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Customer Acceptance of Internet Banking: An Integration of Technology and Service Perspectives

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ABSTRACT

Banks and other financial institutions use web technologies to create a new channel through which they can provide and deliver financial services. The distinct nature of web technologies makes the financial services different. When customers choose Internet banking services, they assess both the technological and service attributes in order to make a complete decision. In this study, an integrated model is developed to investigate customers' perceptions of Internet banking from both technological and service perspectives, and their influences on the acceptance decisions. The model is tested in an exploratory study with 133 subjects. The results show that customers' perceptions of both technological attributes (i.e., TAM attributes) and service attributes (i.e., service quality) of an Internet banking service interact with each other and both have impacts on their intention to use the service.

Keywords

Internet banking, Perceived ease of use, Perceived usefulness, Perceived service quality, Intention to use

INTRODUCTION

Internet banking is not a new concept to customers today. Along with the rapid growth of the use of Internet, it has increasingly become a matter of routine that conventional banks use websites to enhance communications with the customers and deliver financial services. With the help of web technologies, Internet financial institutions which have limited physical presence such as ING Direct and E*Trade also gain their opportunities to compete in the banking industries against the conventional players. Internet banking provides convenient and low-cost financial services to the customers. It allows customer participation and interaction, and makes mass customization possible in the banking industry. The introduction and customer acceptance of Internet banking have become a key element in the customer-centric strategies of a bank (Mols 2000).

Internet banking is the financial services that customers can receive via the bank's website on a self-service basis. It provides Internet customers the similar set of financial services which they usually get from the walk-in, ATM or phone banking. Thus, essentially Internet banking is a web extended channel through which banks provide and deliver their services. Because of the distinct nature of web technologies – supporting rich communications and interactions, the new channel enhances the service performance as well as the customer relationships.

Prior research mostly studied Internet banking from a service perspective. Following the marketing literature on service quality (Parasuraman et al. 1988), many Internet banking researchers were interested in assessing or predicting customer perceived service quality (Broderick et al. 2002) and exploring its influences on customer satisfaction and behaviors (Jun et al. 2001). As discussed above, we believe that the nature of the web technologies empowers this new channel of financial services. It brings dramatic changes in the services. Thus we suggest that the technology component and its attributes should also be taken into the consideration in investigating Internet banking.

The technology acceptance model, TAM (Davis 1989), is a robust model in the Information Systems (IS) field to study users' acceptance of a new technology. It asserts that people's intention to accept and use a new technology is primarily determined by their perceptions of two technological attributes – perceived ease of use and perceived usefulness. This model has been used in the online environment and explained consumers' acceptance of a website (Gefen et al. 2003). In the context of Internet banking, the website and web applications that facilitate banking services are also deemed as new technologies to a first time user. Technological attributes of the website and web applications affect the performance of the banking services such as service reliability and responsiveness. Customers' perceptions of the technologies will interact with their evaluation of the service, and then affect customers' intention to accept and use the Internet banking service.

Therefore, in this paper, we combine both the technological and service perspectives of Internet banking and develop an integrated model to predict customers' behavioral intention. Specifically, we propose that two sets of perceptions – perceived technological attributes and perceived service attributes – exert influences on each other and jointly determine customers' intention to use the Internet banking service. The integration of these two perspectives and two research streams provides us with a richer understanding of customers' overall perceptions of Internet banking. It helps the Internet banking providers to

better predict their customers' intention and behaviors, and provides the banks with solutions to enhance customer relationships.

This paper is organized as following. The following section reviews the theoretical foundations and develops the research model. Then we will describe an exploratory survey study, report and discuss the data analysis results. Implications to future research and practice are provided too. We conclude the paper by briefly present the contributions and limitations.

THEORETICAL FOUNDATION AND MODEL DEVELOPMENT

Internet banking is a web extended channel to provide and deliver financial services. Customers usually see it from two perspectives. On one hand, it essentially provides the same or similar financial services which customers usually receive from traditional channels (e.g., face-to-face, ATM, and phone banking). On the other hand, the web technologies make this channel distinct from the traditional channels in terms of customer participation and interactions. As a result, customers using this channel may develop different perceptions of the banking services, and eventually make different acceptance and usage decisions.

Consistently, research of Internet banking should include both technological and service perspectives. In this paper, we propose that two sets of customer perceptions affect the intention to use an Internet banking service. They are perceptions of technological attributes (i.e., perceived ease of use (PEOU) and perceived usefulness (PU)) and the perception of service attributes (i.e., service quality (ServQual)). We also propose that these two sets of perceptions interact with each other.

Technological Perspective of Internet Banking

The technology acceptance model, TAM (Davis 1989), is a robust model used to explain user's acceptance of a specific technology. Numerous empirical evidences of this model have been provided in various IT contexts including online environment such as the acceptance of an e-commerce website (Gefen et al. 2003). The Internet bank uses a website to replace the physical branch buildings and human contacts, and to provide a new interface and a channel through which consumers can get the same banking services. Consumers' perceptions of the website, specifically how well the website works and how comfortable they are with the website, will affect their decision to use the website as well as the Internet banking.

According to TAM, users' intention to use a technology is primarily associated with their perceptions of two technical attributes – PEOU and PU (Davis 1989). PEOU refers to a user's belief that using this technology requires little effort. PU refers to a user's belief that the use of the technology can improve one's performance or productivity in the job of interest. In addition, TAM also suggests that PEOU positively affect PU – when a technology is believed to be easy to use, it is more likely to be perceived as useful. In the context of Internet banking, consumers' interactions with the bank are all mediated by a technological artifact – the website. The banking information and services are provided and delivered through the website. Thus, they will first evaluate the bank website and the web applications related to the Internet banking services, and form their perceptions about the ease of use and usefulness. When they find that they can easily interact with the website and browse through the pages, that the web applications require little effort to use, and that the use of the website and web applications can save their time and enhance their banking activities, they tend to accept the Internet banking services. Thus, based on TAM, we propose in this study that,

H1: PU positively affects a consumer's intention to use the Internet banking service.
H2: PEOU positively affects a consumer's intention to use the Internet banking service.
H3: PEOU positively affects a consumer's PU of the Internet banking service.

Service Perspective of Internet Banking

Essentially, Internet banking services are still regular financial services, only provided via a different channel. In their acceptance decisions, consumers will also assess the service attributes – how well the services satisfy the customers. Service quality is one of the key attributes that consumers are concerned.

Service quality was first studied in the marketing literature. It was defined as "a measure of how well the service level delivered matches customer expectations" (Lewis et al. 1983). Due to the intangibility, heterogeneity and inseparability of services (Parasuraman et al. 1985), objective measures of service quality is absent in the literature. Researchers are mostly interested in consumers' perceptions of service quality.

The domain of service quality is multi-dimensional. Parasuraman et al. (1988) developed a five-dimension construct of service quality. The dimensions are tangibles, reliability, responsiveness, assurance and empathy (see Table 1 for the definitions). Parasuraman measured service quality with the difference between consumers' perception (P) of specific service

and their expectation (E) of a quality service (i.e., ServQual = P – E). This multidimensional model of service quality have also been adapted into the field of Information Systems (IS) (Pitt et al. 1995) to study IS service quality.

Dimensions	Brick and Mortar Environment (Parasuraman et al. 1988; Pitt et al. 1995)	Online Environment
Tangibles	Physical facilities, equipment, and appearance of personnel	Appearance of the website and web applications that provide and deliver the service
Reliability	Ability to perform the promised service dependably and accurately	Technical capability to perform the promised service dependably and accurately
Responsiveness	Willingness to help customers and provide prompt service	Willingness of the Internet firm and the technical capability to help customers and provide prompt service
Assurance	Knowledge and courtesy of employees and their ability to inspire trust and confidence	The helps and safeguards on the website to inspire trust and confidence
Empathy	Caring, individualized attention the firm provides its customers	Caring and individualized attention that the Internet firm provides its customer through its website

Table 1: A Comparison of the Brick-and-Mortar vs. Online Service-Quality Dimensions

In the context of online service, Parasuraman's five dimensions may have different references and meanings. For example, in an online environment, no physical facilities, equipment or employees would be available or visible. All the services are provided over the website. Thus, the tangibles dimension of the online service should refer to the website and other web technologies, instead of the traditional, physical presence of the service provider. Also in the online service, the human presence and employee qualification are now replaced by the technological capabilities and features. When consumers assess employee courtesy and knowledge to form assurance of a service from a brick and mortar business, they may have more concerns on the security and help/assistance availability issues which are unique in the online environment, and need assurance on these aspects of an online service. In Table 1, we contrast the five dimensions of service quality between traditional brick-and-mortar and online environments. We redefined the five dimensions in the online environment to better model the construct of service quality in the context of Internet banking.

Prior marketing research mostly studied perceived service quality's impacts on customer satisfaction (Jun et al. 2001; Parasuraman et al. 1985). Studies also suggested the effects of perceived service quality on customer interactions and behaviors (Broderick et al. 2002; Singh 2002). For example, evidence have been observed on the relationship of perceived service quality with customer loyalty (Harris et al. 2004), and with their willingness to recommend the service to friends (Parasuraman et al. 1988). Pitt et al. (1995) first studied IS service quality, and suggested to integrate it into DeLone and McLean's (1992) IS success model. Specifically, IS service quality, as well as system quality and information quality, was proposed to be antecedent to IS use and user satisfaction, which interact with each other and then exert IS impacts on individuals and the organization.

In the current study, we focus on consumers' intention to use specific Internet banking. While noting the possible mediating effects of the attitude term (i.e., satisfaction) between perceived service quality and intention to use, we decide to take a parsimonious approach and propose a direct relationship between perceived service quality and intention to use the Internet banking service. Thus,

H4: Perceived service quality positively affect a consumer's intention to use the Internet banking service.

In an Internet banking service, the technological channel and the banking services are inseparable. Customers' perceptions of the web technologies usually interact with their beliefs in the services. First of all, using this new and unfamiliar channel of service delivery, customers may be concerned about the amount of effort required. They expect to pay the same amount of effort as they would for walk-in, ATM or phone banking, if not less, and receive the full-scale of services. If it requires more time or additional skill sets to use this channel, customers may not be able to fully appreciate the advantages of the new form of the service or rate the service quality low. Thus, in this model, we propose an influence of PEOU on perceived service quality. That is,

H5: PEOU positively affects a customer's perceived service quality.

On the other hand, customers' perceptions of the service will affect their feelings of the web technologies too. When they think the financial services delivered over the website are reliable with low-cost, 24/7 access, fast responses and personal attentions, they will form positive beliefs on the new channel – the website and the web applications. They tend to believe the web technologies are useful and enhance their banking performance and overall banking experience. Therefore,

H6: Perceived service quality positively affects a customer's PU.

METHODOLOGY

An exploratory, survey study was conducted with three steps to test the research model. Subjects were first asked to complete a pre-survey including demographic information and the expectation scales for service quality. They were then led to the real

and current website of a small commercial bank. We chose a bank which doesn't serve the location where this data collection took place, to ensure that the subjects had no experience with it. During the study, we specifically asked the subjects to assume that this was a local bank serving their location, and asked them to visit the bank's website and Internet banking features, to consider banking with it in the near future. The bank website provides an online demonstration of their Internet banking services, which allow people login to a demo account and perform banking activities such as checking balance, transferring funds, and scheduling bill payments. The subjects were given time to browse the web pages and try to perform all the available banking activities with the demonstration before they moved to the post-survey. In the post-survey, they were asked about the perceptions of this Internet banking service, as well as PEOU, PU and Intention. In this study, we used student subjects from a senior level finance core course in a southeastern public university. After deleting incomplete responses and outliers, we got 133 data points in the final dataset.

We used all measurement scales from the published works. The TAM scales including intention to use, PEOU and PU were adapted from Davis (1989). Following Parasuraman et al. (1988), two sets of the service quality scales were used in this study. The first set used the "will" items to measure customers' expectation about how quality Internet banking services will look like. The other set use the present tense and measured their perceptions of quality of the Internet banking service that they just visited and tried. Customers' perceived service quality was calculated using perception terms minus expectation terms (i.e., ServQual = P – E). A positive perceived service quality means that subjects believed this Internet banking service was performed better than their expectations, and a negative number means below expectations.

Unlike prior studies, we treated the five dimensions of service quality as formative indicators of this construct in this study. Conceptually each dimension represents a distinct aspect of the service that forms the overall service quality. They are not interchangeable or correlated with each other (Diamantopoulos et al. 2001; Jarvis et al. 2003). For example, a service that is reliable is not necessarily showing care and personal attentions to individual customers. Thus, we believe a construct with weighted, formative indicators represents perceived service quality better than a reflective construct in which all indicators are assumed to be equal.

Each of the five service-quality dimensions was then measured by 4-5 reflective items. As discussed earlier, we modified the service quality scales from Parasuraman et al. (1988) and Pitt et al. (1995) based on the current research context – the Internet banking. For example, in the survey instructions we specifically asked the subjects to evaluate quality Internet banking services in general (i.e., the expectation terms of service quality in the Pre-survey) and the specific Internet banking service they just visited and tried (i.e., the perception terms of service quality in the post-survey). The actual items were worded to refer to "these e-banks" and "the XYZ e-bank" respectively. We replaced "physical facilities" and "equipment" of the tangibles items with "website" and/or "web technologies". We also changed a couple of items that originally referred to employees' courtesy and knowledge into items measuring the availability and choices of online helps.

DATA ANALYSIS

Partial Least Square (PLS) using PLSGraph3.0 was used for data analysis in this study for two reasons. First, PLS is generally recommended for this kind of exploratory and theory building studies. Second, we treated ServQual as a formative construct in this study as discussed early, and the PLS is recognized by its advantage to handle both reflective and formative constructs over the other SEM techniques.

Our data analyses were performed in two steps. We first ran a measurement model to validate the measurement scales and constructs. The results show all items loadings are above 0.7 ($p<0.001$). Cronbach's alphas and composite reliabilities for all constructs are above 0.7. The convergent and discriminant validity is established as all items load higher on their hypothesized constructs than on other constructs, and the square root of each construct's Average Variance Extracted (AVE) is larger than its correlations with other constructs (Agarwal et al. 2000).

	mean	sd	α	cr	1	2	3	4	5	6	7	8
1. Tangibles	-0.12	1.67	.899	.937	**0.913**							
2. Reliability	-0.88	1.78	.951	.963	0.502	**0.915**						
3. Responsiveness	-0.64	1.73	.904	.934	0.509	0.840	**0.883**					
4. Assurance	-0.64	1.72	.931	.951	0.546	0.875	0.874	**0.911**				
5. Empathy	-0.44	1.66	.935	.952	0.534	0.807	0.853	0.871	**0.893**			
6. P Ease of Use	6.23	1.20	.944	.964	0.003	0.085	0.033	0.022	0.032	**0.923**		
7. P Usefulness	5.88	1.40	.963	.976	0.023	0.184	0.124	0.250	0.238	0.672	**0.938**	
8. Intention	4.84	1.70	.924	.952	0.190	0.332	0.206	0.401	0.356	0.293	0.506	**0.906**

Table 2: Reliability, Construct Correlations and Square Roots of AVEs

A structural regression model was run then to test the research model and the hypothesized relationships. The results are presented in Figure 1. PLS does not provide an overall model fit. The explained variances and path coefficients help us assess validity of the model. Intention to use was primarily determined by PU and ServQual. The path coefficients were .340 and .328 respectively, both significant at $p < 0.001$. H2 and H4 were supported. The proposed relationship between PEOU and intention to use was found to be insignificant. H1 was not supported. The R^2 of Intention in this model was 33.6%.

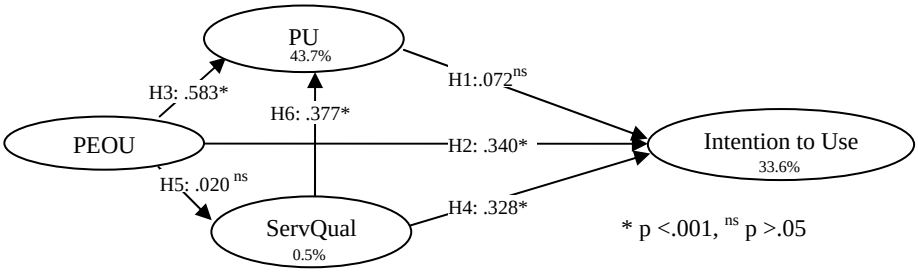

Figure 1: PLS Structural Regression Model

As proposed, part of influences of PEOU was mediated by other constructs. The path coefficient of PEOU to PU was .583 and it was significant at $p < 0.001$. H3 was supported. However, the path from PEOU to ServQual was not significant. H5 was not supported. In addition, the path coefficient of ServQual to PU was .377 and significant at $p < 0.001$. Thus H6 was supported. The R^2s of PU and ServQual in the model were 43.7% and 0.5% respectively.

DISCUSSION AND IMPLICATIONS

The web technologies make the Internet banking services distinct from conventional service channels in many ways. It provides a rich interface through which customers can actively participate in the banking activities and perceive more controls in these activities. This new channel makes a difference in how they perceive the service. Based on prior TAM and service quality literatures, this study integrated technological and service attributes into a big model to predict customers' intention to use an Internet banking service. An exploratory study confirmed our hypotheses that customers' perceptions of both technological and service attributes of an Internet banking service interact with each other and jointly determine their intention to use the service.

Some hypotheses were well supported. One technological attribute – perceived usefulness and the service attribute – service quality had about equal strong influences on the subjects' intention to use the Internet banking service. A fair amount of variance in Intention (33.6%) was explained by these two attributes. We also observed the influence from perceived service quality to perceived usefulness in this study. When subjects perceived high service quality, they rated high on the usefulness of the website.

These supported relationships provide implications to practice. First of all, the study mostly confirmed our argument that both technological attributes and service quality are important in customers' decisions to accept and use an Internet banking service. Thus, the banks that are providing Internet banking or plan to do so may need to pay attention to both their web technologies and their services. Specifically, the banks have to make sure that the website and features are useful and can enhance customers' overall banking performance. On their websites, the banks may want to stress the web features that make the whole Internet banking smooth and convenient, and different from the other channels, such as real-time access to account balance and long account history, balance transfer or payment scheduling, expense analysis, and account security watcher. Customers will appreciate these additional features and take them as pluses in their decisions to use the Internet banking service.

In the mean time, the banks have to make sure their banking service online are reliable and responsive, showing individual attention to the customers. The back-end technologies are the core to ensure service quality. However, additional information and web features on the front-end website will help too. For example, a schedule of system maintenance and expected slow operations can be posted on the website so customers know what to expect. Banks may provide educational information about identity theft and security tips to make customers feel confident and trustful. Online chatting tools, personalizable account page or customized promotions (e.g., special interest rate based on customer history) will also add values to form positive customer perceptions of service quality.

The PEOU, unlike what we expected, didn't show any influence on Intention or perceived service quality. As most of the subjects are finance majors and reported fair Internet banking experience in the past 2 years, it is understandable that the ease of use of the bank website and web applications was not a big concern in their acceptance decisions; neither was it a factor

for the subjects to believe the services were of high quality. However, PEOU did show a mediated influence to Intention through its effect on PU. So still the results suggest that banks should make the website interface user-friendly, the web processes straight forward, and the overall Internet banking operations smooth and thorough. A website that requires less effort to use will indirectly enhance customers overall perception of the Internet banking channel and as a result, they may be more willing to use the Internet banking service. Besides, banks may also have customers who have less or no Internet experience. To them, the PEOU may exert more power in the acceptance decision. A study with a broader sample may provide different insights on this issue.

This study also provides implications to future research. While prior research studied technology acceptance and service quality separately, we believe these two perspectives interact with each other and jointly affect customers' intention to use an Internet banking service. The study results confirmed our argument. In addition, when we only included the TAM beliefs or perceived service quality in the model, the variance explained in Intention lowered down to 25.2% and 21.3% respectively.

While information technologies have been increasingly used to change the way we do business in a variety of industries, researchers should be the first one to be aware of this trend and incorporate the IS features and attributes in the study of the conventional business processes and operations. Specifically in the Internet banking context, the interactions between customers' beliefs in the web technologies and in the services are important to understand their overall perception of the Internet banking and to predict customers' intention and behaviors.

CONCLUSION

This paper proposed an integrated model to predict customers' intention to accept and use an Internet banking service. An exploratory survey study was conducted to test this model. The study findings showed that customers' beliefs in the technological attributes and service quality interact with each other and jointly determine their intention to use the Internet banking service. This paper combined the two perspectives of studying Internet banking. It expands and deepens our understanding of customers' perceptions, beliefs, intention and behaviors in the Internet banking context. This study also has its limitations. Although we believed that the student subjects provided a valid sample in this exploratory study, we also noted that less variance of age, Internet experiences, and banking experience were accounted. A broad sample will be needed in future studies to provide more insights on this topic.

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