

EXAMINING THE ROLE OF USABILITY, COMPATIBILITY AND SOCIAL INFLUENCE IN MOBILE BANKING ADOPTION IN INDONESIA

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ABSTRACT

Adaptation to the internet and advances in mobile technology has become key to the survival of industries, including the banking industry. One of the latest electronic banking channels is mobile banking. While mobile banking offers various advantages, many banks in Indonesia are facing the problem of low adoption. This paper reports on the findings of our research project, which examines mobile banking adoption behavior in Indonesia from an interaction perspective. Specifically, the paper examines the role of usability, compatibility and social influence in explaining people's intention to continue using mobile banking in Indonesia. Using an interaction perspective framework, a research model is proposed. Ten hypotheses are suggested, examining six constructs: satisfaction, perceived usefulness, perceived ease of use, perceived learnability, compatibility and social influence. From a theoretical perspective, this paper is the first to combine usability, compatibility and social influence in a mobile banking adoption study. Data from 319 valid respondents were used to test the proposed model using partial least squares structural equation modeling. The results show that all the hypotheses are supported, and it was found that people's intention to continue using mobile banking is significantly affected by satisfaction, compatibility, perceived usefulness, perceived learnability and social influence.

Keywords: Compatibility; Indonesia; Mobile banking adoption; Social influence; Usability

1. INTRODUCTION

Adaptation to the internet and advances in mobile technology has become key to the survival of industries and has changed the way companies satisfy the needs of their consumers. Banking industries have developed various electronic banking channels to conform to various customer needs. One of the latest channels is mobile banking, which provides various financial services for consumers through information and communication technologies (Hanafizadeh et al., 2014).

Mobile banking offers numerous benefits for banks and bank customers. For bank customers, it offers unlimited access (Wessels & Drennan, 2010; Zhou, 2012; Hanafizadeh et al., 2014); real time information (Laukkanen & Kiviniemi, 2010); convenience (Riquelme & Rios, 2010); and mobility (Zhou et al., 2010). For banks, mobile banking helps to increase service performance (Riquelme & Rios, 2010; Chen, 2013; Hanafizadeh et al., 2014); efficiency (Wessels & Drennan, 2010; Zhou et al., 2010; Chen, 2013); and improve customer relations (Riquelme & Rios, 2010; Hanafizadeh et al., 2014).

Many Indonesian banks have low adoption of mobile banking. Interviews were conducted with several Indonesian bank managers and it was found that many of their customers had not fully

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adopted the mobile banking services; i.e., they do use the services continually (Sitorus et al., 2017). Banks can only enjoy the benefits of mobile banking if their customers utilize the service. The more customers use these services on a continual basis, the more benefits this brings to the banks. A study of what makes customers willing to continue using mobile banking would help bank managers to design effective strategies to increase its usage.

Many scholars have been interested in studying consumer adoption of technology in general, as well as the adoption of mobile banking. The literature on the adoption of technology provides several well-known models; for example, the Technology Adoption Model/TAM (Davis et al., 1989); the Diffusion of Innovation Theory/DOI (Rogers, 2003); and the Unified Theory of Acceptance and Usage of Technology/UTAUT (Venkatesh et al., 2003). These models have been widely used in mobile banking adoption studies, combined with or supplemented by various constructs. Koenig-Lewis et al. (2010) combined TAM and DOI with consumer behavior, while Riquelme and Rios (2010) integrated TAM, DOI, risk and gender. Zhou et al. (2010) blended UTAUT with the Task-Technology Fit model (Goodhue & Thompson, 1995) and Wessels and Drennan (2010) applied the Self-Service Technology/Intention to Use model, a modification of TAM, combining it with interaction need and risk. Akturan and Tezcan (2012) extended TAM by adding benefit and risk, while Al-Jabri and Sohail (2012) supplemented DOI with risk. Bidar et al. (2014) and Hanafizadeh et al. (2014) employed various constructs from various adoption models, including TAM, and Baptista and Oliveira (2015) applied UTAUT2 (Venkatesh et al., 2012), extending it by adding culture. Khasawneh (2015) supplemented TAM with trust and credibility, while Alalwan et al. (2016) complemented it with risk and self-efficacy. Several studies have used certain perspectives; for example, the benefit-cost perspective (Shen et al., 2010); innovation characteristics and trust (Lin, 2011); trust and flow experience (Zhou, 2012); and innovation characteristics, brand association and risk (Chen, 2013).

Our previous work discusses the importance of examining interactions between elements in the mobile banking adoption system and proposes a framework for mobile banking adoption from an interaction perspective (Sitorus et al., 2016). The interaction perspective framework analyzes mobile banking adoption by studying four elements in the mobile banking adoption system, the individual, technology, tasks, and the environment, and elaborates three types of interaction: (1) individual-technology interaction; (2) individual-environment interaction; and (3) individual-task interaction.

We conducted a preliminary study of the first type of interaction in the framework, individual-technology interaction, which focused on two main concepts: usability and compatibility (Sitorus et al., 2017). We included five constructs in the research model: user satisfaction, perceived usefulness, perceived ease of use, perceived learnability (derived from the usability literature), and compatibility. Although we only used a relatively small number of samples, the study indicated that usability and compatibility affect the intention to continue using mobile banking. An empirical study involving a larger number of samples is needed to provide better evidence to confirm the important role of usability and compatibility in mobile banking adoption behavior.

This paper reports on the findings of our research project, which examined mobile banking adoption behavior in Indonesia from an interaction perspective. Specifically, the paper examines the role of usability, compatibility and social influence in explaining users' intention to continue using mobile banking in Indonesia. While our preliminary work investigated the first type of interaction in the interaction perspective framework, this paper extends the examination to the second type, i.e. individual-environment interaction. Many people, especially in Indonesia, have close relations and interactions with their social environment. We believe that the influence of the social environment also plays a crucial role in driving individual behavior. While Venkatesh et al. (2003) argue that the role of social influence has been debatable, empirical evidence has shown

the positive effect of social influence on mobile banking adoption (Zhou et al., 2010; Bidar et al., 2014).

This paper makes a theoretical contribution by providing an empirical study of mobile banking adoption using a new perspective. To the best of our knowledge, this paper is the first to combine usability, compatibility and social influence constructs in mobile banking adoption research.

The remainder of this paper is organized as follows. The following section explains the conceptual model development and data collection method, and is followed by discussion of the results in Section 3. The conclusion and proposals for future research are presented in Section 4.

2. METHODS

2.1. Model Development

The proposed research model integrates usability, compatibility and social influence, as shown in Figure 1. There are ten hypotheses in the model, elaborated from the examination of two interaction types from the interaction perspective framework: individual-technology and individual-social environment.

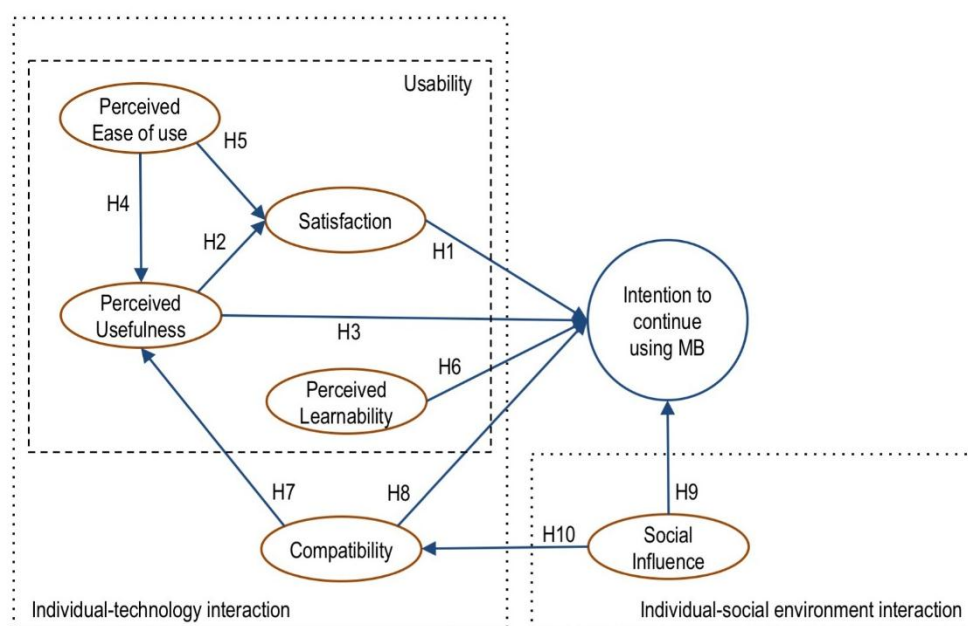


Figure 1 The conceptual research model

Usability is the ability to be used by intended users, with a certain level of learning, in achieving specific tasks effectively, efficiently, and to their satisfaction (Nielsen, 1993; ISO, 1998; Shackel, 2009). Based on the definition of usability, we identified four of its attributes: satisfaction, effectiveness, efficiency and learnability (Sitorus et al., 2016).

Satisfaction concerns users' positive attitude towards a product or service (Nielsen, 1993; ISO, 1998; Shackel, 2009). It is the key determinant of consumers' repurchase decisions in the literature on satisfaction (Hong et al., 2006). Numerous studies have found empirical evidence that satisfaction has the main effect on technology adoption behavior, e.g. mobile internet usage (Hong et al., 2006) and website use loyalty (Flavian et al., 2006). We believe that satisfaction will also have a significant effect on customers' intentions to continue using mobile banking. Therefore, we posit that:

H1. User satisfaction positively influences the intention to continue using mobile banking

Effectiveness is concerned with how a product or service satisfies users' goals (ISO, 1998). Rubin and Chisnell (2008) use the term *usefulness* to define the degree to which a product/service helps to achieve these goals, while Shackel (2009) associates effectiveness with the accomplishment of tasks in a better way. Effectiveness is similar to perceived usefulness in the technology adoption literature, being defined as the extent to which users believe that using certain technology will help to perform tasks better (Davis, 1989). Several studies have found a significant effect of perceived usefulness on the intention to adopt mobile banking (Koenig-Lewis et al., 2010; Riquelme & Rios, 2010). Hong et al. (2006) believe that users form their intention on continuing usage of a technology based on cognitive evaluation of how well the technology helps them to achieve their goal. The more users believe a technology to be useful, the more inclined they are towards continue using it. Therefore, we further posit that:

H2. Perceived usefulness positively influences the intention to continue using mobile banking

Previous scholars believe that user satisfaction is determined by the belief in the usefulness of particular technology. Hong et al. (2006) found that perceived usefulness affects users' satisfaction in employment of IT, while Al-Jabri and Sohail (2012) found an effect of perceived usefulness on mobile banking user satisfaction. The more users perceive a technology to be useful, the more satisfied they feel. In this respect, we posit that:

H3. Perceived usefulness positively influences user satisfaction

Efficiency concerns the resources used in achieving user goals (ISO, 1998). Rubin and Chisnell (2008) underline the importance of the speed and ease of using a product/service. Efficiency is closely related to perceived ease of use in the technology adoption literature. It is one of the main constructs of TAM, which is defined as the degree to which using a technology is perceived as free from effort (Davis et al., 1989). Perceived ease of use has been investigated in various technology adoption studies, including mobile banking. Davis et al. (1989) argue that perceived usefulness is determined by perceived ease of use, which is later confirmed in several mobile banking adoption studies (Koenig-Lewis et al., 2010; Riquelme & Rios, 2010). Thus, we posit that:

H4. Perceived ease of use positively influences perceived usefulness

Hong et al. (2006) argue that perceived ease of use also leads to better user satisfaction, especially for IT innovations provided to individual users. Hong et al. (2006) found a positive effect of perceived ease of use on mobile internet user satisfaction. The more users believe a technology to be easy to use, the higher their satisfaction. Therefore, we posit that:

H5. Perceived ease of use positively influences user satisfaction

Learnability is considered to be the most fundamental usability attribute (Nielsen, 1993). Nielsen (1993) believes that learning to use is the first experience most users have with a new product/service; therefore, we believe it is relevant to consider learnability in the study of technology adoption. Despite the fact that most technology adoption studies view ease of learning as a part of perceived ease of use (Davis et al., 1989; Hong et al., 2006; Riquelme & Rios, 2010; Lin, 2011), Mendoza et al. (2010) argue that it is not necessarily the same as the ease of use of a product/service. We define perceived learnability as the degree to which certain technology is perceived by people to be easy to learn and that they can become skillful at using it (adapted from Staples & Seddon, 2004). The effect of perceived learnability on the intention to continue using mobile banking has not been investigated in previous studies. We believe it is likely that the more mobile banking is perceived to be easy to learn, the more inclined users will be to continue using it. In this respect, we posit that:

H6. Perceived learnability positively influences the intention to continue using mobile banking

Compatibility is the degree to which using a technology is perceived as consistent with the values, experience and needs of users (Moore & Benbasat, 1991). Koenig-Lewis et al. (2010) argue that compatibility is a crucial attribute in mobile banking adoption, and found that the more users perceived mobile banking to conform to their values, habits or needs, the more they considered it to be useful. Therefore, we posit that:

H7. Compatibility positively influences perceived usefulness

Rogers (2003) believes that the compatibility of a technology with a user's values and lifestyle can increase the rate of adoption. Compatibility has been empirically found as the main determinant of the intention to adopt mobile banking in several studies (Al-Jabri & Sohail, 2012; Bidar et al., 2014; Hanafizadeh et al., 2014). We believe that the more compatible mobile banking is with consumers' values, habits and lifestyle, the more inclined they will be to continue using it. We therefore posit that:

H8. Compatibility positively influences the intention to continue using mobile banking

Social influence is the extent to which users believe that friends, family or important others think they should use a technology (Venkatesh et al., 2003). Zhou et al. (2010) state that social influence is the impact of environmental factors, for example friends and family, on individual behavior. Previous studies have found a positive effect of social influence on mobile banking adoption behavior in China (Zhou et al., 2010) and Turkey (Bidar et al., 2014). We believe that social influence would have a similar effect in Indonesia. Thus, we hypothesize that:

H9. Social influence positively influences the intention to continue using mobile banking

Chaouali et al. (2016) argue that in developing countries, where people tend to conform to their society, social influence plays a more important role. We believe that Indonesian people have a similar tendency to conform to their society; therefore, we believe that individuals' values and lifestyle would also be influenced by their social environment. Hence, it is likely that social influence affects mobile banking compatibility with values, habits and users' lifestyle. In that respect, we hypothesize that:

H10. Social influence positively influences compatibility

2.2. Data Collection Method

Data collection was conducted in Indonesia via an online survey using a self-administered questionnaire. A convenience sample was drawn from the population of two main cities in Indonesia, Greater Jakarta and Bandung, being mobile banking users, i.e. bank customers who use mobile banking applications to perform transactions. The convenience sampling approach has been consistently used in many technology adoption studies (Koenig-Lewis et al., 2010), and successfully used in mobile banking adoption studies (Koenig-Lewis et al., 2010; Sun et al., 2012; Khasawneh, 2015).

We collected data using a self-administered questionnaire. All constructs in the conceptual research model were measured using 36 multiple items. The items were adapted from prior studies in the relevant fields, translated into Indonesian. The intention to continue using mobile banking measures were adapted from Baptista and Oliveira (2015); the satisfaction and perceived usefulness measures from Hong et al. (2006) and Cheng et al. (2006), respectively; the measures of perceived ease of use were adapted from Riquelme & Rios (2010); the perceived learnability measures from Riquelme & Rios (2010) and Staples & Seddon (2004); and the compatibility measures from Lin (2011) and Moore & Benbasat (1991). All items were measured using a 7-point Likert-type scale, from 1 (strongly disagree) to 7 (strongly agree).

Data were collected using an online questionnaire on a popular online survey website. To prevent multiple responses from a single respondent, a restriction was set to only allow the questionnaire

to be taken once from the same IP address. We also set a filter to ensure that only individuals who use a mobile banking application to perform transactions could participate in the survey. Respondents were invited to participate by sending them the link to the survey by e-mail, text and chat messages; invitations were also posted on several social media pages. During a 6-week period, 381 responses were obtained. We calculated the multivariate Mahalanobis distance to identify outliers in the sample data. Because outliers tend to be problematic, they were discarded, as well as all responses with missing values. The data from the remaining 319 respondents were then used to test the proposed model. Table 1 outlines the sample characteristics.

3. RESULTS AND DISCUSSION

The conceptual research model was evaluated with Partial Least Squares – Structural Equation Modeling (PLS-SEM), using SmartPLS 3 software. Two-step structural equation modeling was employed; we first evaluated the measurement model, and then conducted the structural model evaluation.

Table 1 Sample characteristics

No	Measure	Items	Frequency	%
1	Gender	Female	170	53.25%
		Male	149	46.75%
2	Age	<25	99	31.08%
		25-34	114	35.66%
		35-44	76	23.86%
		45-55	26	8.19%
		>55	4	1.20%
3	Occupation	Student	72	22.41%
		Homemaker	15	4.82%
		Employee	130	40.96%
		Entrepreneur	48	14.94%
		Teacher/Lecturer	34	10.60%
		Professional	7	2.17%
		Other	13	4.10%
4	Education	Senior high school	38	11.81%
		Undergraduate	200	62.65%
		Graduate/Postgraduate	81	25.54%
5	Mobile banking usage frequency	Several times a day	47	14.73%
		Several times a week	170	53.29%
		Several times a month	94	29.47%
		Several times in 3 months	4	1.25%
		Several times a semester	2	0.63%
		Several times a year	2	0.63%

3.1. Measurement Model Evaluation

We assessed the measurement model by evaluating the reliability of the measurement items and the composite reliability of the constructs. As shown in Table 2, all item loadings are above the threshold value of 0.708, which indicates they are acceptable (Hair et al., 2014). The composite reliability values of all the constructs are also above the threshold value of 0.708, which also indicates their acceptability (Hair et al., 2014).

Table 2 Item loadings, Cronbach's Alpha, Composite Reliability and AVE

Constructs	Measurement items	Loadings	Cronbach's Alpha	Composite Reliability	AVE
Compatibility (COMP)	Comp1	0.918	0.914	0.946	0.853
	Comp2	0.941			
	Comp3	0.911			
Intention to continue using m-banking (INT)	Int1	0.902	0.933	0.952	0.833
	Int2	0.900			
	Int3	0.908			
	Int4	0.941			
Perceived ease of use (PEOU)	Peou1	0.964	0.964	0.976	0.933
	Peou2	0.977			
	Peou3	0.956			
Perceived learnability (PLRN)	Plrn1	0.959	0.966	0.975	0.908
	Plrn2	0.951			
	Plrn3	0.949			
	Plrn4	0.954			
Perceived usefulness (PUSE)	Puse1	0.909	0.928	0.949	0.823
	Puse2	0.940			
	Puse3	0.916			
	Puse4	0.863			
Satisfaction (SAT)	Sat1	0.917	0.906	0.935	0.782
	Sat2	0.922			
	Sat3	0.904			
	Sat4	0.787			
Social influence (SOC)	Soc1	0.939	0.923	0.951	0.866
	Soc2	0.937			
	Soc3	0.916			

The validity of the measurement model was evaluated by assessing the convergent validity and discriminant validity of the constructs. Table 2 shows the Average Variance Extracted (AVE) value of each construct, which are all above the threshold value of 0.5 (Hair et al., 2014), ensuring the convergent validity of all the constructs in the model. Discriminant validity was evaluated using the Fornell-Larcker criterion (Hair et al., 2014). Table 3 shows that the square root of AVE for each construct is always above its highest correlation to other constructs, ensuring the discriminant validity of the measurement model.

Table 3 Discriminant validity: Fornell-Larcker criterion

	COMP	INT	PEOU	PLRN	PUSE	SAT	SOC
COMP	0.924						
INT	0.784	0.913					
PEOU	0.718	0.845	0.966				
PLRN	0.795	0.801	0.844	0.953			
PUSE	0.772	0.829	0.804	0.776	0.907		
SAT	0.724	0.843	0.833	0.781	0.791	0.884	
SOC	0.290	0.292	0.259	0.213	0.281	0.186	0.931

3.2. Structural Model Evaluation

Prior to evaluating the structural model, we checked the collinearity of the constructs, as suggested by Hair et al. (2014). Table 4 shows collinearity statistics value (VIF) of the construct relationships in the structural model. All are below the threshold value of 5, which indicates that they are acceptable.

Table 4 Structural model VIF values

	COMP	INT	PEOU	PLRN	PUSE	SAT	SOC
COMP					2.061		
INT		3.363					
PEOU					2.061	2.831	
PLRN		3.771					
PUSE		3.681				2.831	
SAT		3.343					
SOC	1.000	1.116					

Table 5 shows the coefficients of determination (R^2 values) and adjusted R^2 of the endogen constructs in the structural model. R^2 values represent the amount of variance explained by the constructs in the structural model (Hair et al., 2014). The results show that the model explains 81.1% variance of intention to continue using mobile banking, providing strong support for our proposed model. In addition, it explains 73.5% variance of satisfaction, and 72.5% variance of perceived usefulness.

Table 5 Coefficients of determination (R^2) values

Constructs	R^2
COMP	0.084
INT	0.811
PUSE	0.725
SAT	0.735

Table 6 presents a summary of the hypothesis testing. The statistics confirm that all the hypotheses are supported at the 5% significance level.

Table 6 Hypothesis tests

Hypothesis	Path	Path Coefficient	p. values	Supported
H1	SAT -> INT	0.390	0.000	Yes
H2	PUSE -> INT	0.258	0.000	Yes
H3	PUSE -> SAT	0.344	0.000	Yes
H4	PEOU -> PUSE	0.517	0.000	Yes
H5	PEOU -> SAT	0.556	0.000	Yes
H6	PLRN -> INT	0.154	0.047	Yes
H7	COMP -> PUSE	0.401	0.000	Yes
H8	COMP -> INT	0.160	0.001	Yes
H9	SOC -> INT	0.068	0.015	Yes
H10	SOC -> COMP	0.290	0.000	Yes

3.3. Discussion

Satisfaction is found to have a significant positive influence on the intention to continue using mobile banking ($\beta = 0.390$, $p = 0.000$), thus supporting Hypothesis 1. This finding confirms the results of previous studies (Flavian et al., 2006; Hong et al., 2006); when consumers feel satisfied with mobile banking, they intend to continue using it.

Perceived usefulness is found to have a significant positive influence on continuance of using mobile banking ($\beta = 0.258$, $p = 0.000$) and on satisfaction ($\beta = 0.344$, $p = 0.000$), supporting Hypotheses 2 and 3. This finding is consistent with those of Koenig-Lewis et al. (2010), Riquelme and Rios (2010) and Al-Jabri and Sohail (2012). The more customers find mobile banking to be

useful, the greater their intention to continue using it. This also shows that when customers find mobile banking to be useful, they also find it to be satisfying. In addition, this result extends the findings of Hong et al. (2006), that the effect of satisfaction on the intention to continue usage is also found in the mobile banking context.

Perceived ease of use is found to have a significant positive influence on perceived usefulness ($\beta = 0.517$, $p = 0.000$) and on satisfaction ($\beta = 0.556$, $p = 0.000$), supporting Hypotheses 4 and 5. This is consistent with the findings of Koenig-Lewis et al. (2010), Riquelme and Rios (2010), and Hong et al. (2006), implying that when customers find mobile banking to be easy to use, they also believe it to be useful and feel satisfied. This finding also extends that of Hong et al. (2006); the effect of perceived ease of use on users' satisfaction is also found in the mobile banking context.

Perceived learnability is found to have a significant positive influence on the intention to continue using mobile banking ($\beta = 0.154$, $p = 0.047$), thus supporting Hypothesis 6. Although the path is found to be significant, the magnitude of the effect is relatively small. This might be because the majority of our respondents are young people, who generally have little difficulty in learning to use IT systems. Nevertheless, the finding implies that when customers find it easy to learn mobile banking applications, they will intend to use them continually. This finding also confirms Mendoza et al.'s (2010) suggestion that perceived learnability could be analyzed separately from perceived ease of use.

Compatibility is found to have a significant positive influence on perceived usefulness ($\beta = 0.401$, $p = 0.000$) and on the intention to continue using mobile banking ($\beta = 0.160$, $p = 0.001$), supporting Hypotheses 7 and 8. This is consistent with the findings of Koenig-Lewis et al. (2010), and also those of Al-Jabri and Sohail (2012), Bidar et al. (2014) and Hanafizadeh et al. (2014). This suggests that when customers find mobile banking to be compatible with their values, habits or needs, they are likely to believe it to be useful, and will intend to use it continually.

Social influence is found to have a significant positive influence on the intention to continue using mobile banking ($\beta = 0.068$, $p = 0.015$), consistent with the findings of Zhou et al. (2010) and Bidar et al. (2014). Although the magnitude of the influence is small, this finding suggests that the influence of other people in bank customers' social environment will shape their intention to use mobile banking continually. Social influence is also found to have a significant positive influence on compatibility ($\beta = 0.401$, $p = 0.000$), confirming our suggestion that compatibility with an individual's values, needs and lifestyle is influenced by their social network. The magnitude of the effect implies that the social environment plays a substantial role in shaping customers' belief in the compatibility of mobile banking, although this finding might be impacted by the fact that the majority of our respondents were female. It would be interesting to analyze further whether differences in gender cause differences in continued usage intention.

4. CONCLUSION

The study has found that the intention to continue using mobile banking is significantly determined by satisfaction, compatibility, perceived usefulness, perceived learnability and social influence. Satisfaction is found to have the highest influence on continued usage intention. This shows that satisfaction is not only important for bank customers in direct interactions at the physical bank branches, but also in their experience in using mobile banking applications. Therefore, banks must focus their efforts on increasing customer satisfaction in using such applications. We found that satisfaction is largely determined by perceived ease of use and perceived usefulness, therefore banks should ensure that their mobile banking is easy to use and beneficial in order to improve customer satisfaction.

Our findings confirm that perceived learnability could be analyzed separately from perceived ease of use. In addition, this study is the first to find a significant effect of perceived learnability on the intention to continue using mobile banking.

The research model has been proven to be able to explain a high percentage of continuance usage intention variance. This suggests that examination of the interaction between individuals and technology, represented by usability and compatibility, along with the interaction between individuals and the social environment, can help to understand mobile banking adoption behavior.

The research used convenience sampling to collect empirical data, thus limiting the generalization of the findings. The study also only partially investigates the interaction perspective framework; future work will be to examine all the interaction types in the framework. An analysis of the differences between different sample characteristics and their influence on the intention to continue using mobile banking would also contribute to better understanding of bank customer adoption behavior.

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