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An extension to the expectation-confirmation model

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Determinants of continuance intention to use the smartphone banking services

An extension to the expectation-confirmation model

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Abstract

Purpose – Existing research in the electronic banking area has not deeply investigated the determinants of continuance intention to use smartphone banking services. The purpose of this paper is to attempt to do so by investigating continuance use intention at the post-consumption phase.

Design/methodology/approach – It developed and validated an extended framework based on the expectation-confirmation model (ECM). A total of 301 smartphone users who subscribed to online banking services participated in the study.

Findings – The results revealed that users' confirmation after the initial use of smartphone banking services has significant impact on perceived security, perceived usefulness, trust, and user satisfaction. Perceived security significantly influences trust while perceived usefulness significantly influences trust, user satisfaction, and continuance use intention. Both user satisfaction and self-efficacy also significantly influence continuance use intention. Trust exerts significant impact on user satisfaction. The findings have implications for banks in planning their strategies to increase consumers' continuance intention to use smartphone banking services.

Originality/value – Most studies have focussed only technology adoption and have paid little attention on use continuance in the context of electronic or smartphone banking. This manuscript fills the gap by focussing on the post-consumption phase. In special, the manuscript develops an extended framework based on the ECM to address IS use continuance. In addition, the topic is timely as mobile internet has been flourishing in the world.

Keywords Trust, Continuance use intention, Expectation-confirmation model, Mobile banking, Perceived security and privacy, Smartphone banking services

Paper type Research paper



Introduction

Smartphone banking is gradually becoming popular as the number of smartphone users grows (Kim and Kang, 2012). Smartphone banking service offers ubiquitous services to users. It play a significant role in indulging and satisfying user needs for everyday financial and banking services (Hanafizadeh *et al.*, 2014a; Kim *et al.*, 2009; Lee and Chung, 2009; Shaikh and Karjaluoeto, 2015).

Despite its apparent advantages, many bank users still prefer ATM banking services (Shih and Fang, 2006) due to perceived lack of trust, lack of controllability, security issues, and privacy concerns of electronic banking (e-banking) (Kim *et al.*, 2009; Lee and Chung, 2009; Luarn and Lin, 2005). In fact, many users who have tried smartphone banking have switched back to old PC-based e-banking (Yang *et al.*, 2015). Furthermore, new forms of financial transaction systems such as FinTech have emerged to compete with banks to provide financial services to consumers (Lee, 2015). These new financial transaction systems may draw users away from traditional banks. All these issues present great challenge to banks especially when they have invested large fund into developing smartphone banking services (Lee, 2015). Therefore, if banks want to increase users' usage of smartphone banking, they have to devise effective methods to encourage users to continue using the service. To achieve this objective, they have to understand the factors that influence users' continuance intention to use smartphone banking services after their initial consumption.

Previous literature suggests that one of the key determinants of continuance intention to use a system is customer satisfaction (Ha and Park, 2013). Increasing customer satisfaction by fulfilling their needs and requirements has long been an important concern in the field of marketing and consumer behavior (Bhattacharjee, 2001b; Oliver, 1980). In the IS field, user satisfaction with a technology is also an important factor influencing adoption and continuance use of a technology (Bhattacharjee, 2001b). Besides user satisfaction, trust is another key determinant of adoption and continuance use of e-commerce (Venkatesh *et al.*, 2011) and internet banking (McNeish, 2015). Other factors that influence use of electronic-based services are system usefulness, security, and self-efficacy (Bhattacharjee, 2001b; Bhattacharjee *et al.*, 2008; Bhattacharjee and Premkumar, 2004; Hsu and Chiu, 2004; Kim *et al.*, 2004; Lee and Chung, 2009; Venkatesh *et al.*, 2011).

In summary, the majority of the literature in IT adoption and use focusses on initial adoption. Only few have examined post-consumption intention and behavior (Bhattacharjee, 2001b; Bhattacharjee and Premkumar, 2004; Oghuma *et al.*, 2015b). Previous studies (Bhattacharjee, 2001b; Bhattacharjee and Premkumar, 2004; Oghuma *et al.*, 2015a) contend that the factors influencing individual decision to use technology may vary from the initial adoption phase to the subsequent use phase and finally to the post-consumption phase. These variations are the result of differing individual experience in product perception and consumption (Karahanna *et al.*, 1999; Venkatesh *et al.*, 2011). As such, there is a need to study technology use in the post-consumption phase.

In addition, there is lack of study in smartphone banking services (Kim, 2008). Most current studies focus on e-commerce (Casaló *et al.*, 2007) and the general e-banking context (Casaló *et al.*, 2007; Kim, 2008). We argued that while smartphone banking shares some similar characteristics with e-commerce and e-banking, it has unique features, thus requiring special research attention. Unlike general e-commerce transactions, banking touches on sensitive financial information. Therefore, users may be more cautious when adopting smartphone banking services. Also, while the context of a smartphone adds mobility to traditional banking, it also introduces higher risk in terms of security and privacy compared to PC-based e-banking (Shaikh and Karjaluoto, 2015). Therefore, to fill the research gaps and to assist banks in understanding users' continuance use intention, our study examined the factors that influence users' continuance intention to use smartphone banking services in South Korea. Founded on the expectation-confirmation model (ECM), we developed and validated an extended framework of users' continuance intention to use smartphone banking. ECM has been

applied to various technology use contexts such as internet banking (Susanto *et al.*, 2013) and mobile instant messaging systems (Oghuma *et al.*, 2015a), but not in smartphone banking. By extending the ECM to smartphone banking, we were able to validate the value of the model in a new, emerging technological context. This practice is in line with the philosophy of knowledge building. Also, the ECM provides a solid foundation for the development of our research model.

Theoretical framework

Smartphone banking in Korea

Smartphone banking refers to the conduct of financial transactions through a smartphone. Examples of these transactions are balance inquiries, transactions histories, payments, money transfers. Banks introduce smartphones banking services to provide better customer service using latest technology (Kim *et al.*, 2009; Lee and Chung, 2009). Their effort is supported by strong penetration of smartphones such as iPhone and Samsung Galaxy and fast-growth of IT infrastructure such as the 3G/4G wireless networks.

Smartphone use has been widespread in Korea since 2009. As one of the most internet banking-enabled countries, Korea is capable of supporting smartphone applications with its well-developed telecommunication infrastructure. Its citizens commonly use smartphones to access the internet. In 2014, Korea registered 82.1 percent of internet users (KISA, 2014). Widespread use of smartphones exacerbates the growth in the number of users who subscribe to smartphone banking services. Indeed, the number of registered accounts for smartphone banking has leaped from 13,000 in 2009 to 48 million in 2014 which represents 46.7 percent share of the total e-banking accounts (The Bank of Korea, 2015). Despite high subscription rate, actual transactions performed via smartphone banking is relatively low. For example, smartphone banking only occupies 4.9 percent of the total amount of money transferred in overall banking transactions (The Bank of Korea, 2015). This low usage rate pushes banks to investigate the determinants of continuance intention to use smartphone banking services.

Continuance use intention

Expectation Disconfirmation Theory (EDT) is a prominent model in the consumer behavior and marketing literature to explain post-consumption behavior (Churchill and Surprenant, 1982; Oliver, 1980). According to the EDT, the level disconfirmation toward a consumption process affects user satisfaction (Oliver, 1980). Disconfirmation is a perception consumers derived after they compare their pre-purchase expectations with post-purchase performance of the consumed products or services (Oliver, 1980). When post-purchase performance meets or exceeds pre-purchase expectation, negative disconfirmation takes place, leading to satisfied consumers. Satisfied consumers will have higher likelihood to repurchase the products or services in the future. When post-purchase performance falls below pre-purchase expectation, positive disconfirmation takes place, contributing to dissatisfied consumers. Dissatisfied consumers will avoid using the products or services again in the future.

Expectation toward products or services is a critical factor in EDT. In fact, consumers have already formed certain expectation toward a product or service prior to purchase. After they have consumed the product or service, their expectation will determine their satisfaction level and future repurchase intention. Since expectation plays an important role in consumption behavior, studies (Bhattacharjee, 2001b; Bhattacharjee and Premkumar, 2004; Oghuma *et al.*, 2015b) have used expectation to evaluate performance.

Bhattacharjee (2001b) extended the EDT to explain IS continuance use behavior and called his research model the ECM. In IS literature, ECM has formed the basis of a post-acceptance model to study the dynamics of user beliefs and attitudes in technology use and re-use (Bhattacharjee, 2001b). ECM stresses that that expectation beliefs in post-consumption use and confirmed expectation on perceived use performance are important dimensions of perceived usefulness as a post-ante expectation (Bhattacharjee, 2001b). Perceived usefulness and confirmation from prior use significantly influence users' satisfaction in adopting and using a technology. Confirmation also influences perceived usefulness. Perceived post-acceptance usefulness and user satisfaction lead to continuance intention to use. Since the impact of perceived ease of use is lessened after users become more familiar with an IT system (Karahanna *et al.*, 1999). Bhattacharjee (2001b) included only perceived usefulness as a use-related belief and post-ante expectation in the ECM. Also, since "confirmation" has already interceded with subsequent impact of performance belief, Bhattacharjee (2001b) eliminated the construct "perceived performance belief" that was present in EDT.

Trust

Previous e-commerce studies have investigated the role of trust in e-commerce and internet banking and found that it plays an important mediating role in information exchange and relationship (Chen and Dhillon, 2003; Hanafizadeh *et al.*, 2014a). However, these studies used various definitions and different conceptual framework of trust. In other words, the definition of trust still has not been precisely defined and explained due to its complex nature and the rapidly changing environment (Chen and Dhillon, 2003; Hanafizadeh *et al.*, 2014a). This brings debates over the construct itself as well as its antecedents and outcomes (Hoffman *et al.*, 1999; McKnight *et al.*, 2002). A review of the literature shows that many studies have employed Mayer *et al.*'s (1995) definition of trust. Mayer *et al.* (1995) defined trust as "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party."

The construct of trust is composed of derivative elements: disposition to trust, institution-based trust, trusting beliefs, and trusting intentions. Disposition to trust refers to "one's willingness to rely on others in general"; institution-based trust is "favorably perceived conditions in the situational success in one's life"; trusting beliefs refer to one's beliefs that the other party's characteristics are beneficial and trusting intention refers to one's willingness to rely on others although one relinquishes control (McKnight *et al.*, 2002). Furthermore, trust involves three inherent building factors of trustworthiness: first, the trustee's ability, which is a set of skills and competencies to perform one's objectives; second, benevolence, which is the degree of good intentions toward others; and third, integrity, which is the fixed norms of trusting others (Luarn and Lin, 2005). In summary, the range of trust may vary as it relies on the relationships, experience, development phases, and indications in the extant condition (Rousseau *et al.*, 1998).

Perceived security and privacy

Banks need to urgently address the issues of security and privacy concerns in internet banking because they are the major factors that leading to large number of people who are still unwilling to utilize internet banking services (Pikkarainen *et al.*, 2004). Instead, users prefer to use non-internet banking service such as the ATMs (Hanafizadeh *et al.*, 2014a; Shih and Fang, 2006). Previous research has established the vital role of security

and privacy in e-services such as internet banking (Casaló *et al.*, 2007; Cheng *et al.*, 2006; Hanafizadeh *et al.*, 2014a; Pikkarainen *et al.*, 2004). In particular, security and privacy are strongly influential in the initial stage of technology use and acceptance (Centeno, 2004; Shih and Fang, 2006; Tan and Teo, 2000). The literature also showed that the perception of web security affects users' attitude toward mobile-based banking (Cheng *et al.*, 2006) and the lack of security and privacy decreases user satisfaction and trust in the context of smartphone banking services (Chen, 2012).

Considering the importance of security and privacy, we added it to the ECM to capture the motivational factor of using smartphone banking services. We argued that users who have good perception toward the security and privacy condition of smartphone banking services will have higher affective evaluation toward the service. Users will automatically interact with the system based on flow experience (Cheng, 2014). This process acts as a positive reinforcement to enhance the possibility of future use (Lin *et al.*, 2005). Therefore, perceived security and privacy might be individual perception that varies as users access and use smartphone banking services.

User behavior in online environments involves both intrinsic and extrinsic motivations. Extrinsic motivation refers to the "performance of an activity because it is perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself, such as improved job performance, pay, or promotions" (Davis *et al.*, 1989). While extrinsic motivation requires the reinforcement value of outcomes, intrinsic motivation refers to the "performance of an activity for no apparent reinforcement other than the process of performing the activity per se" (Davis *et al.*, 1989). The literatures suggest that banking transactions mostly involves extrinsic motivation (Shaikh and Karjaluo, 2015). Gefen and Straub (2000) recommended the concept of transactional tasks incorporating the dimensions of perceived usefulness and perceived security, which are generally regarded as extrinsic motivations in IT adoption. Perceived ease of use was found to have no significant impact on intention to use when one performing transactional tasks (Bhattacharjee, 2001b). Therefore, both perceived usefulness and perceived security and privacy are included in our study as the extrinsic motivations (Lin *et al.*, 2005; Park and Kim, 2014).

Self-efficacy

Self-efficacy plays a significant role in in IS acceptance, electronic-based services, and web-based IS use (Hasan, 2006; Hsu and Chiu, 2004; Yi and Hwang, 2003). The concept originates from social cognitive theory and refers to the degree of one's belief about his/her own ability to accomplish tasks and achieve the objectives in specific situations. According to Bandura (1977), self-efficacy may originate from sources such as "performance accomplishments, vicarious experience, verbal persuasion, and physiological states." It may also include social behaviors and cognitive processes that are influenced by his/her external experience and self-perception in making decision about an event.

Self-efficacy may build one's ability to complete different tasks after learning how to perform activities. It will control one's behavior such as motivation, persistence, endurance, and diligence to overcome the difficulties that may appear. In other words, stronger self-efficacy will push a person to undergo various effort in order to complete a task (Hasan, 2006).

Research model and hypotheses

Our study attempted to extend the ECM framework which based on internet banking (Bhattacharjee, 2001a) to the context of smartphone banking. Many studies (Bhattacharjee, 2001b; Bhattacharjee and Premkumar, 2004; Oghuma *et al.*, 2015a, b)

have confirmed the robustness of the ECM as a foundation to examine post-adoption behavior. The original ECM focussed on confirmation, perceived usefulness, satisfaction, and IS continuance intention. In our proposed model, we added the following important factors that are key to smartphone banking services: perceived security and privacy as a form of extrinsic motivation, trust, and self-efficacy. Figure 1 shows the research model.

Bhattacharjee's (2001b) ECM included only perceived usefulness as an IT use-related belief and a post-ante expectation. Perceived performance was removed because it has already been captured in perceived usefulness (Bhattacharjee, 2001b; Bhattacharjee and Premkumar, 2004; Yi, 1990). Perceived usefulness is a precursor variable to measure expectation in the post-adoption process and it connects intermediaries between internal beliefs, attitudes, and intentions (Davis, 1989). Davis *et al.* (1989) emphasized that importance of perceived belief and the value of influential factors for utilitarian perspective of technology use such as system design quality and system characteristics. These utilitarian values are required to adapt their productivity as well as the dimensions of information quality – relevance, accuracy, and timeliness (Lederer *et al.*, 2000). Even though some part of performance belief has already been covered by perceived usefulness in the ECM (Bhattacharjee, 2001b), we argued that confirmation also influences perceived security and privacy as a post-ante expectation, which in turn motivates users' continuous use intention (Bhattacharjee and Barfar, 2011). As a general motivation and a belief, perceived security and privacy are an important confirmation for users after using smartphone banking services. This argument led us to hypothesize that:

H1. Confirmation significantly influences perceived security and privacy.

H2. Confirmation significantly influences perceived usefulness.

User satisfaction has been articulated as an indication of positive disconfirmation in EDT, which is derived from the comparative distinction between pre-purchase

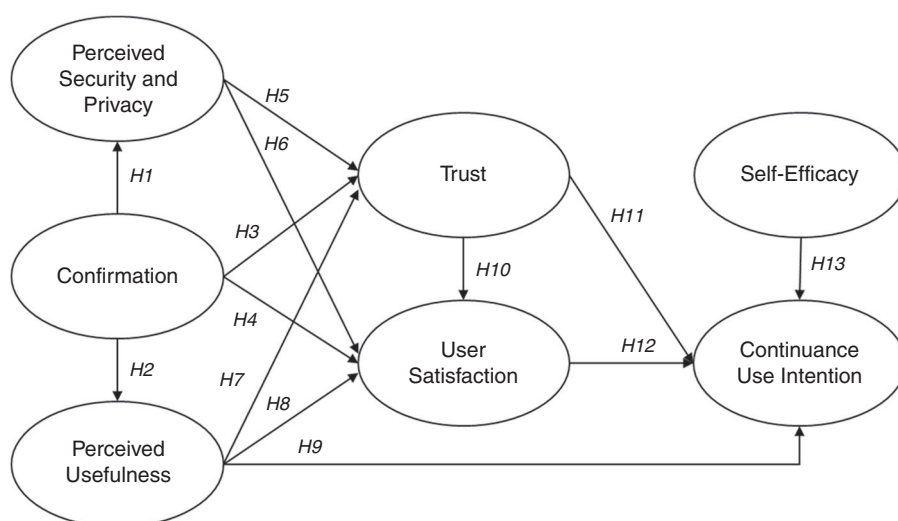


Figure 1.
Conceptual model

expectations and post-purchase performance after using the products or services based on experience (Oliver, 1980; Hsu and Chiu, 2004). Trust has also been found in previous studies as a significant variable that influences one's attitude toward IS adoption both in pre-use and post-use phase (Venkatesh *et al.*, 2011). Confirmation of expectation in using smartphone banking services will increase user satisfaction and improve their trust level toward the service. Accordingly, we posit that:

H3. Confirmation significantly influences trust.

H4. Confirmation significantly influences user satisfaction.

Previous e-commerce studies indicate that perceived security and privacy is an important antecedent of trust (Centeno, 2004; Libaque-Sáenz *et al.*, 2016; Suh and Han, 2002; Yousafzai *et al.*, 2003). Indeed, the importance should not be neglected because security and privacy concerns can play important roles in e-commerce and internet banking success (Hanafizadeh *et al.*, 2014a). Devaraj *et al.* (2002) empirically shown that users will use an IT-based system such as e-commerce and e-banking only if they perceived the usefulness, ease to use, efficiency, and proper security (Devaraj *et al.*, 2002). Moreover, experienced users may expect higher level of security, which eventually drives their satisfaction and repeated use of smartphone banking services in the future (Hanafizadeh *et al.*, 2014b; Yaya *et al.*, 2011; Yoon, 2010). We posited that:

H5. Perceived security and privacy significantly influences trust.

H6. Perceived security and privacy significantly influences user satisfaction.

According to ECM, perceived usefulness affects user perception such as satisfaction both in acceptance phase or post-acceptance (Bhattacharjee, 2001b). Perceived usefulness has been found recently to exert valuable concerns on IS continuance use (Lin *et al.*, 2005; Venkatesh *et al.*, 2011). It also affects trust in the acceptance stage of internet banking (Suh and Han, 2002). Accordingly, we hypothesized that:

H7. Perceived usefulness significantly influences trust.

H8. Perceived usefulness significantly influences user satisfaction.

H9. Perceived usefulness significantly influences continuance use intention.

When the users' overall satisfaction with smartphone banking escalates, they will have a tendency to use the system again (Bhattacharjee, 2001a). This satisfaction level is affected by trust which is a consequence of post-adoption belief (Liébana-Cabanillas *et al.*, 2013; Venkatesh *et al.*, 2011). Therefore, higher satisfaction may lead users to repeat their consumption in the future (Balasubramanian *et al.*, 2003; Kim *et al.*, 2004), which is an important factor in establishing prosperous long-term relationships. User satisfaction is also a crucial factor in e-commerce success (Wang, 2008). We posited that:

H10. Trust significantly influences user satisfaction.

H11. Trust significantly influences continuance use intention.

H12. User satisfaction significant influences continuance use intention.

Previous studies noted that self-efficacy played a positive role in driving one's perception in performing specific tasks in an electronic-based environment (Hasan, 2006;

Verkasalo *et al.*, 2010). Self-efficacy refers to the individual's capability of conducting and accomplishing a proper task while using an electronic device such as a smartphone, which in turn, leads him/her to use it repeatedly (Hsu and Chiu, 2004). We hypothesized that:

H13. Self-efficacy significantly influences continuance use intention.

Methodology

Measurement items

We drew all measurement items from the literature and adapted these items to fit the context of our study. The items for confirmation came from Bhattacharjee (2001b) and Kim *et al.* (2009). The items for perceived security and privacy were adapted from Casaló *et al.* (2007), Fang *et al.* (2005) and Chang and Chen (2009) while the items for perceived usefulness came from Venkatesh *et al.* (2011) and Bhattacharjee and Premkumar (2004). To measure user satisfaction, we drew items from Bhattacharjee (2001b) and Bhattacharjee and Premkumar (2004). The items to measure trust came from Suh and Han (2002) and Venkatesh *et al.* (2011) while the items for self-efficacy came from Bhattacharjee (2001a) and Suh and Han (2002). For continuance use intention, we used the items from Bhattacharjee (2001b) and Suh and Han (2002). All items were measured on seven-point Likert scale. Table AI shows the items.

Data collection

For the full-scale test, we engaged the service of Macromill Embrain research company (www.embrain.com). Macromill Embrain is an online panel research company with large number of members. To collect the data, the panel company's e-mail server randomly sent an e-mail to all panel members who used smartphone banking services and asked for their willingness to participate in the study. If the respondents agreed, then they proceeded to answer a 15-minute survey. A token of appreciation was given to those who have successfully completed the survey. Previous research (Oghuma *et al.*, 2015a, b) has used similar practice of engaging the service of panel companies to collect data.

A total of 301 responses were collected. The gender distribution of the respondents was fairly equal, with 51.2 percent males and 48.8 percent females. About 88.7 percent of the respondents have used smartphone banking for less than three hours per week, and 85 percent of respondents used smartphone banking for less than ten times a week. Table I shows the detailed demographic information.

Results

Measurement model

We used SPSS 18 to perform the descriptive statistical analysis and Smart PLS version 2.0 to perform the structural equation model analysis. To establish the reliability and validity of the measurement model, we examined construct reliability, convergent validity, and discriminant validity. To test for reliability, we assessed the composite reliability, average variance extracted, and Cronbach's α . As shown in Table II, all constructs satisfied the criteria for convergent validity (Chin, 1998). Specifically, the values for composite reliability ranged between 0.91 and 0.95 which exceeded the threshold of 0.9 (Chin, 1998). The AVE were greater than 0.7 (Nunnally and Bernstein, 1994) and the Cronbach's α values were also greater than the cut-off value of 0.7 (Hair *et al.*, 2009).

To assess the discriminant validity, we evaluated the cross loadings of the measurement items and the square root of AVEs. Table III shows that none of the

Respondents (<i>n</i> = 301)		Frequency	%
Gender	Male	154	51.2
	Female	147	48.8
Age	< 20	16	5.3
	21-30	62	20.6
	31-40	95	31.6
	41-50	83	27.6
	51-60	32	10.6
	61 <	13	4.3
	Education	High school	51
	Undergraduate	218	72.4
	Master	25	8.3
	Doctoral	7	2.3
Income (US 1 dollar = 1,100 won)	Less than 1,000,000 won	31	10.3
	1,000,001-2,000,000	51	16.9
	2,000,001-3,000,000	67	22.3
	3,000,001-4,000,000	39	13.0
	4,000,001-5,000,000	55	18.3
	More than 5,000,000 won	58	19.3
Weekly usage (Hour)	0-1	171	56.8
	1-3	96	31.9
	3-5	26	8.6
	5-7	2	0.7
	7-9	5	1.7
	9 <	1	0.3
	Weekly usage (Time)	1-5	165
6-10		91	30.2
11-15		26	8.6
16-20		10	3.3
20-30		8	2.7
31 <		1	0.3

Table I.
Respondent
demographics

Items	Mean	SD	Total (<i>n</i> = 301)		
			α	CR	AVE
Confirmation	5.04	0.90	0.92	0.94	0.80
Continuance intention	5.51	0.92	0.92	0.95	0.86
Security and privacy	4.38	1.12	0.93	0.95	0.82
Self-efficacy	5.50	0.94	0.93	0.95	0.82
Satisfaction	5.23	0.88	0.91	0.94	0.79
Trust	4.99	0.83	0.87	0.91	0.72
Usefulness	5.45	0.95	0.91	0.94	0.78

Table II.
Confirmatory factor
analysis results

Notes: SD, Standard deviation; α , Cronbach's α ; CR, Composite reliability; AVE, Average variance extract

intercorrelations of the items exceeded the square root of the AVEs. From the analyses, we concluded that our measurement model is both reliable and valid.

Structural model

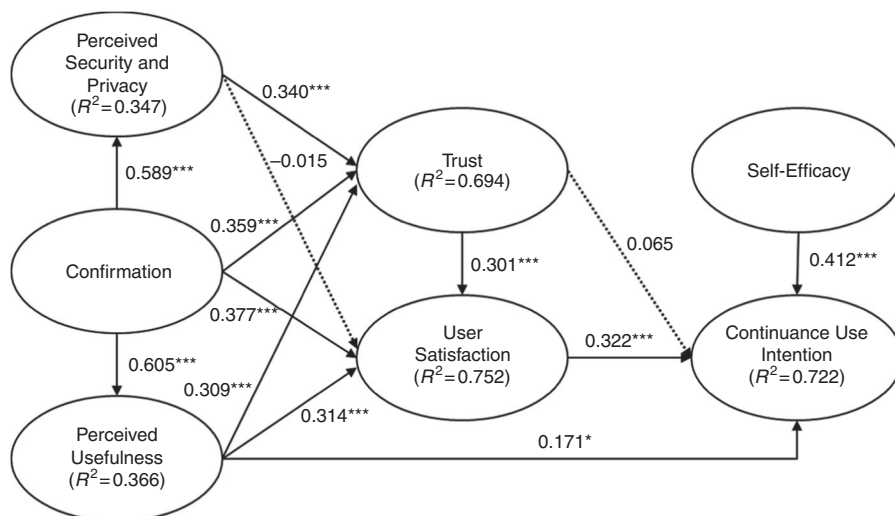
Figure 2 depicts the results of path analysis. All the hypotheses that we proposed were supported with the exception of *H6* (Security and privacy→Satisfaction) and *H11*

(Trust→Continuance intention). The research model explained 34.7 percent of the variance in perceived security and privacy, 36.6 percent of the variance in perceived usefulness, 69.4 percent of the variance in trust, 75.2 percent of the variance in user satisfaction, and 72.2 percent of the variance in continuance use intention. Confirmation has a significant relationship with perceived security and privacy ($\beta = 0.589, t = 10.7297, p < 0.001$), perceived usefulness ($\beta = 0.605, t = 11.8340, p < 0.001$), trust ($\beta = 0.359, t = 6.7304, p < 0.001$), and user satisfaction ($\beta = 0.377, t = 4.4763, p < 0.001$). Perceived security and privacy has a significant relationship only with trust ($\beta = 0.340, t = 7.4329, p < 0.001$). Perceived usefulness has significant relationship with all connected constructs: trust ($\beta = 0.309, t = 7.1340, p < 0.001$), user satisfaction ($\beta = 0.314, t = 5.4878, p < 0.001$), and continuance use intention ($\beta = 0.171, t = 2.1941, p < 0.05$). The mediating variable trust only has a significant relationship with user satisfaction ($\beta = 0.301, t = 3.8495, p < 0.001$). It has no significant relationship with continuance use intention. An additional mediating variable user satisfaction has a statistically significant relationship with continuance use intention ($\beta = 0.322, t = 3.6599, p < 0.001$). Self-efficacy also has a significant relationship with continuance use intention ($\beta = 0.412, t = 6.1277, p < 0.001$). Self-efficacy also has a significant relationship with continuance use intention ($\beta = 0.412, t = 6.1277, p < 0.001$).

Construct	CONF	INT	SEC	SEF	SF	TR	USE
Confirmation	<i>0.90</i>						
Continuance intention	0.63	<i>0.93</i>					
Security and privacy	0.59	0.30	<i>0.91</i>				
Self-efficacy	0.53	0.76	0.19	<i>0.91</i>			
Satisfaction	0.78	0.76	0.52	0.64	<i>0.89</i>		
Trust	0.75	0.64	0.66	0.51	0.78	<i>0.85</i>	
Usefulness	0.61	0.72	0.35	0.66	0.73	0.65	<i>0.88</i>

Note: Diagonal terms (in italic) are the square roots of the AVE

Table III. Construct correlations



Notes: The dotted lines indicate non-significant paths. * $p < 0.05$; *** $p < 0.001$

Figure 2. Model with hypotheses results

Unlike AMOS, PLS does not provide the overall fit statistics. To address this issue, Tenenhaus *et al.* (2004) introduced an alternative way to assess the Goodness of Model Fit (GoF). Following Tenenhaus *et al.* (2004), we calculated the global GoF of our model as follows:

$$\text{Global Goodness of Fit} = \sqrt{R^2 \times \text{Communality}^*}$$

*Communality = Average variance extract (AVE):

$$\text{GoF} = \sqrt{0.576 \times 0.798} = 0.678$$

The result of the GoF indicates that our research model has a GoF value of 0.68, which exceeded the cut-off value of 0.36 used in Chen and Sharma (2015).

Discussion and implications

Discussion

Based on our investigation, we found that all the proposed hypotheses are accepted, with the exception of two: *H6* (Security and privacy-satisfaction) and *H11* (Trust-continuance intention). As noted in previous studies (Bhattacharjee, 2001b; Bhattacharjee *et al.*, 2008; Oliver, 1980), confirmation as a post-consumption perception plays an important role to direct user perceptions such as perceived usefulness and perceived security and privacy in using a service in general and smartphone banking services in particular. It also increases user satisfaction and trust level.

The findings also highlighted that perceived security and privacy significantly influences trust but not user satisfaction.

The findings also highlighted that perceived security and privacy significantly influences trust but not user satisfaction. The literature has previously underscored the irrefutable role of perceived security and privacy in building trust (Casaló *et al.*, 2007; Hanafizadeh *et al.*, 2014a; Vatanasombut *et al.*, 2008). Since banking involves sensitive financial information, it is critical to assure users that it is secured to perform banking transactions using smartphones. Only when users have high confidence toward the security and privacy provided by a bank, will they trust the bank enough to use its smartphone banking services. The insignificant relationship between perceived security and privacy and user satisfaction went in contrary to our expectation. Even though highly experienced users may have greater concerns for the security of online banking than do less experienced users (Yoon, 2010), it is reasonable to conclude that in general, all users expect banks to provide high security and privacy protection for their financial information. Since security is a must-have in banking services, its presence will not affect user satisfaction. However, it is possible that its absence will negatively affect user satisfaction.

The direct relationship between trust and continuance use intention is not significant. Instead, trust indirectly affects continuance use intention via user satisfaction. These results confirmed findings in previous studies which indicated that trust will not always have a positive influence on service use because trust may positively affect short-term relationships but not long-term relationships (Grayson and Ambler, 1999). Also, smartphone banking allows users to perform banking transactions without interacting face-to-face with bank employees. Therefore, it is possible that users feel higher level of risk and higher uncertainty compared to offline banking at the branch office of a bank. Thus, user satisfaction and positive attitude are important before users decide to continue using smartphone banking services (Lee and Chung, 2009).

Theoretical and managerial implications

Our study has extended the ECM by integrating factors that are important to smartphone banking services: trust, perceived security and privacy (as extrinsic motivation) and self-efficacy. By doing so, our model adds to existing knowledge in e-banking and smartphone banking. In line with the wisdom of accumulative knowledge tradition, our work has strengthened existing understanding of niche technology use – smartphone banking. Specifically, we confirmed the role of trust as an important variable in customer relationship research (Kim *et al.*, 2004). However, users' trust toward an organization might be affected by security and privacy concerns that arise when using smartphone-based services. Therefore, we studied how perceived security and privacy along with confirmation and perceived usefulness influence user trust and satisfaction. We also examined how trust, privacy and perceived usefulness, and user satisfaction affects users' continuance intention to use smartphone banking services. Furthermore, since banking relates to sensitive financial matters, consumers need to have confidence toward a new banking service prior to using it. We examined the importance of this confidence level via self-efficacy toward smartphone banking services.

For banks, the findings divulged important determinants that influence users' continuance intention to use smartphone banking after having experienced the service. When banks strategize how to increase continuance use rate of smartphone banking, they should factor in these determinants. Koreans, in general, have high technology literacy, which form attitudes such as self-efficacy and habits of post-use of electronic-based services.

Understanding the factors that drive the impact on user satisfaction and continuance use provides banks with viewpoints to satisfy users' future needs for mobile-based financial services (Shaikh and Karjaluoto, 2015). User satisfaction is a key factors to increase continuance use intention in financial services. Therefore, Korean banks should improve user satisfaction by fulfilling user needs and requirements through efficient and effective responses. Korean banks should also develop close-attached relationships with their customers by maintaining technological innovation, increasing system performance, and preserving banking services to remain reliable, timely, responsive, and secure (Casaló *et al.*, 2007). Such activities will enhance user satisfaction and trust to use banking services continuously (Susanto *et al.*, 2013). Furthermore, banking service attributes have specific aspects such as intangibility and complexity, which present high levels of uncertainty and risk. Banking firms must launch essential marketing campaigns to maintain user trust and develop a reliable relationship.

Limitations and future research

Our study has some limitations that should be taken into account. First, we only studied consumers who used smartphone banking services in South Korea. South Korea ranks high on its IT infrastructure (Ha and Park, 2013). Its citizens are also much IT-savvy compared to the citizens in many other countries (Ha and Park, 2013). Consequently, our findings serve as good guidelines to developed countries that share similar IT context as South Korea. For developing countries, however, additional factors such as environmental contexts and the conditions of IT infrastructure may need to be interjected in order to fully explain consumers' continuance use intention. Future research can compare smartphone use in developed and developing countries to draw meaningful conclusions on the differences between the two.

Second, we only studied users who performed e-banking using smartphones. There are users who performed e-banking using others types of devices such as PCs, and the ATMs. Their continuance use intention may be different due to the varying nature of the devices. In the future, research could examine continuance use intention across different types of e-banking to draw meaningful conclusion on the similarity and differences among them.

Conclusions

To maximize the financial investment in smartphone banking services, banks ought to assure that customers will continue to use their services after the initial experience. Our study provided evidence on the factors that will influence users' continuance intention to use smartphone banking services. The findings show that perceived usefulness, self-efficacy, and user satisfaction play eminent roles in influencing continuance use intention. Confirmation significantly affects perceived security and privacy, perceived usefulness, trust and user satisfaction. Trust contributes to user satisfaction while perceived security and privacy affects trust. Besides having direct impact on continuance use intention, perceived usefulness also has significant impact on trust and user satisfaction.

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Construct	Measurement items	References
Confirmation	My experience with using smartphone banking was better than what I had expected	Bhattacharjee (2001b) and Kim <i>et al.</i> (2009)
	The service level provided by smartphone banking provider was better than what I had expected	
	The expectations that I have about this smartphone banking services were correct	
	Overall, most of my expectations from using smartphone banking services were confirmed	
Perceived security and privacy	I think this smartphone banking service has mechanisms to ensure the safe transmission of its users' information	Casaló <i>et al.</i> (2007) and Chang and Chen (2009)
	I feel secure to perform transactions using smartphone banking	
	This smartphone banking is a secure services through which to send sensitive information	
Perceived usefulness	Overall, this smartphone banking service is a safe place to transmit sensitive information	Venkatesh <i>et al.</i> (2011) and Bhattacharjee and Premkumar (2004)
	Using smartphone banking enables me to access banking services more quickly	
	Using smartphone banking makes it easier to access banking services	
	Using smartphone banking enhances the effectiveness of my banking activities/services	
User satisfaction	I find smartphone banking to be useful for my banking needs	Bhattacharjee (2001b) and Bhattacharjee and Premkumar (2004)
	My choice to use smartphone banking was a wise one	
	My experience with using smartphone banking was satisfactory	
Trust	I think I did the right thing by deciding to use smartphone banking	Suh and Han (2002) and Venkatesh <i>et al.</i> (2011)
	Overall, I was satisfied with the use of smartphone banking	
	I trust this smartphone banking service	
	This smartphone banking provides banking services in my best interest	
Self-efficacy	This smartphone banking offers access to sincere and genuine banking services	Bhattacharjee (2001a) and Suh and Han (2002)
	This smartphone banking performs its role of providing banking services well	
	I can perform my banking needs using smartphone banking even if there is no one around to help me	
	I can perform my banking needs using smartphone banking if I have adequate time to complete them	
	I can perform my banking needs using smartphone banking using only a simple manual or online help for reference	
Continuance use intention	I am confident enough in my ability to perform my banking needs using smartphone banking	Bhattacharjee (2001b) and Suh and Han (2002)
	I contend to continue using smartphone banking rather than discontinue its use	
	My intentions are to continue using smartphone banking than use any alternative means	
	non-smartphone banking	
	I will frequently use this smartphone banking services in the future	

Table AI.
Measurement item

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