

Analysing the Barriers towards Sustainable Financial Inclusion using Mobile Banking in Rural India

Abhishek Behl*¹ and Abhinav Pal²

¹Symbiosis Centre for Management and Human Resource Development, Symbiosis International University, Pune - 412115, Maharashtra, India; abhishekbehl27@gmail.com;

²Symbiosis School of Economics, Symbiosis International University, Pune - 412115, Maharashtra, India; abhinav.pal@sse.ac.in

Abstract

Background/Objectives: The paper aims to develop a relationship between perception of users and degree of usage of mobile banking and also study barriers associated with usage of mobile banking in rural India. **Methods/Statistical Analysis:** The paper uses Technology Acceptance Model (TAM) and inter mixes the concepts with innovation of diffusion theory. Structured Equation Modelling (SEM) is used for data analysis in this study as it would be helpful in calculating and measuring the interrelation between the identified dependent factors for successful diffusion of mobile banking. The fitness of measurement model was also judged using Confirmatory Factor Analysis (CFA) thereby contributing towards reliability and validity of the framework. **Findings:** The results indicate that usage of the mobile banking technology is largely driven by perception of users and potential users. The results reveal that perception whether it is towards usefulness, ease of use or risk aversion plays an important role towards degree of diffusion of mobile banking in rural setup. The result proposes that the diffusion of mobile banking by banks and financial institutions need to study the degree of perception towards credibility risk before upgrading the technology. The longevity of mobile banking is also supported by the perception of users and influence of peer pressure. **Applications/Improvement:** The study also contributes towards understanding and relating perception of the users and the technical aspect of the system i.e. risks predicting the behaviour of the users of mobile banking.

Keywords: Barriers, Financial Inclusion, India, Mobile Banking, Rural, Sustainability

1. Introduction

The world has experienced a rapid growth and advancements in technology in recent times. The growth is substantial in all facets of technology and wireless and mobile technology has been one of the applied field¹. These advances and development in the key areas of mobile technology have positively impacted customer interactions with the service providers and also modified the flow of money in the financial markets². This remarkable growth of the wireless and mobile technology has provided firms with a lucrative channel for creating commercial opportunities and its applications are spread over various sectors like transportation, retail, tourism etc. The financial sector is one such sector where mobile banking is a channel to augment the accessibility of the

financial sector, given the prevalence of mobile phones and wireless data services, mobile banking has become one of the important ways to cater to customer needs by banks³.

The advent of mobile banking has a major significance of providing financial services in areas where banks are not easily accessible⁴. This is further validated by the fact that the tele-density in India has witnessed an increasing trend over the last few years, as highlighted in the Telecom Regularity Authority of India⁵ report. Against this backdrop, it can be said that there is intensive penetration of mobile technology in the rural areas of India as well and, this in tandem with mobile banking can prove to be instrumental towards solving the problem of financial inclusion in an efficient manner.

*Author for correspondence

However, in spite of an intensive penetration of mobile technology, the adoption of mobile banking has not been very promising. The study intends to frame a conceptual model of factors which determine the behaviour intention of adopting mobile banking in addressing the problem of financial inclusion.

A thorough analysis of past literature reveals that while there have been ample studies and research on Internet banking; there is a paucity of research on mobile banking¹. Past research and studies that have focused on comprehending an individuals' adoption of mobile banking, primarily hinges on considering mobile banking as a technological innovation to augment the accessibility of the financial services industry⁶. One of the most popular and significant theories pertaining to adoption of a technological innovation by an individual is the Diffusion of Innovation Theory (DIT). DIT attempts to explain the intricate reasons behind the rate of spread and penetration of any technological innovation⁶. While, studies⁷ has put forth the "innovation diffusion" model, which asserts that "diffusion of a technological 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, behaviour, or physical innovation"². Another model that attempts to study and gauge the rate of adoption of a new technology or innovation is Technology Acceptance Model (TAM) which asserts that an individual's adoption of a new technology or innovation is driven by his intention, which is further determined by his trust on the system⁸. The paper intends to extend and apply TAM in the Indian context to study the behaviour intention towards mobile banking in the rural India.

The study aims to build a reliable and valid framework for "Readiness for adopting technology" based on the key constructs derived from Structured Literature Review. The study also attempts to measure the effect of extraneous variables like perceived risk which would add to the degree of robustness of the model. The following section briefly describes the variables used to develop the framework. The section discusses the importance and viability of these variables as well using Structured Literature Review⁹.

1.1 Readiness to Adopt Technology (RAT)

The financial industry has experienced perpetual infusion of technology and innovation. Different set of technology like internet banking, mobile banking, e-commerce etc

have variable adoption rate over different geographical regions of the world^{10,11}. The diffusion of these technologies has been an area of research which has been well researched on. There exist a number of models to gauge the acceptance rate of a particular technology, few of which are which are Unified Theory of Acceptance and Use of Technology (UTAUT), Technology Acceptance Model (TAM), Theory of Planned Behaviour (TPB) etc. The present study aims to understand the variables which lead to a higher rate of readiness of end users of mobile banking in rural India.

1.2 Perceived Usefulness (PU) and Perceived Ease of Use (PEOU)

Behaviour of an individual is closely related to the perception which he/she has. Technology based models since their inception have used perception as one of the key components in understanding the rate of diffusion of technology. The perception of an individual is usually split into "Ease of Use" and "Usefulness". The study uses both the sub sections to gauge the degree of readiness of users towards mobile banking in rural India. Their importance gains more prominence when applied to newer technology in an unexplored arena. Perceived Usefulness is basically defined as the degree of trust or belief an individual has on the ability of the new technology to cause better productivity or performance of his work. Perceived Ease of Use is defined as the level of trust of an individual that there will be no hindrance in the process of using the new technology¹².

Few studies have focused on the acceptance and adoption of new technology in the rural landscape, stressing on its applicability in the financial supply chain. The studies have further found out that both PU and PEOU are positively correlated with the behavioural intention of the final user¹³⁻¹⁶. The study therefore proposes the following:

- PU will have positive significant impact on the behavioural intention towards mobile banking.
- PEOU will have significant impact on behavioural intention towards Mobile banking.

1.3 Societal Influence (SI)

Society plays a vital role in impacting the decision taken by an individual; this has been vindicated by various studies. According to studies¹⁷, societal influence is the level

of trust an individual has about his/her being a part of the section of taskforce which uses the new technological product. SI stems from the TAR model which highlights a direct relation between SI and BI. The Innovation Diffusion Theory (IDT), also studies the relation between SI and BI. Various theories have proposed different interpretation of the same existing relationship; however the degree of relationship between the two remains almost the same. This construct gathers more importance in a rural area, where majority of the population is not exposed to education. Studies also point out that SI plays an important part in various studies which consist of innovation and technology diffusion in the financial sector as the cynosure of the study¹⁷⁻¹⁹. The usage of mobile banking also falls under the purview of technology adoption and, thus societal influence plays an instrumental role for a higher acceptance or adoption rate. The study proposes the following relationship:

- Societal influence will have a positive impact on behavioural intention to use the mobile banking services.

1.4 Facilitating Conditions (FC)

The success of adoption of any innovation or a technology hinges on the facilitating condition which is defined as the level of trust or belief an individual has about the presence of adequate and sufficient technical and organisational setup to facilitate, augment and supplement the applicability and usage of a system¹⁷. This construct is analogous to an incubator which facilitates the process of hatching eggs. Successful penetration of any technology would be contingent on supporting conditions. It becomes an imperative to focus on this construct, when there are stakeholders providing services as different entities. Therefore, a well balanced and synchronised supply chain will be playing an instrumental role in provision of M-banking services in the rural areas. The study proposes:

- FC has a positive impact on behavioural intention of Mobile banking.

1.5 Perceived Credibility of Risk (PC)

Studies have indicated that majority of the population will have limited exposure and lesser orientation towards both financial and technological systems in rural India. This

instils an element of credibility risk amongst the users for mobile banking. Perceived risk is best defined as the level of belief or trust an individual has about a particular system is devoid of privacy and security threats²⁰. The two aspects i.e. privacy threats and security threats^{21,22} have been carefully studied and in totality represent perceived credibility of risk. Although, there are quite some number of studies which have used credibility of risk, handful of them integrate perception of users towards the terminology. It therefore becomes vital to understand the degree of risk and the component of perception in it as well. The variable is most of the studies have acted as extraneous in nature which makes it challenging to record the exact effect in an implementation scenario. The present study aims to address the following challenges and study it in a rural Indian context.

1.6 Behavioral Intention (BI)

The study attempts to relate the perception based constructs to understand the intention of users to use mobile banking and therefore, Behavioral Intention is being used for this study. The variable is derived from existing technology acceptance model and theory for planned behavior. The terminology is an additive term derived by understanding the behavior and intention towards it. Studies²³ defined behavioral intention as “the subjective probability of performance of any particular behavior in any particular situation”. The variable although is qualitative in nature, but holds ample importance in studies pertaining to diffusion of technology.

Figure 1 reflects interdependence of the identified variables to understand the behavioral intention towards usage of mobile banking in rural India. The theoretical framework confirms that behavioral intention is primarily a function of technology adoption readiness and perceived credibility risk.

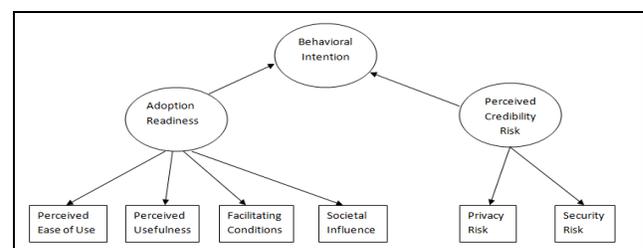


Figure 1. Theoretical framework with proposed linkages between variables.

The model has re-arranged the constructs from the original model of TAM to develop a best reliable fit for understanding diffusion of mobile banking in rural India. Table 1 gives a brief summary of the constructs extracted from the literature.

The objectives of the study are as follows:

- To derive barriers responsible for diffusion of mobile banking in rural areas.
- Develop a conceptual framework in order to enhance diffusion of mobile technology for financial inclusion in rural India.

The present study hypothesizes the following relationship:

- H1: Readiness to Adopt Technology positively influences behavioural intention towards usage of mobile banking.
- H2: Perceived Credibility Risk negatively influences behavioural intention towards usage of mobile banking.

2. Research Methodology

Data collection was done using a structured questionnaire. Special care was considered regarding the reliability and validity of the questionnaire as the constructs were drawn from existing models. Content validity and face validity was checked for every item of the construct²⁶. The questionnaire was split in two sections, the first one aimed at recording demographic data shown in Table 2 while the second section aimed at recording the responses on the items used to measure the constructs. The responses to second part of the questionnaire were recorded using a seven point Likert scale with 7 being strongly agree and 1 being strongly disagree. The target audience was selected

Table 1. Details of Constructs with their references

Constructs	References
Readiness to Adopt Technology	10,11,24
Perceived Usefulness and Perceived Ease of Use	13,14,15,16
Societal Influence	17,18,19
Facilitating Conditions	17
Perceived Credibility of Risk	20,21,22
Behavioural Intention	10,11,24,25

Table 2. Demographic profile of respondents

Demographic Factor	Option	% of Respondents
Gender	Male	71
	Female	29
Educational Background	Literate	11
	Functionally Literate	89
Age	20-30	49
	30-40	38
	More than 40	13
Usage patterns	Users	62
	Potential Users	38
Awareness	Yes	86
	No	14

from the eight blocks of Ajmer, Rajasthan. At least two villages from every block were chosen randomly to collect data. Ajmer was chosen as most of the pilot studies were implemented in the district. The questionnaire was converted in local language as well to record genuine responses from the audience and it was backed up with a manual to simplify asking and recording answers. The study recorded 292 complete data points from 400 respondents approached. The questionnaire was peer administered to collect genuine responses from the target audience comprising of both users and potential users of mobile banking.

3. Results and Discussion

Data Mining was the first step taken before proceeding towards data analysis. SPSS was used for the process of data mining. Structured Equation Modelling (SEM) was used for data analysis in this study as it would be helpful in calculating and measuring the interrelation between the identified dependent factors for successful diffusion of mobile banking²⁷. The fitness of measurement model was also judged using Confirmatory Factor Analysis (CFA) which also contributed towards determining the reliability and validity of the framework. The presence of multiple items in PC Risk and TAR lead to the use of CFA on them while BI was skipped because of its uni-directional nature. The instrument was also found to be reliable with Chronbach alpha greater than 0.7 along with

factor loading value which was also found to be greater than 0.7.

The first step of analysis led to omission of three items after applying CFA. The second order of CFA led to dropping the facilitating condition as a construct because of a significantly high factor cross loading with PC risk²⁸. Table 3 and Table 4 represents the results derived after dropping the necessary constructs after perform the first and the second order of iteration of CFA. The test for degree of freedom was also passed which can be inferred from the tables. The cut off value with standard loadings was found to be greater than 0.6 at significance level of 0.001 was also found to be cleared for every item of the questionnaire. It was also seen that average item to factor loading also clears the cut off value of 0.7 which confirms convergent validity of the measured constructs. A parallel test for testing convergent validity was also conducted using variance extracted estimates and the results indicate affirmative results²⁶.

Table 3. Validation of Measurements

Variables	Indicator	Factor Loading	CR Value	LA	CA	Composite Reliability	AVE
Perceived Ease of Use	PEOU4	0.78		0.81	0.86	0.81	0.65
	PEOU2	0.85	27.25				
	PEOU1	0.79	18.25				
Perceived Usefulness	PU2	0.71		0.82	0.84	0.79	0.64
	PU3	0.78	22.87				
	PU4	0.86	18.97				
Societal Influence	SI3	0.72		0.82	0.84	0.8	0.62
	SI1	0.81	24.14				
	SI2	0.77	23.57				
Security Risk	SR3	0.75		0.78	0.82	0.81	0.58
	SR2	0.81	28.45				
	SR1	0.68	23.15				
	SR4	0.82					
Privacy Risk	PR2	0.62	22.31	0.73	0.84	0.78	0.61
	PR1	0.72	20.87				
	PR4	0.86					
	PR3	0.67	21.72				

Note: Significant at *p<0.005. **p<0.01; ***p<0.001

LA-Loading Averages; CA-Cronbach's Alpha; CR-Critical Ratio; AVE-Average Variance Extracted; CMIN=167; NFI= 0.98; CFI=0.97; GFI=0.98; RMSEA=0.059.

Nomological validity was also confirmed by observing a significant correlation between the constructs. Discriminant validity on the other hand was also confirmed as variance between pairs of sets of constructs is lesser than corresponding value of variance extracted. To summarize, the developed model was found to be valid and reliable.

Diagonal vales represent AVE. Values above the diagonal values represent inter-construct correlations and values below the diagonal represent shared variance.

The empirical model is developed using the remaining items of CFA. Table 5 reflects the empirical estimates of each of the constructs and it can be inferred that data supports the developed conceptual framework. The results can be used to test the hypotheses which were derived from Figure 1. The results prove that RAT is a function of SI, FC, PU and PEOU which is confirmed by the results of path analysis. The results also depict that FC although is a

Table 4. Validation of the measurement model – discriminant and nomological validity

	1	2	3
Perceived Ease of Use	0.65	0.78	0.61
Perceived Usefulness	0.54	0.75	0.71
Societal Influence	0.49	0.48	0.55
	1	2	
Security Risk	0.54	0.71	
Privacy Risk	0.51	0.55	

Significant at ***p<0.001

Table 5. Results of Hypothesis Testing

	Hypothesized Path	Standardized estimate	SE	CR
H1	PEOU <--- RAT	0.87	0.132	11.235**
	PU <--- RAT	0.901	0.074	13.215**
	SI <--- RAT	0.624	0.054	7.213**
	BI <--- RAT	0.735	0.241	13.283**
H2	PR <--- PC	1.106	0.198	4.741**
	SR <--- PC	0.712	0.213	5.213**
	BI <--- PC	-0.32	0.216	-3.743**

Significant at *p<0.05, **p<0.001

SE-standard error, CR-critical ratio; CMIN (df) = 370(113); NFI = 0.845; CFI = 0.912; RMSEA=0.05

dependent factor but does not contribute significantly in RAT in comparison to the other three factors.

The results approve that the first hypothesis holds true as there is a significant positive influence of RAT on the behavioural intention and indirectly on the usage of mobile banking. The results also support that PC is found to be function of PR and SR. A positive and significant correlation can be drawn from PC risk and Behavioural Intention which is supported by the results. Therefore, it can be interpreted that higher the degree of risk, lower will the behavioural intention to adopt mobile banking.

The results indicate that usage of the mobile banking technology is largely driven by perception of users and potential users. The results reveal that perception whether it is towards usefulness, ease of use or risk aversion plays an important role towards degree of diffusion of mobile banking in rural setup. The result proposes that the diffusion of mobile banking by banks and financial institutions need to study the degree of perception towards credibility risk before upgrading the technology. The longevity of mobile banking is also supported by the perception of users and influence of peer pressure. The results support the arguments made by theory developed by²⁹ which relates barriers of mobile banking using Interpretive Structural Modelling. The results are also in sync with earlier found results^{20,30}. The results also support that there is a significance role of security and PR in developing public perception towards credibility of using mobile banking for financial transactions. Research needs to be carried out in making the electronic mobile transfer fraud free. An approach towards the same could be enhancement of telecom network to ensure minimal issues while transaction. A parallel approach could be enhancement of technology self-efficacy among the users by imparting training to use the mobile banking instead of using conventional banking.

The results reveal that facilitating conditions does not play a significant role towards changing the behavioural intention of individuals which was contradictory to earlier studies³¹. The availability of smart phones and reduced cost of mobile packs might be one reason which might have led to such a result. Apart from this, the results are almost in sync with previous studies conducted along the lines. In a rural setup, the culture helps binding the people together and peer pressure helps people to connect with each other which are evident from the results as well³². The result also posits that increased usage of mobile banking would make them more proficient. This would

reduce their reliability on bank branches and would lead to increase in productivity of banking and contribution towards financial inclusion.

4. Conclusion

The results of the study would contribute in developing a new framework and understanding a fresh perspective towards behavioural intention of users of mobile banking. The study also contributes towards understanding and relating perception of the users and the technical aspect of the system i.e. risks predicting the behaviour of the users of mobile banking. The study would be helpful for the banking industry and telecom operators to reconsider their strategies to facilitate the diffusion plans of mobile banking in other areas. The results would also instil thoughts in the minds of stakeholders which can therefore act on the loop holes to provide better and enhanced efficiency of mobile banking in rural areas to cater towards financial inclusion of the country.

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6. References

1. Yu CS. Factors affecting individuals to adopt mobile banking: Empirical evidence from the UTAUT model. *Journal of Electronic Commerce Research*. 2012 May 1; 13(2):104.
2. Behl A. An exploratory study of telecommunication sector for selected countries. *Indian Journal of Science and Technology*. 2015 Dec; 8(34):1-9.
3. Donner J, Tellez CA. Mobile banking and economic development: Linking adoption, impact and use. *Asian Journal of Communication*. 2008 Dec; 18(4):318-32.
4. Klein M, Mayer C. Mobile banking and financial inclusion: The regulatory lessons. *World Bank Policy Research Working Paper Series*. 2011.
5. TRAI Report. 2015. Available from: <http://www.trai.gov.in/WriteReadData/WhatsNew/Documents/PR-34-TSD-Mar-12052015.pdf>
6. Al-Jabri IM, Sohail MS. Mobile banking adoption: Application of diffusion of innovation theory. *Journal of Electronic Commerce Research*. 2012; 13(4):379-91.

7. Rogers EM. *Diffusion of Innovations*. 4th ed. New York: ACM the Free Press; 1995. p. 15–23.
8. Peisker A, Dalai S. Data analytics for rural development. *Indian Journal of Science and Technology*. 2015 Feb; 8(S4):50–60.
9. Tranfield D, Denyer D, Smart P. Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *British Journal of Management*. 2003 Sep; 14(3):207–22.
10. Howcroft B, Hamilton R, Hewer P. Consumer attitude and the usage and adoption of home-based banking in the United Kingdom. *International Journal of Bank Marketing*. 2002 Jun; 20(3):111–21.
11. Liao S, Shao YP, Wang H, Chen A. The adoption of virtual banking: An empirical study. *International Journal of Information Management*. 1999 Feb; 19(1):63–74.
12. Davis FD. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*. 1989 Sep:319–40.
13. Davis FD, Bagozzi RP, Warshaw PR. User acceptance of computer technology: A comparison of two theoretical models. *Management Science*. 1989 Aug; 35(8):982–1003.
14. Davis FD, Venkatesh V. A critical assessment of potential measurement biases in the technology acceptance model: Three experiments. *International Journal of Human-Computer Studies*. 1996 Jul; 45(1):19–45.
15. Featherman MS, Miyazaki AD, Sprott DE. Reducing online privacy risk to facilitate e-service adoption: The influence of perceived ease of use and corporate credibility. *Journal of Services Marketing*. 2010 May; 24(3):219–29.
16. Hess TJ, McNab AL, Basoglu KA. Reliability generalization of perceived ease of use, perceived usefulness and behavioral intentions. *Mis Quarterly*. 2014 Mar; 38(1):1–28.
17. Behl A, Singh M. Critical analysis of management information system of selected Indian microfinance institutions. *Procedia-Social and Behavioral Sciences*. 2014 May; 133:20–7.
18. Baker EW, Thatcher JB, Gundlach M, McKnight DH. The influence of social aversion and institution-based trust on computer self-efficacy, computer anxiety and antecedents to IT use. *JOEUC*. 2014 Jan; 26(1):1–26.
19. Kleijnen M, Wetzels M, de Ruyter K. Consumer acceptance of wireless finance. *Journal of Financial Services Marketing*. 2004 Mar; 8(3):206–17.
20. Wang YS, Wang YM, Lin HH, Tang TI. Determinants of user acceptance of Internet banking: An empirical study. *International Journal of Service Industry Management*. 2003 Dec; 14(5):501–19.
21. Hernandez B, Jimenez J, Martin MJ. Extending the technology acceptance model to include the IT decision-maker: A study of business management software. *Technovation*. 2008 Mar; 28(3):112–21.
22. Thakur R, Srivastava M. Customer usage intention of mobile commerce in India: An empirical study. *Journal of Indian Business Research*. 2013 Mar; 5(1):52–72.
23. Douglass RB, Fishbein M, Ajzen I. *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research*. 1977.
24. Tan M, Teo TS. Factors influencing the adoption of Internet banking. *Journal of the AIS*. 2000 Mar; 1(1):5.
25. Sathye M. Adoption of internet banking by Australian consumers: An empirical investigation. *International Journal of Bank Marketing*. 1999 Dec; 17(7):324–34.
26. Fornell C, Larcker DF. Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*. 1981; 18(1):39–50.
27. Hair JF, Black WC, Babin BJ, Anderson RE, Tatham RL. *Multivariate data analysis*. Upper Saddle River, NJ: Pearson Prentice Hall; 2006.
28. Anderson JC, Gerbing DW. Structural equation modelling in practice: A review and recommended two-step approach. *Psychological bulletin*. 1988 May; 103(3):411–23.
29. Kumar VR, Sethi M, Krishnakumar D. Transforming banking through telecom-an approach. *Indian Journal of Science and Technology*. 2015 Feb; 8:1–12.
30. Luarn P, Lin HH. Toward an understanding of the behavioral intention to use mobile banking. *Computers in Human Behavior*. 2005 Nov; 21(6):873–91.
31. Taylor S, Todd PA. Understanding information technology usage: A test of competing models. *Information Systems Research*. 1995 Jun; 6(2):144–76.
32. Rao YV, Budde SR. Banking technology innovations in India: Enhancing customer value and satisfaction. *Indian Journal of Science and Technology*. 2015 Dec; 8(33):1–10.