A Study of

Mobile banking application adoption, usage, security, and trust among customers in Ahmedabad

Name- Amit Kumar

Enrollment no – 1011517118

Batch – PGDM-2015-17

Shanti Business School

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Under guidance of:

(Vina Vani)

Designation – Professor

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ABSTRACT

Mobile banking is growing yet there are numbers of issues and threats in mobile banking system and the major problem of mobile banking is its non-adoption by the customers. This research focuses on the barriers in adoption of mobile banking. It further focuses on preferred services by the mobile banking customers and influence of demographic variable on mobile banking service adoption. Findings suggest that customers' security concern is the major barrier in adopting mobile banking services. As far as preferred services are concern balance check tops, as customers prefer information based services rather than financial services provided by the bank.

INTRODUCTION

Mobile banking is a service provided by a bank or other financial institution that allows its customers to conduct a range of financial transactions remotely using a mobile device such as a mobile phone or tablet, and using software, usually called an app, provided by the financial institution for the purpose of any financial transaction (Chen, 2013).

Recent innovations in telecommunications have enabled the launch of new access methods for banking services; one of these is mobile banking; whereby a customer interacts with a bank via mobile phone. Mobile banking is a term used for performing balance checks, account transactions, payments etc. via a mobile device such as a mobile phone. Mobile banking today is most often performed via SMS or the mobile internet but can also use special programs called clients downloaded to the mobile device. It can also be understood as availing banking and financial services with the help of mobile telecommunications devices. The services offered by mobile banking included getting account information, transferring funds, sending checkbook request, managing deposits, checking transactions and so on. Technological advancements in the area of telecommunications and information technology have continued to revolutionize the banking and finance industry. The delivery of financial services has experienced major changes during the past few years. A feature of the banking industry across the globe has been that it is increasingly becoming turbulent and competitive. Banks aided by technological developments, have responded to the challenges by adopting a new strategy, which emphasizes on attempting to build customer

satisfaction through offering better products and services and at the same time to minimize operation costs(Chen, 2013).

Provision of mobile banking services has been broadly used, and an understanding of the customer adoption process will have important implications for bankers and customers alike. A mobile banking software product for smart phones and other mobile devices has been upgraded to enable customers to automatically select the right bank product that fits their needs. Mobile phones have become a tool for everyday use, which creates an opportunity for the evolution of banking services to reach the population through mobile banking (m-banking). The use of m-banking can make basic financial services more accessible to people, minimizing time and distance to the nearest retail bank branches. This newly emerging tool for providing financial services via mobile devices has generated the foundation of m-banking, which can be applied through such technological means as downloadable applications, mobile browsers, text messaging, and preloaded applications. Electronic banking is one of the most successful business-to-consumer applications in electronic commerce [Pousttchi & Schurig 2004]. Research in the area of electronic banking has spanned over a gamut of delivery options, from measuring consumers' attitudes toward automated teller machines to issues on adoption and quality of services of internet banking (A. Harris & P. Patten, 2014).

The terms "mobile banking" and "mobile payments" describe distinct but in some cases overlapping sets of products. Some m-banking platforms provide services, such as money transfers, that are considered forms of mobile payment, while some m-payments products are so closely linked to bank accounts as the source of funds that they assume m-banking functions (Boyd & Jacob, 2007). Mobile banking refers to using mobile devices to provide financial information, communication and transactions to customers such as checking account balances, transferring funds and accessing other banking products and services from anywhere, at any time (Ensor, et al., 2012; ITU, 2012). While mobile becomes a popular access point, there are many emergent benefits of mobile banking for both banks and customers. Services provided through mobile banking include sending and receiving messages and instructions, access (pre-paid or subscription) to a mobile service, and M-banking application installed on user's SIM card to facilitate deposits, withdraws and money transfer between parties (Hernandez, 2011). Mobile banking service can also increase the amount of data processing and improve operational performance. Moreover,

adoption of mobile banking has significant impact on reducing costs and facilitating change in retail banking (Laukkanen and Lauronen, 2005). Statistics suggest that adoption of mobile banks services is escalating. About more than sixty percent of banks worldwide have planned to offer mobile banking services in 2010 considering that users of mobile banks in United States only may already be reached 11 million households in 2009 (Sripalawat *et al.*, 2011). Mobile banking is emerging as a wireless service delivery channel providing increased value for customers' banking transaction(Sulaiman, Jaafar, & Mohezar, 2007).

OBJECTIVES

Generally, this study attempts to study the factors that affect the adoption of mobile banking services. The specific objective is:

❖ To explore what factors that may influence the adoption of mobile banking services.
❖ To study the barriers in using Mobile banking services.

LITERATURE REVIEW

To provide a comprehensive foundation for the current study, the literature related to e-commerce, M-commerce, Internet banking, m-banking, and consumer adoption of new technology were reviewed with a particular focus on identifying the variables affecting customers' attitude and intention to adopt m-banking.

According to Rogers (1995) the perceived innovation characteristics are supposed to provide the framework how potential adopters perceive an innovation. Research that has investigated the product characteristics of innovation has generally endorsed evaluating the innovation along the product characteristics that involve five constructs; relative advantage, compatibility, complexity, trial ability and observe ability. Concept of perceived risk is often included as augmented by Bauer (1960). Particularly in banking services the perceived risk associated with the financial product itself as well as with electronic delivery channel is higher than in basic consumer goods, and hence increasing the importance of this attribute of innovation. Ensuring security and confidentiality are the fundamental prerequisites before any banking activity involving sensitive information can take place.

Past research on understanding individuals' adoption of mobile banking mainly relies on considering mobile banking as a technological innovation. The diffusion of innovation theory (DIT) could be considered as one of the most popular theories that have attempted to explore factors that affect an individual to adopt an innovation or a new technology. DIT is a theory that seeks to explain how, why, and at what rate new ideas and technology spread through cultures. Rogers defines diffusion as the adoption of an innovation "over time by the given social system", as a consequence diffusion processes result in the acceptance or penetration of a new idea, behavior, or physical innovation. Rogers identified several attributes of an innovation that are key influences on adoption behavior. According to Rogers, these attributes are relative advantage, complexity, compatibility, trial ability, and observability. A number of previous studies have examined these factors in adoption and diffusion of Internet-based technologies and have consistently concluded these attributes, particularly those of relative advantage, ease of use, and compatibility, as the most frequently salient factors for adoption of Internet and mobile technologies(Al-Jabri & Sohail, 2012).

Following is brief summary of five attributes and their relationship with innovation adoption.

Relative advantage

Relative advantage refers to the degree to which an innovation is perceived as providing more benefits than its predecessor. Relative advantage results in increased efficiency, economic benefits and enhanced status. Past research has found that relative advantage of an innovation is positively related to the rate of adoption. Research suggests that when user perceives relative advantage or usefulness of a new technology over an old one, they tend to adopt it. In the context of mobile banking adoption, benefits such as immediacy, convenience and affordability to customers have been reported [Lin 2011]. Therefore, it is hypothesized that, when customers perceive distinct advantages offered by mobile banking, they are more likely to adopt it(Al-Jabri & Sohail, 2012).

Perceived risk

This attribute refers to the degree of risks in using an innovation. Risk perception by customers usually arises due to the doubt related to the degree of inconsistency between customers' judgment and real behavior, and technology failing to deliver its anticipated outcome and its consequent loss. In technology adoption, there is research evidence of the importance of the perception of risk in deploying new technology or services.

In the context of mobile banking, the perception of risk is even more important due to the threat of privacy and security concerns. Secondly, fear of loss of PIN codes may also pose security threats. Thirdly, some users also fear that hackers may access their bank accounts via stolen PIN codes. Finally, some users may also have a fear of loss or theft of a mobile device with stored data (Al-Jabri & Sohail, 2012). Therefore, perceived risk is more likely to negatively affect the mobile banking adoption.

Complexity

Complexity as the extent to which an innovation can be considered relatively difficult to understand and use. They found that complexity negatively influences the adoption of internet usage. Complexity is the opposite of ease of use. Ease of use refers to the extent to which mobile banking is perceived as easy to understand and operate. A vast body of research suggests that there is a strong impact of perceived ease of use of new technology on its adoption. As mobile banking

services have very user friendly interfaces, users see them as easy to use, and hence to form positive attitudes towards them.

Complexity in use is a major factor in adoption of mobile banking. There is considerable amount of empirical research on the mobile technology to suggest that users' intention to adopt mobile banking is inhibited by the perceived complexity of the innovation. Much of the extant literature on barriers of mobile banking adoption is predominantly related to technical complexity. Complexity in use, technical infrastructure, and design of technology are reported as individual barriers in a number of studies. Users will be inhibited to use mobile banking if they find it requires more mental effort, is time-consuming or frustrating. Therefore, it is hypothesized that perceived complexity inhibits adoption of mobile banking [Au & Kauffman 2008; Mallat 2007; Ondrus & Pigneur 2006].

Compatibility

Compatibility refers to the degree to which a service is perceived as consistent with users' existing values, beliefs, habits and present and previous experiences [Chen et al. 2004]. Compatibility is a vital feature of innovation as conformance with user's lifestyle can propel a rapid rate of adoption. Research has shown that compatibility is a significant antecedent in determining consumers' attitude towards internet banking adoption in Malaysia. Compatibility has further been found influential in the adoption of virtual store [Chen et al. 2004], m-payment [Chen 2008], and mobile banking. Al-Gahtani [2003] found that compatibility had significant correlation with computer adoption and use in Saudi Arabia. Thus, it is also likely that the relation between compatibility and adoption will hold in the context of mobile banking.

Observability

Observability of an innovation describes the extent to which an innovation is visible to the members of a social system, and the benefits can be easily observed and communicated. Simplified the original construct by redefining observability into two constructs: visibility and result demonstrability. In the context of mobile banking, observability is defined as the ability to access the banking services at any time and from any location without any delay or queue, and seeing the effect of mobile banking transactions immediately, and conveying the accessibility benefits to

others. Through such exposure, customers gain knowledge about mobile banking and its benefits, thereby facilitating adoption Al-Gahtani [2003] .

Mobile banking adoption

Adoption as a decision to make full use of an innovation. In this study, we are investigating the factors that influence the adoption of mobile banking. While there are many studies that define adoption in terms of implementation, usage, utilization, or satisfaction; this study uses satisfaction as it is the most widely used single measure of adoption. Satisfaction has often been used as the dependent variable for IT success [DeLone & McLean 1992, 2003; Montazemi 1988; Raymond 1990]. The reason for selecting satisfaction as surrogate measure for adoption is twofold. First, "satisfaction" has a high degree of face validity. It is hard to deny the success of a system where users say that they like it. Second, the satisfaction is widely used as a success measure [DeLone & McLean, 1992 2003; Liu & Guo 2008; Mahmood et al. 2000; Zviran & Ehrlich 2003] and post-adoption measure of m-services.

Clark (2008) suggested that as a channel the mobile phone can augment the number of channels available to consumers, thereby giving consumers more low-cost self-service options by which to access funds, banking information and make payments. Mobile as a channel delivers convenience, immediacy and choice to consumers. But there are a large number of different mobile phone devices and it is a big challenge for banks to offer Mobile banking solution on any type of device. Some of these devices support Java2Micro Edition (J2ME) and others support Wireless Application Protocol (WAP) browser or only SMS. Barnes and Corbitt (2003); Scornavacca and Barnes (2004) suggest that recent innovations in telecommunications have enabled the launch of new access methods for banking services, one of these is mobile banking; whereby a customer interacts with a bank via a mobile device such as a mobile phone or personal digital assistant. Further Vyas (2009) stated that Indian banks will target non online banking users who may lack regular access to desktop internet but are very likely to own a mobile device, thus reporting great potential of Mobile banking in India.

The theoretical framework for this study is based on the 'innovation diffusion' model by Rogers (1995). Rogers (1995) defines diffusion as the adoption of an innovation 'over time' by the given social system as a consequence of diffusion processes, which result in the acceptance or

penetration of a new idea, behavior, or physical innovation. Prior studies have traditionally analyzed consumers' adoption of innovation using Rogers' (1995) five categories of adopters: innovators, early adopters, early majority, late majority and laggards.

The Benefit of Using Mobile Banking

Ha, Canedoli, Baur, and Bick (2012) indicated that the benefits of using mobile banking include: 1) ubiquity, 2) immediacy, 3) localization, 4) instant connectivity, and 5) proactive functionality. As mentioned in the beginning, mobile banking can actually cut the operating costs and become a competitive strategy for a small bank or credit union (Garrett, 2011).

Features in Mobile Banking

Mallat, Rossi, and Tuunainen (2004) discussed possible functions for mobile banking, especially payment through mobile devices. Today's mobile device is a personal device which includes cell phones, schedulers, and simple GPS. Mobile banking has to incorporate these features in their mobile devices. The banking-related features include: 1) checking the balances of accounts, 2) using bill pay, 5) sending text messages, 6) consulting an investment advisor, 7) and using business intelligence features, such as budget limit control. Video and the ability for social media are other potential features for mobile banking. Figure 1 shows a typical website which displays mobile banking features.

Security in Mobile Banking

Garrett (2011) indicated that mobile banking is the future but that security is a concern for wireless. Vaithilingam, Nair, & Guru (2013) investigated the adoption of mobile services in Malaysia and found trust and security have a significant impact on the adoption of mobile banking. As is the case with online banking, consumers were asking these questions, "Whether the bank will store the user id and passwords in the database?" "Will the mobile banking encrypt the transaction?" To minimize the customers' concerns about mobile security, one banking strategy is to provide more description about the mobile security such as encryptions and authentication methods.

Personal innovativeness and innovation diffusion

Personal innovativeness is found to be the best predictor of technology adoption which is often used in previous research (Agarwal and Prasad, 1998; Lockett and Littler, 1997). Personal innovativeness embodies the risk-taking propensity that is higher in certain individuals. In innovation diffusion research, it has long been recognized that highly innovative individuals are active information-seekers of new ideas. They are able to cope with high levels of uncertainty, and develop more positive intentions towards acceptance (Rogers, 1995). Agarwal and Prasad (1998) defined personal innovativeness in the domain of information technology as "the willingness of an individual to try out any new information technology".

Demographic profile and innovation diffusion

In terms of the effects of demographics on innovation diffusion, recently investigated gender differences in the context of individual adoption and sustained usage. They found gender to be an important determinant of technology adoption and usage.

Besides gender, also suggested that gaining a better understanding of age differences is important, particularly as it relates to user acceptance and usage of new information technologies. Early adopters of new products are commonly thought to be young in most technology markets. According to Polatoglu and Ekin (2001), demographic factors that describe electronic banking services adopters include the young, the affluent and the highly educated. Similarly, a Finnish study reported that the internet banking user is middle aged, relatively wealthy and highly educated(Sulaiman et al., 2007) .

HYPOTHESIS FOR MOBILE BANKING ADOPTION

NULL HYPOTHESIS

H01: There is no significant relationship between Mobile Banking Application Adoption and compatibility.

H02: There is no significant relationship between Mobile Banking Application Adoption and observability.

H03: There is no significant relationship between Mobile Banking Application Adoption and complexity.

H04: There is no significant relationship between Mobile Banking Application Adoption and Perceived risk.

H05: There is no significant relationship between Mobile Banking Application Adoption and Barriers.

ALTERNATIVE HYPOTHESIS

H1 (1): There is significant relationship between Mobile Banking Application Adoption and compatibility.

H1(2): There is significant relationship between Mobile Banking Application Adoption and observability.

H1(3): There is significant relationship between Mobile Banking Application Adoption and Complexity.

H1(4): There is significant relationship between Mobile Banking Application Adoption and Perceived risks.

H1(5): There is significant relationship between Mobile Banking Application Adoption and Barriers.

RESEARCH METHODOLOGY

❖ Questionnaire Design

Based on the research objectives, I will make structured questionnaire like multiple-choice questions, Dichotomous questions and 5-point Likert scale was used, in which 1 = strongly disagree and 5 = strongly agree question.

❖ Data Collection

We will collect the data from questionnaires.

I have collected data from students and faculties of shanti Business school as a population of research interest. I have collected 92 responses as a primary data for analysis.

❖ Data Cleaning :

Data was screened for missing values and no missing value was found. Further data was analyzed for outliers using SPSS 22. All standardized values (z scores) were between -2.11 to 2.64, suggesting absence of outliers.

❖ Reliability Analysis :

Cronbach alpha value is 0 .820 suggesting satisfactory internal consistency among items.

❖ Analytical Tools :

The SPSS 22 was used to analyze the data using Multiple Regression analysis test, factor analysis, Correlation and Frequency analysis.

Diffusion of innovations (DIT)

DIT is a theory that seeks to explain how, why, and at what rate new ideas and technology spread through cultures. Rogers 1962 defines diffusion as the adoption of an innovation "over time by the given social system", as a consequence diffusion processes result in the acceptance or penetration of a new idea, behavior, or physical innovation.

LIMITATIONS OF THE STUDY

❖ The customers are mostly using ATM and online banking services. Most of the customers feel comfortable without mobile banking. They also feel, there are chances of misuse in mobile banking due to mobile handset theft.

❖ Lack of primary data

❖ Time consuming

❖ The study is limited to Ahmedabad only.

MANAGERIAL IMPLICATIONS OF THE STUDY

This research specifies the implications in three perspectives, viz., theoretical, methodological and managerial. Furthermore, this study provides the practical recommendations to enhance customer trust and guidelines to reduce perceived risk. The most significant implication for the banking sector is that apart from offering useful and user-friendly services, they need to build a trusting relationship with customers.

Taking into account the high costs involved in increasing the client base as a result of growing competence, one of the main goals of banks and other financial services providers that operate through the internet should be to develop long-term relationships with their clients in order to improve their results. Thus, the management of consumer trust and commitment is a fundamental task for marketers since they are two key variables that are required in order to achieve long-term relationships (e.g. Morgan and Hunt, 1994). Therefore, this research offers several alternatives for improving the levels of consumer trust and commitment in the context of online banking. Firstly, online banks should enhance the levels of their web site security and privacy as perceived by the consumer. Broadly speaking, it is necessary to properly manage the legislative, technical and business measures that determine the levels of security and privacy. Such management needs to give priority to increasing the security and privacy of communications, as this will help to increase consumer trust. In addition, it would be useful to publicise the technologies developed to ensure security in e-mails, coding or anonymous surfing among the consumers and the private sector. Therefore, it will be easier to see their usefulness and, in some cases, to make personal use of them (e.g. digital certificates, firewalls, antivirus programs). Furthermore, governments, in collaboration with the private sector, should take more direct action such as giving users the training they need

through free courses in order to increase perceived online privacy and security. Secondly, management should not give priority to the design of complex web sites full of multi-media effects but concentrate instead on designs and structures that are simple and easy for the user to understand. The most effective web site may not be the most sophisticated one, but the easiest to use. Thus, marketers must priorities ease-of-use in web site development. Indeed, greater perceived usability favours improved comprehension of the contents and tasks which are required and offers more security to web site users as well as a more comfortable atmosphere, which may also serve to satisfy consumer needs. Thus, usability may help to increase the level of consumer trust and, as a result, it will be possible to enhance consumer commitment to a financial services web site.

FREQUENCY DISTRIBUTION

I have collected primary data in Ahmedabad area. Total no of respondents is 92 in which Male=77 and female=15.

Variable		No of Respondent	% of Respondent
Gender	Male	77	83.7
	Female	15	16.3
Age	18-25 years	86	93.5
	26-30 years	2	2.2
	31 – 40 years	4	4.3
	40 & above year	0	0
Education	Illiterate	0	0
	High school	0	0
	Intermediate	0	0
	Graduation	24	26.1
	Masters Degree	68	73.9
	Other	0	0
Marital Status	UN married	85	92.4
	Married	7	7.6
Profession	Govt Employee	0	0
	Private Employee	10	10.9
	Business	0	0
	Self Employee	0	0
	Student	82	89.1
	Other	0	0
Monthly Income	Up-to 10,000	76	82.6
	10,000- 20,000	5	5.4
	20,001-30,000	3	3.3
	30,001-40,000	6	6.5
		1	1.1

	40,001-50,000	1	1.1
	50,001 and above	0	0
	Do not want to mention		
Do you own a cell phone?	Yes	88	95.7
	No	4	4.3
Do you operate a bank account?	Yes	88	95.7
	No	4	4.3
Which category of the banks do you consider as most technologically advanced?	Public sector bank	15	16.3
	Private sector bank	77	83.7
	Co-operative	0	0
	Other	0	0
Which attribute of the bank do you value the most?	Quality of Service	49	53.3
	Technology used	23	25.0
	Trust	17	18.5
	Location	3	3.3
	Type of the bank	0	0
Which factor promotes you to use the new techniques in banking?	Reduced time of transactions	11	12.0
	Cost effectiveness	9	9.8
	Ease of use	14	15.2
	Technology savvy	5	5.4
	All	53	57.6
Can you please tell me, what type of a bank account do you have?	Saving Account	64	69.6
	Current Account	6	6.5
	Both	22	23.9
Are you using mobile banking application?	Yes	55	59.8
	No	37	40.2
Do you use your cell phone for any	Yes	67	72.8
	No	25	27.2

financial/ banking transactions?			
Since how long you are using Mobile Banking	Less than 1year	0	0
	1year	27	29.3
	2 years	16	17.4
	More than 2 Year	49	53.3
What do you use mobile banking for?	Transfer funds	17	18.5
	Check account balance	12	13.0
	Pay bills	18	19.6
	Cash withdraw	1	1.1
	All	44	47.8
How often do you use Mobile banking?	Daily	9	9.8
	Once a week	25	27.2
	Once a month	35	38.0
	Many times a month	23	25.0

CRONBACH'S COEFFICIENT OF RELIABILITY

The items in the study constructs were then tested for reliability. To check the reliability of each factor, internal consistency using Cronbach's Alpha analysis was computed. The coefficients ranged between 0.822 (factor Satisfaction) and 0.563 (factor Complexity). This table indicates that all items (Relative Advantage, Compatibility, Observability, Perceived Risk, Mobile Banking Adoption, Barriers in using Mobile banking) in the factorial groups in this study are sufficient reliable measures, but Complexity is not reliable. Cronbach's Alpha reliability coefficients are presented in below Table.

Mean, Standard Deviation, and Cronbach's Alpha Reliability

Dimension	No. of Item	Mean	Standard Deviation	Cronbach's Alpha

Relative Advantage	5	3.674	3.395	0.766
Compatibility	5	3.738	3.395	0.822
Complexity	3	3.551	1.935	0.563
Observability	4	3.617	2.687	0.785
Perceived Risk	5	3.534	3.528	0.780
Mobile Banking Adoption	5	3.733	3.142	0.797
Barriers in using MB	5	3.663	3.338	0.747

Notes: Mean scores based on a five point scale, where 1= Strongly Disagree and 5= Strongly Agree

REGRESSION ANALYSIS

Regression analysis with Mobile Banking Application Adoption as the dependent variable and the other five scales as independent variables (compatibility, observability, complexity, Perceived risk, Barriers).

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H1(4): There is significant relationship between Mobile Banking Application Adoption and Perceived risks.

H1(5): There is significant relationship between Mobile Banking Application Adoption and Barriers.

❖ Graph is showing that relationship between Mobile Banking Application Adoption and other five variables (compatibility, observability, complexity, Perceived risk, Barriers).
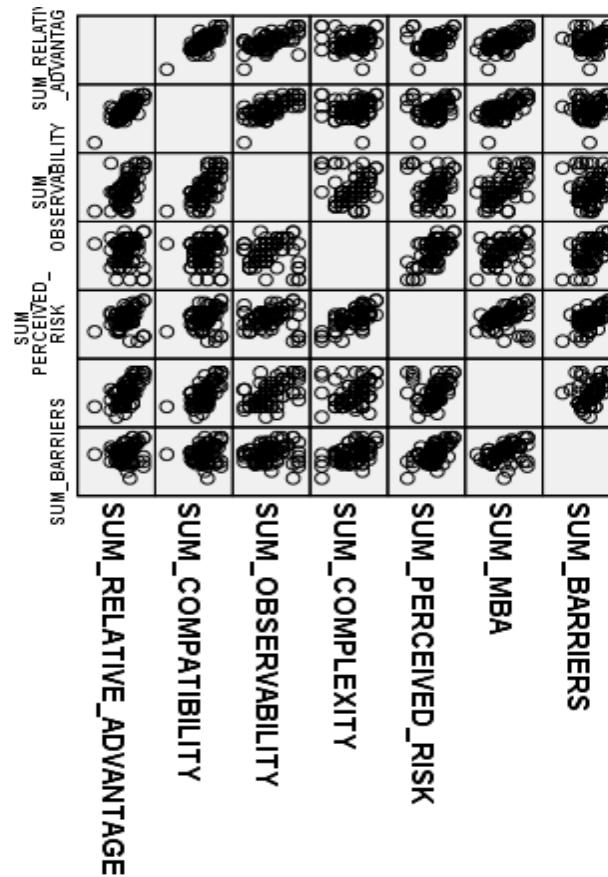
Descriptive Statistics

	Mean	Std. Deviation	N
SUM_MBA	18.71	3.152	90
SUM_COMPATIBILITY	18.84	3.243	90
SUM_OBSERVABILITY	14.54	2.649	90

SUM_COMPLEXITY	10.70	1.917	90
SUM_PERCEIVED_RISK	17.67	3.547	90
SUM_BARRIERS	18.33	3.352	90

Correlations

		SUM_MBA	SUM_COMPATIBILITY	SUM_OBSERVABILITY	SUM_COMPLEXITY	SUM_PERCEIVED_RISK	SUM_BARRIERS
Pearson Correlation	SUM_MBA	1.000	.662	.578	.335	.328	.513
	SUM_COMPATIBILITY	.662	1.000	.675	.112	.198	.246
	SUM_OBSERVABILITY	.578	.675	1.000	.134	.071	.173
	SUM_COMPLEXITY	.335	.112	.134	1.000	.673	.530
	SUM_PERCEIVED_RISK	.328	.198	.071	.673	1.000	.575
	SUM_BARRIERS	.513	.246	.173	.530	.575	1.000
Sig. (1-tailed)	SUM_MBA	.	.000	.000	.001	.001	.000
	SUM_COMPATIBILITY	.000	.	.000	.147	.031	.010
	SUM_OBSERVABILITY	.000	.000	.	.103	.253	.052
	SUM_COMPLEXITY	.001	.147	.103	.	.000	.000
	SUM_PERCEIVED_RISK	.001	.031	.253	.000	.	.000
	SUM_BARRIERS	.000	.010	.052	.000	.000	.
N	SUM_MBA	90	90	90	90	90	90
	SUM_COMPATIBILITY	90	90	90	90	90	90
	SUM_OBSERVABILITY	90	90	90	90	90	90
	SUM_COMPLEXITY	90	90	90	90	90	90
	SUM_PERCEIVED_RISK	90	90	90	90	90	90
	SUM_BARRIERS	90	90	90	90	90	90

For testing the hypothesis Correlation test is carried on. The above mentioned table shows the results of Correlation test. The result shows following:

❖ P1: Correlations table shows the correlation among Mobile Banking Application Adoption and compatibility.

❖ P2: Correlations table shows the correlation among Mobile Banking Application Adoption and observability.

❖ P3: Correlations table shows the correlation among Mobile Banking Application Adoption and complexity.

❖ P4: Correlations table shows the correlation among Mobile Banking Application Adoption and Perceived risk.

❖ P5: Correlations table shows the correlation among Mobile Banking Application Adoption and Barriers

CORRELATION CO-EFFICIENT

❖ The correlation co-efficient of P1 is 0.662, which shows that there is positive & high correlation between compatibility and Mobile Banking Application Adoption.

❖ The correlation co-efficient of P2 is 0.578, which shows that there is positive & high correlation between Observability and Mobile Banking Application Adoption.

❖ The correlation co-efficient of P3 is 0.335, which shows that there is positive & moderate correlation between Complexity and Mobile Banking Application Adoption.

❖ The correlation co-efficient of P4 is 0.328, which shows that there is positive & moderate correlation between Perceived risk and Mobile Banking Application Adoption.

❖ The correlation co-efficient of P5 is 0.513, which shows that there is positive & moderate correlation between Barriers and Mobile Banking Application Adoption.

MODEL SUMMARY TABLE

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Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.778[a]	.605	.581	2.040	1.872
a. Predictors: (Constant), SUM_BARRIERS, SUM_OBSERVABILITY, SUM_COMPLEXITY, SUM_COMPATIBILITY, SUM_PERCEIVED_RISK					
b. Dependent Variable: SUM_MBA					

</div>

❖ Looking at the model summary table which gives the R and R Square values. The R value represents the simple correlation and is 0.778 which indicates a high degree of correlation. So we can conclude that there is a strong correlation between Mobile Banking Application Adoption and other five variables.

❖ The R_2 value indicates how much of the total variation in the dependent variable, Mobile Banking Application Adoption, can be explained by the independent variables, compatibility, observability, complexity, Perceived risk, Barriers.

❖ Here R Square= 0.605 indicates that 60.5% of the variance is explained by the model and thus model fit is good.

Durbin–Watson statistic

❖ If the Durbin–Watson statistic is substantially less than 2, there is evidence of positive serial correlation. As a rough rule of thumb, if Durbin–Watson is less than 1.0, there may be cause for alarm. Small values of D indicate successive error terms are, on average, close in value to one another, or positively correlated.

❖ Here we can see that Durbin–Watson statistic is substantially less than 2 (D < 2), there is evidence of positive serial correlation.

ANOVA TABLE

This table is the ANOVA table, which reports how well the regression equation fits the data (i.e., predicts the dependent variable) and is shown below:

ANOVAᵃ						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	534.792	5	106.958	25.692	.000ᵇ
	Residual	349.696	84	4.163		
	Total	884.489	89			
a. Dependent Variable: SUM_MBA						
b. Predictors: (Constant), SUM_BARRIERS, SUM_OBSERVABILITY, SUM_COMPLEXITY, SUM_COMPATIBILITY, SUM_PERCEIVED_RISK						

- ❖ The ANOVA test will test the null hypothesis that there is no significant relationship between Mobile Banking Application Adoption and other five variables (compatibility, observability, complexity, Perceived risk and Barriers).

- ❖ The result of ANOVA test shows that the significance value is 0.000, which is less than 0.05 (5% significance level), so the Null hypothesis will be rejected and we can conclude There is significant relationship between Mobile Banking Application Adoption and other five variables (compatibility, observability, complexity, Perceived risk and Barriers).

COEFFICIENTS TABLE

Coefficientsᵃ												
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	.029	1.762		.016	.987	-3.476	3.534					
	SUM_COMPATIBILITY	.413	.094	.425	4.402	.000	.227	.600	.662	.433	.302	.504	1.982

SUM_OBSER VABILITY	.263	.113	.221	2.329	.022	.038	.488	.578	.246	.160	.522	1.916
SUM_COMPL EXITY	.170	.160	.103	1.062	.291	-.148	.487	.335	.115	.073	.499	2.005
SUM_PERCEI VED_RISK	-.031	.090	-.034	-.340	.735	-.209	.148	.328	-.037	-.023	.460	2.175
SUM_BARRIE RS	.316	.083	.336	3.825	.000	.152	.480	.513	.385	.262	.611	1.635

a. Dependent Variable: SUM_MBA

❖ The Coefficients table provides us with the necessary information to predict Mobile Banking Application Adoption from the level of compatibility, observability, complexity, Perceived risk and Barriers, as well as determine whether these five variables contributes statistically significantly to the model (by looking at the "Sig." column).

❖ The result of Coefficients test shows that the significance value of Compatibility that is 0.000, which is less than 0.05 (5% significance level), so the Null hypothesis will be rejected and we can conclude There is significant relationship between Mobile Banking Application Adoption and compatibility.

❖ The significance value of Observability that is 0.022, which is less than 0.05 (5% significance level), so the Null hypothesis will be rejected and we can conclude There is significant relationship between Mobile Banking Application Adoption and observability.

❖ The significance value of Complexity that is 0.291, which is greater than 0.05 (5% significance level), so the Null hypothesis will be Accepted and we can conclude There is no significant relationship between Mobile Banking Application Adoption and complexity.

❖ The significance value of Perceived risk that is 0.735, which is greater than 0.05 (5% significance level), so the Null hypothesis will be accepted and we can conclude There is no significant relationship between Mobile Banking Application Adoption and Perceived risk.

- ❖ And the significance value of Barriers that is 0.000, which is less than 0.05 (5% significance level), so the Null hypothesis will be rejected and we can conclude There is significant relationship between Mobile Banking Application Adoption and Barriers).

- ❖ As we know that the linear regression equation is $Y = a + bX$, where Y is dependent variable, here it is Mobile Banking Application Adoption, and X is an independent variable, here it is compatibility, observability, complexity, Perceived risk and Barriers, a is constant, b is co-efficient.

- ❖ In this case the linear equations will be as follow:

- ❖ **Mobile Banking Application Adoption** = 0.029 + 0.413 (compatibility) + 0.170 (observability) − 0.742(complexity) - 0.031 (Perceived risk) + 0.316 (Barriers).

Identify Multicollinearity

The Variance Inflation Factor (VIF) measures the impact of collinearity among the variables in a regression model. The Variance Inflation Factor (VIF) is 1/Tolerance, it is always greater than or equal to 1. There is no formal VIF value for determining presence of multicollinearity.

Value of VIF is greater than 2.5 then indicating multicollinearity, but here we can see that all value of VIF is less than 2.5 which is under (1.635 to 2.175). So we can conclude that here no multicollinearity.

FACTOR ANALYSIS

KAISER MEYER OLKIN (KMO) AND BARLETT'S TEST:-

This test measures the strength of relationship among the variables. And The KMO measures the sampling adequacy, which determines if the responses given with sample are adequate or not. Kaiser (1974) recommends a bare minimum of 0.5 and that values between 0.5 and 0.7 are moderate, values between 0.7 and 0.8 are good, values between 0.8 and 0.9 are great and values above 0.9 are superb. For these data the value is 0.700, which falls into the range of being good, so we should be confident that the sample size is adequate for factor analysis.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.700
Bartlett's Test of Sphericity	Approx. Chi-Square	1778.774
	Df	378
	Sig.	.000

Bartlett's test is another indication of the strength of the relationship among variables. This test the null hypothesis that the correlation matrix is an identity matrix. We can see that the Bartlett's test of Sphericity is significant (0.000), that is, significance is less than 0.05. In fact, it is actually 0.000, i.e. the significance level is small enough to reject the null hypothesis. This means that correlation matrix is not an identity matrix.

COMMUNALITIES:-

The communalities table which showing how much of the variance in the variables has been accounted for by the extracted factors. Before extraction the communality is 1. After extraction, it shows how many percentage of variance is considered and how much it is discarded, thus it shows how many information is lost. (I.e. the communalities value which should be more than 0.5 to be considered for further analysis. Else these variables are to be removed from further steps factor analysis.) Hence in this table, we can see that most of value of variables after extraction is greater than 0.5. Before extraction, there are as many factors as there are variables, so all variance is explained by the factors and communalities are all 1. However, after extraction some of the factors are discarded and so some information is lost. The retained factors cannot explain all of the

variance present in the data, but they can explain some. The amount of variance in each variable that can be explained by the retained factors is represented by the communalities after extraction.

Communalities		
	Initial	Extraction
Mobile Banking is useful for managing financial resources	1.000	.740
MB fits well with the way I like to manage my finances	1.000	.702
I like to try new technology	1.000	.657
I like to adopt new innovation	1.000	.772
MB is compatible with my lifestyle	1.000	.728
Using MB fits into my working style	1.000	.759
MB can be accessed anytime & anywhere when in India	1.000	.649
MB have no queue	1.000	.585
MB can be accessed when abroad	1.000	.769
I can see the effect of a transaction immediately	1.000	.757
MB requires a lot of mental effort	1.000	.614
MB requires technical skills	1.000	.731
MB can be frustrating	1.000	.780
Information about my transactions may be tampered by others	1.000	.791
I fear that the PIN codes get lost & end up in wrong hands	1.000	.472
Information about my transactions may be known to others	1.000	.782

Mobile banking service may process payments incorrectly	1.000	.809
Fear of unauthorized access	1.000	.666
I will adopt mobile banking as soon as possible	1.000	.591
I intend to use mobile banking in the future	1.000	.698
I will regularly use mobile banking in the future	1.000	.600
Based on my experience, I am very likely to return to use online banking facility.	1.000	.776
Provided that I may have access to online banking system in future, I will use it.	1.000	.690
security concern	1.000	.827
network problem	1.000	.664
insufficient operating guidance	1.000	.684
cost per transaction	1.000	.595
Difficulty in Handling Mobile Phone	1.000	.646
Extraction Method: Principal Component Analysis.		

COMPONENT MATRIX:-

This matrix contains the loadings of each variable onto each factor. By default SPSS displays all loadings; however, we requested that all loadings less than 0.4 be suppressed in the output and so there are blank spaces for many of the loadings. This matrix is not particularly important for interpretation, but it is interesting to note that before rotation most variables load highly onto the first factor.

Component Matrix[a]						
	Component					
	1	2	3	4	5	6
Based on my experience, I am very likely to return to use online banking facility.	.748					

I will regularly use mobile banking in the future	.731				
security concern	.714				-.444
Provided that I may have access to online banking system in future, I will use it.	.714				
MB is compatible with my lifestyle	.661				
I like to adopt new innovation	.654				
I can see the effect of a transaction immediately	.654				
Using MB fits into my working style	.645	-.484			
Mobile Banking is useful for managing financial resources	.641				
I like to try new technology	.621				
I intend to use mobile banking in the future	.617		-.474		
MB can be accessed anytime & anywhere when in India	.585		.407		
MB have no queue	.572	-.408			
insufficient operating guidance	.504	.467			
I fear that the PIN codes get lost & end up in wrong hands	.441	.403			
Mobile banking service may process payments incorrectly	.471	.694			
MB can be frustrating	.462	.560			
Information about my transactions may be known to others		.557			
Fear of unauthorized access		.535	.416		
Difficulty in Handling Mobile Phone		.513	-.487		

	1	2	3	4	5	6
cost per transaction		.466				
MB fits well with the way I like to manage my finances	.413		.545			
MB can be accessed when abroad		-.467	-.518			
MB requires technical skills			-.495		.414	
I will adopt mobile banking as soon as possible			.454			
MB requires a lot of mental effort			.449			
Information about my transactions may be tampered by others	.430		-.441	.482		
network problem	.422				-.543	
Extraction Method: Principal Component Analysis.						
a. 6 components extracted.						

TOTAL VARIANCE EXPLAINED:-

The Eigen value table has been divided into three sub-sections. I.e. initial Eigen values, extracted sums of squared loadings and rotation of sums of squared loadings. Before extraction, SPSS has identified 28 linear components within the data set (we know that there should be as many eigenvectors as there are variables and so there will be as many factors as variables). The eigenvalues associated with each factor represent the variance explained by that particular linear component and SPSS also displays the eigenvalue in terms of the percentage of variance explained (so, factor 1 explains 28.877% of total variance). It should be clear that the first few factors explain relatively large amounts of variance (especially factor 1) whereas subsequent factors explain only small amounts of variance. SPSS then extracts all factors with eigenvalues greater than 1, which leaves us with six factors. The eigenvalues associated with these factors are again displayed (and the percentage of variance explained) in the columns labelled Extraction Sums of Squared Loadings. The values in this part of the table are the same as the values before extraction, except that the values for the discarded factors are ignored.

Total Variance Explained										
Compone nt	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings			
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	**8.086**	**28.877**	**28.877**	**8.086**	**28.877**	**28.877**	**4.523**	**16.153**	**16.153**
2	**4.176**	**14.916**	**43.793**	**4.176**	**14.916**	**43.793**	**3.960**	**14.141**	**30.294**
3	**2.523**	**9.012**	**52.805**	**2.523**	**9.012**	**52.805**	**3.844**	**13.727**	**44.021**
4	**1.905**	**6.805**	**59.610**	**1.905**	**6.805**	**59.610**	**2.781**	**9.933**	**53.954**
5	**1.565**	**5.590**	**65.200**	**1.565**	**5.590**	**65.200**	**2.239**	**7.995**	**61.949**
6	**1.278**	**4.564**	**69.763**	**1.278**	**4.564**	**69.763**	**2.188**	**7.814**	**69.763**
7	.975	3.481	73.244						
8	.906	3.237	76.481						
9	.830	2.965	79.445						
10	.782	2.793	82.238						
11	.593	2.119	84.358						
12	.546	1.950	86.307						
13	.534	1.908	88.215						
14	.478	1.708	89.923						
15	.444	1.586	91.509						
16	.392	1.401	92.910						
17	.353	1.261	94.171						
18	.287	1.024	95.195						
19	.218	.780	95.975						
20	.202	.720	96.695						
21	.192	.685	97.380						
22	.175	.623	98.003						
23	.160	.572	98.575						
24	.116	.414	98.989						
25	.102	.365	99.355						
26	.075	.268	99.623						
27	.055	.198	99.821						
28	.050	.179	100.000						
Extraction Method: Principal Component Analysis.										

Before rotation, factor 1 accounted for considerably more variance than the remaining three (28.877% compared to 14.916, 9.012, 6.805, 5.590 and 4.564%), but after extraction it accounts for only 16.153% of variance (compared to 14.141, 13.727, 9.933, 7.995 and 7.814% respectively).

In the final part of the table (labelled Rotation Sums of Squared Loadings), the eigenvalues of the factors after rotation are displayed. Rotation has the effect of optimizing the factor structure and one consequence for these data is that the relative importance of the six factors is equalized.

SCREEN PLOT

The scree plot is a graph of the eigenvalues against all the factors. The graph is useful for determining how many factors to retain. The point of interest is where the curve starts to flatten. It can be seen that the curve begins to flatten between factors 6 and 7. Also that factor 7 onwards have an eigenvalue of less than 1, so only six factors have been retained.

Scree Plot
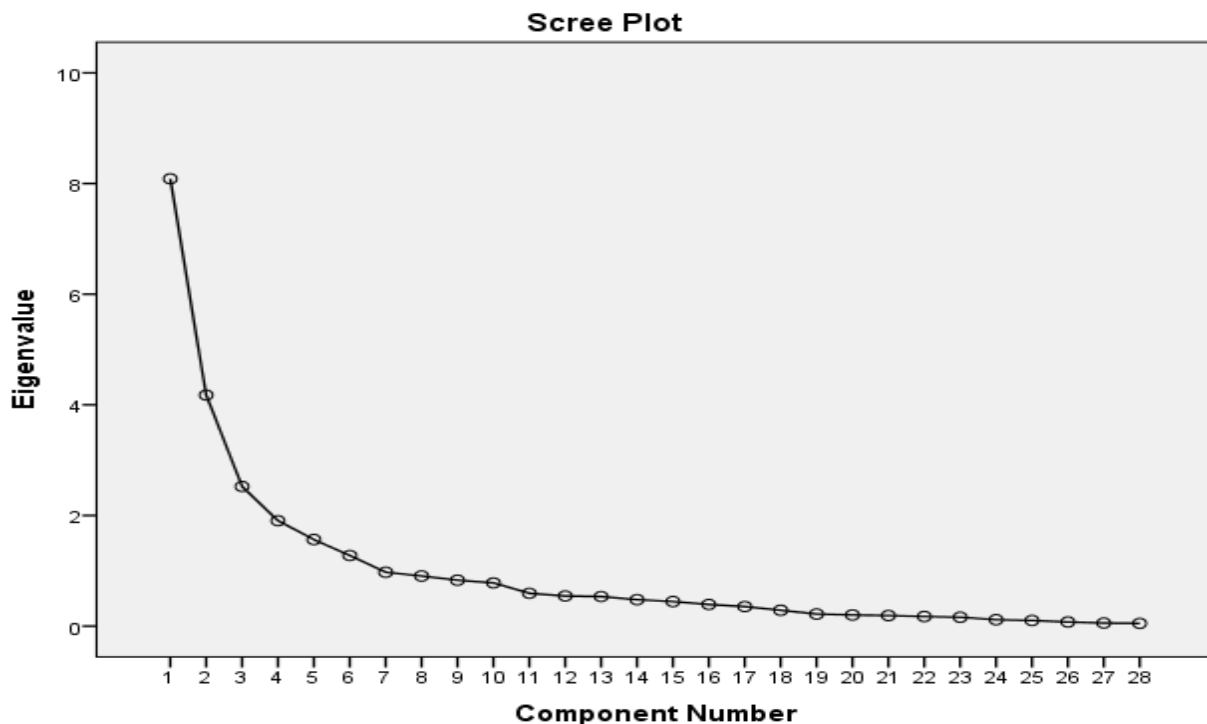
REPORT:-

A principal component analysis (PCA) was conducted on the 28 items (variable) with orthogonal rotation (varimax). The Kaiser–Meyer–Olkin measure verified the sampling adequacy for the analysis, KMO = .700 ('Good' according to Field, 2009). Bartlett's test of sphericity χ^2 (378) = 1778.774, p < .001, indicated that correlations between items were sufficiently large for PCA. An initial analysis was run to obtain eigenvalues for each component in the data. Four components had eigenvalues over Kaiser's criterion of 1 and in combination explained 69.763% of the variance. The scree plot was slightly ambiguous and showed inflexions that would justify retaining both

components 6 and 7. Given the large sample size, and the convergence of the scree plot and Kaiser's criterion on four components, this is the number of components that were retained in the final analysis. The factor loadings after rotation. The items that cluster on the same components suggest that component 1 represents very likely to return to use online banking facility, component 2 Risk factor, component 3 Good experience, component 4 fear factor, component 5 Network problem and component 6 security concern.

CONCLUSION

Our findings suggest that banks, in India, should offer mobile banking services that are compatible with various current user requirements, past experiences, lifestyle and beliefs in order to fulfill customer expectations. With better mobile banking support and provision of variety of services, the more useful customers perceive mobile banking to be and to increase their level of adoption. Hence, bank's attention should focus on understanding customer behavior and designing reliable mobile banking systems that will meet their needs and provide useful and quality services. In addition, banks should focus on communicating information that emphasizes the relative advantage and usefulness of mobile banking compared to other banking channels like physical presence to the bank or using ATM machines. Banks must seek to reduce risk perceived by their customers by offering specific guarantees protecting them and taking their complaints seriously and urgently.

This study used convenience sampling technique for data collection. Thus the findings cannot be generalized because the majority of the sample size is young respondents, between 18 and 25 years old. The mobile banking services are still relatively new in India, and probably immature, therefore, further research is needed to identify additional factors that facilitate adoption of mobile banking in this country. Searching for additional variables that will improve our ability to understand actual use and predict usage intention more accurately is necessary. Since the research model explained less than half of the variance of the dependent variable, it would be reasonable to add social influence and facilitating conditions, such as self-efficacy and technical support, to the research model. Moderating variables like age, education, and experience may also add more insight to the findings of future studies.

BIBLIOGRAPHY AND REFRENCES

Harris, M., & P. Patten, K. (2014). Mobile device security considerations for small- and medium sized enterprise business mobility. *Information Management & Computer Security*, *22*(1), 97–114. http://doi.org/10.1108/IMCS-03-2013-0019

Agarwal, R. and J. Prasad, "A conceptual and operational definition of personal innovativeness in the domain of information technology," Information Systems Research, Vol. 9, No. 2: 204-215, 1998.

Rogers, E., Diffusion of Innovations, New York, Free Press, 1995.

DeLone, W. and E. McLean, "The DeLone and McLean Model of Information Systems Success: A Ten-Year Update", Journal of Management Information Systems, Vol. 19, No. 4: 9–30, 2003.

Mallat, N., Rossi, M., & Tuunainen, V. K., (May 2004), Communications of the ACM, 47(5).

Garrett, J. (2011, Nov. 14). Mobile banking security, Credit Union Magazine, 24-28. Retrieved from http://www.creditunionmagazine.com/articles/37367-mobile-banking-security

Delone, W. and E. McLean, "Information systems success: the quest for the dependent variable," Information Systems Research, Vol. 3, No. 1: 60-95, 1992.

Agarwal, R. and J. Prasad, "A conceptual and operational definition of personal innovativeness in the domain of information technology," Information Systems Research, Vol. 9, No. 2: 204-215, 1998.

Al-Gahtani, S. S., "Computer technology adoption in Saudi Arabia: Correlates of Perceived Innovation Attributes," Information Technology for Development, Vol. 10, No. 1: 57–69, 2003.

Chen, L., "A model of consumer acceptance of mobile payment," International Journal of Mobile Communications, Vol. 6, No. 1: 32-52, 2008.

Chen, L., M. Gillenson, and D. Sherrell, "Consumer acceptance of virtual stores: A Theoretical Model and Critical Success Factors for Virtual Stores," ACM SIGMIS Database, Vol. 35, No. 2: 8-31, 2004.

Harris, M., & P. Patten, K. (2014). Mobile device security considerations for small- and medium-sized enterprise business mobility. *Information Management & Computer Security*, *22*(1), 97–114. http://doi.org/10.1108/IMCS-03-2013-0019

Al-Jabri, I. M., & Sohail, M. S. (2012). Mobile banking adoption: application of diffusion of innovation theory. *Journal of Electronic Commerce Research*, *13*(4), 379–391.

Bamoriya, P. S., & Singh, P. (2012). Mobile Banking in India : Barriers in Adoption and Service Preferences. *Journal of Management*, *5*(1), 1–7.

Chen, C. (2013). Perceived risk, usage frequency of mobile banking services. *Managing Service Quality*, *23*(5), 410–436. http://doi.org/10.1108/MSQ-10-2012-0137

Sulaiman, A., Jaafar, N. I., & Mohezar, S. (2007). An overview of mobile banking adoption among

the urban community. *International Journal of Mobile Communications*, 5(2), 157. http://doi.org/10.1504/IJMC.2007.011814

Au, Y.A. and R. J. Kauffman, "The economics of mobile payments: Understanding stakeholder issues for an emerging financial technology application," *Electronic Commerce Research and Applications*, Vol. 7, No. 2: 141-164, 2008.