

Application of Diffusion of Innovation Theory in Behavior Intention to use Mobile Banking

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Abstract- This Research paper aimed to determine the effect of Roger's diffusion of innovation characteristics i.e. Relative Advantage, Compatibility, Complexity, Triability and Observability on the behavioral intention to use mobile banking services. The data was collected from 400 mobile banking users using snowball sampling technique and the research hypothesis were also framed and tested by using factor analysis and Structural Equation Modeling. The results provided statistical significant support for compatibility, complexity, Triability and observability with behavioral intention to use mobile banking services. However, no relationship was found between Relative Advantage and Behavioral Intention to use mobile banking services.

Keywords-Mobile Banking, ATM.

I. INTRODUCTION

In a move to promote digital transactions post-demonetization, the government has made it mandatory for all the banks in India to offer mobile banking services by 31st march 2017. As per the report by Indian Express (2017), there are only 65 per cent of the populations with saving accounts numbers are linked with the mobile numbers and only 50 percent are linked with Aadhaar card numbers. Out of the 65 percent saving accounts numbers that are linked with mobile numbers only 20 percent are using m-banking. In the month of February 2017, all the banks in India are advised by Reserve Bank of India (RBI) to commence some customer awareness and education programs in different languages through multiple channels of communication like self-service kiosks, Internet banking websites, ATMs, SMS and emails, in order to promote the usage and process of m-banking registration/activation. This research work is an effort to apprehend the present m-banking scenario in the country. In the Indian context, an exploratory analysis has been done to reveal various factors and reasons for the slow adoption of mobile banking services. There are many technological issues like

difficulty in downloading application, type of handsets, encryption requirement, time lag in activation, a variety of operating systems etc.

Mobile-Banking Services

Services included in the mobile-banking are like Account information services that includes Access to loan and/or card statements, Alerts on account activities, Monitoring term deposits, Mini statements and account history, Insurance policy management. Funds transfer services includes Fund transfers to other accounts, Fund transfers between customer-linked accounts, Bill payments, and Credit card payments. Investment services like Real-time stock quotes, Portfolio management, personalized alerts and notifications on security prices. Support services includes Complaint filing and tracking, Cheque book and card requests, ATM location.

In the last few years m-banking has reached heights, from traditional ways of banking to complete banking services on mobile phones. Technologically, all the banking transactions that involves using mobile applications on the mobile phones or using the bank website on it are considered as m-banking. Any customer may simply register on the respective mobile banking applications after downloading the specific mobile applications on their smartphones.

Innovations in the Mobile banking sector

For those users who are not having smart phones can also do banking transactions via their simple handsets just by dialing *99#. National Payments Corporation of India is offering such facility of m-banking services on a NUUP i.e. National Unified USSD Platform. This particular code allows the users to access their bank accounts with a simple and single code irrespective of their type of mobile handset, telecom service provider.

II. LITERATURE REVIEW

Previous researches on the m-banking mainly depends on the advancement of the technology in the telecom sector. So, in this regard Roger's diffusion of innovation is considered best in explaining and exploring the adoption and behavioral intention to use mobile banking services. Rogers defines diffusion as "the adoption of an innovation over time by the given social system", as a result this process of diffusion results in the adoption of new ideas or any new physical innovation. Rogers has defined and identified several characteristics of innovation which are important factors in influencing the behavioral intention to use m-banking services. According to Rogers, these characteristics are relative advantage, compatibility, complexity, trialability, and observability. Many authors have studied these factor relating it to internet banking and m-banking also and found out these are the influencing factors in adoption of technological innovation (Koenig- Lewis et al. 2010; Liu & Li 2010; Papies & Clement 2008; Park & Chen 2007; Vijayasathy, 2004).

Hypotheses Development

Following hypotheses are developed after reviewing the literature:

Relative Advantage

Roger has defined Relative advantage as "the degree to which an innovation is perceived as better or superior than ever before". The more the perceived Relative Advantage by the users of m-banking the more they will adopt the innovative technology. (Rogers, 1983).

Nor and Pearson (2007) also discussed and explained that the relative gain is defined as "the extent to which the innovation can be considered to be a better idea to replace the things you want improved performance". Lichtenstein and Williamson (2006) also claimed that the choice of methods of doing the banking transactions is influenced by the relative advantage. As also founded by the previous researches, relative advantage is significantly related with the behavioural intention to use m-banking services (Shih and Fang (2004), Nor and Pearson (2007), and Williamson Lichtenstein (2006).

H1. Relative advantage will have a positive effect on mobile banking adoption.

Compatibility

Rogers (1995) defines compatibility as "an innovation is considered consistent with the socio-cultural values and beliefs, experiences, and needs of potential adopters". As stated by Hoerup (2001) every innovation affects the opinions, values, beliefs, and outlook. Rate of adoption of every technological advancement will increase if it is compatible with the needs of the individual. Perceived compatibility of a technological innovation demonstrates that it is connected with the user's values, experiences, and needs. Compatibility is the "degree to which an innovation is perceived as consistent with the values whose mother, past experiences and needs of potential adopters" (AndlivariHuisman, 2006). Compatibility refers to "the extent of the service user is considered as consistent with existing values, beliefs, customs and current and previous experience" (Chenet al , 2004) .

H2. Compatibility will have a positive effect on mobile banking adoption.

Triability

Triability is the "degree to which an innovation can be tested within a certain limit" (Rogers1995). In general terms triability is when given an option to experiment with innovations to feel more comfortable (Agarwal and Prasad, 1998; Rogers, 2003). Tan and Teo (2000) also claim that if given an option to use and then adopt the technology the rate of adoption will. Therefore, repeating the use of m-banking during the trial period can effectively reduce the ambiguity about using or not using the m-banking services. Trialability can also be defined as "the degree to which an innovation may be experimented with on a limited basis" (HuismanandIivari, 2006).

H3. Triability will have a positive effect on mobile banking adoption.

Observability

Observability can be described as "the extent to which an innovation is visible to the members of a social system, and the benefits can be easily observed and communicated" [Rogers 2003]. Moore & Benbasat (1991) also described observability in the context of m-banking 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". Users are gaining knowledge about m-banking and they are also aware about the benefits , thereby increasing the rate of adoption of m-banking services.

H4. Observability will have a positive effect on mobile banking adoption.

Complexity

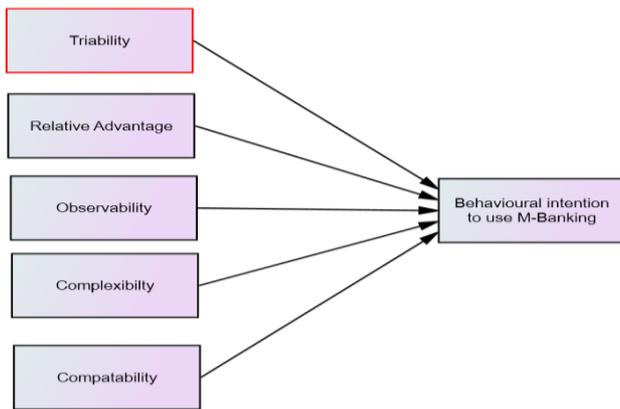
Cheung (2000) defined complexity as "the extent to which an innovation can be considered relatively difficult to understand and use" and also found that complexity negatively influences the adoption of internet usage. Complexity is the opposite of ease of use. Ease of use refers to "the extent to which mobile banking is perceived as easy to understand and operate". There are many studies which suggests that there is a strong positive influence of perceived ease of use on any new technological innovation and its adoption (Gu et al. 2009; Luarn & Lin 2005; Venkatesh & Davis 2000; Wang et al. 2006).

There are substantial empirical research done on technological advancement of mobile gadgets which suggests that users' behavioral intention to use m-banking is repressed by the perceived complexity (Au & Kauffman 2008; Mallat 2007; Ondrus & Pigneur 2006). Therefore, following hypothesis can be framed:

H5. Complexity will have a negative effect on mobile banking adoption.

Behavioural Intention to Use

Ajzen (1991) demonstrates that intention as "a person's tendency to choose to do or not do any work". Intention can also define as "how many desire to try and how strong effort allocated to make it happen" Fusilier and Durlabhji (2005). After reviewing the literature the following model can be proposed.



III. RESEARCH METHODOLOGY

In this study the researcher has used the primary as well as secondary data from different sources. Primary data was collected through questionnaire using offline as well as online mode.

Sample and Sampling Technique

For the interpretation of SEM results the determination of sample size is important, as it provides an important base for the estimation of errors while selecting the samples. In this study sample size of 400 respondents is taken. As per Sekaran, 2006, there is no possibility of sampling frame error unless there are non-response errors. Hence, after the final questionnaire, we were able to collect data from 400 respondents out of which 380 were the usable responses to fulfil the above objectives. Sampling technique that was used for this study was snowball sampling also known as chain-referral sampling, and it is a non- probability sampling technique. One limitation of this study was that the selection of the respondents is inclined towards the educated respondents.

Collection of Data

The data for the present study had to be collected from Mobile banking services users in Delhi and NCR. For collecting data from different customers reference from the family and friends was taken. For collection of primary data, schedule/questionnaire was an essential tool that was developed for reliable and first hand data collection.

IV. ANALYSIS OF DATA

In this research study Exploratory Factor Analysis and SEM was used as the method of data analysis using SPSS version 19 and AMOS version 20.

Factor Analysis

In this research paper, exploratory factor analysis (EFA) technique was used. In the present study, 380 sample size is taken for EFA. A factor loading is statistically significant if it is greater than or equal to 0.35. The data for the analysis is examined using Principle component Axis (PCA) matrix methods. A total of 6 factors were identified for PCA with varimax rotation and Eigen value more than 1. The result confirmed that there are 6 factors that accounted for 69.57 % percent of total variance explained in this analysis. By using cronbach alpha, the reliability of the

questionnaire was tested. Alpha (α) the reliability coefficient of each construct or latent variable are shown in Table 3:

Table 3: Reliability of factors (Cronbach Alpha)

S. No.	Factors	Cronbach Alpha
1	Relative Advantage	0.932
2	Compatibility	0.843
3	Complexity	0.867
4	Triability	0.832
5	Observability	0.816
7	Behavioral Intention towards adopting mobile banking	0.934
8	Overall Reliability	0.912

After checking the individual reliability of factors and overall reliability, Barlett’s test for sphericity and Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy was run (Table 4).

Table 4 : KMO and Barlett’s Test

Kaiser-Meyer-Olkin Adequacy.	Measure of Sampling	.901
Bartlett’s Test of Sphericity	Approx. Chi-Square	6693.670
	df	325
	Sig.	.000

Total variance explained showed the extent to which total variance of the observed variable is explained by each of the principle component. Initial factor extraction revealed six important Risk related factors with Eigen value greater than 1. The first principle component, which is related to Relative advantage (RA) of m-banking Services which makes the largest and major part of the total variance explained, has an Eigen value of 8.701 which amounts to 33.46% of the total variance explained. The complete table of the value for total variance explained is shown Table 5 below:

Table 5: Total variance explained

S. No.	Factors	Total variance explained
1	Relative Advantage	33.464
2	Compatability	14.773
3	Observability	8.016
4	Complexity	7.328
5	Triability	5.995
6	Behavioral Intention towards adopting Mobile banking	3.656

However, all the seven factors have identified from 35 statements accounted for 68.21 % percent of total variance explained.

Structural Equation Modelling

SEM was used to check the relationship between the multiple variables in the model. SEM was applied in two parts; first is the measurement model and second is the structural model. First of all the model was analyzed as a CFA model that provides an assessment of Reliability, Convergent Validity and Discriminant validity and then secondly, to understand the causal relationship, path analysis was conducted.

Conducting CFA to validate the Measurement Model

As discussed, Measurement model was analyzed by checking the Reliability, Convergent Validity and Discriminant validity. Reliability was checked through the cronbach alpha value, which should be below 0.7 according to Nunnally (1978). In this research paper convergent validity and discriminant validity was satisfied by the data as shown in table 7 and table 8 below.

Table 7: showing Convergent Validity

S.No.	Factors	Cronbach Alpha	Average Variance Explained
1	Relative Advantage	0.932	0.739
2	Compatibility	0.843	0.542
3	Complexity	0.867	0.704
4	Triability	0.832	0.158
5	Observability	0.816	0.527
6	Behavioral Intention towards adopting mobile banking	0.934	0.690

Table 8: showing Discriminant Validity

S.No.	Factors	Average Variance Explained	Maximum Shared Variance
1	Relative Advantage	0.739	0.181
2	Compatibility	0.542	0.493
3	Complexity	0.704	0.493
4	Triability	0.632	0.158
5	Observability	0.527	0.181
6	Behavioral Intention towards adopting mobile banking	0.690	0.312

In order to check the zero order model in CFA, P- value of all Individual constructs was checked that is below 0.05 and model fit is shown in Table 9 and model fit for the first order measurement model was also checked and is satisfying all the condition of goodness of fit as shown in Table 10.

Table 9: Model Fit Indices for Zero order

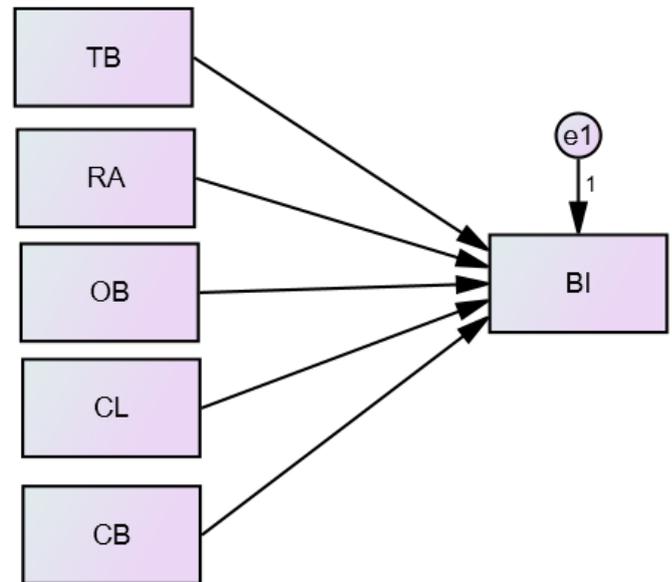
Summary of Zero order Model fit indices.				
	CFI	GFI	RMSEA	CMIN /df
Relative Advantage	.994	.985	0.71	2.897
Compatibility	1	.998	.000	.752
Complexity	1	1	0	0
Triability	1	1	0	0
Observability	.997	.995	.044	1.739
Behavioral Intention towards adopting mobile banking	.997	.991	.048	1.863

Table 10: Model Fit Indices for First order

Summary of First order Model fit indices.				
	CFI	GFI	RMSEA	CMIN/df
First Order Model	0.967	0.913	.045	1.778

The value of GFI was above 0.90, the required cut off criterion. The CFI was also above the acceptable guideline of 0.90. Additionally, the RMSEA was below the 0.08 guideline of acceptability. Therefore the model was determined to be acceptable enough to proceed with further analysis.

Figure1: Proposed Research Model



The establishment of an identified path model then allows us for testing of the hypothesized relationship of the constructs as outlined in the proposed research model.

Table 11: Testing the proposed model with Regression Weight

			Estimate	S.E.	C.R.	P	Relationship
BI	<---	TB	0.112	0.042	2.634	0.008	Significant
BI	<---	RA	0.006	0.032	0.186	0.852	Not Significant
BI	<---	OB	0.103	0.036	2.848	0.004	Significant
BI	<---	CL	-0.294	0.045	6.564	***	Significant
BI	<---	CB	0.404	0.049	8.17	***	Significant

Table 11 shows the result of the path analysis that was conducted to check the relationship between the multiple constructs. So as per the result Compatibility, Observability and Triability were found to be positively statistically significant and can affect the Behavioral Intention of adoption of mobile banking services in the Indian context and Complexity influence behavioral intention to use mobile banking services negatively. So the hypotheses H2, H3, H4 and H5 are accepted and H1 is rejected.

V. DISCUSSIONS AND SUGGESTIONS

Based on the results of research and discussion that has been described in the previous chapter, it can be drawn some conclusions as follows:

- 1 There is a significant Positive effect of Compatibility and Behavioral Intention to use m-banking services.
- 2 There is a significant Negative effect of Complexity and Behavioral Intention to use m-banking services.
- 3 There is a significant Positive effect of Triability and Behavioral Intention to use m-banking services.
- 4 There is a significant Positive effect of Observability and Behavioral Intention to use m-banking services.

The researcher has suggested that all the banks should offer m-banking services that are compatible with various current user requirements, past experiences, lifestyle and beliefs in order to fulfill customer expectations. To increase the rate of adoption of m-banking services complexity, triability, observability and ease of use should be increased. Hence, banks should focus on understanding the customers need and designing the application which is easy to use. Customers should also be given a chance to try the application on their own handsets. Also, banks should give timely and updated information to the customers about their developments this will enhance the rate of adoption of m-banking users.

VI. CONCLUSION

This study has used snowball sampling technique for collection of data. Thus it would be very difficult to generalizethe findings. The mobile banking is at nascent stage in India so adoption rate is less, so, it is the need of the hour to increase the rate of adoption by understanding the customer and its need. Further research is also needed to categorizethe additional factors that will also help in increasing the rate of adoption of m-banking services in India. Moderating variables like age, education, and experience may also be added to get more insight into the findings for future studies.

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