Assessment of a Modified Technology Acceptance Model among E-banking Customers in Coimbatore City

Geetha Kallanmarthodi and Malarvizhi Vaithiyanathan

***Abstract*—Financial liberalization and technology revolution have allowed the developments of new and more efficient delivery and processing channels as well as more innovative products and services in banking industry. A strategic challenge facing banking institutions today is the growing and changing needs and expectations of consumers in tandem with increased education levels and growing wealth. Consumers are becoming increasingly discerning and have become more involved in their financial decisions. This study determines the factors influencing the consumer's adoption of e-banking in India and hence investigates the influence of perceived usefulness, perceived ease of use and perceived risk on use of e-banking. It is an essential part of a bank's strategy formulation process in an emerging economy like India. Survey based questionnaire design with empirical test was carried out. The results have supported the hypothesis that banks need to highlight the benefits of e-banking, make it easy to use, and enhance its security to improve consumers' trust.**

***Index Terms*—e banking, perceived usefulness, ease of use, perceived risk.**

I. Introduction

Revolutionary development in Information and Communication Technology (ICT) in the past 20 years has impacted individuals as well as businesses in a profound way. It is an invaluable and powerful tool driving development, supporting growth, promoting innovation and enhancing competitiveness [1,2]. Banks and other businesses alike are turning to Information Technology to improve business efficiency, service quality and attract new customers [3, 2]. E-banking is thus emerging as a radical technological innovation with potential to change the structure and nature of banking by speeding up communication and transactions for clients. To sustain business competitiveness, banks are transforming from their traditional approach of "bricks and mortar" branch to a "clicks and mortar" branch. ATMs, Tele-banking, Internet banking, Credit Cards and Debit cards have emerged as effective delivery channels for traditional banking products. Banking activities through the traditional delivery channels of branches networks are on the decline and customers can now do banking business from the comfortable confines of their homes using most modern electronic delivery channels. Banks are able to deliver their products more cheaply than the traditional branch networks loaded with expensive staff. The information technology has enabled banks to increase the range of their products and market them more effectively. The popular electronic delivery channels are ATMs, Mobile banking, Internet banking, Telebanking, Truncated Cheque, Electronic Cheque, Electronic Funds Transfer, National Electronic Funds Transfer, RTGS etc. Customer satisfaction and customer retention are increasingly developing into key success factors in e-banking [4]. Though customer acceptance is a key driver determining the rate of change in the financial sector, empirical studies on what is holding customers from acceptance of e-banking services have been few. Not enough is known regarding how customers perceive and evaluate electronically delivered services which have also highlighted the need for further research to measure the influence of e-service on customer perceived service quality and satisfaction.

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Authors are with the Department of Economics, Faculty of Humanities, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, Tamilnadu, India.

A. Perceived Usefulness

Perceived usefulness is defined as" the degree to which a person believes that using a particular system would enhance his or her job performance" [2]. People adapt a particular technology presuming that using this technology and Information system would enhance their performance. There is also extensive research in the information system community that provides evidence of the significant effect of perceived usefulness on usage intention [2]. Perceived usefulness is a strong determinant of behavioral intention to adopt online banking [5]. Same finding was observed by Eriksson et al.[6] by proving perceived usefulness as a key construct for promoting customer use of online banking. Whereas, the study by Wang et al.[7] showed that perceived usefulness was a significant antecedent of the intention to use an internet banking system. Perceived usefulness is one of the components of Technology Acceptance Model (TAM), which has been widely used by information system researchers. According to Amin [8] "PU is the extent to which a person believes that using a particular system will enhance his or her performance". Mathwick, et al,[9] defined PU as the extent to which a person deems a particular system to boost his or her job performance. The importance of PU has been widely recognized in the field of electronic banking [4,10,11,12]. It is the primary prerequisite for mass market technology acceptance, which depends on consumers' expectations about how technology can improve and simplify their lives [13]. Empirical studies on TAM have suggested that PU has a positive effect on the adoption of information technology [14].

B. Perceived Ease of Use

According to Davis [5] perceived ease of use is the extent to which a person believes that using a particular system will be free of effort. It is a critical factor in the

development and delivery of IB services [15, 16,17,14]. Perceived ease-of-use is a person's subjective perception of the effortlessness of a computer system, which affects the PU thus having an indirect effect on a user's technology acceptance [18]. Also, the longer an individual has been using IB the more likely they are to find it easy to use [19]. The easier it is for a user to interact with a system, the more likely he or she will find it useful. There is substantial empirical support for this view [20,2 21,18]. It affects the consumers' intentions to use IB [13,15,6]. Pikkarainen, et al.,[22] found that PEU was not positively correlated with online banking use. This indicated that PEU does not statistically significantly affect the use of online banking. In contrast, Wang, et al., [7] found that PEU had a significant positive effect on behavioural intention. This finding refers to the fact that users who have a higher computer self-efficacy are likely to have more positive PEU [8]

C. Perceived Risk

The distant and impersonal nature of the on-line environment and the implicit uncertainty of using a global open infrastructure for transactions have rendered risk an inevitable element of e-commerce [23]. The main components of PR are perceived security and trust, which have emerged as the top issues inhibiting IB adoption. This construct reflects an individual's subjective belief about the possible negative consequences of some type of planned action, due to inherent uncertainty which is likely to negatively influence usage intentions. Trust is at the heart of all kinds of relationships [24]. Recent research indicates that trust has a critical influence on users' willingness to engage in online exchanges of money and sensitive personal information [15]. Trust refers to an expectation that others will not behave opportunistically [13,25]. Consumers' perceived trust in online payment system is defined as consumers' belief that e-payment transactions will be processed in accordance with their expectations [26]. It is defined in terms of the individual's perception of: the security of the system; the service provider's reputation; loss of privacy; and concerns about risks associated with the reliability of IB. Trust can be defined as a user's confident belief in a bank's honesty toward the user. Consumers' trust in their online transactions is important and has been identified as a key to the development of the system [27, 28].

Customer's trust is a function of degree of risk involved in the situation where there is a physical separation between the bank and the customer, circumstances are difficult to predict, and the relationships are difficult to monitor [28]. There are still customers who fear to make use of IB, as they are concerned with security aspects of such a system. Previous research has found the risk associated with possible losses from the online banking transaction is greater than in traditional environments [29, 30]. Many studies showed PR as an important factor that influences online banking adoption; which is negatively related [31, 32, 33]. Perceived risk was one of the major factors affecting consumer adoption, as well as customer satisfaction of online banking services [33]. Perceived risk usually arises from uncertainty. To Howcroft, et. al., [34] the principal characteristics that inhibit online banking adoption are security and privacy. In Malaysia it was found that security was main barrier to e-commerce expansion. Security is perhaps the most feared problem on the internet. Banks and customers take a very high risk by dealing electronically (Mukti, [35]; Chung and Paynter, [36]. It is noted that although consumer's confidence in their bank was strong, yet their confidence in the technology was weak [37]. Today's consumers are increasingly more concerned about security and privacy issues (Howcroft et al. [34].

A majority of studies highlight the fact that "security" is the biggest single concern for customers when faced with the decision to use internet banking. Security has always been an issue, but its scope has changed from mere doubts about the privacy of personal information to worries of financial loss [38]. White and Nteli [39] find that "security" is the most important attribute for UK internet banking customers. It is followed by "responsiveness of service delivery (speed and timeliness)", "ease of use", "credibility of the bank", and "product variety". Akinci et al. [40] find that the selection of an internet banking service provider is effected by security, reliability and privacy. Security, which involves protecting users from the risk of fraud and financial loss, has been another important issue in safe use of the internet when conducting financial transactions in Saudi Arabia [41].The security and privacy have a direct and significant effect on consumer trust in the online banking context [42]. When people have the confidence and assurance about the absolute privacy and security attached with the online banking then certainly it induces them for future transaction using the same system. Today's consumers are duly concerned with the perceived risk attached with online banking. By enhancing the trust in online banking, perceived risk can be minimized to great extent [24]. The issue of security is among the most critical obstruction for the acceptance of online banking [43]. Manzano et al. [44] claimed that perceived risk is composed of security, privacy, performance and social factors, and have strong bearing on e-banking adoption.

One of the most utilized model in studying information system acceptance is the technology acceptance model (TAM) in which system use (actual behavior) is determined by perceived usefulness (PU) and perceived ease of use (PEU) relating to the attitude toward use that relates to intention and finally to behavior. For studying the acceptance of e-banking, the original TAM is inadequate because the technology used and the transaction environment in e-banking are different from that of conventional IT and the normal business environment. Before accepting e- banking services, users should be aware about benefits, security issues and the risk associated with it. In this regard, an extended TAM model with the addition of an extra variable (perceived risks) to the model to provide a more comprehensive theoretical perspective of user technology acceptance in the context of e-banking services becomes imperative.

II. GLOBAL E-BANKING SCENARIO

Finland was the first country in the world to take a lead in e-banking. Online banking was launched in Finland in the year 1996. It has become common place across that country

with penetration rates of over 50 per cent, with penetration rates of over 60 per cent among private bank customers and in some age categories (35-49) in the year 2004 according to the Finnish Banking Association's survey of usage of credit, the penetration rate is over 70 percent [22]. As per the latest results about 84 percent of the Finns use internet today with the usage of internet banking at 67 percent for activities such as bill payments. This is a tremendous leap from only 4 percent of the interviewees using internet for bill payments in the year 1992. The usage of ATMs and Telebanking is found to be coming down according to the Finnish Banking Association survey Spring 2007 report on 'Saving and borrowing in Finland'. The number of people paying bills on ATMs has decreased further as compared to the previous year (2006).

Use of direct debit has increased slightly in the past year while use of payment service has decreased a little. Telephone is used for paying bills by a very small number of Finns, only one per cent of the respondents. According to this report while 88% of respondents aged between 18 and 34 years pay their bills on the internet, the corresponding figures for age groups 55 to 64 years and 65 to 74 years stand at 50% and 20% respectively. More than 50 million of the US adult population is banking online according to a new survey by the Pew Internet and American Life Project Evolving Technology Trends in Indian Banking Sector 33 [45]. This is a major growth considering the fact that in the year 2000 only about 14 million people used online banking sites. This has been facilitated by the growth in broadband connections, as it is found that broadband users are twice more likely to use internet banking than dial up connection users. Survey on internet banking in U. K. by Forrester Research during 2007 showed that about 31 percent of British adults use online banking. This is despite the fact that about two thirds (67%) of the British are regular users of the internet. Only about 46 percent of the internet users in Britain bank online. The main reason why non-users are not going for net banking is because they are happy with the other channels, with 44% of them stating that they are happy to visit their branch, while others preferred banking through ATMs (33%) and telephones (11%). Security as a reason of non-usage was cited by only 31% of the nonusers.

III. E-Banking in India

The Government of India enacted the Information Technology Act, 2000, generally known as IT Act, 2000, with effect from the 17th October 2000 to provide legal recognition to electronic transactions and other means of Electronic Commerce. Reserve bank of India had set up a Working Group on Internet Banking to examine different aspects of Internet banking (I-banking). The Group had focused on three major areas of I-banking i.e., (i) technology and security issues, (ii) legal issues and (iii) regulatory and supervisory issues. RBI had accepted the recommendations of the Working Group and accordingly issued guidelines on Internet banking in India for implementation by banks. The Working Group has also issued a report on Internet banking covering different aspects of I-banking. Considerable progress has been made in consolidating the existing payment systems and in upgrading technology with a view to establishing an efficient, integrated and secure system functioning in a real-time environment. Major projects under implementation are electronic clearing, centralized funds management, structured financial messaging solutions and the Indian Financial Network. Facilities under Electronic Funds Transfer have been upgraded and their spatial reach expanded with multiple settlements in a day. Foreign exchange clearing has been initiated through the Clearing Corporation of India Limited. Adequate security features are being incorporated into the EFT. Preparatory work for the real time gross settlement is complete (RBI, 2001). Private and foreign banks have been the early adopters of e-banking while the Public sector banks are also beginning to hold on to the competition. ICICI Bank and HDFC Bank have taken a lead in introducing e-banking in India. ICICI Bank is the first one to have introduced Internet banking for a limited range of services such as access to account information; correspondence for the first time in 1996 and recently, funds transfer between its branches [46]. ICICI is also getting into e trading, thus offering a broader range of integrated services to the customer. Other banks also followed the suit. However, 1996-98 was the period of Internet banking adoption while the Internet banking usage gained importance only in 1999. After ICICI, Citibank, IndusInd Bank and HDFC Bank were the early ones to adopt the technology in 1999. Banks boost technology investment spending strongly to address revenue, cost and competitiveness concerns. A study on the Internet users, conducted by Internet and Mobile Association of India (IAMAI), found that about 23% of the online users prefer internet banking as the banking channel in India, second to ATM which is preferred by 53%. In the study by IAMAI, it was found that the people are not doing financial transactions on the banks' Internet sites in India because of reasons such as security concerns (43%), preference for face-to-face transactions (39%), lack of knowledge about transferring online (22%), lack of user friendliness (10%), or lack of the facility in the current bank (2%). Hence there is a need to understand the reasons for not favouring e-banking services. The purpose of present study is to analyze such effects of e-banking in India, since only few rigorous attempts have been undertaken to understand this aspect of the banking business. This paper is confined to the study of e-banking services offered by private, public and foreign banks operating in India.

IV. Research Gap

Prior research has empirically found positive relationship between PU and PEU as critical factors on the use of e-banking [47]. It is suggested that perceived risk is more powerful at explaining consumers' behavior since consumers are more often motivated to avoid mistakes than to maximize utility in purchasing [29]. Previous study suggests that perceived risk is an important ingredient in consumer decision making process regarding the adoption of information technology [13, 48]. The review of literature suggest that most of the studies have been done on issues related to Internet banking in countries like Australia [17], Malaysia [35]; [36] and [41] , Singapore [32], Turkey vs.

UK [38] and Saudi Arabia [49]. Much work has not been done in India with regard to Internet banking issues. The present study intends to know the factors affecting the acceptance of e-banking by the customers and also indicates level of concern regarding security and privacy issues in Indian context.

V. Research Model and Hypotheses

PU and PEU is significant factors affecting acceptance of an information system or new technologies and previous research has empirically found positive relationship between PEU and PU as critical factors on the use of e-banking [50]. Hence an application perceived to be useful, and perceived to be easier to use is more likely to be accepted by users. Hence it was hypothesized: H1: Perceived usefulness has a positive effect on use of e-banking. H2: Perceived ease of use has a positive effect on use of e-banking. Perceptions of risk is a powerful explanatory factor in consumer behavior as individuals appear to be more motivated to avoid mistakes than to maximize purchasing benefits [29]. Services are inherently more risky than products and the major reason for this is the higher levels of uncertainty which are associated with services [29]. PR usually arises from uncertainty. Hence it was hypothesized: H3: Perceived risks have a negative impact on use of e-banking.

VI. Methodology

Data were collected through an interview schedule administered to 200 bank customers belonging to 19 public sector banks in the city of Coimbatore, India during April-June 2011. Convenience sampling method was used in the selection of the sample respondents. The reasons for using this sampling technique are twofold. Firstly, it saves time and costs and secondly, it offers an easy way to collect data. A total of 200 questionnaires were distributed to the bank customers who use e-banking services. Each questionnaire item was scored on a five-point Likert scale (1 = strongly disagree; 2 = disagree; 3= neutral; 4 = agree; and 5 = strongly agree). Factor analysis was performed to assess the validity of the construct and regression analysis was employed to analyze the data. Statistical Package for Social Sciences (SPSS) version16 was used has the analysis tool.

VII. Research Findings

Table I presents the demographic characteristics of the 200 respondents. About 67 percent of the respondents are males and 33 percent respondents are females. . The highest category using online banking services are in the age group of 20-30 years. Majority of the users of e-banking services were graduates (45 percent) and were earning a monthly salary of Rs. 10,000-30,000.

Reliability is determined by Cronbach's coefficient alpha (α), a popular method for measuring reliability [51]; Nunnally [52] suggests that for any research at its early stage, a reliability score or alpha that is 0.60 or above is sufficient. As shown in Table II, the reliability scores of all the constructs were found to exceed the threshold; all measures demonstrated good levels of reliability (greater than0.80) suggesting the consistency of scale for measuring the factors favouring the use of e-banking among the customers.

TABLE I: Distribution of Respondents on the Basis of Demographic Factors

Demographic Variables	Categories	No. of respondents
Gender	Male	134 (67)
	Female	66 (33)
Age (in years)	Less than 20	2 (1)
	20-30	78 (39)
	30-40	60 (30)
	40-50	40 (20)
	Above 50	20 (10)
Qualification	Up to 12th	47 (23.5)
	Graduates	90 (45)
	Post graduates	38 (19)
	Professionals	25 (12.5)
Income (per month)	Below 10,000	41 (20.5)
	10,000-30,000	73 (36.5)
	30,000-60,000	66 (33)
	Above 60,000	20 (10)

Source: Field Survey, 2011

TABLE II: Reliability Statistics

Determinants	No. of items	Reliability for this sample
PU	5	0.802
PEU	5	0.853
PR	5	0.832

To determine the appropriateness of applying factor analysis, Kaiser- Meyer-Oklin (KMO) and Bartlett's test measure were computed. The correlation matrix was initially examined to determine how appropriate it was for factor analysis. The Kaiser- Meyer-Oklin (KMO) value was .774, which is higher than the recommended minimum of 0.6 [10] indicating that the sample size was adequate for applying factor analysis. In addition, the value of the test statistic for sphericity [3] on the basis of a Chi-squared transformation of the determinant of the correlation matrix was large (1.417E3). Bartlett's test of sphericity was significant, supporting the factorability of the correlation matrix and the associated significance level was extremely small (0.000). The communalities for each variable were computed to determine the amount of variance accounted by the variables to be included in the factor rotations and all the variables had values greater than 0.50 signifying substantial portion of the variance were accounted by the factors. For factor extraction, principal component method was used, under the restriction that the eigen value of each generated factor was more than one. A factor analysis was conducted to develop constructs that will help to evaluate factors that will influence customer's usage of e-banking. Three factors were generated, which explained 70.59% of the variability of the data. The extracted factors were then rotated using variance maximizing method (Varimax). These rotated factors with their variable constituents and factor loadings

are given in Table III.

TABLE III: ROTATED COMPONENT MATRIX

	Components		
	PEU	PR	PU
Ease of use	.589		
Ease of use	.763		
Ease of use	.654		
Ease of use	.650		
Ease of use	.534		
Risk		.607	
Risk		.734	
Risk		.726	
Risk		.735	
Risk		.645	
Usefulness			.787
Usefulness			.904
Usefulness			.822
Usefulness			.693
Usefulness			.594

The factors identified were PU, PEU and PR. A regression model was fitted to determine the impact of these components on the acceptance of e-banking services by the customers. The dependent variable was formed by referring to the customers' usage of e-banking services. Predictor variables included PU, PEU and PR. Regression results are shown in tables 4 and 5.

TABLE IV: MODEL SUMMARY

R	R^2	Adjusted R2	F	Sig.
.590	.348	.338	34.845	.000

TABLE V: COEFFICIENTS

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std Error	Beta		
PEU	.072	.031	.136	2.356	.019
PR	-.077	.032	-.140	-2.426	.016
PU	.304	.032	.554	9.605	.000

The results of the regression analysis conducted on the factors indicate that PR, PU and PEU were found to be the most influential factors explaining the use of e-banking services. The variables PR (t = -2.426, p< 0:05), PU (t = 9.605, p < 0:01) and PEU (t=2.356, p< 0.05) are statistically significant, the overall model was also statistically significant (R^2 = .348, p < 0.001). The adjusted R square value of 0.338 signifies that the model accounted for 33.8% of the variance in the dependent variable. The F value is 34.845 (p<0.000) which is highly significant. The regression result shows that PR is negatively related to the adoption of e-banking which supports the hypothesis and is in line with the previous studies [16, 13, 21]. Also it shows that PU and PEU have positive relation with e-banking usage supporting the hypotheses. This finding refers to the fact that consumers use e-banking for the benefits and also due to its easiness in use provides. This finding is in line with other studies [15, 27, 21, 3].

Practical implication of these results is that banks need to highlight the benefits of e-banking, makes it easy to use and enhance its security to improve consumers' trust. They also need to make the consumers aware about the system by providing them about the details of the benefits associated with it and also ensuring security of the system. Banks also need to engage in security enhancement activities such as encryption, firewall, and user protection and authenticity. Trust is one of the more influential factors, implying that controlling the risk of e-banking is more important than providing benefits. This finding is particularly important for managers as they decide how to allocate resources to retain and expand their current customer base. However, building a risk-free e-banking transaction environment is much more difficult than providing benefits to customers. Therefore, e- banking companies need to search for risk-reducing strategies that might assist in inspiring high confidence in potential customers. In addition, this study suggests that banks should develop trust-building mechanisms to attract customers, such as statements of guarantee, increased familiarity through advertising, and long-term customer service.

VIII. CONCLUSION

The result of the study shows that PU, PEU and PR are the important determinants of e- banking adoption. In a country like India, there is a need for providing better and customized services to the customers. Customers are reluctant to adopt new technologies that might contain risk. Hence ,the banks should ensure that online services is as safe as traditional banking, emphasize the convenience of using online banking and educate the customers regarding the uses of online services as well as security of their accounts.

IX. LIMITATIONS AND SCOPE OF FURTHER RESEARCH

This research serve as an initial step in exploring customer's views and expectation of e-banking services. However, the relatively small size of the sample limits generalization of the outcome of the study. By using a longitudinal study in the future, one could investigate the research model in different time periods and make comparisons, thus providing more insight into the phenomenon of e-banking adoption. Finally, a comparative study focusing on the differences in adoption processes between different forms of banking channels will be an enriching vector for this work.

In a country like India, there is need for providing better and customized services to the customers. Banks must be concerned about the attitudes of customers with regard to acceptance of online banking. The importance of security and privacy for the acceptance of internet banking has been noted in many earlier studies and it was found that people have weak understanding of internet banking, although they are aware about risk. The present study shows that customers are more reluctant to join new technologies or methods that might contain little risk. Hence, banks should

design the website to address security and trust issues. The recommendations to the banks are that they have to increase the level of trust between banks' website and customers. In order to achieve this, the following strategies should be applied by banks.

- Banks should ensure that online banking is safe and secure for financial transaction like traditional banking.
- Banks should organize seminar and conference to educate the customer regarding uses of online banking as well as security and privacy of their accounts.
- Some customers are hindered by lack of computer skills. They need to be educated on basic skills required to conduct online banking.
- Banks must emphasize the convenience that online banking can provide to people, such as avoiding long queue, in order to motivate them to use it.
- Banks must emphasize the cost saving that online can provide to the people, such as reduce transaction cost by use of online banking.

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Dr.K.T.Geetha was born in Kerala, India on September 1956. She has completely post graduation in economics from Madras University and her doctorate from Bharathiar University. Currently, she is working as Professor in the department of economics, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, Tamilnadu, India. specialization includes Development economics, Women studies, Banking, Quantitative techniques and Agricultural economics.

V.MalarVizhi was born in Tamilnadu, India on May 1974. She has completely post graduation in economics from Madras University and her doctorate in Economics from Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, Tamilnadu, India. Currently, she is working as Assistant Professor in the Department of Economics, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, Tamilnadu, India. Her specialization includes Development Economics, Banking and Agricultural Economics.