

EXAMINING THE EFFECT OF SUBJECTIVE NORMS AND COMPATIBILITY AS EXTERNAL VARIABLES ON TAM: MOBILE BANKING ACCEPTANCE IN YEMEN

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ABSTRACT: The combination of wireless technology and mobile devices through wireless infrastructure has reshaped the delivery and consumption of financial services, and is spreading rapidly throughout the world. The purpose of this study is to test the external critical success factors that impact the intention to use mobile banking services in Yemen via an extended model of TAM (Technology Acceptance Model). Evaluation of the proposed model was done through a survey questionnaire with data collected from 482 valid responses from non-users of mobile banking services. Structural Equation Modelling (SEM) via AMOS was utilized to determine the important levels of association and interactions between the factors tested. The proposed research model, evidenced by the goodness of fit of the model to the data, explained 80% of the variance in intention to use mobile banking services. The findings of the multivariate analysis revealed that subjective norms and compatibility have a significant positive effect on perceived usefulness, and perceived ease of use. Furthermore, perceived ease of use (PEOU) and perceived usefulness (PU) has a positive important direct influence on the behavioral intention to use mobile banking services in Yemen. The results of the current study will give further insights into mobile banking strategies.

Keywords: Mobile Banking, Yemen, TAM: Technology Acceptance Model, Subjective Norms, Compatibility.

1. INTRODUCTION

Mobile banking users are predicted to exceed 1 billion in 2015, and this represents almost 1 in 5 of the global adult population [1]. A study conducted by [2] revealed that in India, 76% of user conducted banking transactions on their mobiles in last 6 months. China came next with 70% users, followed by South Africa (61%), compared to on 38% in the US and 31% in the UK in the same period. Germany (24%) and Canada (18%) came at the end of the list of the 14 countries covered in the study. The global average for mobile banking adoption rate is 45% (Please see Figure 1). [3] Conducted another study to examine the mobile banking adoption rate among Arab countries and reported that 53% of Saudis conducted banking transactions on their mobile phones and 58% of users from Kuwait. Others involved in the study were Qatar (44%), UAE (43%), Egypt (around 41%) and Jordan (35%). Yemen had one of the poorest in mobile banking usage at 25%. The mobile banking adoption rate differed from one country to another because client mindset varied from one country to the other. Low usage will lead to low performance, low productivity and less return on investment [4-6]. Therefore, it is crucial to identify what factors promote or hinder the adoption of mobile banking services in Yemen. The technology Acceptance Model (TAM) appears to be the most broadly used and accepted theory among Information Systems (IS) researchers for studying individuals' system usage and acceptance behavior [7-8]. In this study, TAM is employed as the underpinning theory. Its core constructs are perceived usefulness and perceived ease of use. However, one of its weaknesses is that it does not cover all aspects that could affect individual behavioral intention and actual behavior in IS adoption. [9-10] suggest examining the effect of external variables on the main construct of the TAM in the original model. However, as TAM focuses only on the PU and PEOU [9, 11-12], and disregards assessing the barriers to using an information system device, it is unlikely to accurately reflect the adoption

of mobile banking [13]. In this study, TAM will be extended, with external variables added to perceived usefulness and ease of use. Yemen is a collectivist nation, according to [14], and in Arab countries individualism ranks very low in comparison with the rest of the world. Therefore subjective norms play a greater role in predicting client intention to use mobile banking in Yemen.

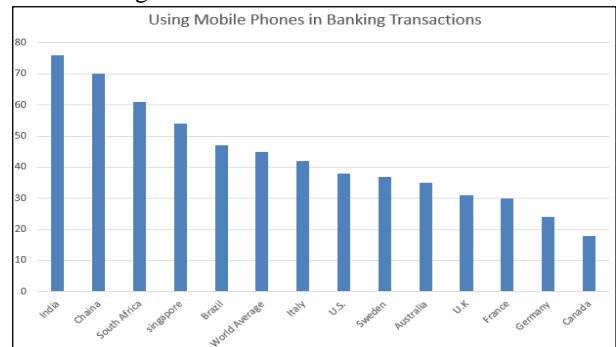


Figure 1: Mobile Banking Worldwide Usage 2012

Source: (ACI, 2012)

This study will also provide the basis for further refinement of the TAM to predict technology adoption, more specifically the addition of compatibility as a predictor of behavioral intention. To date, only limited empirical research has been carried out in developing countries, particularly in the Middle East [11], although there are many studies in IS restating calls for examining the factors that predict the intention to adopt mobile phone banking [15-16]. Thus, this study examines the impact of external variables on the TAM and therefore on the behavioral intention to use mobile banking services. This study attempts to achieve the following research objectives:

- (1) To examine the effect of *subjective norms (SN)* on *perceived usefulness*.
- (2) To examine the effect of *subjective norms* on *perceived easy to use*.
- (3) To examine the effect of *compatibility* on *perceived usefulness*.

(4) To examine the effect of *compatibility on perceived easy to use*.

(5) To examine the effect of *perceived usefulness (PU) on the intention to use mobile banking services*.

(6) To examine the effect of *perceived ease of use on perceived usefulness (PEOU)*.

(7) To examine the effect of *perceived ease of use on intention to use mobile banking services*.

2. LITERATURE REVIEW

2.1 Subjective Norms

[17] Has defined subjective norm as 'the perceived social pressure about whether to adopt a specific behavior'. The subjective norm construct was included in the original TAM model and was called TAM2 [18], reflecting the social pressure exerted by family, friends and prominent individuals. The subjective norm construct is a significant predictor of the intention to use mobile commerce [19], and this is consistent with [17, 20-27]. It was split into two constructs by [12], while [28] kept it as a single construct, since the adoption of mobile banking is mainly an individual personal decision rather than an organization-dependent one. [18] in the mobile services context, proposed that the SN has a direct effect on PU, and [29] reported its significant impact on PU in online banking. In contradiction, [30] reported that there is a negative important effect on the PU in mobile banking. In the e-learning and mobile learning context, [31-32] also reported the important effect of the SN on the core constructs of the TAM. Mobile banking in Yemen could be predicted by the SN that might influence client intention to use mobile banking services. Consequently, the following hypotheses are proposed:

H1. Subjective Norms have a positive effect on Perceived Usefulness.

H2. Subjective Norms have a positive effect on Perceived Ease of Use.

2.2 Compatibility

Compatibility is one of the significant factors to determine the attitude of clients toward e-banking services and their adoption [33]. It is considered as one of the key determining factors of innovation diffusion as well [34]. [33, 35] have defined compatibility as 'the degree to which mobile banking services are in line with consumers' lifestyle and current needs. Studies reveal that more than two-thirds of financial transaction services that meet the needs of clients fail due to non- ubiquity in traditional channels provided by a wireless and mobile channel [36]. In addition, [33, 37] reported that high compatibility with banking needs will lead to a higher chance of technology acceptance and adoption. When the channel of communication between a bank and its clients is not compatible with their needs, it is more likely to fail in offering services and will lead to clients avoiding the service. Many studies including from [38- 41], have confirmed the significant effect of compatibility on user intention in different applications. Another study conducted by [42-43] found that PU and PEOU were significantly affected by compatibility. Thus, a high level of compatibility of mobile banking with the banking needs and wants of clients would raise the likelihood of its adoption. Consequently, the following hypotheses is proposed:

H3. Compatibility has a positive effect on Perceived Usefulness.

H4. Compatibility has a positive effect on Perceived Ease of Use.

2.3 Perceived Usefulness

PU is defined by [9-10] as 'the extent to which a person believes that using a particular system will enhance his or her job performance'. Evidence of the substantial effect of PU on the adoption intention is provided through a broad range of research in the information systems community [9-10, 16, 18, 44-50]. The main reason behind the usage of mobile banking services is that people perceive it as useful service to conduct their banking transactions. Consequently, the following hypothesis is proposed:

H5. Perceived Usefulness has a positive effect on the Intention to use mobile banking services.

2.4 Perceived Ease of Use

[9- 10] has defined the PEOU as the degree of a user's belief that the usage of a particular system will be a measure of effort. Extensive research has been conducted in the past, providing empirical proof of the important effect of PEOU on behavioral intention, either directly or indirectly through its effect on PU [42, 51- 57]. A mobile banking system needs to be easy to learn and use in order to avoid, the problem of underutilization. When an IT applications are easy to use, clients will be less intimidated to use it [58]. This indicates that the PEOU construct is likely to have a positive influence on user perception of usefulness in their interaction with mobile banking systems, in addition to its direct influence on intention to use mobile banking services. Consequently, the following hypotheses are proposed:

H6. Perceived Ease of Use has a positive effect on Perceived Usefulness.

H7. Perceived Ease of Use has a positive effect on the Intention to use mobile banking services.

2.5 Intention to Use Mobile Banking

Intention to use is a variable which refers to the intention of an end-user to use new technology [59]. In other words, it is the probability of using a particular system. [9-10] in the TAM, proposed that behavioral intention affects and causes actual behaviour when using a new system. Likewise, [60] study using TPB (Theory of Planned Behaviour) asserted that the intention of a certain behaviour determines the actual usage. Thus, the intention to use a technology determines the actual use of the system. Later studies state that intention to use technology is merely a mediating factor [18, 61]. However since this current study focuses on non-users of mobile banking, intention to use mobile banking services will be the core construct, measuring it through three dimensions, namely intention to use, desire, and preference [18, 20, 62].

3. RESEARCH METHODOLOGY

3.1 Overview of the proposed research model

The proposed model of this research is based on the Technology Acceptance Model (TAM) [9-10] to explain intention to use mobile banking in Yemen. As suggested by [9-10], the external variables are subjective norms and compatibility. Relationships among the external variables and the core constructs of the TAM (perceived usefulness, and perceived ease of use) and the intention to use mobile banking services are represented in figure 2.

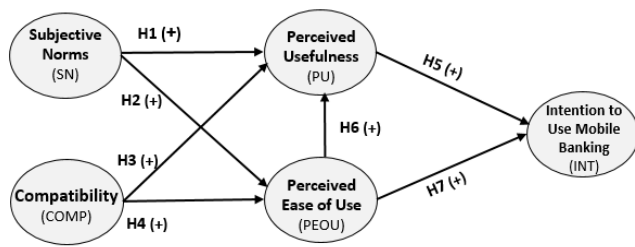


Figure 2: The integrated research model

3.2 Development of instrument

Questionnaires are used to collect data for this study, specially designed to measure all the main constructs of the research model. The questionnaire contained close-ended questions that were tested and translated into Arabic language since the respondents are from Yemen. The survey is divided into two sections. The first section measures five core constructs using seven-point Likert scale ranging from 1 strongly disagree to 7 strongly agree (Please refer to Appendix A for the instruments) whereas the second section covers the demographic profile of the respondents and measured using nominal or ordinal scale.

3.3 Data collection

The respondents of this study were individuals who have a bank account at any bank that provides mobile banking services in Yemen, have mobile phones and are not users of mobile banking services. In this study, snowball sampling, a non-probability sampling technique, was adopted to reach potential subjects among Yemeni banks clients in the capital city Sana'a. This is appropriate when the target population is difficult to reach [11]. 482 valid usable responses were received and analyzed, the first part via a multivariate analysis process using Structural Equation Modelling (SEM) via analysis of moment structures (AMOS) software version 21.0. AMOS was used because of its simplicity and technically advanced nature [63]. Moreover, it offers a more precise assessment of the discriminant validity of an instrument than exploratory analysis [64]. The second part was analyzed through Statistical Package for the Social Sciences (SPSS) version 22.0.

4. DATA ANALYSIS AND RESULTS

4.1 Respondents Demographics Profile

Frequency and percentage demographics in this study show that 71.0% of respondent were male and 29.0 % were female. For the age groups, 2.7 % less were than 20 years old, 93.1 % between 20 and 49 years and 4.1% 50 years and above. Regarding respondent occupation, 23.7 % were students, 68.4% government and private sector employees, with 7.9% from other categories (business owners, unemployed, others). In terms of income based on gross household monthly income, 15.4% earn less than YER (Yemeni Rials) 20,000 per month, 12.9% range between YER 20,000 and YER 39000, 51.2% between YER 40,000 and YER 99,000 (the majority), and 20.5 % more than YER 100,000. The banking experience profile revealed that 20.3% have used banking services for a year or less, 57.0% have been banks clients for 2 to 7 years, while 22.6 % have been users for more than 7 years.

4.2 Descriptive Analysis

The mean and standard deviation are represented in Table 1 for each core variable in the current study. The results indicate that the levels of PEOU and PU are high among the respondents, showing that they expect easiness, flexibility and usefulness when using mobile banking. The results also show that the level of compatibility and subjective norms are moderate among respondents, indicating that they find mobile banking compatible with their needs. In addition, they think that the people who are important to them and have an influence on their decisions would affect the adoption of mobile banking services. Finally, the intention to use mobile banking services in the future is good (4.77 out of 7).

Table 1: Mean and Standard Deviation

Construct	Item	Loading (>0.5)	M	SD	α (> 0.7)	CR (> 0.7)	AVE (>0.5)
PU	PU1	0.92	4.85	1.86	0.947	0.947	0.857
	PU2	0.92					
	PU3	0.94					
PEOU	PEOU1	0.83	4.94	1.76	0.876	0.887	0.723
	PEOU2	0.90					
	PEOU3	0.82					
SN	SN1	0.85	3.86	2.02	0.875	0.878	0.708
	SN2	0.94					
	SN3	0.71					
COMP	COMP1	0.89	4.31	1.98	0.868	0.869	0.768
	COMP2	0.86					
INT	INT1	0.94	4.77	1.88	0.964	0.964	0.900
	INT2	0.96					
	INT3	0.94					

Note:

- M=Mean; SD=Standard Deviation, α = Cronbach's alpha; CR = Composite Reliability, AVE = Average Variance Extracted
- The measurement used is seven-point scale ranging from 1 (strongly Disagree) to 7 (strongly Agree).

Key: PU: Perceived Usefulness, PEOU: Percieved Ease of Use, SN: Subjective Norms, COMP: Compatibility, INT: Intention to Use Mobile Banking Services.

4.3 Measurement Model

Absolute fit indices determine how well a priori model fits the sample data [65]. Based on the results of Confirmatory Factor Analyses (CFA), the Absolute fit indices show that the chi-square is not significant, and this is justified by the high sample size [66]. However, model fit reported in the RMSEA coefficient is .071, indicating a good fit. The Adjusted Goodness of Fit Index AGFI (.898) is fit, and Incremental fit indices indicate that both tests are fit since the NFI and CFI obtained are .966 and .976 respectively. With Parsimony fit indices also indicating fit, since the PGFI is .597 and PNFI, is .712, the model fits well. In addition, Incremental fit indices indicate that both tests are fit since the CFI obtained is .976, and thus the model fits well [66-67]. The CFA model in the current study, tested all variables simultaneously, not individually, because the hypothesized model integrates a small number of items for each of the latent variables. Generally, the goodness-of-fit statistics (see Table 2) support the integrity of the overall model. In this research, the overall model fit reported in Table 2 shows that the overall fit indices for the CFA model are acceptable [66-67], since Incremental fit indices and Parsimony fit indices are fulfilled.

Table 2: Goodness-of-Fit Indices for the Measurement Model

Fit Index	Cited	Admissibility	Result	Fit (Yes/No)
X ²			227.272	
DF			67	
P value		>.05	.000	No
X ² /DF	[67]	1.00 - 5.00	3.392	Yes
RMSEA	[70]	<.08	.071	Yes
GFI	[71]	>.90	.935	Yes
AGFI	[71]	>.80	.898	Yes
NFI	[72]	>.80	.966	Yes
PNFI	[72]	>.05	.712	Yes
IFI	[73]	>.90	.976	Yes
TLI	[74]	>.90	.967	Yes
CFI	[66]	>.90	.976	Yes
PGFI	[75]	>.50	.597	Yes

Note: X² = Chi Square, DF = Degree of freedom, GFI = Goodness-of-fit, NFI = Normed fit index, IFI = the increment fit index, TLI = Tucker-Lewis coefficient Index, CFI = Comparative-fit-index, RMSEA = Root Mean Square Error of Approximation, PNFI = Parsimony Normed Fit Index, AGFI = Adjusted Goodness of Fit Index

***The indexes in bold are recommended since they are frequently reported in literature (Awang, 2014)

Convergent validity was tested on the CFA model before testing the hypotheses. The convergent validity of the measurement model was tested by examining the factor loading, composite reliability, and Average Variance Extracted (AVE). High loadings (at least .50) on a factor indicate that the items converge on the same common point [68]. The composite reliability is the same acceptable cut-off for the Cronbach's alpha (at least .70). High AVE values (greater than 0.5) show that the latent variables have high convergent validity [68]. In table 1, the results of composite reliability show values greater than 0.7 and AVE values more than 0.5. Consequently, all variables have convergent validity [69].

The Fornell-Larcker criterion is a more conservative approach to assess discriminant validity, and compares the value of the AVE with the latent variable correlations. Specifically, AVE should exceed the correlation with any other construct [68]. Table 3 represents the Fornell-Larcker criterion for this study and shows that AVE exceeds the correlation with every construct.

Table 3: Results of Discriminant Validity by Fornell-Larcker criterion

Factors	1	2	3	4	5
1 PU	0.926				
2 PEOU	0.723	0.850			
3 SN	0.535	0.482	0.841		
4 COMP	0.672	0.584	0.601	0.876	
5 INT	0.873	0.754	0.55	0.669	0.948

Note: Note: Diagonals represent the square root of the average variance extracted while the other entries represent the correlations.

Key: PU: Perceived Usefulness, PEOU: Perceived Ease of Use, SN: Subjective Norms, COMP: Compatibility, INT: Intention to Use Mobile Banking Services.

4.4 Structural Model And Hypotheses Testing

The goodness-of-fit of the structural model was comparable to the previous CFA measurement model. In structural model, the X²/df = 3.467, CFI = 0.975, and RMSEA = 0.072. These fit indices provided evidence of adequate fit between the hypothesised model and the observed data [66]. The entire

hypotheses were tested using structural equation modelling via AMOS software version 21.0 as presented in Figure 3. The structural model fit as shown in Table 4 provides the indication of the hypotheses tests. The p-values associated with each standardized path estimate are used to determine significance at an alpha level of .05.

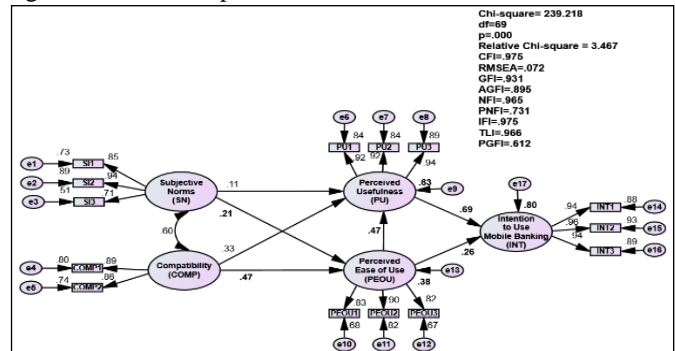


Figure 3: Research Structural Model Results

The results of the seven hypotheses built for this study are shown in Table 4. The structural equation modelling (SEM) analysis indicates that subjective norms significantly predicts perceived ease of use ($\beta = .221, p < 0.001$) and also significantly predicts the perceived usefulness ($\beta = .110, p < 0.05$). Therefore, H1 and H2 are supported. H3 and H4 are supported as compatibility remarkably influenced the perceived ease of use and perceived usefulness with beta values $\beta = .466$, and $\beta = .334$ respectively. Also, perceived usefulness, greatly predicts intention to use mobile banking ($\beta = .687, p < 0.001$) and thus H5 is supported. In the same way, H6 and H7 are supported as perceived ease of use was found to be an important antecedent of perceived usefulness and intention to use mobile banking services with beta values $\beta = .473$, and $\beta = .261$ respectively.

Table 4: Structural Path Analysis Result

	DV	IV	β	S.E	C.R.	p	Finding
H1	PU	<- SN	.110	.055	2.494	.013*	Supported
H2	PEOU	<- SN	.221	.059	3.724	***	Supported
H3	PU	<- COMP	.334	.052	6.519	***	Supported
H4	PEOU	<- COMP	.466	.051	7.763	***	Supported
H5	INT	<- PU	.687	.046	16.444	***	Supported
H6	PU	<- PEOU	.473	.057	9.991	***	Supported
H7	INT	<- PEOU	.261	.053	6.449	***	Supported

Note: PU: Perceived Usefulness, PEOU: Perceived Ease of Use, SN: Subjective Norms, COMP: Compatibility, INT: Intention to Use Mobile Banking Services; ***p<.001; **p<.01; *p<.05; S.E = Standard Error; C.R = Critical Ratio

The Coefficients of Determinations for the research proposed model are shown in table 6. Subjective norms, compatibility and perceived ease of use explained 63% of the variance in perceived usefulness. However, subjective norms and compatibility explain 38% of the variance in perceived ease of use of using mobile banking services. Further, 80% of the variance of intention to use mobile banking is explained by perceived usefulness and perceived ease of use. According to [76-78], the R² of the intention of using mobile banking services in the current study is considered substantial.

5. DISCUSSION

The main objective of this study was to examine the external variables (subjective norms and compatibility) on the two essential factors of the TAM and consequently determine the behavioral intention of using mobile banking services. The specific objectives of this study were achieved via testing the hypotheses proposed in this study. For objectives 1 and 2, subjective norms had a significant positive affect on the perceived ease of use ($\beta = .221, p < 0.001$), which means those around us who affect our decisions will improve our perception of ease of use. Also, perceived usefulness was also influenced via the subjective norms ($\beta = .110$) as those around us can increase our usefulness perception. There is a positive notable effect of SN on usefulness and ease of use, and this is in line with previous studies, [31]. Thus H1 and H2 were supported. Subjective norm may be an extrinsic motivational factor that could help the bank clients to accept and adopt mobile banking services.

Objectives 3, and 4 were achieved through testing H3 and H4. This study has provided new insights into the importance of compatibility, in which compatibility had an indirect significant impact on the intention to use mobile banking, and was found statistically significant to influence perceived usefulness ($\beta = .334$) and perceived ease of use ($\beta = .466$). In this study, client evaluations of the extent to which the new technology will be compatible with their needs, was shown to be important. If clients perceive mobile banking as consistent with their banking needs, they are more likely to use these services. Hence compatibility is a significant extension to the TAM model in the context of mobile banking. This result is in line with [42] who revealed the direct and indirect significance of compatibility on the intention to use mobile banking services. Based on this, H3 and H4 are supported.

For objectives 5, 6 and 7, the original TAM proposed by [9-10] theorized that PEOU predicts perceived usefulness, and both perceived usefulness and perceived ease of use are predictors of the behavioral intention to use new technology. In the current study, perceived ease of use was confirmed as a significant antecedent of perceived usefulness with ($b=.473$). Thus, the higher the perception of easiness of mobile banking services the higher the perception of the usefulness of this technology application among bank clients. This is in line with previous studies by [30, 57], in a different context and application, who reported the significance positive influence of perceived ease of use on perceived usefulness. Potential users of the mobile banking system in Yemeni banks' perceive that as much as a mobile banking services system is easy to use, their perception of the usefulness of the same system will be increased as well. This will consequently increase their intention to use mobile banking services. This is also consistent with [13, 52, 79-80] who showed empirically that perceived usefulness and ease of use have a positive influence on the intention to use mobile banking services. Based on the above and through analyzing the structural model of this study, H5, H6 and H7 are supported and have achieved the related objectives. The findings clearly show that ease of use and usefulness are important predictors of Intention to use in the initial adoption stage of mobile banking services [27, 81- 83]. The 80% variance in the intention to use mobile banking services is explained through

subjective norms, compatibility, perceived usefulness, and perceived ease of use.

6. LIMITATIONS AND SUGGESTIONS

In Yemen, mobile banking services are still relatively new and to a degree, immature. Hence, further research is needed to identify more factors that may facilitate the acceptance of mobile banking in Yemen. This research only studied the acceptance of mobile banking among clients in Yemeni banks, and further studies may shed more light on actual usage. Additionally, adding moderating factors such as education, age and experience could also provide more insight into the findings of future studies. Although mobile banking acceptance and adoption is increasing worldwide, the collected data was geographically limited to Yemen. Retesting and comparing the proposed model across different cultural and geographical contexts as in a future study will increase the generalizability of the results of the proposed model.

7. CONCLUSION

The chief objective of this research was to determine the effect of external variables that could affect perceived usefulness, and perceived ease of use, the main constructs of the TAM, in the context of Yemeni acceptance of mobile banking services. Despite the limitations of this study, the results have shed some encouraging lights on new variables of the intention to use mobile banking services in Yemen. In summary, both subjective norms, and compatibility increase ease of use and usefulness perception of using mobile banking since both positively affects the core constructs of the TAM, and therefore the intention to use such services. In addition, Mobile banking services have to present something new to bank clients to compete with services in the same category (e.g. e-banking). Perceived usefulness has a great impact on the intention to use mobile banking services. As shown in this study, after bank clients evaluate mobile banking services based on their perceptions of ease of use, usefulness and compatibility with their banking needs, their decision toward intention to use mobile banking services will be more positive. The study results clearly show that SN and COMP are important antecedents of PU, and PEOU and therefore predict the intention to use mobile banking services.

8. REFERANCE

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