

ADOPTION OF INTERNET BANKING IN SRI LANKA: AN EXTENSION TO TECHNOLOGY ACCEPTANCE MODEL

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Abstract

This study develops an extended model to predict customer adoption of Internet banking based on the Technology Acceptance Model (TAM) integrating with perceived risks, perceived web site features. In particular, drawing from the perceived risk construct, six specific risk facets; security, privacy, social, time, performance and financial risk synthesized with the construct perceived web site features which has two variables; perceived system quality and perceived information quality which are integrated with the technology acceptance model (TAM) variables; perceived usefulness and perceived ease of use to propose a theoretical model to predict customers' adoption of Internet banking. An online questionnaire was designed and sent out to Internet banking users in the selected three local commercial banks in Sri Lanka. Respondents participated through extensive personalized e-mail invitations through the selected commercial banks. The extended model is then tested using the data collected and analyzed using multiple- regression. The results indicated that the adoption of Internet banking is positively affected by perceived usefulness, perceived security, perceived social facet, and perceived system quality and those variables were found to be the most influential factors explaining the adoption of Internet banking services. In addition, analysis has revealed that there is a moderated impact on the relationship between the independent variables and dependent variable through respondents' age, income levels and working hours.

Keywords: Adoption of Internet banking, Perceived risks, Perceived web site features, Technology acceptance model (TAM)

1. Introduction

The advent of information technology (IT) has influenced many industries. One of the industries which have been greatly influenced by this phenomenon is the banking industry. IT has made the banks able to perform their tasks more effectively and expand their business to and through the internet. This study concentrates on the electronic channel internet which the banking sector has led to the concept of Internet banking. Internet banking (IB) is one of the technologies which is fastest growing banking practices which provides an internet based service enabling people to do all the banking transactions.

In essence, online banking is an electronic customer interface and an alternative channel of distributions and it is defined as the conducting of banking transactions through the internet (Bradley & Stewart, 2003).

1.1 Internet Banking in Sri Lanka

Sri Lanka was the first South Asian country to introduce unrestricted, commercial internet connectivity in April 1995 (Jayamaha, 2008). Despite this head start, penetration has been slow and uneven in the 16 years since. Sri Lankans are now enjoying Internet banking services over the internet, where it was first introduced in Sri Lanka in March 1999 (Jayamaha, 2008). Not surprisingly, customers are still in their inception. For a country with 8.3 percent internet penetration, it will take few more years for exclusive Internet banks and fully pledged Internet banking services to come into existence (Central Bank of Sri Lanka, 2012).

In reviewing literature, it was found that the usage of Internet and Internet technology had a steady growth in Sri Lanka and now many banks in Sri Lanka have implemented Internet technology in their services by providing Internet Banking facilities to its customers. Even though there are many internet users and many banks with fully fledged Internet banking services, yet the number of Internet Banking users are low amongst the internet users (Zarook, 2010).

1.2 Rationale for the Research Problem

One of the most utilized models in studying information system acceptance is the technology acceptance model (TAM). Studies of Davis, Bagozzi and Warshaw (1989) and Mathieson (1991) have identified that system use (actual behaviour) is determined by perceived usefulness (PU) and perceived ease of use (PEOU) which relates to intention towards use of the system. In the present study, adoption behaviour is explained in the light of the TAM. Lee (2009) argues that the scope of the adoption decision is large and it depends on customers' benefits and risks perceptions and it includes both positive and negative factors: which he identified as 'perceived benefits' and 'perceived risks' of online banking. Specifically, in the studies of Shih (2004) and Shih and Fang (2006) have emphasized the importance of perceived website features in the Internet banking adoption. This proposed research model also intends to identify how demographic factors (age, education, occupation, income level, working hours and internet experience) moderate the key relationships of the variables identified in the proposed research model.

This study attempts to predict the Internet Banking (IB) adoption with possible factors derived from different sources of literature with an objective to find out the customer adoption of IB with a proposed research framework which integrates the construct of perceived risks of IB and also the construct of perceived website features with the TAM. Therefore, the research problem for the present study would be:

What are the factors that affect in predicting the customer adoption of Internet banking in commercial banks in Sri Lanka?

1.3 Research Objectives

Research objectives derived for this study are as follows:

- To investigate determinants of the adoption of Internet banking among selected users in commercial banks.

- To develop a proposed predictable model of Internet banking for the level of adoption by evaluating the integration of TAM with Theory of Perceived Risks and Perceived Web site Features.
- To examine the moderated effect of the demographic characteristics on the level of adoption of Internet banking.

2. Literature Review

The banking sector in Sri Lanka has undergone a rapid transformation with the adoption of ICT (Information Communication Technology)-based banking solutions. The widespread usage of ICT in Sri Lanka's banking sector began only in the late 1980s with the introduction of the first ATM by HSBC Bank in 1986 (Jayamaha, 2008). The most recent delivery channel introduced for financial services is Internet or Online banking and on the other hand, is the latest, most innovative and most profitable banking services to be offered by the banks (Sathye, 1999). The Internet was first used as a platform for providing banking services in the USA in 1995. In just a few years, this new channel has rapidly gained popularity in almost all developed countries and many developing countries (Zarook, 2010). Where as in Sri Lanka, Internet banking was introduced in early 1999 (Jayamaha, 2008).

Internet banking acceptance has gained special attention in academic studies during past years (Bradley & Stewart, 2003; Gerrard, Cunningham, & Devlin, 2006; Jayasiri, 2008; Karjaluo, Mattila, & Pento, 2002; Mattila, Karjaluo, & Pento, 2003; Mukherjee & Nath, 2003; Polatoglu & Ekin, 2001; Robinson, 2000; Sathye, 1999; Tan & Teo, 2000). However, despite the fact that Internet banking provides many advantages, there is still a large group of customers who refuse to adopt such services due to uncertainty and security concerns (Kuisma, Laukkanen, & Hiltunen, 2007; Littler & Melanthiou, 2006).

Davis (1989) proposed TAM to explain and predict user acceptance of Information systems (IS) or Information technology (IT). TAM theorizes that a technology that is easy to use, and if found to be useful will have a positive influence on the intended users' attitude which in turn increases intention towards using the technology that generates the adoption behavior. In literature it is found that many studies have been carried out in the area of Internet banking using TAM (Gounaris & Koritos, 2008; Lee, 2009; Manzano, Navarre, & Sanz-Blas, 2009; Pikkarrainen, Pikkarrainen, Karjaluo & Pahnla, 2004; Qureshi, 2008; Shih, 2004; Suh & Han, 2002; Sukkar & Hassan, 2005; Venketesh & Davis, 2000).

TAM as the most widely applied model in Internet banking literature, and despite its predictive ability, it does not provide enough systematic guidance to practitioners on how they can influence the perceptions that can potentially lead to increased adoption. In order to provide a solid theoretical basis for examining the adoption of Internet banking services, the present study draws attention on two sound theoretical bases: the Technology Acceptance Model (TAM) and the Theory of Perceived Risks (TPR) integrating with a new construct perceived web site features. Several studies have showed perceived risk as an important factor in Internet banking adoption (Gerrard et al., 2006; Lee, 2009; Polatoglu & Etkin, 2001). The risk factor (i.e. perceived risks) has been integrated with the adoption models to explain Internet banking adoption behaviour (Lee, 2009; Manzano et al., 2009; Pikkarrainen et al., 2004). Lee (2009) confirmed that perceived risk has a stronger effect on an individual's decision to use Internet banking in comparison to the benefit factor and defined perceived risk in Internet banking as the subjectively determined expectation of loss by an Internet banking user in contemplating a particular online transaction. Most of scholars claimed that consumers' perceived risk is a kind

of a multi-dimensional construct (Lee, 2009). Six components, facets or types of perceived risk have been identified: perceived financial risk, perceived performance risk, perceived physical risk, perceived time risk, perceived security risk and perceived privacy risk.

One of the key objectives in the present study is to develop the proposed predictable model of Internet Banking for the level of adoption by evaluating the integration of TAM with Theory of perceived Risks and Perceived Web site Features. As Alhudaithy and Kitchen (2009) suggests the concept of perceived website design characteristics may fill the identified gap and website features may contribute in attracting potential users to the site and, hence, the service presented. Accordingly, the construct perceived website features is introduced in the present study and an argument made for the influence of perceptions of such features on adoption of new technology in general and Internet banking in particular. Alhudaithy and Kitchen (2009) have identified four dimensions to describe perceived information quality: completeness, accuracy, format, and currency of information provided by websites and five dimensions to describe perceived system quality: reliability, flexibility, integration, accessibility, and timeliness.

Demographic variables are the most popular basis for distinguishing customers. Individual differences in consumer behavior have been theorized and found to be associated with the acceptance of new information technology, such as Internet banking (Karjaluoto et al., 2002; Mattila et al., 2003; Sathye, 1999;). Therefore, by using the aid of previous literature, the present study expects to explore whether these demographic factors are moderating the relationship between the adoption of Internet banking and other independent variables selected for this study.

2.1 Conceptual Framework

The conceptual framework (as in Figure 1) is developed using two well established theories Technology Acceptance Model (TAM) and Theory of Perceived Risks (TPR), and a construct to measure the effect of Internet banking website features on the adoption of Internet banking. The TAM is used to develop the construct 'adoption of Internet banking system' which has two antecedents: perceived usefulness and perceived ease of use. TPR is used to develop the construct 'perceived risks' which consists of five variables as types of risks: performance, financial, social, time loss, security and privacy risk. Since this study intends to develop a proposed extended model for TAM integrating it with TPR, a construct named 'perceived website features' has also been added to extend the existing model. The construct 'perceived website features' is expected to have two variables: perceived information quality and perceived system quality. Further, this study also intends to measure the moderated effect of the demographic characteristics of the users of Internet banking on the adoption of Internet banking.

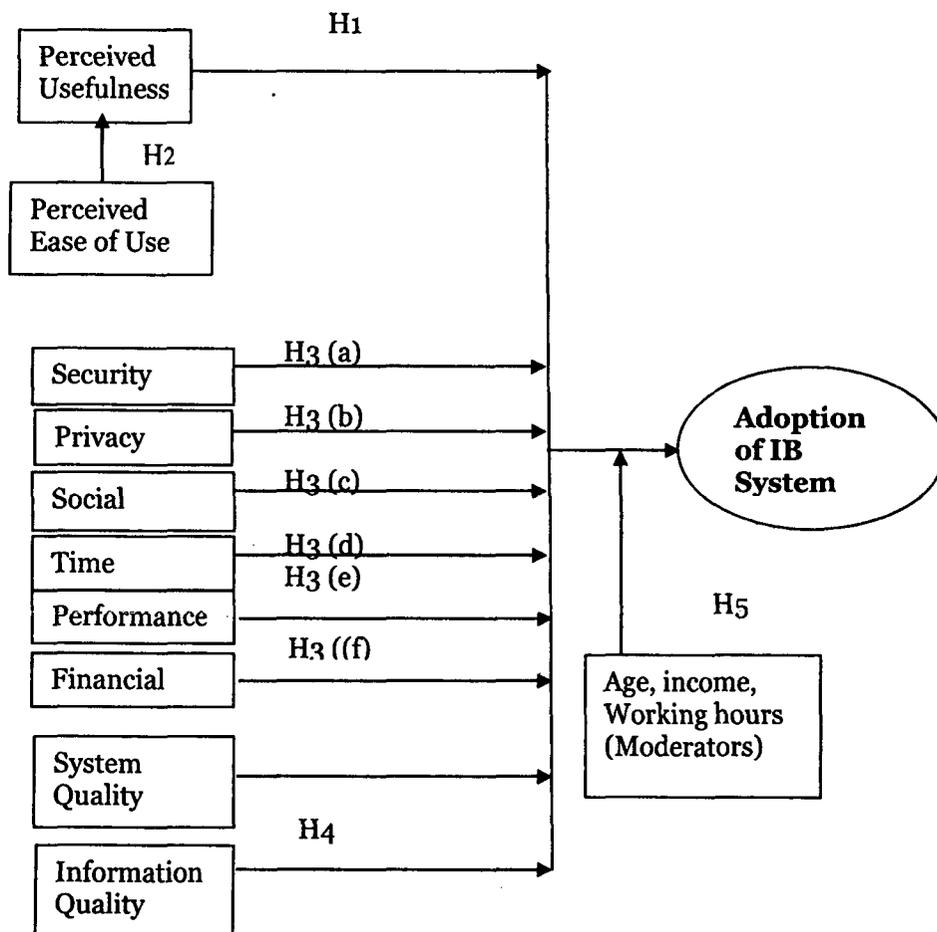


Figure 1: Conceptual Framework of the Study

3. Research Methodology

3.1 Research Design and Method

Since this study intends to predict the adoption of internet banking using an extended framework to the Technology Acceptance Model (TAM), the quantitative method is being selected as the research design. Survey method is used as the most appropriate tool of data collection to get detailed information in large numbers, which will be focused on the sample selected. Use of such also justifies the time, cost and resource availability for the present

research. The unit of analysis of this study is at individual level as the objectives of the study is to investigate the factors affecting the adoption of Internet banking to predict a proposed research model for the adoption of Internet banking among users of Internet banking.

This research adopted a multi-stage sampling method because, the aim of the study is to investigate the determinant factors existing within a random sample of the Internet banking users with respect to their Internet banking perceptions and related factors.

3.2 Data Collection Procedure

This study adopts an online questionnaire survey conducted over the world-wide-web which is administered among internet banking users in selected commercial banks. In order to collect internet banking users' information as *primary data*, this study first required the permission of three commercial banks which are originally based in Sri Lanka to express the need for the information required for research purpose. As a result of that, the above mentioned banks agreed to email invitation letters to its Internet banking users with a message explaining the need to understand their (the users) experience in the adoption of internet banking services. The invitation letter is linked to a website where users could fill out and send back the online questionnaire which is then automatically saved in a database.

Secondary data collection helped to strengthen the primary data analysis and it provided a better analysis for the results. In this study, secondary data is relating to Internet banking services, which will include the type of the services offered by banks, number of users from origin, user's trend etc. which was gathered through discussions with bank officials in the selected commercial banks in Sri Lanka, websites of those banks, annual reports and quarterly reports of the Central Bank of Sri Lanka, reports of the Information Communication Technology Agency (ICTA), and the web.

A total of 600 online questionnaires were sent by the three selected commercial banks to their Internet banking users. This online survey was conducted for two months and yielded 214 responses, with 11 responses rejected since those were having Internet banking experience for less than one year, resulting in a sample size of 203 responses which denoted a response rate of 33.8 percent.

4. Research Analysis

The purpose of this section is to analyze the collected data in order to find answers for the research questions of this study. SPSS 16.0 was used throughout the data analysis.

4.1 Reliability and Validity Assessment

Reliability was assessed using Cronbach's alpha values. The Cronbach's alpha values range from 0.645 (for adoption of IB system) to 0.970 (for Perceived usefulness) thus passing the test of construct reliability by exceeding the threshold level of 0.06. Therefore, all constructs in this research model demonstrated accepted reliability because the construct with the lowest alpha coefficient, the adoption of IB system, deemed to have adequate reliability for the next stage of analysis.

It is also necessary to test for multicollinearity in the data, which refers to high correlations among the independent variables. Since the SPSS output reveals that correlation is significant at

0.05 and 0.01 level (two-tailed), the results showed that there was no evidence of multicollinearity. The potential problem of multicollinearity can be further examined formally in the context of regression analysis. A threshold VIF (variance inflation factor) that is less than or equal to 10 (i.e. tolerance > 0.1). the VIFs for perceived usefulness, perceived security risk, perceived privacy risk, perceived performance risk, and perceived financial risk are 2.93, 3.31, 4.01, 3.87, and 2.82 respectively, in predicting adoption, providing further evidence against multicollinearity. Therefore, high correlations among similar concepts indicate convergent validity while low cross construct correlation is an indication of discriminant validity. Evidence in non-existence of multicollinearity effect also confirms the above.

Table: 1 Regression Analyses

Constant (β)	PU	PSR	PPR	PSOR	PTR	PPR	PFR	PIQ	PSQ
Coefficients^a									
Adoption of IB (AIB)	0.283* (5.409)	0.191** (4.405)	-0.091 (-1.484)	0.170** (3.808)	0.036 (1.055)	-0.066 (-1.094)	-0.065 (-1.573)	0.030 (0.441)	0.183** (2.478)
VIF	2.926	3.312	4.009	2.024	1.423	3.868	2.821	2.198	2.705
R²	0.59								
Adjusted R²	0.57								

Source: Researcher's construction using SPSS output

** denotes the independent variables which are significant at 0.05 and 0.01 levels.

The objective of using multiple regression analysis in this present study is to predict the changes in the dependent variable (adoption of Internet banking) in response to changes in the independent variables (Perceived usefulness, perceived ease of use, perceived security risk, perceived privacy risk, perceived social risk, perceived time risk, perceived performance risk, perceived financial risk, perceived information quality, and perceived system quality).

Table 1 presents the results of the multiple regression analysis with significant and non-significant constructs, standardized path coefficients (beta) between constructs, and the collinearity statistics. The overall explanatory power of this research model had an R-square of 59% for adoption of Internet banking. Adoption of Internet banking in this study is jointly predicted by perceived usefulness (Standardized path coefficient, $\beta=0.43$, $p < 0.05$), perceived security risk ($\beta=0.37$, $p < 0.05$), perceived social risk ($\beta=0.25$, $p < 0.05$), and perceived system quality ($\beta=0.19$, $p < 0.05$). These variables together explained 59% of the variance of adoption of Internet banking ($R^2 = 0.59$, coefficient of determination, $p < 0.05$) and therefore the overall model is statistically significant. These findings validated hypotheses 1, 3(a), 3(c), and 5 respectively.

The results evidence the key role of perceived ease of use in the adoption of Internet banking. The influence of ease of use on Internet banking use is influenced by perceived usefulness. The

level of perceived ease of use had significant indirect effect on adoption of Internet banking, through the effect of perceived usefulness. Perceived ease of use ($\beta=0.897$, $p < 0.05$) significantly influenced perceived usefulness and explained 80% of the total variance in perceived usefulness. As a result, hypothesis 2 is accepted. Further, the correlation between PU and PEOU was 89.7%, where the correlation was significant at 0.01 level (two-tailed).

Based on the data analysis of this study, perceived usefulness, perceived ease of use, security risk, social risk and perceived system quality are statistically significantly affecting the adoption of Internet banking. As a result, hypotheses 1, 2, 3(a), 3(c), and 5 are supported. The rest of the hypotheses (3(b), 3(d), 3(e), 3(f) and 4) were not supported by the data.

Though the hypotheses 3(a) and 3(c) are supported, their effects show positive relationships on the adoption of Internet banking. As theorized in the hypotheses, customers have different perceptions regarding the distinct types of variables in the extended model in their adoption of Internet banking systems. In summary, hypotheses 1, 2, 3(a), 3(c), and 5 are fully supported and hypotheses (3(b), 3(d), 3(e), 3(f) and 4) were not supported. Hypotheses that not supported in the data analysis were related to the variables perceived privacy risk, perceived time risk, perceived performance risk, perceived financial risk, and perceived information quality.

4.2 Demographics Factors

Demographic variables of age, education, occupation, income and working hours were **first** examined across the construct, adoption of Internet banking. For that, cross tabulation was first identified to describe the demographic variables and the dependent variable. Then, Chi square test was used to test the statistical significance of the distribution by the demographic variables. The demographic variables results showed that there were significant differences between all the age levels (except the age 60 and above, where there were no respondents) and adoption of Internet banking (p-value/significant value 0.000, t-value 3.823). For education, significant differences were present in the adoption of Internet banking (sig. value 0.000, t-value 3.737). For occupation, the results showed a significant difference between occupation and adoption of Internet banking (sig. value 0.000, t-value 4.312). Differences were found between all most all the types of occupation and the adoption of Internet banking. For income, significant differences were found between the different income groups and the adoption of Internet banking (sig. value 0.000, t-value 4.654). Except the income level of Rs. 20,000 and below, in all other income levels, there were significant difference in the adoption of Internet banking. Finally, for working hours, significant differences were found between the different working hours of respondents and the adoption of Internet banking ((sig. value 0.000, t-value 3.705).

Then, the moderating effects of the demographic variables; age, income levels and working hours, were analyzed. Findings revealed that the demographic variables of age, income level and working hours of the adopters of Internet banking are having a significant moderating impact (p value/sig.values being less than 0.05** and 0.1*) on the relationship between the independent variables of the extended model and the dependent variable adoption of Internet banking. Thus, validating the hypotheses 6, 7 and 8.

Results revealed that age is having a significant moderating effect on the perceived privacy risk of Internet banking ($\beta=2.11$, $p < 0.05$). It also has a significant moderating effect on the perceived financial risk in adopting Internet banking ($\beta=1.17$, $p < 0.05$). The moderating effect on the perceived usefulness ($\beta=-0.87$, $p < 0.1$) and perceived social risk ($\beta=-0.95$, $p < 0.1$) through the age levels of adopters are relatively low. The overall explanatory power of the extended research model with the moderated variable age, had an R-square of 69%.

Further, the income levels have high moderating impact on the perceived performance risk ($\beta=-2.4$, $p < 0.05$) and perceived information quality ($\beta=1.56$, $p < 0.05$) and relatively low moderating impact on perceived privacy risk ($\beta=0.94$, $p < 0.1$). The overall explanatory power of the extended model has improved to 75% with the moderating effect through the income levels of the respondents.

The explanatory power of the extended model with the moderating variable, working hours has improved the R-square to 71%. Results revealed that working hours of the Internet banking users are having significant interaction effect with perceived usefulness ($\beta=-1.19$, $p < 0.05$) and perceived social facet ($\beta=0.89$, $p < 0.05$).

The analysis of the demographic variables concludes that, in predicting the adoption of Internet banking; age, income levels and working hours of the adopters will moderate the relationship between the independent variables and the dependent variable adoption of Internet banking.

5. Conclusion

Results of the present study indicated that perceived usefulness, perceived ease of use, security, social facet, and the perceived system quality were found to be the most influential factors explaining the adoption of Internet banking services. Further, the results support the view that perceived usefulness, web security, social facet, and the perceived system quality as predicting variables, perceived ease of use affecting perceived usefulness as intervening variable, and adoption of Internet banking as the dependent variable. Age and income levels of the respondents were found to have a moderated effect on the relationship between the independent variables of perceived usefulness, web security, social facet, and the perceived system quality and the dependent variable, adoption of Internet banking in predicting the adoption.

5.1 Limitations of the Study

The online survey method seems appropriate for collecting data from participants with internet and internet banking experience and who are free of geographical constraints. However, generalizability could be enhanced if future research is systematically sampled from a more dispersed sample.

5.2 Suggestions for Future Studies

First, future studies should be carried out on non-adopters of Internet banking to investigate their adoption intentions of such services. Also, future research can extend this model to different contexts. The model can further be applied to identify the differences between adopter and non-adopter groups. The model can further be integrated with additional variables that are not included in this research. For example, new models can also be designed in a way to reveal the differences of adoption behavior in different cultures. Cross-cultural adoption models would significantly contribute to the development of the literature.

This research followed a cross sectional approach. Future research can employ longitudinal approach to observe the effect of additional variables to investigate in different time periods and make comparisons, thus providing more insight into the phenomenon of Internet banking adoption.

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