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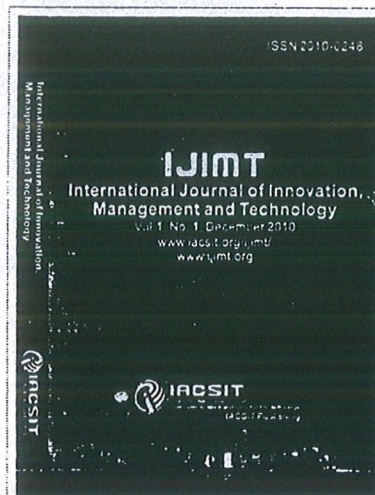
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## Assessment of a Modified Technology Acceptance Model among E-banking Customers in Coimbatore

Geetha Kallanmarthodi and Malarvizhi Vaithyanathan

**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 expanded the range of their products and services more effectively. The popular electronic banking services like ATMs, Mobile banking, Internet banking, Truncated Cheque, Electronic Remittance Transfer, National Electronic Fund Transfer, Customer satisfaction and loyalty are increasingly developing into e-banking [4]. Though customer adoption is determining the rate of change, there are empirical studies on what is influencing the acceptance of e-banking services. Not enough is known regarding how to best evaluate electronically delivered services. This study highlighted the need for further research on the influence of e-service on customer adoption and satisfaction.

#### A. Perceived Usefulness

Perceived usefulness is defined as the extent to which a person believes that using a particular technology would enhance his or her job performance in a particular domain [8]. A particular technology presuming that the technology and Information system would enhance performance. There is also extensive research in the literature in the community that provides evidence of the influence of perceived usefulness on usage of technology. Perceived usefulness is a strong determinant of the intention to adopt online banking [5]. Same findings by Eriksson et al.[6] by proving perceived usefulness as a construct for promoting customer adoption. Whereas, the study by Wang et al.[7] proved that perceived usefulness was a significant antecedent to the use of an internet banking system. Perceived ease of use of the components of Technology Acceptance Model (TAM), which has been widely used by researchers. According to Amin [8] perceived ease of use which a person believes that using a particular system will enhance his or her performance. Davis defined PU as the extent to which a person believes that using a particular system to boost his or her performance. The importance of PU has been widely researched in the context of electronic banking [4,10,11,12]. Perceived ease of use is a prerequisite for mass market technology adoption. It depends on consumers' expectations that technology can improve and simplify their lives. Research on TAM have suggested that PU has a significant influence on adoption of information technology [9].

#### 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 cognitive

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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 [20,21,18]. 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. Perhaps the most feared problem on the internet is that customers take a very high risk by dealing with the internet (Mukti, [35]; Chung and Paynter, [36]). It is noted that although consumer's confidence in their bank is high, yet their confidence in the technology was low. 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 making the decision to use internet banking. Security has always been an issue, but its scope has changed from the 1990s to the present about the privacy of personal information and the risk 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 of the bank", and "product variety". Akinola [40] found that the selection of an internet banking service is primarily effected by security, reliability and privacy. Security involves protecting users from the risk of financial loss, has been another important issue of the internet when conducting financial transactions in Saudi Arabia [41].The security and privacy issues have a significant effect on consumer trust in the internet banking context [42]. When people have the confidence and assurance about the absolute privacy and security of the online banking then certainly it leads to a successful future transaction using the same system. However, consumers are duly concerned with the security issues attached with online banking. By enhancing the security of online banking, perceived risk can be minimized to a certain extent [24]. The issue of security is among the top concerns for the obstruction for the acceptance of online banking. Manzano et al. [44] claimed that perceived risk of security, privacy, performance and social factors all have strong bearing on e-banking adoption.

One of the most utilized model in studying technology system acceptance is the technology acceptance model (TAM) in which system use (actual use) is determined by perceived usefulness (PU) and perceived ease of use (PEU) relating to the attitude toward using the system. TAM relates to intention and finally to behavior. For the acceptance of e-banking, the original TAM is not sufficient because the technology used and the environment in e-banking are different from conventional IT and the normal business environment. Before accepting e-banking services, users need to be aware about benefits, security issues and the risks associated with it. In this regard, an extended TAM model with the addition of an extra variable (perceived risk) is needed to provide a more comprehensive theoretical perspective on 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 introduce e-banking. Online banking was launched in Finland in the year 1996. It has become common place across

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 17<sup>th</sup> 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 efficient, integrated and secure system in real-time environment. Major implementation are electronic clearing, management, structured financial message and the Indian Financial Network. Facilities like Funds Transfer have been upgraded and expanded with multiple settlements. In exchange clearing has been initiated through Corporation of India Limited. Adequate security is being incorporated into the EFT. Preparation for real time gross settlement is complete (RTGS) and foreign banks have been the early adopters while the Public sector banks are also beginning to the competition. ICICI Bank and HDFC Bank a lead in introducing e-banking in India. ICICI is the first one to have introduced Internet banking with a range of services such as access to account, correspondence for the first time in 1996 and funds transfer between its branches [46]. ICICI moved into e trading, thus offering a broader range of services to the customer. Other banks also followed. However, 1996-98 was the period of slow adoption while the Internet banking gained importance only in 1999. After ICICI, Citibank and HDFC Bank were the early adopters of technology in 1999. Banks boost technology spending strongly to address revenue and competitiveness concerns. A study on technology conducted by Internet and Mobile Association of India (IAMA), found that about 23% of the online users use internet banking as the banking channel. In contrast, ATM which is preferred by 53%. In the study it was found that the people are not using online transactions on the banks' Internet sites in several reasons such as security concerns (43%), preference for face-to-face transactions (39%), lack of confidence in transferring online (22%), lack of user friendliness or lack of the facility in the current bank (20%). It is a need to understand the reasons for non-usage of banking services. The purpose of present study is to study such effects of e-banking in India, since only a few attempts have been undertaken to understand the banking business. This paper is confined to the e-banking services offered by private, public and banks operating in India.

### IV. RESEARCH GAP

Prior research has empirically found positive relationship between PU and PEU as critical factors in the adoption of e-banking [47]. It is suggested that perceived risk is a powerful at explaining consumers' adoption of e-banking. Consumers are more often motivated to avoid risk to maximize utility in purchasing [29]. Research suggests that perceived risk is an important factor in consumer decision making process regarding adoption of information technology [13, 48]. The research suggests that most of the studies have been related to Internet banking in countries like Malaysia [35]; [36] and [41], Singapore [40]

Arabic [49]. Much work has not been done in the area of research regarding to Internet banking issues. The study aims to know the factors affecting the use of e-banking by the customers and also indicates the factors favouring the use of e-banking regarding security and privacy issues in the use of e-banking.

#### RESEARCH MODEL AND HYPOTHESES

The study identifies the significant factors affecting acceptance of e-banking system or new technologies and previous research empirically found positive relationship between PU as critical factors on the use of e-banking. Hence an application perceived to be useful, easy to use and easier to use is more likely to be accepted. Hence it was hypothesized: H1: Perceived ease of use has a positive effect on use of e-banking. Perceptions of risk is a powerful determinant in consumer behavior as individuals are more motivated to avoid mistakes than to maximize benefits [29]. Services are inherently intangible products and the major reason for this is the lack of uncertainty which are associated with e-banking. PR usually arises from uncertainty. Hence it was hypothesized: H3: Perceived risks have a negative effect on use of e-banking.

#### VI. METHODOLOGY

Data was collected through an interview schedule from 200 bank customers belonging to 19 public banks in the city of Coimbatore, India during April-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 secondly, it offers an easy way to collect data. 200 questionnaires were distributed to the bank customers who use e-banking services. Each questionnaire 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 reliability of the construct and regression analysis was used to analyze the data. Statistical Package for Social Sciences (SPSS) version 16 was used as the analysis tool.

#### VII. RESEARCH FINDINGS

Table I presents the demographic characteristics of the sample respondents. About 67 percent of the respondents are males and 33 percent respondents are females. The majority of the 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. The reliability of the constructs is determined by Cronbach's coefficient alpha ( $\alpha$ ), a popular method for measuring reliability [51]; Nunnally [52] suggests that for any research at its early stages, a reliability score or alpha that is 0.60 or above is considered acceptable. 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 than 0.80) 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-Olkin (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-Olkin (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 <sup>2</sup>	Adjusted R <sup>2</sup>	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 security that e-banking provides. This finding is in line with previous studies [27, 21, 3].

Practical implication of these findings is to highlight the benefits of e-banking and enhance its security to improve customer confidence. Banks also need to make the consumers aware of the risks by providing them about the risks associated with it and also ensuring that the risks are minimized. Banks also need to engage in security activities such as encryption, firewalls and authenticity. Trust is one of the factors that are important in implying that controlling the risks is more important than providing benefits. This is particularly important for managers to allocate resources to retain and expand their customer base. However, building a secure transaction environment is much more important than providing benefits to customers. Companies need to search for risk management strategies that might assist in inspiring high-risk customers. In addition, this study suggests to develop trust-building mechanisms such as statements of guarantee, through advertising, and long-term relationships.

## VIII. CONCLUSION

The result of the study shows that the important determinants of e-banking adoption in a country like India, there is a need for customized services to the customer who is reluctant to adopt new technologies. Hence, the banks should ensure that e-banking is as safe as traditional banking, emphasize using online banking and educate the customer about the uses of online services as well as opening accounts.

## IX. LIMITATIONS AND SCOPE OF THE STUDY

This research serves as an initial study to understand the customer's views and expectations. However, the relatively small size of the sample limits the generalization of the outcome of this study. A longitudinal study in the future, or a comparative research model in different time periods, thus providing more insights into the phenomenon of e-banking adoption. This study focusing on the differences between different forms of banking services is an enriching vector for this work.

In a country like India, there is a need for customized services to the customer who is concerned about the attitudes of e-banking. The factors that affect the acceptance of e-banking are trust and privacy for the acceptance of e-banking, as noted in many earlier studies and the customer's lack of understanding of internet banking. Customers have weak understanding of internet banking and are not aware about risk. The present study shows that customers are more reluctant to join e-banking methods that might contain little risk.

website to address security and trust issues. The solutions to the banks are that they have to increase trust between banks' website and customers. In order to achieve this, the following strategies should be used 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 banking can provide to the people, such as reduce transaction cost by use of online banking.

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