Mobile Banking – An Answer to Financial Inclusion in Hilly Rural India.

Anil Mehta; Deepankar Chakrabarti; Rajeev Srivastava; Ranjeet Mehta

Abstract: Financial Inclusion is still a major challenge for the India, despite of being one of major agenda since 2004-2005, due to difficulty in reaching far flung areas of the country comprising 600,000 villages. This has huge implications on economic development of the country. Therefore there is regular thrust from Government of India (GoI) to bring everyone to the ambit of formal banking system through various schemes. Mahatma Gandhi National Rural Employment Act (MGNREGA) is one of the major GoI schemes that have contributed significantly to financial inclusion in India. India has more mobile connections compared to banking accounts, therefore GoI in Economic Survey 2014-15, proposed JAM (JanDhan Yojana, Aadhar Number and Mobile Number) trinity to use ICT for more efficient and effective spread of formal banking even to the hilly areas where brick and mortar banks are difficult to build and sustain. Hence to understand the constructs of mobile banking adoption for financial inclusion in Champawat district of Uttarakhand, India under MNREGA, this research discusses revised technology acceptance model (TAM) and carefully picked constructs from literature review which were weaved together by using Total Interpretive Structural Modeling (TISM) to form a conceptual model for Champawat District of Uttarakhand, India.

Keywords: Financial Inclusion, Mobile Banking, Technology Acceptance Model (TAM), Intention Behavior, Hilly Rural India, Total Interpretive Structural Modeling (TISM)

I. INTRODUCTION:

The world is undergoing a dramatic transformation. It’s been more than 2 decades since mobile and internet came into India and since then technological evolution in the country is on fast track and getting faster with each passing year. Mobile technologies not only helping business houses in improving operations, cost cutting, new customers and markets reachout, it has also created altogether new ways to do business and helped in designing and developing new industry/workforce. In the same lines, banking across the globe is no longer the same traditional business now. Mobile banking provided a channel to customers to access all banking services without visiting banks and also independent from location of customer or bank. (Donner & Tellez, 2008)

One of the major significance of mobile banking is that it has reduced the physical distance between customers and banks, which have made banks more accessible. Also, now various banking transactions can be done irrespective of time and location (Klein & Mayer 2011; Kleijnen et al., 2004; Herzberg, 2003). The above is validated by Telecom Regulatory Authority of India report on mobile subscribers in India, by June 2018 there were more than 116 Crore active mobile connections in India (Economic Times, Aug 2018). The number clearly indicates the amount of diffusion of mobile technology even in far flung villages of India and therefore mobile banking can be one of the most successful and efficient tool to enhance financial inclusion.

After agricultural and industrial revolution, ICT has been considered as the biggest evolution. However, despite of such diffusion of mobile technology, adoption and usage of mobile banking is very bleak. (Behl & Pal, 2016; Bank of America Merrill Lynch Report, 2015; Upadhyay & Jahanyan, 2016; Magotra, 2016; Singh, 2015; Nayak et al, 2014; Bamoriya & Singh, 2011).

The literature review shows many studies were done on mobile banking and its adoption under various demography and geographical setup, however there is dearth of research on mobile banking in Champawat district of Uttrakhand, India.

II. OBJECTIVE

Identification of constructs, resulting in the adoption of mobile banking in Champawat district of Uttrakhand, India. To develop a conceptual model to understand the effect of BI on mobile banking usage in Champawat district of Uttrakhand, India.

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And most importantly, Information & Communication Technology has been the quickest consumer level technology which covered both depth and breadth in history of human society (Ali & Kaur, 2015; Jack&Suri, 2011). The customer interface with the service providers have been positively impacted due to evolution and breakthroughs in few of the major areas of mobile technology and also brought many innovative techniques to infuse money in economy (Behl 2016). Similarly, the significant development in information & communication technology gave industries a new way to think of designing and developing avenues for business and the applications are industry agnostic. In the same way mobile banking provided a channel to customers to access all banking services without visiting banks and also independent from location of customer or bank. (Donner & Tellez, 2008)
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III. LITERATURE REVIEW

During all these years various studies were undertaken by using Theory of planned behavior (TPB), Theory of reasoned action (TRA) and Technology Acceptance Model (TAM) to understand the behavioral intention in using information and communication technology. The above mentioned models are the most studied and researched models to understand and predict behavioral intention of users towards technology under different geography and demography (Szajna, 1994; Gefen & Straub, 2000; Gefen, 2000; Igbaria et. al, 1995; Chau & Hu, 2001). TAM, (Davis 1986) is maximum studied model to understand behavioral intention of users towards adoption of information technology. (Hong et. al 2002) argued, one of the principal advantage to use TAM is that it gives a structure to study and examine influence of external variables on adoption and usage of new system. The external variables could fall under any category whether it is a humanitarian aspect, knowledge aspect or logistics aspect. Many studies were undertaken using TAM to understand the adoption of Mobile Banking across globe. (Kumar et al., 2017; Mortimer et al., 2015; Jeong & Yoon, 2013; Norzaid et. al., 2011; Luarn & Lin, 2005). This research took revised TAM framework (Davis, 1989) which was further undertaken many empirical studies which emphasized that PEOU and PU mediated effect of external factors on behavioral intention of users to adopt and use technology (Kesharwani & Singh 2012; Kim et. al 2008; Zhou et. al, 2007), and found that attitude did not mediate PEOU and PU while influencing behavioral intent of users to adopt and use of technology (Gefen et. al, 2003; Hong et. al, 2001; Venkatesh and Morris, 2000; Lopez & Manson, 1997; Igbaria et. al, 1996; Szajna, 1996; Venkatesh and Davis, 1996). (Barroso & Flores, 2014) opined that consumer adoption intention towards mobile banking was affected mainly by convenience and ease of use. Mobile phone has been used from mobile commerce (shopping, banking etc.) to entertainment services, therfore mobile technology has been the favorite piece of researchers to verify and validate the application of TAM and understand the user adoption. (Wessel & Drennan 2010; Wu & Wang, 2005; Luarn & Lin, 2005; Nysveen et al., 2005).

![Fig 1 – Revised TAM, Davis 1989](image)

Revised TAM was suggested by Davis in the year 1989, as shown in Figure 1, where behavioral intention is dependent on PU and PEOU, here former is defined as “the measure of belief of an individual has perceived that his/her work will improve by using a given system”. (Kumar et al. 2017; Mortimer et al. 2015; Hanafizadeh et al. 2014), showed that perceived usefulness positively effects the behavior intention towards use of mobile banking. Revised TAM, defined that PEOU “the measure of belief an individual perceives the working with given system is effort less” (Davis 1989).

It is implicit to adopt anything we need to have access to it. (Kim et. al, 2019; Al-Qeisi et. al, 2014; Brown et. al, 2012; Park et. al, 2012, Hsiao & Yang, 2011, Lin&Lu, 2000; Davis, 1989) indicated that accessibility is an important influence on the adoption of information technology. (Ives et. al, 1983), introduced convenience of access as factor impacting adoption of information systems. Various studies undertaken to understand the adoption of mobile and e-learning system observed accessibility as major influencer. (Almaiah & Alismaiel, 2018; Salloum & Shaalan, 2018; Debei, 2014).

Accessibility removes the physical and spatio-temporal limitation of a service and the statistical correlation linking Perceived Accessibility and Perceived Ease of Use (PEOU) was observed by (Hsiao & Yang, 2011). (Suoranta M, 2003), found that accessibility as one of the most significant triggers for the adoption of mobile banking.

Another most studied construct in technology adoption is the influence of society. Subjective norm have been embeded in TAM as influencer of behavior intention to adopt technology. (Samodra & Mariani 2013; Legris et al., 2003; Venkatesh & Davis, 2000). The subjective norm refers to “individual’s perception about opinion of other individual, whose perception and beliefs are important for him or her, to use the given system” (To et. al 2018; Yean et. al, 2015). There were many studies which shows the influence of subjective norm towards the effort of using mobile banking (Binaymin et. al 2018; Tan & Lau, 2016; Sripalawat et al., 2011; Dasgupta et al., 2011; Puscel et al., 2010; Riquelme & Rios, 2010; Amin et. al., 2008;).

(Park et. al, 2012) points out that trust is yet another construct to understand the better rate of diffusion of technology. On the same lines (Afshan & Sharif, 2016, Zhou, 2011; Gu et. al, 2009;) observed that helping customers to overcome security & privacy risks to develop trust will contribute in adoption of mobile banking. (Schnall et. al 2015) opined that trust came out as prominent influencer in case mHealth technologies.

(Bhatt&Bhatt, 2016) found faster responses from service providers help customers in adopting mobile banking services. The same observations were also done by (Hoehle et. al, 2012) and concluded that responsiveness in completing a transaction is one of the key constructs to control choice for any particular technology. (Kesharwani & Singh, 2012, Shu & Strassmann 2005) supported the argument that responsiveness helps to increase the satisfaction level of customers and improves its willingness of technology usage.

(Venkatesh and Davis, 2000; Davis et. al, 1992) used extended TAM in their respective studies and found quality of the output as the major contributor towards Perceived Usefulness (PU) in case of Information & Communication Technology (ICT). In similar direction, it was found by many earlier researches that information quality effects the perception towards usefulness of information (Chopra & Sherry, 2014; Pelletier et. al, 2011; Loo et. al, 2011). A study was conducted by (Venkatesh and Davis, 2000) with respect to multiple technologies in banking and finance sector and found that customers opt for technology with greater output quality.
Improper terminology used in information systems was found to be a major problem in adoption of technology (Hong et al. 2002). Terminology used in any system aid much efficient use of resources and provides effective navigation through the same (Hong et al. 2002; Kim, 2006). A research was performed by (Vatsa et. al, 2010 and Puri 1997), which argues that mismatch in terminology used by information seeker and terminology used by information provider makes communicate with system difficult and also impedes maximization of the probable system benefits.

Self efficacy for a system can be defined as one’s perception with respect to the capability to use the system. (Compeau & Higgins, 1995). Further, various empirical studies have shown correlation of technology self-efficacy and Perceived Ease of Use (PEoU) (Jeong & Yoon, 2013; Sripalawat et al., 2011; Wang et al., 2006; Luarn & Lin, 2005).

Self efficacy was included as an external factor in revised TAM which can impact both PU and PEOU (Kesharwani & Singh, 2012; Kim et al. 2008). In some of the studies it was found that usage of system gets influenced by perceived usefulness and self-efficacy (Alalwan et al. 2016; Hong et al., 2002; Karahanna & Straub, 1999; Igbria et al., 1997;).

(Hu et al. 2019; Tan & Teo 2000) stated that adoption of new technology is influenced by Government support. Many studies in past where TAM was studied with respect to different technologies and geographical regions, it was found that intent to adopt technology was influenced majorly by government support. (Mandri & Chong 2018; Kirana et al. 2018, Marakarkandy & Dasgupta 2016; Haderi 2014; Moon & Bretschneider 1997). In an empirical study on online banking (Chong et al. 2010) supported the argument that government support plays major role in helping customer technology adoption.

Many previous studies on adoption of new technologies established that technical support plays very vital role in decision making of users in choosing technology (Zheng et al. 2018; Borchers & Bewly 2015; Russell & Bewley 2013; Chang et al. 2007). In terms of Information and Communication Technology applications like Internet Banking, Mobile banking, Mobile Computing Devices, personal computing, many researchers have found that intent to adopt and use the technology is influenced by technical support. (Son et al. 2012; Riguemle & Rios 2010; Chung & Kwon 2009; Shih & Fang 2004; Igbria et al. 1997).

The operational definition of identified constructs is shown below in Table 1.

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<thead>
<tr>
<th>Variables</th>
<th>Definition</th>
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<td>Perceived Ease of Use</td>
<td>“the degree of belief a person perceives the working with given system is effort less”</td>
<td>Saj &amp; Paul 2018; Al-Qessi et al. 2014; Brown et al. 2012; Hsiao &amp; Yang, 2011; Gu et al. 2009; Johnson &amp; Johnson, 1996; Davis, 1989</td>
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<td>Perceived Usefulness</td>
<td>“the measure of belief which an individual has perceived that his/her work will improve by using a given system”</td>
<td>Ma et al. 2017; Teo &amp; Noyes, 2014; Link &amp; Ting, 2012; Gu et al. 2009; Anderson &amp; Schzwager, 2004; Davis, 1989</td>
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<td>Accessibility</td>
<td>“the degree of ease through which information can be taken and used from given system”</td>
<td>Musa, 2006; Davis et al., 1989</td>
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**Subjective Norm**

“individual’s perception about opinion of other individual, whose perception and beliefs are important for him or her, to use the given system”

Al-Busaidi, 2013; Vermeulen et al., 2011; Brouwer et al., 2009; Francis et al. 2004; Ajzen, 1991;

**Self Efficacy**

“the degree of belief which an individual have in his/her capability to perform the given task”

Zheng et al. 2018; Picha & Howell 2017; Holden & Rada, 2011; Lamb et al. 2014; Mun & Hwang, 2003; Bandura 1986

**Output Quality**

“the degree to which a task performed by system matches job in hand.”

Putra et al. 2018; Lee et al. 2018; Venkatesh and Davis, 2000;

**Responsiveness**

“degree of timely response from a system on request of information”

Pai & Huang 2010; Tam & Tsang 2007; Wixom & Todd 2005

**Terminology**

“the body of terms and words used by the system”

Kim, 2006; Vaidyanathan et al. 2005; Hong et al., 2002

**Trust**

“An individual’s willingness to depend on another party because of the characteristics of the other party”

Marakarkandy & Dasgupta 2016; Gu et al. 2009; Gfen 2000; Mayer et al. 1995

**Government Support**

“the degree of legal and infrastructural support provided by Government to influence the adoption”

Tan and Teo 2000; Moon & Bretschneider 1997

**Technical Support**

“the degree of ease in accessing technical infrastructure and resources”

Chung & Kwon 2009; Taylor & Todd 1995;

**Behavioral Intention**

“degree of intent to use a system or behave specifically”

Hu et al. 2019; Park et al., 2012; Thong et al., 2006; Lin & Lu, 2000; Davis, 1993

**Actual Usage**

AU is defined as “actual behavior of people w.r.t usage frequency and volume based on users’ self report”

Wang & Liu 2009; Moon & Kim 2000;

**IV. RESEARCH METHODOLOGY**

The literature review clearly shows that there is scarcity of research on factors of mobile banking influencing its adoption in Champawat district of Uttarakhand, India w.r.t. financial inclusion. Therefore it is very important to study and understand the linkages between the constructs identified. To establish relationship between all the identified constructs Total Interpretive Structural Modeling (TISM) has been used to develop a conceptual model.

The steps discussed below and shown in Figure 2 are involved in TISM (Prasad et al. 2018; Jena et al. 2016) –
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Step 1: Identification of the constructs
The identification of constructs for mobile banking was done literature review as discussed above.

Step 2: Identification of links between the constructs
In this step, relationship between constructs will be established by understanding the effect of one construct on other constructs.

Step 3: Relationship Interpretation
Once relationship has been established, each identified construct will be compared to other constructs one by one. Therefore, there will be 156 pairs of comparison for 13 identified constructs. The existence or relationship will be depicted by “Y” whereas non-existence will be shown by “N”. Further, against each “Y”, one interpretive question about the way construct – A effects construct-B will be asked and answered.

Step 4: Development of Interpretive logic-knowledge base
In this step, each construct will be put into comparison with other constructs and existence or non-existence of relationship will be represented with letter “Y” or “N” respectively and for each “Y” further interpretation is done to understand the relationship.

Step 5: Formation of Reachability Matrix
Reachability matrix, as shown in table 2, will be formed by entering “1” for each existing relationship representing row construct is driving column construct. Final reachability matrix, as shown in table 3, was obtained by testing transitivity in an iterative approach and inserting the same into initial reachability matrix.

Step 6: Reachability Matrix – Level Partition
Under this step, reachability and antecedent set has been identified from initial reachability matrix, as shown in table 4, table 5, table 6 and table 7, through iterated process of level partitioning. A construct with similar intersection and antecedent set has been assigned a level and excluded from analysis.

Step 7: Construction of digraph
Digraph, as shown in Figure 3, is the pictorial representation of relationships between constructs. It shows construct and direction of relationship through node and directed lines respectively. The direction is obtained as per reachability matrix. Direct relationships were shown with solid lines where as indirect relationships are shown with dotted lines.

Step 8: Development of interpretive matrix
This binary matrix/MICMAC analysis, as shown in Table 8, will be developed by using digraph, mentioning relationships among various constructs from the interpretation given in interpretative logic-knowledge base. In this matrix 1 indicates the direct and transitive relation between constructs.

Step 9: Total Interpretive Structural Model
In the final step, TISM model will be developed using interpretative matrix and digraph. This will be final figure, as shown in Figure 4, showing all the relationships along with interpretation of the same. Each interpretation will be illustrated by the side of respective arrow link.

For the current study 17 experts were consulted to understand the relationship between various identified constructs. Expert group comprised of experts from various institution (Bank officials in the geographical area under study, Block Officers, MGNREGA executives, RBI, TRAI).

Fig 2 – Basic Steps Involved in TISM

Table 2 – Initial Reachability Matrix

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Table 3 – Final Reachability Matrix

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Table 4 – Interpretive Structural Model

I. Identify various factors to be linked
II. Identify relationships between identified factors
III. Interpretation of relationships
IV. Develop interpretive logic-knowledge base
V. Develop reachability matrix
VI. Level partitioning to determine level of all factors
VII. Prepare interpretive matrix from the final digraph
VIII. Develop a digraph from initial reachability matrix
IX. Develop the TISM model
(Terminology Clarity) doesn't influence the behavior intention and further actual usage of mobile banking in Champawat district of Uttarakhand, India. All these constructs come under “Autonomous” category in MICMAC analysis. This indicates the variety of constructs which influences the adoption of mobile banking in Champawat district of Uttarakhand, India. Therefore, to further push adoption of mobile banking services to improve financial inclusion would need determined endeavor on various facets. Further, these “Autonomous” constructs have higher dependence. This highlights that driver constructs are most important working on which will improve adoption of mobile banking.

From the analysis of results and MICMAC, following conceptual model, Figure 5, was derived:

**Analysis and Discussion** The research provides a TISM based conceptual model to enhance the mobile banking in Champawat district of Uttarakhand, India to improve financial inclusion. Both the driving and dependence of constructs will be established by direction of the link. The model depicts that mobile banking usage is primarily depends on PEoU and PU. It was also observed that in addition to core constructs influencing each other, six out of nine identified external constructs further influence these core constructs. After analysis it was also found that C7 (Response Time), C8 (Output Quality) and C9
V. MANAGERIAL IMPLICATIONS

Authors were not able to find any systematic study which will help to improve the adoption of mobile banking usage in Champawat district of Uttrakhand, India. This research will facilitate all the stakeholders involved in influencing the identified constructs and impacting their correlation. The MICMAC analysis clearly shows that constructs coming under “Driver” category would need maximum attention to improve the usage of mobile banking in the Champawat District. Most of the time, lot of efforts were put into dependence and lesser driving power constructs which leads to wastage of time. Therefore it’s very important to lay a strong foundation by working on “driver” constructs like perceived ease of use, perceived usefulness, accessibility, trust, technology self efficacy, subjective norm, technical support and government support to sustainable adoption strategy for mobile banking.

VI. CONCLUSION

This paper develops a conceptual model using TISM to present and interpret the hierarchical relationships between identified constructs for mobile banking adoption. Further, driver constructs and dependence constructs out of the identified constructs were segregated using MICMAC analysis. This paper has endeavored to present a conceptual model to all the stakeholders working towards adoption of mobile banking to enhance financial inclusion in Champawat district of Uttrakhand, India. In various studies, Mobile banking has been highlighted as the biggest disruption in the recent times which will and have been in some cases transformed the methods to do banking transactions. However, it is found that still lot of efforts is needed to bring the potential of mobile banking to reality as far as rural India is concerned. The categorization of drivers and dependents constructs will help government and industry to prioritize the factors.

Scope for further study

This may be the first systematic studies on constructs of mobile banking adoption in Champawat district of Uttrakhand, India. It gives a foundation to carry out further research in this area and help bankers, government and citizens to enhance adoption of mobile banking and further improve the financial inclusion. Future study can be undertaken to test and research these relationships formed by conceptual model. Also, develop strategies to work on identified constructs for better adoption and actual usage of mobile banking.
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