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The role of perceived usefulness, perceived ease of use, security and privacy, and customer attitude to engender customer adaptation in the context of electronic banking

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This research intends to propose a conceptual framework that will investigate the effects of perceived usefulness, ease of use, and security and privacy on customer adaptation mediated through customer attitude in the context of e-banking. To test the framework, structural equation modeling techniques have been applied to data collected from 227 customers of private commercial banks in Bangladesh. Primarily this study aims to test the theoretical models to measure the causality whether perceived usefulness, ease of use, security and privacy, and customer attitude can foster customer adaptation. The initial results of the study indicate that perceived usefulness, ease of use, security and privacy, and customer attitude are significantly and positively related to customer adaptation. Implications for practicing managers and for future research are discussed.

Key words: Perceived usefulness, perceived ease of use, security and privacy, customer attitude, customer adaptation, electronic banking.

INTRODUCTION

Financial sector of Bangladesh is dominated by banking enterprises. Banks during the early stages of the history of Bangladesh were nationalized and there was mismatch between assets and liabilities. In the early 1980s, the Government of Bangladesh began to reform the financial sector. Private banks were allowed to enter the market and two nationalized commercial banks (NCB's) were decentralized and another nationalized bank was converted into a limited liability company and partially privatized. Currently, the banking sector comprises four NCB's, five government-owned specialized banks dealing with development finance in specialized sectors, 30 private commercial banks (PCB's), and ten foreign com-

mercial banks (FCB's) (Ahmad, 2005).

New and developed information technology has an enormous effect in developing more flexible and user-friendly banking services. Nowadays, the electronic banking has received greater attention in the banking arena; more to it, the clients are adapting the Internet based banking service. In recent years, commercial banks in Bangladesh have also tried to introduce Internet-based e-banking systems to improve their operations. The foreign banks are the pioneers in adopting electronic banking in Bangladesh. Most of the foreign banks are using the computerized transaction system and taking advantage of the superior technology by attracting customers and providing inter -branch and inter -bank linkage. Foreign banks through successful use of a global network have increased the accuracy of information, benefiting its customers, employees and also management. Nowadays in Bangladesh 23.1% of banks is providing credit card

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point of sale services. Some foreign banks provide electronic fund transfer (EFT) services. Some of them are providing the service of Microchips embedded Smart Card for utility bill payment. Automated teller machine (ATM) is expanding rapidly in major cities (Alam et al., 2007). Despite all their efforts these systems remained largely unnoticed by the customers. Therefore, customer perception has become very essential to become successful in providing e-banking service.

In view of all this, the banking system has been attempting to gather more and more information on aspects that induce people to do their banking over the Internet (Gerrard and Cunningham, 2003; Sathye, 1999). The adoption of e- banking by consumers is being extensively investigated by several authors (Sayar and Wolfe, 2007; Eriksson, Kerem and Nilsson, 2005; Jaruwachirathanakul and Fink, 2005; Gerrard and Cunningham, 2003; Wang et al., 2003; Mukherjee and Nath, 2003). Among the different models that have been proposed, the technology acceptance model (TAM) (Davis, 1989; Davis et al., 1989) adapted from the theory of reasoned action (TRA) (Ajzen and Fishbein, 1980), appears to be the most widely accepted one. According to the TAM, adaption behavior is determined by the intention to use a particular system, which in turn is determined by the perceived usefulness and perceived ease of use of the system. Although previously researchers have investigated and replicated the TAM and agreed that it is valid in predicting the individual's acceptance, the TAM's fundamental constructs does not fully reflect the specific influences of technological and usage-context factors that may alter the users' acceptance (Moon and Kim, 2001). Therefore, in the current study the researchers incorporated two new constructs (security and privacy and customer attitude) to enhance the understanding of an individual's acceptance behavior of electronic banking.

In this study the researchers have proposed two different conceptual frameworks to investigate the causal relationship between the perceived usefulness, ease of use, security and privacy, and customer adaptation those to be mediated (both directly and indirectly) by customer attitude to aid explaining the causality among the studied variables.

REVIEW OF LITERATURE

Perceived Usefulness

The importance of perceived usefulness has been widely recognized in the field of electronic banking (Guriting and Ndubisi, 2006; Jaruwachirathanakul and Fink, 2005; Eriksson et al., 2005; Laforet and Li, 2005; Polatoglu and Ekin, 2001; Liao and Cheung, 2002). According to them usefulness is the subjective probability that using the technology would improve the way a user could complete

a given task. Based on theories in social psychology, such as the theory of reasoned action (TRA) (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975) and the theory of planned behavior (TPB) (Ajzen, 1985), the technology acceptance model (TAM) has been validated as a powerful and parsimonious framework (Davis, 1989; Davis et al., 1989). According to the TAM, perceived usefulness is the degree to which a person believes that using a particular system would enhance his or her job performance. According to Davis et al. (1992), perceived usefulness refers to consumers' perceptions regarding the outcome of the experience. Davis (1993) defined perceived usefulness as the individual's perception that using the new technology will enhance or improve her/his performance. Similarly, Mathwick et al., (2001) defined perceived usefulness as the extent to which a person deems a particular system to boost his or her job performance.

Pikkarainen et al. (2004) applied TAM in Finland and they found perceived usefulness as a determinant of actual behavior which encouraged the user of the twenty-first century banking to use more innovative and user-friendly self-service technologies that give them greater autonomy in performing banking transactions, in obtaining information on financial advices, and in purchasing other financial products. However, Gerrard and Cunningham (2003) noted that the perceived usefulness depends on the banking services offered such as checking bank balances, applying for a loan, paying utility bills, transferring money abroad, and obtaining information on mutual funds.

There are extensive evidences proving the significance of effect of perceived usefulness on adaptation intention (Chen and Barnes, 2007; Guriting and Ndubisi, 2006; Jaruwachirathanakul and Fink, 2005; Eriksson et al., 2005; Hu et al., 1999; Venkatesh, 2000; Venkatesh and Davis, 1996; Venkatesh and Morris, 1996). Tan and Teo (2000) suggested that the perceived usefulness is an important factor in determining adaptation of innovations. As a consequence, the greater the perceived usefulness of using electronic banking services, the more likely that electronic banking will be adopted (Polatoglu and Ekin, 2001, Jaruwachirathanakul and Fink, 2005). Hence, the researchers posit:

Research question 1: Does perceived usefulness have positive effect on customer attitude?

Research question 2: Does perceived usefulness have positive effect on customer adaptation?

Hypothesis 1: Perceived usefulness has positive effect on customer attitude.

Hypothesis 2: Perceived usefulness has positive effect on customer adaptation.

Perceived ease of use

Researchers argued that perceived ease of use is the extent to which a person accepts as true that using an exacting method would be at no cost to that individual (Davis et al., 1989; Mathieson, 1991; Gefen and Straub, 2000; Gahtani, 2001). At first Rogers (1962) affirmed perceived ease of use is the term that represents the degree to which an innovation is perceived not to be difficult to understand, learn or operate. He further stated that perceived ease of use is the degree to which consumers perceive a new product or service as better than its substitutes (Rogers, 1983) . Similarly, Zeithaml et al. (2002) stated that the degree to which an innovation is easy to understand or use could be considered as perceived ease of use.

According to Mathieson (1991), the perceived ease of use is the consumer's perception that banking on the internet will involve a minimum of effort. Similarly, Consult (2002) noted that perceived ease of use refers to the ability of consumers to experiment with a new innovation and evaluate its benefits easily. He also affirmed that the drivers of growth in electronic banking are determined by the perceived ease of use which is a combination of convenience provided to those with easy internet access, the availability of secure, high standard electronic banking functionality, and the necessity of banking services.

Extensive research over the past decade provides evidence of the significant effect of perceived ease of use on usage intention, either directly or indirectly (Hernandez and Mazzon, 2007; Guriting and Ndubisi, 2006; Eriksson, 2005; Wang et al., 2003; Venkatesh, 2000; Venkatesh and Davis, 1996; Venkatesh and Mor-ris, 2000). Early in 1962, Rogers noted that under-standing the technology leads to adaptation of innovative service/product by customers is known as ease of use. Recently, Chen and Barnes (2007) have empirically found that two technological aspects of the interface, namely perceived ease of use and perceived usefulness significantly affect customer adaptation intentions. Therefore, following research questions and hypotheses has been formulated:

Research question 3: Does perceived ease of use have positive effect on customer attitude?

Research question 4: Does perceived ease of use have positive effect on customer adaptation?

Hypothesis 3: Perceived ease of use has positive effect on customer attitude.

Hypothesis 4: Perceived ease of use has positive effect on customer adaptation.

Security and privacy

The importance of security and privacy for the acceptance of online banking has been noted in many banking studies (Hernandez and Mazzon, 2007; Chen and Barnes, 2007; Sathye, 1999; Hamlet and Strube, 2000; Tan and Teo, 2000; Polatoglu and Ekin, 2001; Black et al., 2002; Howcroft et al., 2002). To be more precise, lack of privacy and security were found to be significant obstacles to the adoption of online banking (Chen and Barnes, 2007; Sathye, 1999). Roboff and Charles (1998) found that people have a weak understanding of online banking security risks although they are aware of the risks. Furthermore they noted that although consumers' confidence in their bank was strong, their confidence in technology was weak (Howcroft et al., 2002).

As the amount of products and services offered via the Internet grows rapidly, consumers are more and more concerned about security and privacy issues. According to many studies e.g. Hernandez and Mazzon (2007), Westin and Maurici (1998), Cranor et al. (1999), privacy issues have proven important barriers to the use of online services. As trust, security, and privacy are multidimensional constructs and need further explanation, in this article we concentrate only on the aspects consumers are most concerned about. Thereby the researchers propose that:

Research question 5: Does security and privacy have positive effect on customer attitude?

Research question 6: Does security and privacy have positive effect on customer adaptation?

Hypothesis 5: Security and Privacy has positive effect on customer attitude.

Hypothesis 6: Security and Privacy has positive effect on customer adaptation.

Customer attitude

Empirical studies related to diffusion of technological innovations have expanded the use of the TAM model to include attitudes as defined by the Theory of Reasoned Action (Davis et al., 1989; Jayawardhena and Foley, 2000; Karjaluoto et al., 2002). At first, Lancaster (1966) noted that attitude is the driver of consumer utility or attributes. Triandis (1979) described attitude as an individual's positive or negative behavior towards innovation adaptation. Triandis further stated that attitude portrayed the perceptions of usefulness of electronic banking, adaptation features, bank electronic features, risk and privacy, and personal preferences.

TAM suggests that attitude is based on the salient be-

liefs which a person has about the consequences of a given behavior and his or her evaluation of those consequences. More specifically, Polatoglu and Ekin (2001) suggested that customer attitude is composed of one's attribute beliefs about the object and perceived importance (weight) of that attribute in making the decision to adopt. In the electronic banking context, consumers attitude is assorted in terms of perceptions regarding product information, form of payment, delivery terms, service offered, risk involved, privacy, security, personalization, visual appeal, navigation, entertainment, and enjoyment.

Understanding the determinants of consumers' attitude, it is argued that this attitude has a strong, direct, and positive effect on consumers' intentions to actually use the new technology or system (Hernandez and Mazzon, 2007; Eriksson et al., 2005; Jaruwachirathanakul and Fink, 2005; Bobbitt and Dabholkar, 2001). On this basis, the researchers expect that customer attitude affects the acceptance of electronic banking:

Research question 7: Does customer attitude have positive effect on customer adaptation?

Hypothesis 7: Customer attitude has positive effect on customer adaptation.

Customer adaptation

TAM (Davis, 1989; Davis et al., 1989) model suggests that customer adaptation behavior is determined by the intention to use a particular system, which in turn is determined by the perceived usefulness and perceived ease of use of the system. Liao and Cheung (2002) utilized an alternative research approach which assumes that customer adaptation is determined by intention to perform the behavior. However, factors affecting the adaptation of a new information technology are likely to vary with the technology, target users, and context (Moon and Kim, 2001). Sohail and Shanmugham (2003) pointed out that customer adaptation describes beliefs about having necessary resources and opportunities for an individual's intention to perform. These are facilitating conditions, which refer to the availability of resources, i.e. the technological resources and infrastructure needed to engage in the adaptation.

Lee and Allaway (2002) suggested that the adaptation of electronic banking depends on the service firm's resource management by lowering delivery costs and by releasing service personnel to provide better and more varied service. Adaptation of electronic banking is important not only in terms of reducing costs and improving competitiveness but also in terms of a bank's ability to retain the existing customer base and to attract new customers (Guriting and Ndubisi, 2006; Bradley and Stewart, 2003; Gerrard and Cunningham, 2003; Rotcha-

nakitmnuai and Speece, 2003; Akinci et al., 2004). Recently, Hernandez and Mazzon (2007) found that system adaptation is determined by perceived usefulness and perceived ease of use, which are related to attitude and thereby to actual use.

Conceptual framework

Based on the above, a two-level analysis was employed. The first level investigated whether customer attitude is mediating the relationship between perceived usefulness, ease of use, security and privacy, and customer adaptation. At the second level, it investigated both direct and mediated relationship between customers' perceived usefulness, ease of use, security and privacy, and customer adaptation where customer attitude was the mediating variable to draw causal inferences regarding the relationship among the studied variables.

METHODOLOGY

Sample

Data have been collected from 227 electronic banking users of private commercial banks in Bangladesh and the response rate was 91%. The average age of the respondents was 34 years. Among the respondents 74.89% respondents were male and 25.1% were female.

Measures

A structured questionnaire was used in this study to collect data from customers. In the questionnaire, there were five sections: perceived usefulness, perceived ease of use, security and privacy, customer attitude, and finally customer adaptation of electronic banking.

Pikkarainen et al. (2004) developed this 5-item scale to measure perceived usefulness. A higher score indicated higher perceived usefulness. This scale had reported reliabilities of the items to be above 0.86. Perceived ease of use was measured on a scale developed by Pikkarainen et al. (2004). Each item is cast on a 5-point likert scale. Pikkarainen et al. (2004) provided evidence of the satisfactory reliability of 0.90. Security and privacy was measured by using 6 items scale developed by Pikkarainen et al. (2004). This scale was used by Wong et al. (2004) and had reported reliabilities of the items to be above 0.80. Customer attitude was measured by using 3 items scale developed by Shih and Fang (2004) which had a reported reliability of 0.89. Customer adaptation of electronic banking was measured by using 3 items scale developed by Shih and Fang (2004) with a reliability of 0.88.

Analysis

To assess direct and indirect relationships among the studied variables the researchers have followed confirmatory factor analysis and structural equation modeling (Anderson and Gerbing, 1988). Amos 5.0 has been used to perform these analyses.

In the Model 1 (Figure 1) and Table 1 paths from the perceived usefulness, perceived ease of use, security and privacy to customer
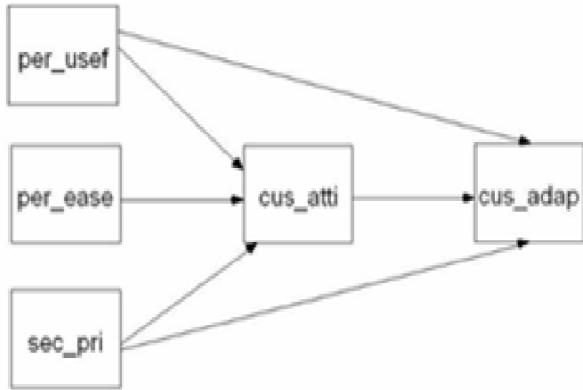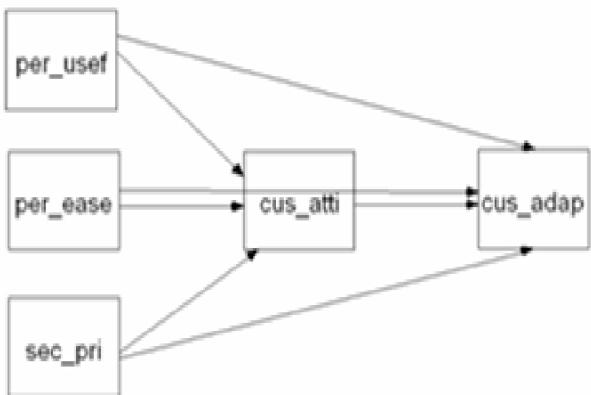
Figure 1. Conceptual framework 1.

Figure 2. Conceptual framework 2.

attitudes were estimated and finally the path from customer attitude to customer adaptation was also estimated. In Model 2 (Figure 2) paths from the perceived usefulness, perceived ease of use, security and privacy and customer attitude to customer adaptation were estimated. The paths from perceived usefulness, perceived ease of use, security and privacy to customer adaptation that mediated through customer attitude were also estimated.

RESULTS

Descriptive and correlation statistics among studied variables are listed in Table 2 and 3. The reliability coefficients, means, and standard deviations of all the constructs in the current study are displayed in Table 2. The coefficient alphas for the different constructs were computed using the reliability procedure in SPSS (version 11.0) . Nunnally (1978) suggested for any research at its early stage minimum reliability score or alpha 0.60 or above is sufficient. The reliabilities of all the constructs in

this study were found to be above the standard set by Nunnally (1978). Mean scores have been computed by equally weighting the mean scores of all the items. On a five- point scale, the mean score for perceived usefulness was 4.27 ($\underline{sd}$ = 0.37) indicating that consumers perceive electronic banking service to be very useful which has improved the way of managing daily banking tasks. The mean score for perceived ease of use was 4.21 ($\underline{sd}$ = 0.39). It suggests that the customers perceive that the system is very easy to use and it is not difficult to understand, learn or operate.

The mean score for security and privacy was 4.44 ($\underline{sd}$ = 0.45). It implies that the customers perceive that the online banking system to be very secure. The mean score for customer attitude was 4.24 ($\underline{sd}$ = 0.63) . It suggests that these customers have positive attitude towards the electronic banking system. The mean score for customer adaptation was 4.34 ($\underline{sd}$ = 0.43). It implies that the customers have the intention of using the electronic banking system.

A correlation analysis was conducted on all variables to explore the relationship between the variables. The bivariate correlation procedure was subject to two tailed tests of statistical significance at two different levels highly significant ($\underline{p}$<.01) and significant ($\underline{p}$<.05). The result of correlation analysis for all the variables is shown in Table 3. It examines the correlations among perceived usefulness, perceived ease of use, security and privacy, customer attitude, and customer adaptation. All the hypothesized relationships were found to be positive and statistically significant. The variables significantly (statistically) and positively correlated with customer attitude were perceived usefulness (r = 0.41, $\underline{p}$< .01), perceived ease of use (r = 0.46, $\underline{p}$< .01), and security and privacy (r = 0.48, $\underline{p}$< .01). The variables significantly (statistically) and positively correlated with customer adaptation were perceived usefulness (r = 0.29, $\underline{p}$< .01), perceived ease of use (r = 0.41, $\underline{p}$< .01), security and privacy (r = 0.76, $\underline{p}$< .01), and customer attitude (r = 0.40, $\underline{p}$< .01).

Confirmatory factor analyses

The Comparative Fit Index (CFI), Goodness of Fit Index (GFI; Hair et al., 2003), Normed Fit Index (NFI), and Root Mean Square Error of Approximation (RMSEA; Steiger, 1990) were used in judging the model fit. The Comparative Fit Index is a recommended index of overall fit (Gebring and Anderson, 1993), Goodness of Fit Index measures the fitness of a model compared to another model (Hair et al., 2003), Normed Fit Index measures the proportion by which a model is improved in terms of fit compared to base model (Hair et al., 2003), and the latter (RMSEA) provides information in terms of discrepancy per degree of freedom for a model (Steiger, 1990). As suggested in the literature (Bollen and Long, 1993;

Table 1. Summary of theoretical models.

Model	Theoretical Models
Model 1	Paths from perceived usefulness, perceived ease of use, security and privacy to customer attitude, and customer attitude to customer adaptation.
Model 2	Paths from perceived usefulness, perceived ease of use, security and privacy to customer attitude, and customer adaptation, customer attitude to customer adaptation.

Table 2. Reliability coefficient and descriptive statistics of perceived usefulness, perceived ease of use, security and privacy, customer attitude, and customer adaptation.

Scales	Number of items	Alpha	M	SD
Perceived Usefulness	5	0.64	4.27	0.37
Perceived Ease of Use	5	0.65	4.21	0.39
Security and Privacy	6	0.78	4.44	0.45
Customer Attitude	3	0.78	4.24	0.63
Customer Adaptation	3	0.69	4.34	0.43

Note: n = 227.

Table 3. Correlation matrix for perceived usefulness, perceived ease of use,security and privacy, customer attitude, and customer adaptation.

Variables	Perceived Usefulness	Perceived Ease of Use	Security and Privacy	Customer Attitude	Customer Adaptation
Perceived Usefulness	-	0.29**	0.14*	0.41**	0.29**
Perceived Ease of Use		-	0.43**	0.46**	0.41**
Security and Privacy			-	0.48**	0.76**
Customer Attitude				-	0.40**
Customer Adaptation					-

Note: *p < .05, **p < .01

Joreskog and Sorbom, 1993; Kline, 1998) model fit was assessed by several indices. The accepted thresholds for these indices x^2/df ratio should be less than 3; the values of GFI, RFI, NFI, and CFI should be greater than 0.90; and RMSEA is recommended to be up to 0.05, and acceptable up to 0.08 (Gefen et al., 2000).

Structural equation analysis

Table 4 represents the results of measurement models to test the hypothesis with regard to model paths. The first model (Model 1; Figure 1) estimated that customer attitude mediates the relationship between perceived usefulness, perceived ease of use, security and privacy and customer adaptation (x^2 =179.39, df = 3, p <.05) which did not support the fitness of the model. This model was then compared with Model 2 (Figure 2) where a direct and also mediated relationship existed between the per-ceived usefulness, perceived ease of use, security and privacy and customer adaptation mediated by customer attitude (x^2 =1.323, df = 1, p >0.05) and the data fit the model well. The other results also supported the fitness

Table 4. Summary of results of measurement models.

	χ^2	df	χ^2/df	CFI	NFI	GFI	RMSEA
Model 1	179.39	3	59.79	0.545	0.549	0.820	0.510
Model 2	1.323	1	1.323	0.999	0.997	0.998	.038

Note: RMSEA = root mean square error of approximation; GFI = Goodness-of-Fit Index; NFI= Normed Fit Index; CFI = Comparative Fit Index.

of Model 2. The change in χ^2/df is (59.79 to 1.323); NFI, GFI, and CFI (0.549, 0.820, and 0.545 to 0.997, 0.998, and 0.999 respectively); and in the RMSEA (improved from 0.510 to 0.038).

Path analysis

Considering the pattern of significance for the parameter estimates within the Model 1, all the paths were found to be significant in hypothesized directions. In case of model 2, perceived usefulness, perceived ease of use, and security and privacy were found to be significantly and positively related to customer adaptation. No significant relationships were found between perceived ease of use and customer adaptation. All the other variables were significantly related to customer adaptation as hypothesized direction (Table 5)

DISCUSSION

The present study presents a conceptual framework that considers how perceived usefulness, ease of use, and security and privacy affect customer adaptation to e-banking service through customer attitude in the context of Bangladesh. Data supported the proposed model 2, where direct paths from perceived usefulness, ease of use, and security and privacy toward the customer adaptation; and also indirect paths from perceived usefulness, ease of use, and security and privacy mediated by customer attitude was considered.

In general, the results supported most of the developed hypothesized relationships. The research contributes to our knowledge by providing support for the contention that customer attitude performs a mediating role in the link between perceived usefulness, ease of use, security and privacy, and customer adaptation. However, the main focus of management attention should be on customer attitude, of which perceived usefulness, ease of use, security and privacy are very important antecedents. The findings of this study have implications for develop-ing usable e-banking systems. Considering the cost that has been incurred in developing e-banking systems

throughout the country, it is of paramount importance to ensure that people will actually use them. In order to achieve this goal, attention must be given in designing easy-to-use, useful, and reliable systems. Hence, the electronic banking authorities need to develop the beliefs of the customers regarding the usefulness, ease of use, and security and privacy of electronic banking. From the managerial perspective, the findings of this research will be very helpful to the bankers and policy makers as a tool to determine the success of electronic banking in Bangladesh. The findings of this study suggest that in order to attract more users towards electronic banking, it is not going to be sufficient to merely introduce an e-banking system. They need to develop the belief of usefulness of the system as well. Moreover, it is of prime importance for banks to develop e-banking systems, which are easy to use, secure, and private for their users. Thus, the management needs to focus on the development of such belief on the part of the users. They can also help their customers by organizing computer training courses to increase the general computer self-efficacy of the consumers so that the users feel comfortable in using the system with ease and be prepared to avail the e-banking services.

The findings of this study have to be interpreted considering the limitations of the study keeping in mind. First, this study was a single cross-sectional study but to determine the causal paths of studied variables multiple cross sectional studies or a longitudinal study is more appropriate (Poon, 2004) . Hence, future research should consider experimental or longitudinal studies so that the causal inferences could be made more confidently and safely. Secondly, there may be many other factors which influence customer adaptation towards e-banking. It is not practically possible to incorporate all the variables in a single study. But, the research models could have been more robust if few more variables could have been added. The version of Amos 5.0 that the researchers used for the current study cannot deal with more than eight variables in a single run. Future research should make several extensions of the current study. The future researchers should also investigate whether customer perceived online service quality can influence customer

Table 5. Standardized path coefficients for the models.

Path	Model 1	Model 2
Perceived usefulness Customer attitude	0.30***	0.30***
Perceived ease of use Customer attitude	0.22***	0.22***
Security and privacy Customer attitude	0.34***	0.34***
Perceived usefulness Customer adaptation		0.20***
Perceived ease of use Customer adaptation		0.06
Security and privacy Customer adaptation		0.74***
Customer attitude Customer adaptation	0.40***	0.15***

Note- *** $p < .001$.

satisfaction and in turn customer adaptation and loyalty. Future research can also examine whether promotional and communicational issues or the system characterristics, such as screen design and feedback, have any influence on the acceptance of e-banking service. By attempting to explain these relationships the researchers can represent e-banking both as a challenge and an opportunity for marketers of financial products.

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