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Factors Influencing the Adoption Behavior of Mobile Banking: A South Korean perspective

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Abstract

The objective of this study was to identify factors influencing the adoption of mobile banking service. We specifically focused our attention on perceived risk, perceived usefulness, and trust in mobile banking adoption. This study modified the concept of a technology acceptance model (TAM) within the context of mobile banking. It introduced "perceived risk" and "trust" in a proposed model to reflect consumers' needs to use mobile banking. In addition to the satisfactory fit level of our proposed model, we concluded that perceived risk indirectly influences adoption behavior but only when it was via trust. Using the mobile banking service context, we also obtained strong empirical evidence for measuring perceived risks' dimensions. Evidence for a composite perceived risk variable was identified. We found the strong inhibiting effect of perceived risk on trust. This result encouraged the decomposition of the perceived risk variable into its theorized dimensions. The financial-performance risk dimension proved to be the most salient concern for this sample and its context. Trust also had stronger influence on the adoption behavior of mobile banking than perceived usefulness, which was used as an important variable in the traditional TAM variables.

Keywords: **mobile banking; trust; perceived risk; adoption behavior.**

INTRODUCTION

Mobile financial services provide convenience and promptness to customers along with cost savings, banks are interested in expanding their market through mobile services. Traditionally, the most widespread method of conducting banking transactions has been through offline retail banking. Wireless technology, however, is rapidly changing the way personal financial services are designed and delivered. In the last several years, retail banks in South Korea have introduced and diffused mobile banking systems throughout their operations to improve their operations as well as to reduce costs. Despite all the efforts aimed at developing better and easier mobile banking systems, mobile banking is seriously under utilized, since many customers do not accept it. According to statistics from the Bank of Korea, there were 7.3 million subscriptions to mobile phones in 2004; but, less than 1.5 percent of banking transactions were conducted through mobile handsets.

Mobile banking services are still in their infancy. These services have a great deal of room for improvement. Thus there is a need to study and understand users' acceptance of mobile banking services in order to identify the factors affecting their intention to use mobile banking. The purpose of this study is to identify factors influencing the adoption behavior of mobile banking services. We, specifically, focus on the importance of perceived risk, perceived usefulness, and trust in the context of mobile banking adoption.

CONCEPTUALIZATION AND HYPOTHESIS DEVELOPMENT

We assumed that the user's adoption behavior as the behavioral intention with mobile banking was determined by its usefulness. The constructs of perceived usefulness and behavioral intention to use are the same as the ones in the TAM (Technology Acceptance Model); other variables of perceived risk and trust were newly introduced in this study to explain the adoption behavior of mobile banking.

1) Perceived Risk

Cunningham(1967) identified two major categories of perceived risk: performance and psychosocial. He categorized performance into three different types: economic, temporal and effort; and psychosocial into two types: psychological and social. He further typified perceived risk as having six dimensions: (1)performance, (2)financial, (3) opportunity/time, (4)safety, (5)social, and (6)psychological loss. He, also, posited that all risk facets originated from their performance risk. A rich stream of consumer behavior literature supports the usage of these risk facets in understanding consumer evaluation and purchases of products and services.

Recent research results indicated that people are concerned about unwanted disclosure of private information, or simply its misuse of their information by the company collecting it (Kesh et al.2002, Sathye 1999). This dimension of risk included undisclosed capture of information such as consumers' shopping habits. Thus, privacy risk was particularly salient for e-payments. Perceived privacy risk is defined as the possibility that online businesses might use personal information inappropriately hence invading a consumer's privacy (Nyshadham 2000). Since privacy risk appears as a common concern that inhibits adoption, we incorporated privacy risk as a part of perceived risk in our model.

If businesses want to reduce consumers' perceived risk, they need to identify the effects of different types of risk. We reviewed previous studies and found that researchers identified nine dimension of perceived risk: financial, performance, social, physical, psychological, time-loss, personal, privacy, and source. Kim and Prabhakar (2002) grasped the effect of perceived risk on accepting technology such as Internet banking by demonstrating that the more perceived risk one has, the less likely he will accept new technology. So in this study, we partially adopted their method of examining the perceived risk in Internet banking (Kim and Prabhakar 2002, Kim 2001).

H1: Perceived risk has a negative effect on the adoption behavior of mobile banking.

2) Trust(online)

Researchers found that perceived risk is influenced by trust toward the transaction partner (Javenpaa and Todd 1998, Nooteboom et al.1997). Jarvenpaa and Todd (1998) also showed that trust works as a mechanism for reducing consumer's perceived risk in Internet shopping. A recent study of Internet banking showed that trust reduces perceived risk and invigorates the usage of online banking service (Yousafzai et al. 2003, Suh and Han 2002). In contrast, Nooteboom et al.(1997) found that higher perceived risk decreases the level of trust toward the partner. In addition, Mayer et al.(1995) insisted

that it was unclear whether trust comes before perceived risk or otherwise. Although previous studies showed that perceived risk is an important determinant of online behavior, there was mixed reviews about the relationship between perceived risk and trust in the research literature. Thus in our study we tested the following relationship between perceived risk and trust.

H2: Perceived risk has a negative effect on trust.

All business transactions require some elements of trust especially those conducted in uncertain environments (Lee 1998). In order to complete the purchase transaction, customers have to trust the online business or the overwhelming social complexity will cause them to avoid purchasing (Gefen 2000). In electronic commerce, trust can be viewed as a perceptual belief or the level of confidence one expects from the other party during an online transaction (Javenpaa et al. 1998).

While consumers initially trust their e-vendors and have an idea that adopting online service is beneficial to job performance or life style, they will eventually believe that on-line services are useful (Gefen et al. 2003). In particular, a model of trust and Gefen et al.'s(2003) TAM in an on-line shopping setting explicitly indicated that trust is an antecedent of perceived usefulness. Trust also has a direct influence on a consumer's behavioral intention to use the service (Wu and Chen 2005). Trust is one of the determinants of perceived usefulness especially in an on-line environment. Pavlou (2001) also found that trust has a positive effect on perceived usefulness in an e-commerce setting.

H3: Trust has a positive effect on the adoption behavior in adopting mobile banking.

H4: Trust has a positive effect on the perceived usefulness of mobile banking.

3) Technology Acceptance

The TAM posits that a user's adoption of a new information system is determined by the user's intention to use the system, which is determined by the user's beliefs about the system. The TAM further suggests that two beliefs-perceived usefulness and perceived ease of use-are instrumental in explaining the variance in users' intentions. Perceived usefulness is defined as the extent to which a person believes that using a particular system will enhance his or her job performance. Perceived ease of use refers to the extent that a person believes that using a particular system will be free of effort. Based on these TAM beliefs, perceived ease of use is hypothesized as a predictor of perceived usefulness. In our study, however, we were only interested in perceived usefulness in the TAM since we believe our variables of the Internet, i.e., perceived risk and trust will be unlikely to affect the perceived ease of use in consumers' adoption of mobile banking. In addition, Wang et al.(2003), also successfully introduced the issues of trust-related privacy in the acceptance of online banking. Because of the context similarity between Internet banking and mobile banking, we therefore focused our attention on the perceived risk and trust that affect the adoption of mobile banking.

H5: Perceived usefulness has a positive effect on the adoption behavior of mobile banking.

METHODOLOGY

The survey questionnaire consisted of two parts. The first section recorded the subject's demographic information. The demographic variables included gender, age, level of education, and the purchase experience when using a cell phone. The second section asked each of the subject's perceptions of each variable in the model using the seven-point Likert scales from 1("strongly disagree") to 7("strongly agree"). The question items were translated into Korean and then reviewed by several experts. While most of the translated scales have been widely used in Internet marketing and information systems research in Korea, some items were restated to be compatible within mobile banking contexts.

For data collection, we designed and implemented a Web survey. We asked mobile banking users to participate in the survey. 306 total cases were gathered over 10 days from December 11 to December 20, 2005. There was no missing data in the sample collected since respondents submitted all answers.

The respondent sample consisted of 58 percent male and 41 percent female. All respondents were between 20 and 40 years old; about 45 percent of the sample had college degrees and nearly 73 percent of the respondents had experience with wireless e-commerce for over one year.

ANALYSIS AND RESULTS

Following the two-step approach (Anderson and Gerbing 1988), the measurement model was estimated prior to testing the structural equation model. The measurement model test presented a good fit between the data and the proposed measurement model. A second-order confirmatory factor analysis was used to achieve strong reliability and validity because the measurement model provided a reasonably good approximation with reality.

1) The Second-order factors structure

Perceived risk has been theorized as comprising all of these dimensions: financial-performance risk, psychological risk, time risk, social risk, and privacy risk. Confirmatory factor analysis for the measurement model was used to identify the strongest underlying dimensions of the composite variable of perceived risk.

Results indicated an acceptable level of fit as indicated in Table 1. The maximum likelihood (ML) estimated fit indices presented in Table 1 were less sensitive to small sample sizes as Diamantopoulos and Siguaw (2000) confirmed. Accordingly, based on the result of the analysis, it was appropriate to conclude that a mobile banking user's perceived risk consisted of five dimensions and trust consisted of three dimensions.

2) Reliability and validity

A measurement model based on the items of perceived risk and trust was tested by confirmatory factor analysis, respectively. Before testing the hypothesis of our research model, we tested the reliability and validity of the indicators or items measuring each construct. The instruments were initially examined to establish the reliability of the scale.

The Cronbach's alpha's coefficient for each factor was for financial performance= 0.7716; psychological= 0.9026; time= 0.6093; social= 0.7776; privacy= 0.6894; bank= 0.8191; telecom corporation= 0.7659; wireless mobile banking= 0.7792; usefulness= 0.8750; and adoption behavior= 0.8923. The Cronbach's alpha coefficients ranged from 0.6093 to 0.9026, which exceeded the recommended value of 0.6(Hair et al. 1995, Nunnally 1978). These values demonstrated sufficient internal consistency among the multi-item scales employed for our model. A satisfactory fit of the measurement model was suggested by several goodness-of-fit statistics including GFI=0.91, AGFI=0.85, NFI=0.85, CFI=0.89, and RMSEA=0.19. All indicators loading for constructs were statistically significant at the 0.01 level.

Table 1. Results of confirmatory factor analysis of perceived risk and trust

Constructs	First order factors	Items	Path coefficient	t-value	ML fit indices
Perceived risk	Financial-performance risk	X1	0.67	12.76	χ^2= 335.62 df =45(p= 0.000) GFI=0.85 AGFI=0.73 NFI=0.79, CFI=0.81, RMSEA=0.15
		X2	0.58	10.66	
		X3	0.57	10.32	
		X4	0.84	17.40	
	Psychological risk	X5	1.02	17.37	
		X6	0.78	13.49	
	Time risk	X7	0.56	5.61	
		X8	0.23	3.50	
	Social risk	X9	0.75	12.91	
		X10	0.88	15.15	
	Privacy risk	X11	0.66	10.82	
		X12	0.66	10.83	
Trust	Bank	Y1	0.80	15.72	χ^2= 186.63 df =24(p=0.000) GFI=0.88 AGFI=0.78, NFI=0.86, CFI=0.87, RMSEA=0.149
		Y2	0.77	14.85	
		Y3	0.72	13.60	
	Telecom corporation	Y4	0.60	10.96	
		Y5	0.82	16.39	
		Y6	0.92	19.38	
	Wireless internet	Y7	0.89	17.94	
		Y8	1.00	21.09	
		Y9	0.39	6.96	

* All item loadings for factors were statistically significant at .01 level.

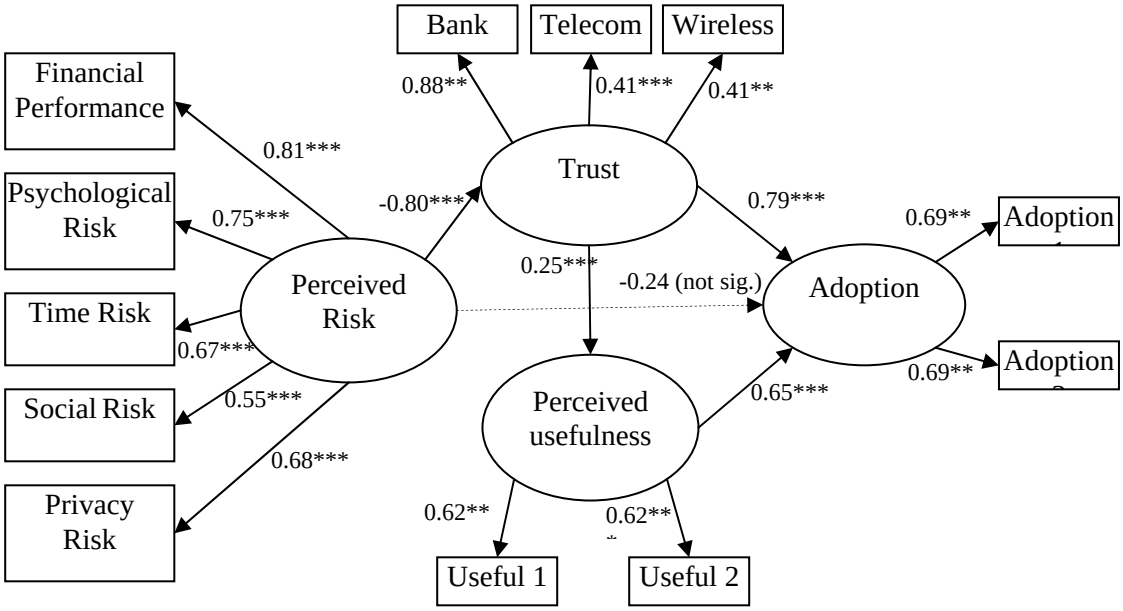
3) Structural equation model and hypothesis testing

Figure 1 shows the overall fit indices and the effect weights for our research model. Each of the constructs was measured by four indicators. The items for each risk dimension were combined to define five indicators for the perceived risk variable. The items for the trust dimension were combined leaving three indicators. Whereas the chi-square statistic as the absolute goodness of fit index for the model was significant (χ2=71.04, p< .05), as expected given the sample size, the other fit index CFI (0.92) represented evidence of good model fit. Thus the structural equation model had a good fit with the data as based on assessment criteria such as GFI (0.94) and AGFI (0.91).

H1 and H2 examined the effects of perceived risk on the adoption behavior of mobile

banking and perceived risk on trust, respectively. Perceived risk had an insignificant negative impact on the adoption behavior of mobile banking (β=-.24, t= -1.35). In contrast, perceived risk had a significant negative impact on trust (β=-0.80, t= -21.98, p<0.01). In addition, H3 was supported at the significance level of 0.01 and confirmed the positive impact of trust on adoption behavior (β=0.79, t= 3.49, p<0.01). For H4, we investigated the impact of trust on perceived usefulness. We found a significant impact of trust on usefulness (β=.25, t= 7.97, p<0.01). Finally, H5 was supported at the significance level of 0.01 with a positive significant impact of usefulness on adoption behavior (β=0.65, t= 4.09, p<0.01). As illustrated in Figure 1, two variables were significant antecedents except for perceived risk. Also, trust played the most important role in influencing adoption behavior.

FIGURE 1 Model of Factors Influencing Adoption of Mobile banking Services



***sig. at p<.001, **sig. at p<.01, *sig. at p<.05

DISCUSSION OF THE RESULTS

In this study, we followed the concept of the TAM. We modified it within the context of mobile banking. We introduced “perceived risk” and “trust” in our model to reflect a consumer’s needs to use mobile banking. In addition to the satisfactory fit level of our proposed model, we were confident that both perceived usefulness and trust had important effects on the adoption behavior of mobile banking. Consumers’ trust in and the perceived usefulness of the mobile banking service had direct effects on their adoption behavior. Perceived risk, however, had an indirect effect on adoption behavior even though it had an insignificant direct relationship with adoption behavior. This demonstrated that the perceived risk indirectly influenced adoption behavior only through trust. Using the mobile banking service context, we obtained strong empirical evidence

for measuring the perceived risk dimensions. Additionally, evidence for a composite perceived risk variable was found. Perceived risk was identified to exert a strong inhibiting influence on trust. This finding encouraged the decomposition of the perceived risk variable into its theorized dimensions. The financial-performance risk dimension proved to be the most salient concern for this sample and context.

We found that trust had a stronger influence on the adoption behavior than perceived usefulness of the traditional TAM variable. That is, the consumer's trust of the bank, telecom provider, and wireless Internet had significant influence on their using mobile banking. Therefore banking managers should concentrate on building trust as a prerequisite to mobile banking adoption and developing m-commerce relationships.

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