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Understanding users' initial trust in mobile banking: An elaboration likelihood perspective

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ABSTRACT

Due to the high perceived risk, building users' initial trust is crucial to facilitating their adoption and usage of mobile banking. Drawing on the elaboration likelihood model (ELM), this research examined users' initial trust in mobile banking. The results indicated that initial trust develops along a dual route including the central route and peripheral route. Self-efficacy as the elaboration likelihood moderates the effects of central cues and peripheral cues on initial trust. Central cues include information quality and service quality, whereas peripheral cues include system quality, structural assurance and reputation. The results imply that service providers need to employ differentiated strategies to build users' initial trust in mobile banking.

1. Introduction

Mobile business has been developing rapidly in the world. According to a report issued by China Internet Network Information Center (CNNIC), the number of mobile internet users in China has exceeded 356 million, accounting for 69% of its internet population (CNNIC, 2012). Faced with the great market, service providers have released a variety of mobile services, such as mobile instant messaging, mobile game and mobile banking. Among them, a few services related to communication, information and entertainment have received wide adoption among users. In comparison, mobile banking as a transaction application has only been adopted by a minority of users (8.2%) (CNNIC, 2012). This highlights the need to adopt effective measures to facilitate user adoption and usage of mobile banking.

Mobile banking means that users adopt mobile terminals to access various payment services, such as account balance enquiry, transference, bill payment and financial management. Mobile networks have freed users from temporal and spatial constraints, and enabled them to use mobile banking services at anytime from anywhere. This provides great convenience to users. However, mobile banking also involves great uncertainty and risk. For example, mobile networks are vulnerable to hacker attack and information interception. Viruses and Trojan horses may also exist in mobile terminals. These problems increase users' concern about payment security and decrease their trust in mobile banking, which may further affect their usage intention and behavior.

Initial trust refers to the trust developed during the first interaction with mobile banking (McKnight, Choudhury, & Kacmar, 2002a,b). Building users' initial trust is critical for mobile banking service providers. On one hand, due to the lack of previous direct experience, users may perceive great risk and uncertainty when they use mobile banking for the first time. They need to build initial trust to decrease perceived risk. On the other hand, the switching cost is low for mobile banking users. They may switch to other service providers or online banking. Thus, service providers need to build users' initial trust to retain them.

Extant research has revealed the effect of trust on mobile banking user behavior (Kim, Shin, & Lee, 2009; Lin, 2011; Luo, Li, Zhang, & Shim, 2010). However, prior research is often based on information technology adoption theories such as the innovation diffusion theory (IDT) (Kim et al., 2009; Lin, 2011), and the unified theory of acceptance and use of technology (UTAUT) (Luo et al., 2010). The process of trust development has seldom been explored. The elaboration likelihood model (ELM) proposes that users change their attitude via a dual route including central route and peripheral route (Petty & Wegener, 1999). The central route processes arguments related to information such as information quality, and requires more effort investment. In comparison, the peripheral route processes information cues such as reputation, and requires less effort. Whether users choose central route or peripheral route is determined by the elaboration likelihood, which includes motivation and ability. To better understand mobile banking users' initial trust development, this research employs ELM as the theoretical base to identify the factors affecting initial trust.

The rest of this paper is organized as follows. We review related literature on initial trust, mobile banking user adoption and ELM in the next section. Section 3 develops research model and hypotheses. Section 4 describes instrument development and data collection. Section 5 presents results, followed by a discussion of these

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results in section 6. Section 7 presents theoretical and managerial implications. We conclude the paper in Section 8.

2. Literature review

2.1. Initial trust

Trust reflects a willingness to be in vulnerability based on the positive expectation toward another party's future behavior (Mayer, Davis, & Schoorman, 1995). Trust often includes three beliefs: ability, integrity and benevolence (Zahedi & Song, 2008). Ability means that service providers have the knowledge and ability necessary to fulfill their tasks. Integrity means that service providers keep their promises and do not deceive users. Benevolence means that service providers are concerned with users' interests, not just their own benefits. According to the development phase, trust can be divided into initial trust and continuance trust. When users gain more direct experience, initial trust develops into continuance trust.

Due to its significant role, initial trust has received considerable attention in the online commerce context. Various factors are identified to affect initial trust. The first category of factors is related to website. As the interface between consumers and online vendors, website quality is a significant factor affecting initial trust (Lowry, Vance, Moody, Beckman, & Read, 2008; McKnight et al., 2002a,b). Information quality is also found to affect initial trust in inter-organizational data exchange (Nicolaou & McKnight, 2006). In addition, as two main constructs of the technology acceptance model (TAM), perceived ease of use and perceived usefulness also affect initial trust in online stores (Benamati, Fuller, Serva, & Baroudi, 2010; Chen & Barnes, 2007; Hampton-Sosa & Koufaris, 2005). The second category of factors is related to online vendors. Reputation as a trustworthiness signal is a significant determinant of initial trust (Fuller, Serva, & Benamati, 2007). In addition, company size and willingness to customize may affect initial trust (Koufaris & Hampton-Sosa, 2004). The third category of factors is related to consumer. Trust propensity, which reflects a natural tendency, is identified to be a determinant of initial trust (Li, Hess, & Valacich, 2008). The fourth category of factors is related to third party. Due to the lack of direct experience, users may rely on third party mechanisms to build their initial trust. These mechanisms include web assurance seals (Hu, Wu, Wu, & Zhang, 2010), association (Delgado-Ballester & Hernandez-Espallardo, 2008), portal affiliation (Lim, Sia, Lee, & Benbasat, 2006; Sia, Lim, Lee, Huang, & Benbasat, 2009), and structural assurance (Kim et al., 2009).

2.2. Mobile banking user adoption

As an emerging service, mobile banking has not been widely adopted by users. Thus, researchers have tried to identify the factors affecting user adoption. Information technology adoption theories such as IDT, UTAUT, TAM and task technology fit (TTF) are often used as the theoretical bases. Lin (2011) integrated IDT and trust theory to examine the effect of innovation attributes and knowledge-based trust on mobile banking user behavior. Innovation attributes include relative advantage, ease of use and compatibility. Zhou, Lu, and Wang (2010) combined TTF and UTAUT to identify the factors affecting usage intention of mobile banking. Luo et al. (2010) used UTAUT as the theoretical base and revealed the effect of performance expectancy and perceived risk on user behavior. Kim et al. (2009) drew on IDT as theoretical base and found the effect of relative benefits on initial trust in mobile banking. Gu, Lee, and Suh (2009) stated that perceived ease of use, perceived usefulness and trust affect the behavioral intention to use mobile banking.

2.3. ELM

ELM originates from social psychology and argues that individuals change their attitude through a dual route including central route and peripheral route (Petty & Cacioppo, 1986). The central route processes arguments related to information and it entails effort and time spent on information scrutinizing. On the other hand, the peripheral route processes information cues and it requires less effort investment. However, the attitude changed via the central route may be more stable and enduring than that changed via the peripheral route (Bhattacherjee & Sanford, 2006).

In the information systems discipline, ELM has been used to examine user behavior. Bhattacherjee and Sanford (2006) proposed that two factors including argument quality and source credibility affect user attitude towards document management systems. Yang, Hung, Sung, and Farn (2006) noted that information quality as the central cue and third-party seals as the peripheral cue affect initial trust in online vendors. Angst and Agarwal (2009) reported that argument frame and issue involvement affect post-adoption of electronic health records. Greiner and Wang (2011) employed ELM to examine consumer-to-consumer trust in e-finance marketplaces. Central cues include economic status, whereas peripheral cues include social capital and listing quality.

ELM provides a useful theoretical lens to understand mobile banking user behavior. Information systems theories such as TAM, IDT and UTAUT focused on the motivations affecting user behavior, such as perceived usefulness and relative advantage. They have seldom considered the influence processes underlying these factors. ELM argued that individual user changes their attitudes via both central route and peripheral route. Thus, we draw on ELM to examine mobile banking user trust and expect to reveal initial trust development processes.

3. Research model and hypotheses

3.1. Central cues

Information quality reflects information relevancy, sufficiency, accuracy and currency. Users access mobile banking to acquire information on their account balance and payment. If this information is irrelevant, insufficient, inaccurate or out-of-date, users may doubt whether service providers have enough ability, integrity and benevolence to provide quality information to them. This may decrease their initial trust in mobile banking. As users need to spend much effort and time on evaluating and scrutinizing information, information quality may affect initial trust through the central route. Yang et al. (2006) has reported the effect of information quality as central cues on initial trust in online stores. Information quality has also been found to be a significant determinant of user trust (Nicolaou & McKnight, 2006; Zahedi & Song, 2008). Thus, we propose,

H1. Information quality positively affects initial trust.

Service quality reflects service reliability, promptness, assurance and personalization (Gefen, 2002). Users always expect to obtain ubiquitous mobile banking services. This requires continuous resource and effort investment from service providers as mobile networks have relatively slow responses and instable connections. If users cannot obtain reliable, prompt and personalized services, they may feel that service providers lack ability and integrity to present quality services to them. This may lead to their lack of trust in mobile banking. Service quality may act its effect as central cues because users need to spend time on experiencing mobile banking and assessing its service quality. They may also compare the service quality of mobile banking to that of online banking. These

inspections require effort investment from users. In addition, the effect of service quality on trust has been validated in extant research (Gefen, 2002; Kim, Xu, & Koh, 2004).

H2. Service quality positively affects initial trust.

3.2. Peripheral cues

System quality reflects access speed, ease-of-use, navigation and visual appeal (Vance, Christophe, & Straub, 2008). Compared to desktop computers, mobile terminals have constraints such as small screens and inconvenient input. This highlights the necessity of delivering a well-designed interface to users. If mobile banking systems are difficult to use and have poor interface and navigation, users may feel that service providers have not invested enough effort and resources on system quality. This will decrease their trust in mobile banking. System quality may affect initial trust through the peripheral route because users can easily obtain these information cues such as visual appeal and navigation when accessing mobile banking. Vance et al. (2008) also noted that system quality including visual appeal and navigational structure affects user trust in mobile technologies.

H3. System quality positively affects initial trust.

Reputation has been identified to be a significant determinant of initial trust (Beldad, de Jong, & Steehouder, 2010). As users lack direct experience, they need to rely on second-hand information such as reputation to form their initial trust in mobile banking. Reputation will exert its effect as peripheral cues because reputation represents a prominent trustworthiness signal. Extant research has noted that source credibility (similar to reputation) affects user attitude via the peripheral route (Bhattacherjee & Sanford, 2006). Thus, we suggest,

H4. Reputation positively affects initial trust.

Structural assurance reflects that there exist technological and legal structures to ensure security (McKnight et al., 2002a,b). Structural assurance represents an institution-based mechanism. According to trust transference (Pavlou & Gefen, 2004), users may transfer their trust in these third-parties to mobile banking. Thus, structural assurance may affect initial trust. Structural assurance may also act as its effect on initial trust via the peripheral route as it represents information cues and does not require much effort investment from users. Prior research has reported the peripheral effect of third-party seals (similar to structural assurance) on user trust (Yang et al., 2006).

H5. Structural assurance positively affects initial trust.

3.3. Self-efficacy

Self-efficacy reflects individual user's perceived ability of performing an activity to acquire expected outcome (Compeau & Higgins, 1995; Marakas, Johnson, & Clay, 2007). In this research, self-efficacy means perceived ability and skills to operate mobile banking, which represents an emerging service. According to social cognitive theory, users with high self-efficacy will form positive expectation toward future results (Bandura, 1997). This may affect their initial trust in mobile banking.

H6. Self-efficacy positively affects initial trust.

ELM proposes that whether users change their attitude through central route or peripheral route is determined by the elaboration likelihood, which includes user motivation and ability (Bhattacherjee & Sanford, 2006). When users perceive that the information is relevant to their target behavior or they have high ability, they may change their attitude through the central route. Otherwise, they may change attitude through the peripheral route. Thus, self-efficacy as users' perceived ability may moderate initial trust building. When users have high self-efficacy, they may mainly form their initial trust via the central route. Otherwise, they may form their initial trust via the peripheral route. Thus, we state,

H7. Self-efficacy positively moderates the effect of information quality on initial trust.

H8. Self-efficacy positively moderates the effect of service quality on initial trust.

H9. Self-efficacy negatively moderates the effect of system quality on initial trust.

H10. Self-efficacy negatively moderates the effect of reputation on initial trust.

H11. Self-efficacy negatively moderates the effect of structural assurance on initial trust.

Fig. 1 presents the research model. Central cues include information quality and service quality, whereas peripheral cues include system quality, reputation and structural assurance. Self-efficacy moderates the effects of central cues and peripheral cues on initial trust.

4. Method

The research model includes seven factors. Each factor was measured with multiple items. All items were adapted from extant literature to improve content validity (Straub, Boudreau, & Gefen, 2004). These items were first translated into Chinese by a researcher. Then, another researcher translated them back into English to ensure consistency. Both researchers had knowledge on e-business and expertise on English-Chinese translation. There were no significant discrepancies between the original English items and the back-translated items. When the instrument was developed, it was tested among five users that had mobile banking usage experience. Then, according to their comments, we revised some items to improve the clarity and understandability. The final items and their sources are listed in Appendix A. All items were measured with a five-Likert scale ranging from strongly disagree (1) to strongly agree (5).

Items of information quality, service quality and system quality were adapted from Kim et al. (2004). Four items of information

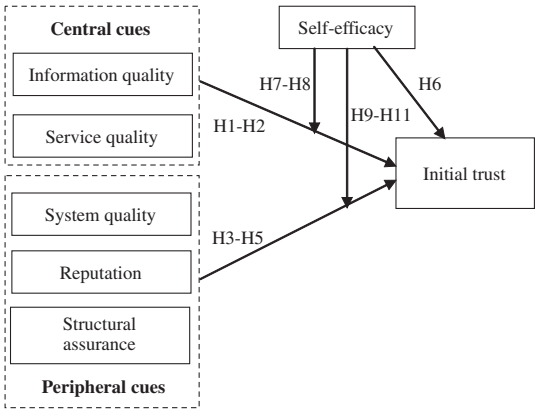

Fig. 1. Research model.

quality measure information relevancy, sufficiency, accuracy and timeliness. Items of service quality measure service reliability, responsiveness, assurance and personalization. Items of system quality measure access speed, ease-of-use, navigation and visual appeal. Items of reputation were adapted from Koufaris and Hampton-Sosa (2004) to reflect that mobile banking is well-known among users. Items of structural assurance were adapted from McKnight et al. (2002a,b) to reflect that technological and legal structures can ensure payment security. Items of self-efficacy were adapted from Lee, Tsai, and Lanting (2011) to measure users' perceived ability of operating mobile banking. Items of initial trust were adapted from Lim et al. (2006) to measure mobile banking's ability, integrity and benevolence.

Data were collected at a university located in an eastern China city, where mobile business is relatively better developed than other regions. We feel that selecting students as our subjects is appropriate as they represent the largest group of mobile internet users (35.2%) (CNNIC, 2010). They are also potential mobile banking users, which fit our research context. In order to obtain a representative sample, we distributed the questionnaires among students with amateur degree, bachelor degree and graduate degree, respectively. We also considered their majors to cover a wide sample. Researchers first inquired whether the students had mobile banking usage experience. Then, we invited those without previous experience to participate in our survey, which was conducted in an e-commerce laboratory. Before the survey, we briefed mobile banking functions to users. Then, they were asked to experience mobile banking via the mobile phones provided by us. We had installed mobile banking applications in these phones in advance to ensure that users can perform real operations. They were required to check account balance, transfer and conduct small-volume payment. To ensure that users had actually used these functions, we told them to transfer ten RMB Yuan to a designated account. Each respondent operated mobile banking for 10 min. After that, users were asked to fill the questionnaire based on this first-time usage experience. Only those that had successfully completed the transference were included into data analysis to ensure that they had obtained various cues. We scrutinized all responses and dropped those with too many (above five) missing values, which may affect estimation results in data analysis. As a result, we obtained 240 valid responses. Among them, 52.9% were male and 47.1% were female. A majority of them (70%) had used mobile internet for more than 3 years. Over half of them (65%) used mobile internet over once in a day.

To examine the common method variance (CMV), we conducted three tests. First, we performed a Harman's single-factor test (Podsakoff & Organ, 1986). The results indicated that the largest variance explained by individual factor is 14.512%. Thus, none of the factors can explain the majority of the variance. Second, we modeled all items as the indicators of a factor representing the method effect (Malhotra, Kim, & Patil, 2006), and re-estimated the model. The results indicated a poor fitness. For example, the goodness of fit index (GFI) is 0.616 (<0.90), and the root mean square error of approximation (RMSEA) is 0.121 (>0.08). Third, we used PLS to assess CMV (Liang, Saraf, Hu, & Xue, 2007). The results are listed in Appendix B. The average variance explained by substantive constructs (0.834) was substantively larger than the average variance explained by methods (-0.001). In addition, all substantive factor loadings were significant, whereas most of method factor loadings were insignificant. With these tests, we feel that CMV is not a significant problem in our research.

5. Results

Following the two step-approach recommended by Anderson and Gerbing (1988), we first examined the measurement model to test reliability and validity. Then, we examined the structural model to test research hypotheses.

First, we adopted structural equation modeling software LISREL to conduct a confirmatory factor analysis (CFA) and examine the validity. Validity includes convergent validity and discriminant validity. Convergent validity measures whether items can effectively reflect their corresponding factor, whereas discriminant validity measures whether two factors are statistically different. Table 1 lists the standardized item loading, the average variance extracted (AVE), the composite reliability (CR) and Cronbach Alpha values. As listed in the table, most item loadings are larger than 0.7. T values indicate that all loadings are significant at 0.001. All AVEs exceed 0.5 and CRs exceed 0.7. Thus, the scale has a good convergent validity (Bagozzi & Yi, 1988; Gefen, Straub, & Boudreau, 2000). In addition, all Alpha values exceed 0.7, suggesting a good reliability (Nunnally, 1978). Table 2 lists the recommended and actual values of fit indices for CFA model. The results suggest a good fitness.

To examine the discriminant validity, we compared the square root of AVE and factor correlation coefficients. As listed in Table 3, for each factor, the square root of AVE is larger than its correlation coefficients with other factors. This suggests a good discriminant validity (Fornell & Larcker, 1981; Gefen et al., 2000). We also conducted a chi-square difference test. The results are listed in Appendix C. There exist significant differences between the original model and constrained model. This also demonstrates a good discriminant validity (Gefen et al., 2000).

Second, we adopted moderated regression to test research hypotheses. We first examined a model (model 1) that only considered the main effects. Then, we added interaction terms into the model (model 2) and examined the moderation effect. Table 4 lists the results. *F*-statistics indicates that there exist significant differences between two models. Information quality, service quality, system quality, reputation, structural assurance and self-efficacy have significant effects on initial trust, providing support to H1-H6. With respect to the moderation effect of self-efficacy, except the relationship between reputation and initial trust, other paths are moderated by self-efficacy. Thus, H7, H8, H9 and H11 are supported, but H10 is not.

6. Discussion

The results indicated that both central cues and peripheral cues have significant effects on initial trust. Central cues include information quality and service quality, and peripheral cues include system quality, reputation and structural assurance. Among them, information quality, system quality and structural assurance have relatively larger effects. Information quality has been found to be a significant factor affecting user trust in health infomediaries (Song & Zahedi, 2007). Users expect to acquire accurate, timely and relevant information associated with using mobile banking. This entails service providers' effort and resource investment. For example, they need to ensure that mobile banking is synchronous with online banking. Otherwise, users may obtain wrong information on account balance through mobile banking when they have conducted payment via online banking. In addition, service providers need to present relevant information to users as it is relatively difficult for users to search information with mobile banking. They can recommend relevant information and services to users based on their usage records and preferences. They can also use location-based services to acquire user location and push relevant information such as the nearby bank and automated teller machine to the user. This personalized information may enhance user trust in mobile banking.

In addition, system quality as a peripheral cue also affects initial trust. This is consistent with extant research, which has reported

Table 1
Standardized item loadings, AVE, CR and Alpha values.

Factor	Item	Standardized item loading	AVE	CR	Alpha value
Information quality (INF)	INF1	0.743	0.57	0.84	0.84
	INF2	0.750			
	INF3	0.806			
	INF4	0.718			
Service quality (SEV)	SEV1	0.774	0.55	0.83	0.83
	SEV2	0.784			
	SEV3	0.765			
	SEV4	0.621			
System quality (SYS)	SYS1	0.743	0.58	0.84	0.84
	SYS2	0.816			
	SYS3	0.810			
	SYS4	0.660			
Reputation (REP)	REP1	0.838	0.54	0.78	0.78
	REP2	0.709			
	REP3	0.648			
Structural assurance (SA)	SA1	0.768	0.54	0.78	0.78
	SA2	0.738			
	SA3	0.692			
Self-efficacy (SE)	SE1	0.758	0.67	0.86	0.86
	SE2	0.839			
	SE3	0.854			
Initial trust (TRU)	TRU1	0.787	0.59	0.81	0.80
	TRU2	0.831			
	TRU3	0.673			

Table 2
The recommended and actual values of fit indices for CFA.

Fit indices	chi^2/df	GFI	AGFI	CFI	NFI	NNFI	RMSEA
Recommended value	<3	>0.90	>0.80	>0.90	>0.90	>0.90	<0.08
Actual value	2.25	0.846	0.800	0.978	0.961	0.974	0.062

Note: chi^2/df is the ratio between Chi-square and degrees of freedom, GFI is Goodness of Fit Index, AGFI is the Adjusted Goodness of Fit Index, CFI is the Comparative Fit Index, NFI is the Normed Fit Index, NNFI is the Non-Normed Fit Index, RMSEA is Root Mean Square Error of Approximation.

Table 3
The square root of AVE (shown as bold at diagonal) and factor correlation coefficients.

	Mean	SD	SK	KU	INF	SEV	SYS	REP	SA	SE	TRU
INF	3.43	0.64	0.04	0.07	**0.755**						
SEV	3.43	0.66	−0.04	0.56	0.515	**0.739**					
SYS	3.32	0.66	−0.05	0.18	0.498	0.575	**0.760**				
REP	3.35	0.71	−0.17	0.31	0.503	0.420	0.498	**0.736**			
SA	3.33	0.61	−0.08	0.29	0.519	0.418	0.582	0.562	**0.733**		
SE	3.59	0.78	−0.19	0.01	0.448	0.518	0.584	0.521	0.464	**0.818**	
TRU	3.49	0.64	0.05	0.24	0.587	0.521	0.596	0.588	0.516	0.573	**0.767**

Note: SD, means standard deviation; SK, means skewness; KU, means kurtosis.

the effect of system quality on user trust in mobile commerce technologies (Vance et al., 2008) and online vendors (Kim et al., 2004). System quality including visual appeal and navigational structure forms users' first impression toward mobile banking. If mobile banking has a poor interface design, users may doubt service providers' ability and integrity to provide quality services. Besides the wireless application protocol (WAP) based mobile banking, service providers have developed mobile banking applications catering to different operation systems, such as Symbian, Apple, Android, and Windows Phone. Compared to the WAP-based mobile banking, these applications have better interfaces and this may improve user experience. In addition, due to the constraints of mobile terminals such as small screens and inconvenient input, users may feel difficult to operate mobile banking. Thus, it is necessary to present an easy-to-use mobile banking system to build user trust.

Structural assurance has a significant effect on initial trust. Compared to online banking, mobile banking built on wireless network is vulnerable to eavesdropping and information interception. In addition, there may exist viruses and Trojan horses in mobile terminals. Thus, users may perceive great uncertainty and risk associated with using mobile banking. Due to the lack of direct experience, they need to rely on third-party mechanisms such as technological and legal structures to ensure payment security and alleviate perceived risk. Service providers can use encryption technologies and digital certificates to increase user trust in mobile banking.

Table 4
The moderation effect of self-efficacy on initial trust.

Variables	Model 1 Main effects	Model 2 Interaction effects
Information quality (INF)	0.18**	0.23**
Service quality (SEV)	0.10*	0.11*
System quality (SYS)	0.21**	0.23**
Reputation (REP)	0.13*	0.10*
Structural assurance (SA)	0.18**	0.20**
Self-efficacy (SE)	0.28***	0.18**
INF * SE		0.16**
SEV * SE		0.10*
SYS * SE		−0.18**
REP * SE		−0.05
SA * SE		−0.11*
R^2	0.732	0.785
F	106.301	75.897
ΔR^2		0.053
ΔF		11.278**

*** $p < 0.001$.
** $p < 0.01$.
* $p < 0.05$.

Self-efficacy as the elaboration likelihood positively moderates the effects of central cues including information quality and service quality on initial trust, and negatively moderates the effects of peripheral cues including system quality and structural assurance on initial trust. Thus, when users have high self-efficacy, they carefully scrutinize information quality and service quality to foster initial trust via the central route. In contrast, when users have low self-efficacy, they rely on information cues such as system quality and structural assurance to foster initial trust via the peripheral route. We did not find the moderation effect of self-efficacy on the relationship between reputation and initial trust. This suggests that the effect of reputation on initial trust is not affected by self-efficacy. Extant research has identified that reputation is a stable factor predicting user trust (Doong, Wang, & Foxall, 2011; Zhang et al., 2011). Future research can validate this effect.

7. Theoretical and managerial implications

From a theoretical perspective, this research examined mobile banking users' initial trust from the perspective of ELM. As noted earlier, extant research has mainly drawn on information technology adoption theories such as IDT, UTAUT and TAM to examine mobile banking user adoption, and has seldom considered the effect of initial trust on user behavior. This research tries to fill the gap and discloses initial trust development process. The results indicated that initial trust develops through a dual route including the central route and peripheral route. Information quality and service quality act as central cues, whereas system quality, reputation and structural assurance act as peripheral cues. Self-efficacy as the elaboration likelihood moderates initial trust development. More specifically, when users have high self-efficacy, they mainly rely on central cues to form initial trust. Otherwise, they rely on peripheral cues to form initial trust. These results advance our understanding of mobile banking user behavior. On the other hand, information systems research has examined ELM in the contexts of document management systems, electronic health records and e-finance marketplace. Our research extends ELM to an emerging service: mobile banking and validates its effect on user behavior. This also enriches extant research on ELM.

From a managerial perspective, the results imply that service providers need to adopt differentiated strategies to build users' initial trust in mobile banking. When the target users have relatively high self-efficacy, such as young working professionals, service providers need to present quality information and services to them as these users mainly build their initial trust via the central route. On the other hand, when the target users have low self-efficacy, such as those that are unfamiliar with mobile internet, service providers need to highlight the role of interface design and structural assurance. Then, users may build their initial trust in mobile banking and increase their usage behavior.

8. Conclusion

As an emerging service, mobile banking has not been widely adopted by users. Especially, the high perceived risk and low switching cost highlight the necessity to build users' initial trust in order to facilitate their adoption and usage. Drawing on ELM, this research examined users' initial trust in mobile banking. The results indicated that initial trust develops via a dual route including central route and peripheral route. Self-efficacy as the elaboration likelihood moderates the effects of central cues and peripheral cues on initial trust. The results imply that service providers need to consider users' self-efficacy and adopt different measures in order to foster their initial trust.

This research has the following limitations. First, our subjects are university students. Although they represent potential mobile banking users, future research needs to generalize our results to other samples, such as working professionals. Second, besides the five determinants of initial trust identified in the research model, there exist other information cues such as interactivity and perceived usefulness that possibly affect initial trust. Future research can examine their effect. Third, we only considered the moderation effect of an elaboration likelihood–self-efficacy on initial trust. Besides self-efficacy which reflects perceived ability, user motivations such as personal involvement may also affect initial trust building. Future research can examine their possible effects.

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Appendix A. Measurement scale and items

Information quality (INF) (adapted from Kim et al. (2004)).
INF1: This mobile banking provides me with information relevant to my needs.
INF2: This mobile banking provides me with sufficient information.
INF3: This mobile banking provides me with accurate information.
INF4: This mobile banking provides me with up-to-date information.
Service quality (SEV) (adapted from Kim et al. (2004)).
SEV1: This mobile banking provides dependable services.
SEV2: This mobile banking provides prompt services.
SEV3: This mobile banking provides professional services.
SEV4: This mobile banking provides personalized services.
System quality (SYS) (adapted from Kim et al. (2004)).
SYS1: This mobile banking quickly loads all the text and graphics.
SYS2: This mobile banking is easy to use.
SYS3: This mobile banking is easy to navigate.
SYS4: This mobile banking is visually attractive.

Reputation (REP) (adapted from Koufaris and Hampton-Sosa (2004)).
REP1: This mobile banking is well-known.
REP2: This mobile banking has a good reputation.
REP3: This mobile banking has a reputation for being honest.
Structural assurance (SA) (adapted from McKnight et al. (2002a,b)).
SA1: I feel confident that encryption and other technological advances on the mobile Internet make it safe for me to use mobile banking.
SA2: I feel assured that legal and technological structures adequately protect me from payment problems on the mobile Internet.
SA3: Mobile Internet is a robust and safe environment in which to use mobile banking.
Self-efficacy (SE) (adapted from Lee et al. (2011)).
SE1: I am confident of using mobile banking if I have only the online instructions for reference.
SE2: I am confident of using mobile banking even if there is no one around to show me how to do it.
SE3: I am confident of using mobile banking even if I have never used such a system before.
Initial trust (TRU) (adapted from Lim et al. (2006)).
TRU1: This mobile banking has the ability to fulfill its tasks.
TRU2: This mobile banking will keep its promises.
TRU3: This mobile banking will keep customers' best interests in mind.

Appendix B. CMV results estimated by PLS

Factor	Item	Substantive factor loading (R_1)	R_1^2	Method factor loading (R_2)	R_2^2
Information quality (INF)	INF1	0.783**	0.613	0.039	0.002
	INF2	1.007**	1.014	−0.193**	0.037
	INF3	0.782**	0.612	0.077	0.006
	INF4	0.708**	0.501	0.089	0.008
Service quality (SEV)	SEV1	0.709**	0.503	0.128	0.016
	SEV2	0.749**	0.561	0.100	0.010
	SEV3	0.830**	0.689	0.014	0.000
	SEV4	0.973**	0.947	−0.263**	0.069
System quality (SYS)	SYS1	0.675**	0.456	0.145	0.021
	SYS2	0.921**	0.848	−0.060	0.004
	SYS3	0.879**	0.773	−0.025	0.001
	SYS4	0.808**	0.653	−0.057	0.003
Reputation (REP)	REP1	0.752**	0.566	0.138*	0.019
	REP2	0.857**	0.734	−0.029	0.001
	REP3	0.893**	0.797	−0.117	0.014
Structural assurance (SA)	SA1	0.677**	0.458	0.179*	0.032
	SA2	0.902**	0.814	−0.058	0.003
	SA3	0.916**	0.839	−0.114	0.013
Self-efficacy (SE)	SE1	0.904**	0.817	−0.059	0.003
	SE2	0.973**	0.947	−0.084	0.007
	SE3	0.768**	0.590	0.142*	0.020
Initial trust (TRU)	TRU1	0.809**	0.654	0.052	0.003
	TRU2	0.846**	0.716	0.051	0.003
	TRU3	0.889**	0.790	−0.115	0.013
Average		0.834	0.704	−0.001	0.013

* $p < 0.05$.
** $p < 0.01$.

Appendix C. Chi-square test results

Constrained path	Chi-square value	Degrees of freedom	Chi-square difference
Original model	520.97	231	–
INF-SEV	582.37	232	61.40
INF-SYS	661.07	232	140.10
INF-REP	667.65	232	146.68
INF-SA	640.75	232	119.78
INF-SE	721.57	232	200.60
INF-TRU	568.25	232	47.28
SEV-SYS	599.95	232	78.98
SEV-REP	635.01	232	114.04
SEV-SA	613.60	232	92.63
SEV-SE	665.82	232	144.85
SEV-TRU	556.87	232	35.90
SYS-REP	564.00	232	43.03
SYS-SA	560.15	232	39.18
SYS-SE	610.20	232	89.23
SYS-TRU	526.71	232	5.74
REP-SA	563.40	232	42.43
REP-SE	615.52	232	94.55
REP-TRU	557.08	232	36.11
SA-SE	613.13	232	92.16
SA-TRU	542.62	232	21.65
SE-TRU	542.70	232	21.73

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