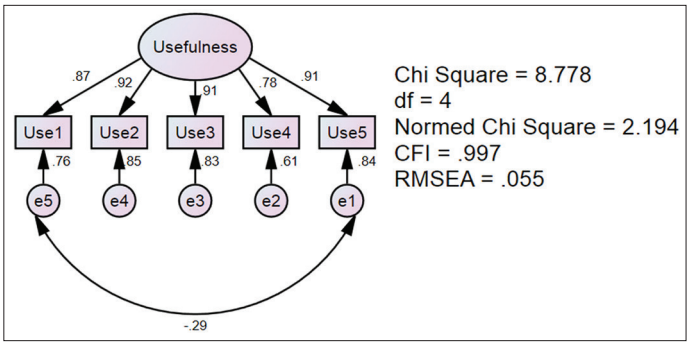
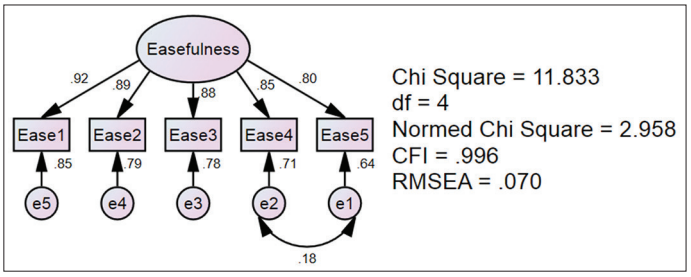


Figure 3: Confirmatory factor analysis of easefulness



3.2.3.3. Relative advantage

Undeviatingly, CFA for relative advantage is conducted. Upon inspection of the modification indices, it's discerned that the association of e1 and e2 is more than 15. Hence, it is essential to respecify the model correlating these residuals by stamping a double-headed arrow. Therefore, the modified measurement model is examined that revealed a more significant absolute fit and parsimonious fit as shown in Figure 4. The modified measurement model for relative advantage construct is acceptable (Chi-square/df <5, CFI>0.9, RMSEA<0.08). All the factor loadings are >0.7 and AVE is 80%.

3.2.3.4. Perceived interactivity

Accordingly, CFA is conducted for perceived Interactivity yielding a parsimonious fit Normed Chi-square, an incremental fit CFI and absolute fit of RMSEA. Basically, all the fit indices are within threshold values as shown in Figure 5. The measurement model for Perceived Interactivity construct as shown in Figure 5 is acceptable (Chi-square/df <5, CFI>0.9, RMSEA<0.08). All the factor loadings are >0.5 and AVE is 65%.

3.2.3.5. Perceived cost

Homogeneously, CFA is conducted for perceived cost. Upon inspection of the modification indices, it's discerned that the association of e1 and e2 as well as e4 and e5 is more than 15. Hence, it is essential to respecify the model correlating these residuals by embossing a double-headed arrow. Therefore, the modified measurement model is examined that revealed a more noteworthy absolute fit and parsimonious fit as shown in Figure 6. The modified measurement model for Perceived Cost construct is acceptable (Chi-square/df <5, CFI>0.9, RMSEA<0.08). All the factor loadings are >0.7 and AVE is 67%.

Figure 4: Confirmatory factor analysis of relative advantage

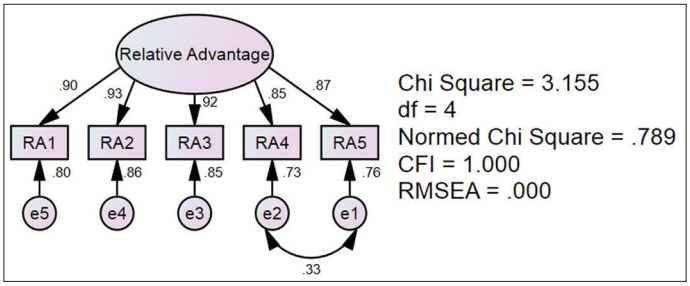
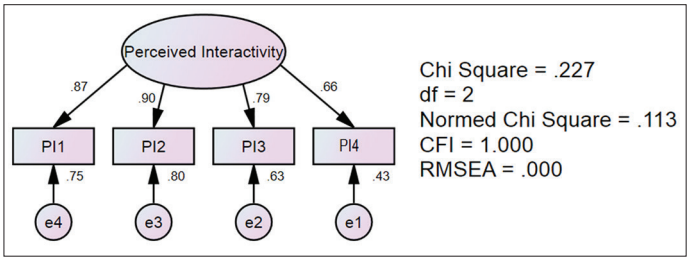


Figure 5: Confirmatory factor analysis of perceived interactivity



3.2.3.6. Perceived risk

Uniformly, CFA is conducted for perceived risk. Upon inspection of the modification indices, it's spotted that the association of e1 and e2 is more than 15. Hence, it is paramount to respecify the model correlating these residuals by sculpting a double-headed arrow. Therefore, the modified measurement model is examined that revealed a more noteworthy absolute fit and parsimonious fit as shown in Figure 7. The modified measurement model for Perceived Risk construct is acceptable (Chi-square/df <5, CFI>0.9, RMSEA<0.08). All the factor loadings are >0.7 and AVE is 78%.

3.2.3.7. Attitude towards using mobile banking

Persistently, CFA is conducted for attitude towards using mobile banking. Upon inspection of the modification indices, it's spotted that the association of e4 and e5 is more than 15. Hence, it is paramount to respecify the model correlating these residuals by sculpting a double-headed arrow. Therefore, the modified measurement model is examined that revealed a more noteworthy absolute fit as shown in Figure 8. The modified measurement model for attitude towards using mobile banking construct is acceptable (Chi-square/df <5, CFI>0.9, RMSEA<0.08). All the factor loadings are >0.7 and AVE is 78%.

3.2.3.8. Intention to use mobile banking

Proportionately, CFA is conducted for Intention to use mobile banking. Upon inspection of the modification indices, it's spotted that the association of e1 and e2 together with e2 and e5 is more than 15. Hence, it is paramount to respecify the model correlating these residuals by fashioning a double-headed arrow. Therefore, the modified measurement model is examined that revealed a weightier absolute fit and parsimonious fit as shown in Figure 9. The modified measurement model for intention to use mobile banking construct is acceptable (Chi-square/df <5, CFI>0.9, RMSEA<0.08). All the factor loadings are >0.7 and AVE is 84%.

3.2.4. Average variance extracted and composite reliability

Average variance extracted and composite reliability values of all the constructs are computed. Bagozzi and Yi (1988) endorses composite reliabilities of more than 0.60 is sufficient. Accordingly, composite reliabilities of all the constructs are satisfactory. Moreover, average variance extracted of more than 0.50 is essential. Consequently, the average variances extracted of all the constructs are significant. Table 3 shows an adequate convergent validity and discriminant validity for each construct in the model.

3.2.5. Discriminant validity

Discriminant validity is prevailed when the variance shared between a construct with other construct in the model is greater than the variance within that construct itself (Fornell et al., 1982). Table 4 shows the correlation matrix for the constructs in which the diagonal elements have been replaced by the square roots of the average variance extracted. Accordingly, discriminant validity is substantiated as the diagonal elements are greater than are all corresponding construct correlations.

3.2.6. Hypotheses testing

The SEM was performed to test the relationship among constructs. The model fit indicators of the structural regression model is

Figure 6: Confirmatory factor analysis of perceived cost

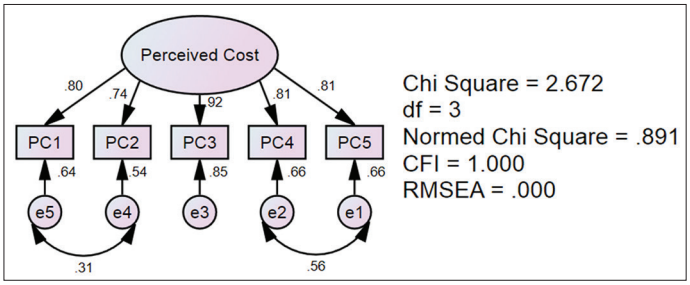


Figure 7: Confirmatory factor analysis of perceived risk

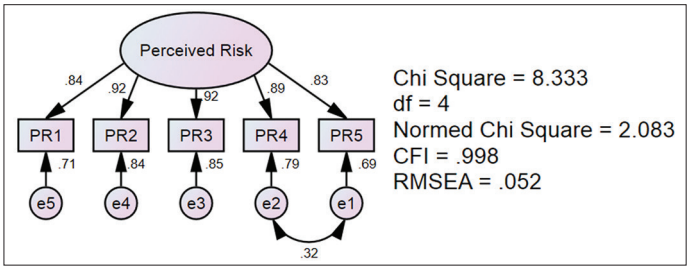


Figure 8: Confirmatory factor analysis of attitude towards using mobile banking

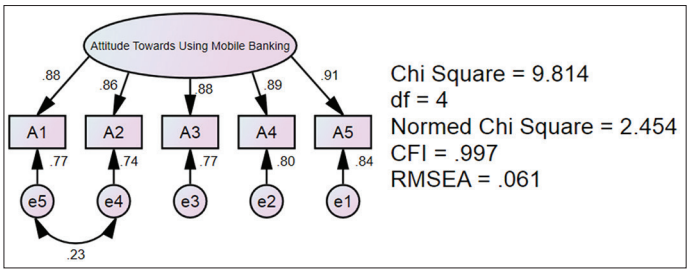
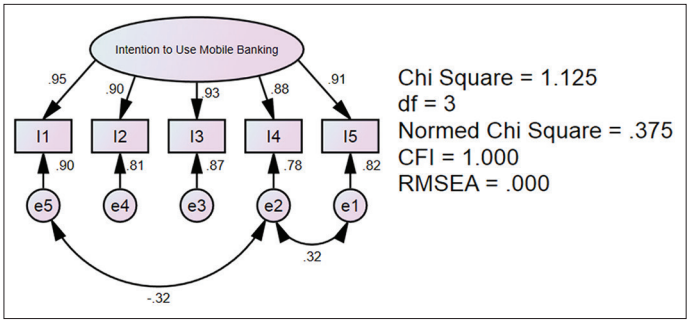


Figure 9: Confirmatory factor analysis of intention to use mobile banking



acceptable (Chi-square/df <5, CFI>0.9, RMSEA<0.08). The structural model is constructed as in Figure 10.

Table 5 presents the statistics of structural regression model. Hypotheses testing is examined using the critical ratio (CR) statistic whereby if CR>±1.96, the hypothesis is not rejected (Byrne, 2013). There is a significant impact ($\beta = 0.321$, CR>±1.96, $P < 0.05$) of Usefulness on attitude towards using mobile banking indicating usefulness is a significant predictor.

Besides that, there is a significant impact ($\beta = 0.233$, CR>±1.96, $P < 0.05$) of relative advantage on attitude towards using mobile

banking indicating relative advantage is a significant predictor. In addition, there is a significant impact (β = −0.288, CR>±1.96, P < 0.05) of perceived risk on attitude towards using mobile banking indicating perceived Risk is a significant predictor. Furthermore, there is a significant impact (β = −0.154, CR>±1.96, P < 0.05) of perceived cost on attitude towards using mobile banking indicating perceived cost is a significant predictor. Moreover, there is a significant impact (β = 0.312, CR>±1.96, P < 0.05) of easefulness on attitude towards using mobile banking indicating easefulness is a significant predictor. Homogeneously, there is a significant impact (β = 0.134, CR>±1.96, P < 0.05) of perceived interactivity on attitude towards using mobile banking indicating perceived interactivity is a significant predictor. Intriguingly, there is a significant impact (β = 0.773, CR>±1.96, P < 0.05) of attitude towards using mobile banking on intention to use mobile banking indicating attitude towards using mobile banking is a significant predictor. On the whole, all the hypothesized paths in relation to

Table 3: Average variance extracted and composite reliability

Construct	Average variance extracted	Composite reliability
Intention to use mobile banking	0.837	0.963
Attitude towards using mobile banking	0.781	0.947
Usefulness	0.776	0.945
Easefulness	0.757	0.940
Relative advantage	0.800	0.952
Perceived cost	0.674	0.911
Perceived risk	0.777	0.946
Perceived interactivity	0.655	0.882

Table 4: Summary of inter-construct correlations

	ITU	ATU	Usefulness	Easefulness	RA	PC	PR	PI
ITU	0.915							
ATU	0.828	0.884						
Usefulness	0.561	0.635	0.881					
Easefulness	0.575	0.644	0.754	0.870				
RA	0.470	0.558	0.538	0.530	0.895			
PC	−0.365	−0.408	−0.261	−0.374	−0.260	0.821		
PR	−0.467	−0.422	−0.243	−0.210	−0.238	0.337	0.882	
PI	0.346	0.368	0.284	0.319	0.355	−0.154	−0.178	0.810

ITU: Intention to use mobile banking, ATU: Attitude towards using mobile banking, RA: Relative advantage, PC: Perceived cost, PR: Perceived risk, PI: Perceived interactivity

Figure 10: Structural model of the consumers' perceived interactivity of intention to use mobile banking

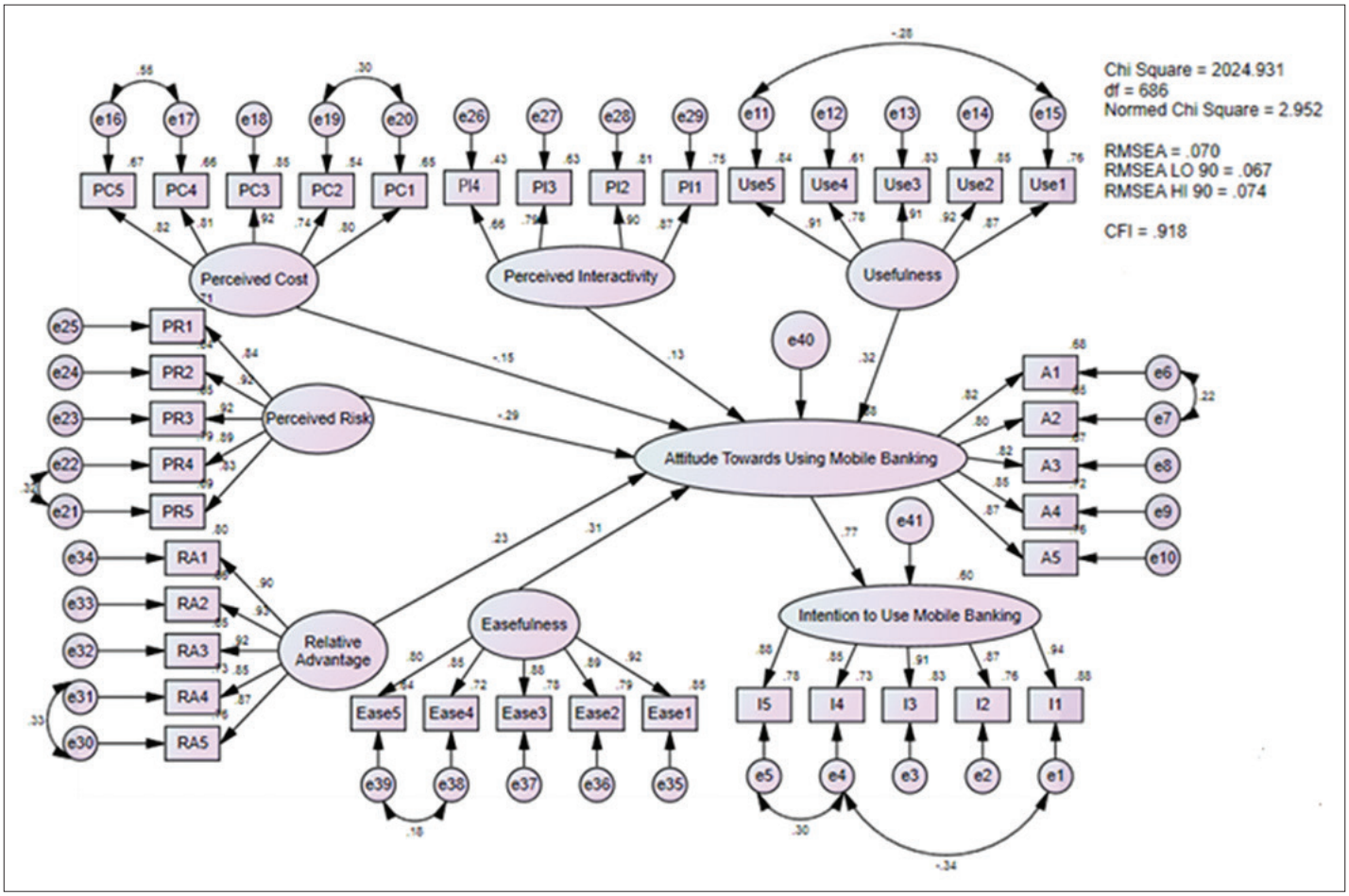


Table 5: Statistics of structural regression model

Exogenous variable	Endogenous variable	Standardized regression weight	Critical ratio	P
Usefulness	ATU	0.321	4.881	0.002
RA	ATU	0.233	4.281	0.004
PR	ATU	−0.288	−5.910	0.002
PC	ATU	−0.154	−3.063	0.003
Easefulness	ATU	0.312	4.632	0.002
PI	ATU	0.134	2.729	0.013
ATU	ITU	0.773	20.740	0.002

ITU: Intention to use mobile banking, ATU: Attitude towards using mobile banking, RA: Relative advantage, PC: Perceived cost, PR: Perceived risk, PI: Perceived interactivity

direct relationships between the variables of the research model has $P < 0.05$, hence, the significance of the related hypotheses is corroborated (Hair et al., 2006).

4. CONCLUSION

This study has revealed that higher the perceived usefulness and easefulness of mobile banking, consumers' attitude towards using mobile banking becomes higher. The result is further justified with the study of (Fu et al., 2012) which found that the perceived usefulness and perceived ease of use has significant effect on attitude. Wu et al. (2015) consumers' attitude is significantly affected by perceived usefulness and perceived ease. In this study, it is also proven that relative advantage is the vital factor that inspires more people to use mobile banking. Accordingly, the result is justified with the study of (Püschel et al., 2010) which found that relative advantage as a significant predictor of consumers' adoption intention of mobile banking technology. Moreover, in this study, it is established that consumers' attitude towards using mobile banking is significantly affected by their perceived cost. Moreover, (Kuo and Yen, 2009) found that perceived cost had a significantly negative effect on attitude. Allegedly, in this study, perceived risk exhibited significant negative relationship with consumers' attitude towards using mobile banking. Moreover, the result is vindicated with the study of (Lagzian and Naderi, 2015) which found that perceived risk exhibited significant negative relationship on customers' acceptance intention of e-invoice. In relation to perceived interactivity, consumers' attitude towards using mobile banking is significantly influenced by perceived interactivity. This is warranted with the study of Wu (1999) which found perceived interactivity has a significant influence on the attitude. Hence, H_1, H_2, H_3, H_4, H_5, H_6 and H_7 are supported by the data.

This research meets the requirements of mobile banking backdrop. Furthermore, it is an addition to the scanty number of literatures in the mobile banking subject. It also pervades the gaps of previous studies. From the findings of this far-reaching structural equation modelling approach, mobile banking service providers and mobile banking app developers will have to recognize the eminences of knowing and understanding consumer behaviour. In addition, both these mobile banking service providers and mobile banking app developers can utilize these findings of this research as a reference to improve their market share. This can be done by stages with the concept of personalisation of services to the consumers. Apart from that, marketing strategies can be coined to suit to consumers' attitude and behavioural intentions. Therefore, the findings of this research could be used banks, mobile banking service providers and mobile banking app developers in their marketing game plan. Fundamentally, it will be an instrumental to a country's economic growth.

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