

A COMPREHENSIVE REVIEW OF EVOLUTION OF DIGITAL PAYMENT METHODS IN INDIA

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ABSTRACT

The historical transition in the banking and payment industry had begun in India in 1996 when ICICI Bank introduced Internet banking as an alternative mode of banking. From there onwards, the continuous technological advancements are the driving forces for digitizing the landscape of banking and payment industry in India to the next level. This review is an examination of past studies based on the evolution of internet banking to the emergence of digital payment methods. This study is an attempt to review literature of nationally and internationally reputed journals spanned from 1999 to 2022. The review apparently suggests that the adoption of internet/mobile banking will continue in the near future. The findings also evidently demonstrated that the factors affecting Internet/Mobile banking adoption then and now remained similar in nature. This study also offers a framework for the research scholars in this emerging research area.

Keywords: Internet banking, Mobile banking, Digital payment methods, Adoption, Technology, Demonetization, TAM, Trust, UTAUT model and COVID-19.

INTRODUCTION

Today technological innovations have become inevitable and carry radical transformations in all aspects of an individual's life. The expansion of Information and Communication Technologies (ICT), the internet and the mobile services have transformed the way people shop, study, work, communicate, travel and created many other useful devices for better living. Banking and payment are one such significant domains of an individual's life which have gone through the evolution from the paper-based payment system to the digital payment system. The very first initiative towards electronic payments services was taken by ICICI Bank in the year 1996 by introducing Internet banking in India. However, it was recognized by users in the year 1999 due to lower internet cost and increased awareness.

The journey of emergence of digital payment methods has witnessed many milestones but two major milestones namely the launch of Digital India Programme and demonetisation acted as a catalytic agent in creating awareness and the adoption of the digital payment system in India. Digital India Programme was launched in the year 2015, a flagship programme of the Government of India with a vision to transform India into a digitally empowered society by developing digital infrastructure as a basic utility to every single citizen. But digital payment methods actually gained awareness among common people of the nation during the event of demonetisation on 8th November 2016. The nation got aware and realised the need for alternative payment methods to survive the initial cash crisis. The adoption of "Faceless, paperless and cashless" is one of the professed roles of Digital India Programme and this is the turning point for the Indian banking and payment industry as well as for the ultimate user of the banking services.

Since the humble start of Internet banking in the year 1996 followed by mobile banking in the year 2002, it is the extensively researched topic amongst researchers to date. Ever since the emphasis of researchers were on factors influencing Internet banking/mobile banking (also includes mobile apps, e-wallets) adoption using prevalently models namely Technology Acceptance Model (TAM) (Davis, 1989), extended Technology Acceptance Model (TAM2) (Venkatesh and Davis, 2000), Unified theory of users' acceptance and use of Technology (UTAUT) (Venkatesh et al., 2003) and Innovation Diffusion Theory (Rogers, 1983).

The key objective of this study is to present the journey from the paper-based payment system to the digital payment system. For an in-depth analysis of factors affecting the adoption of internet banking/mobile banking this study reviewed the literature based on three key milestones of digital payment platform:

- Factors affecting traditionally cash-based economy moving to internet banking followed by mobile banking
- Impact of Digital India Programme and demonetisation
- COVID-19 effect

This study is an attempt to include all the phases associated with the evolution of digital payment methods in India. These three milestones have proved to be shaping the future digital payment in India. The objective of this paper is to identify the factors in the initial phase of internet banking to post COVID-19 which are affecting the adoption of digital payment methods. Also, it discusses the efficacy of the Digital India Programme in terms of basic infrastructure and digital literacy.

Payment System in India: An Overview

The Reserve Bank as the central bank of India has taken many initiatives towards introducing latest technology towards convenience banking from conventional banking system. In India, Banking sector accepted new technologies from 1980's through mechanization of cheque processing to progression of ATMs, NEFTs, automation (computerization) of branches (in 1990s) to adopting online and telebanking post 2000 (Unnithan & Swatman 2002), but there onwards observed a very slow progress on digital payments adoption by users (Gupta 2017). The figure.1 depicts the technological development of Indian banking system from manual system in early 1980s.

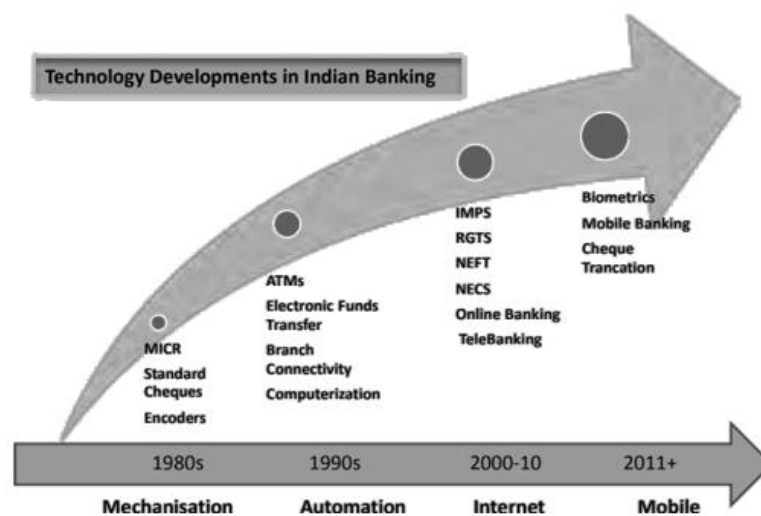


FIGURE 1
TECHNOLOGY DEVELOPMENT IN INDIAN BANKINGS

The two basic payment systems in India are:

- **Paper-based payment:** Cheques and demand drafts.
- **Electronic payments/Digital payments:** The Payment and Settlement Act, 2007 has defined digital payments as any “electronic funds transfer” means any transfer of funds which is initiated by a person by way of instruction, authorization or order to a bank to debit or credit an account maintained with that bank through electronic means and includes point of sale transfers; Automated Teller Machine (ATM) transactions, direct deposits or withdrawal of funds, transfers initiated by telephone, internet and card payment. It consists of terminologies such as ECS (Electronic Clearing Service), NEFT (National Electronic Funds Transfer), RTGS (Real Time Gross Settlement). Other digital payment systems such as banking card (debit and credit cards), Mobile banking system/apps, mobile wallets, Aadhar Enabled Payment System (AEPS), Unstructured Supplementary Service Data (USSD) (RBI, n.d.).

Evolution of Internet Banking to Digital Payment Methods

The Indian Banking and Payment System is continuously evolving since 1990 onwards to till date. The transition from paper-based banking and payment system digital payment system has been a challenge for the users. Although, digital payment methods are relevant and useful in today's time it has been observed in the past two decades that people still have many apprehensions with the use of technology. The main agenda of this review is to present the journey of evolution digital payments vis-à-vis an in-depth analysis of factors affecting the adoption of internet banking/mobile banking. It is also an attempt to gauge the performance of Digital India Programme and impact of demonetization and effect of COVID-19 in adoption of internet/mobile banking.

Research Methodology

For conducting the study, the authors have reviewed the literature of nationally and internationally reputed journals spanned from 1999 to 2022. The authors have used the following databases for literature search:

- Science direct (Elsevier)
- Emerald insigh
- Springer link
- Taylor and francis online
- Sage and others

LITERATURE REVIEW

The review of literature is a presentation of insight of the above stated three major milestones of digital payment platform in India. The meticulous investigation of each milestone is an attempt to understand the evolution of Internet banking to the emergence of digital payment methods and mapping out the factors affecting its acceptance then and now. Also, analyzing implementation of Digital India Programme vis-à-vis adoption of digital payment methods.

Factors Influencing the Adoption of Internet Banking Followed by Mobile Banking

In order to identify the factors influencing Internet banking then and now, the review contemplated various descriptive, exploratory and qualitative studies. Most of these studies used the seminal models of technology acceptance such as TAM, TAM2, TRA and UTAUT as the conceptual framework to conduct the research. Sharma explored challenges in e-banking, noting security concerns and limited digital literacy as major barriers to adoption. Accordingly, in this section, the review is specifically classified as

major influencing of Internet banking/Mobile banking factors down the timeline followed by studies based on seminal models of technology acceptance and service quality of Internet banking and Mobile banking.

In the context of factors affecting the adoption of Internet banking in the very nascent stage a pioneer empirical investigation, highlighted three main barriers *i.e.*, security concerns, lack of awareness and its benefits in the adoption of internet banking in Australia (Sathye 1999). During the initial years evidently security was the major issue for not banking online (Gupta & Sareen 2001; Mukherjee & Nath 2003; Laforet & Li 2005 and Iyengar & Belvalkar 2009). With the passage of time more of qualitative researches conducted to have deep understanding why people resisting the use of internet banking in Singapore and interestingly revealed new concern areas faced by the users. The concern areas were perceptions about risk, the need, lacking knowledge, inertia, inaccessibility, human touch; pricing and IT fatigue (Gerrard et al. 2006). An experimental study examined users' perception about online banking in China based attributes of online banking websites and determined that perceived ease of use and the privacy policy were found to have a substantial impact on online banking adoption (Hua 2009).

Trusting the technology for banking purposes is still difficult as in this industry human facet was highly dominant. Trust plays a critical role in the adoption of internet banking (Kim & Prabhakar 2000; Mukherjee & Nath 2003). Trust affected customers' online commitment to banks and willingness to engage in online transactions. Yousafzai, et al. (2009) examined that trust and perceived risk are directly associated with the intention to use the internet banking. The authors proposed trust as a multi-dimensional concept with three aspects which were perceived trustworthiness, perceived security and perceived privacy. They also developed a multi-dimensional model of trust in order to analyse the impact of trust in internet banking. The results of a study conducted by Kim, et al. (2013) proposed a model which outlined the factors of consumer perceived security and perceived trust, in addition to the effects of perceived security and perceived trust on the use of e-payment systems.

The study by Chang (2003) focused particularly on aspects of social structure concerning education and technology in Korea. The results suggested that the adoption of internet banking was dominated by demographics, the degree of exposure to internet banking and the features of the banks. Laforet & Li 2005) study gave an exhaustive insight into online and mobile banking in China. Chinese online and mobile banking users were primarily males irrespective of their age and education. Perceived risk, computer and technological skills and habit to carry cash were the main barriers towards the adoption of internet banking. Sharma and Pahuja examined service quality in Tricity banks, identifying reliability and responsiveness as key satisfaction drivers. Lack of awareness and understanding of the benefits of mobile banking were the obstacles in the case of mobile banking adoption. Srivastava (2007), the study was dedicated to understanding internet banking in India from the perspective of the consumer and offered a conceptual model which suggested technical skills required to conduct internet banking can be learnt through training programmes to break the common belief that internet banking was very complex to execute. Though, the concern and need to use internet banking was directly influenced by the user's level of education, culture and gender. Hogarth et al (2008) investigated consumer payment behaviour and concluded that varied e-payments were impacted by socio-economic, demographic and attitudinal characteristics. Sharma and Pahuja (2020) studied private bank employees in Mohali, revealing stress and work-life imbalance as key issues for working women. It was found out younger, highly qualified, high-income level, were more likely to adopt digital payment choices than others. The study also revealed that consumers' attitudes and perceptions, security and privacy, convenience and familiarity and ease of use, were significant correlates of payment choices. Khare (2010) conducted exploratory research in India to assess the relevance of online banking and its significance in building customer relationships for proving more value. The results showed that customers had awareness about Internet banking but its use is limited primarily for checking their account balances. Sharma and Goyal (2023) compared public and private banks, highlighting differences in risk management frameworks and compliance practices. The

apprehension to use internet banking for financial transactions was directly associated with perceived risk. Khare et al (2010) explored the distinctive role of an under-researched aspect of a consumer *i.e.*, personality of Internet banking users in India. David Aaker's personality dimension scale and Pikkarainen et al (2004) attributes of online banking such as perceived ease of use, security and privacy, perceived usefulness, amount of information and perceived enjoyment) were deployed to conduct the study. The findings suggested that consumers who had extroverted personality traits were likely to take the risk with innovations. Batta, Pahuja and Sharma (2025) linked strong employer branding to improved employee retention rates in India's private banking sector. Banks needed to take special consideration to consumers' personality while designing their websites. Yang et al. (2011) explored the factors through the pre-adoption and post-adoption stages on users of a mobile payment service in China. A blend of behavioural beliefs with social influences and personal traits were vital determinants for embracing mobile payment services and usage, but then again their effect on behavioural intention do differ through different stages. Bamoriya & Singh (2011), the study explored factors affecting mobile banking with a distinctive perspective. The study was focused on analysing specific mobile banking issues from urban customers' viewpoint of mobile banking users from Indore city. The findings indicated that mobile handset operability, security/privacy and standardization of services were the critical issues. Thakur & Mala, (2014) research study confirmed that intention to use mobile payments significantly depended on adoption readiness, perceived risk and personal innovativeness. Upadhyay & Chattopadhyay (2016) the study analysed that for better acceptability and adoption, service providers should work with the government agencies to provide more institutional legality and support. The survey was limited to four metros portraying the perspective of urban India excluding semi-urban and rural areas of India. Chawla et al. (2017) the study found that Technology Adoption (TA) leaders had the most positive attitudes and intentions followed by TA followers and TA laggards. It was restricted to large metro cities in India with the majority of the respondent being young and educated. Singh & Srivastava (2018) a theoretical model was developed which was further validated by conducting a survey on a sample of 855 bank customers from public, private, foreign and cooperative banks in India. The model included six concepts (explicitly, perceived ease of use, computer self-efficacy, social influence, perceived financial cost, security and trust) to expound customers' intent to use mobile banking. It was validated by using structural equation modeling analysis that security, computer self-efficacy, perceived ease of use and perceived financial cost influence users' intention to adopt mobile banking. Patel & Patel (2018) in order to discover the influencing factors of internet banking adoption in Gujarat the authors assimilated perceived security and social influence with the extended technology acceptance model. Confirmatory Factor Analysis (CFA) was conducted on 284 individuals who were internet banking users. The outcome emphasized that the intention to use internet banking is positively influenced mainly by perceived security, followed by other significant factors, namely, perceived usefulness, perceived ease of use and social influence.

The above literature review was an attempt to have a deep understanding and provide with a holistic view on the diverse factors affecting the adoption of Internet/Mobile banking. The review evidently states that the adoption of internet/mobile banking will continue in the near future as there is not much change in the major concerns of the users with respect to Internet/Mobile banking adoption in the early days of 1999 to till date 2022. The major factors are summarized such as trust, perceived risk, security, Education, PU, PEOU and computer literacy (Alkhowaiter, et al. 2020 & Sulaiman & Jauhari 2021). Notably, even after two decades, these factors have remained to act as barriers in the adoption of various digital payment methods.

DISCUSSION

Studies Based on Seminal Models of Technology Acceptance

It has been observed that the past research studies were profoundly conducted on gaining deep understanding of various factors influencing the adoption of technology (Internet/Mobile banking) using well established theoretical frameworks such as TAM, TAM2, UTAUT and innovation of diffusion and other related models.

Tan & Teo (2000) conducted a study based on the well-established theory of planned behaviour (Ajzen 1985) and the diffusion of innovations theory (Rogers 1983). Based on the theoretical framework an online survey conducted on factors influencing the adoption of Internet banking in Singapore. The study expounded that the attitude and perceived behavioural control factors explicitly relative advantage, compatibility, trialability and risk were found to be impacting the intention to adopt internet banking. Government support found to be prominent towards the intention to use internet banking in order to gain confidence in using services. Pikkarainen, et al. (2004) examined online banking acceptance in Finland by incorporating additional elements to the Technology Acceptance Model (TAM). The result showed that perceived usefulness, perceived ease of use and information on online banking on the website was the main factors influencing online-banking acceptance. Amin et al. (2014) examined Technology Acceptance of Model (TAM) factor Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) along with an additional factor of trust on mobile websites user's satisfaction in Malaysia. The results of Structural Equation Modelling (SEM) indicated a significant relationship of customer satisfaction with correctly aligned PU, PEOU and trust. Trust was determined to be the most essential element of mobile commerce.

Nor & Pearson (2007) empirically examined various attributes of the Theory of Diffusion of Innovation (IDT) on students of the business school at four universities in West Malaysia. Structural Equation Modeling (SEM) was used to analyse the effect of trust together with the other attributes of IDT *i.e.*, relative advantage, usefulness, compatibility, trialability, attitude and intentions on internet banking acceptance. Trust with a large standardized coefficient in association with other factors demonstrated its higher contribution in influencing the attitude toward using Internet banking. Thus, attitude considerably affects the intention to use technology. Nor, et al. (2008) validated a research model based on the Theory of Reasoned Action (TRA) using internet banking in Malaysia. The study was primarily conducted on non-users of internet banking. The theory was based on three components which are Behavioural Intentions (BI) to use internet banking was affected by-Attitudes (A) bank to boost positive attitude and Subjective Norms (SN) by internet banking's usefulness, ease of use.

Kesharwani & Bisht (2012) in order to establish security and privacy threat as pivotal factors of internet banking adoption in India the authors conceptualised a model by prudently extending the Technology Acceptance Model (TAM). The study demonstrated that perceived risk, trust was the insignificant impact on behavioural intention and on perceived risk respectively. The user- friendliness of a well-designed website facilitated and reduced perceived risk apprehensions regarding internet banking usage. Nasri & Zarai (2014) In their empirical study used the framework of an extended model of Technology Acceptance Model (TAM2) indicated that perceived usefulness and perceived ease of use were the determinants factors to gauge the intention to use internet banking in Tunisia. They developed a conceptual model which detailed that the users' perceived usefulness can be measured by perceived ease of use, awareness and its benefits and social influence, on the other hand, perceived ease of use impacted by security and ability to use the computer.

Deb & David (2014) a conceptual model was developed constructed on Technology Acceptance Model (TAM) and Diffusion of Innovation (DOI) categorized factors influencing m-banking adoption in major commercial cities of India namely Delhi, Mumbai, Kolkata and Bangalore. Data were collected using a questionnaire from 600 customers and further analyzed using SPSS and AMOS. It was found out that perceived usefulness, perceived ease of use and social influence had a positive attitude towards mobile

banking.

Singh, et al., (2016) this study added a new variable hedonism along with variables of a model in the integrated UTAUT. The results depicted a significant relationship between consumers' perception, preference, usage and satisfaction and security, trust, hedonism are few of the most influencing variables accompanied by demographic variables (Khurana, et al. 2019). That also impact consumer satisfaction and usage rate. Trust, usefulness, perceived security, risk, compatibility, relative information and user-friendliness of website design have the determining factors in the adoption of Internet/Mobile banking. The study based on TAM emphasized on factors such as perceived usefulness, perceived ease of use, brand image, user innovativeness and government support have a positive impact on customers' intention to use online banking services, while perceived risk has a negative influence (Le, et al., 2022).

It has been observed that the researchers excessively used TAM and related constructs till now. It's time to move on from the technology aspect of Internet/Mobile banking to consumer payment behavior for further studies as in the last two decades slowly but surely technology has become a significant part of our life.

Impact of Digital India Programme and Demonetisation

Digitisation of monetary transactions has been in progress for more than a decade now. Digital India Programme was launched in 2015 mainly for building the digital infrastructure in the nation to realise the dream of cashless India. Its implementation at a rural level stills a challenge. Khurana (2017) highlighted the major challenges such as a large part of the Indian population not even having bank accounts/operational accounts and basic infrastructure required for digitalization. Rana, et al. (2018) and Kaur, B. (2025) conducted the study in Bangalore on finding the challenges of Digital Financial Services in India and proposed a model indicating that lack of literacy/digital literacy and universal unavailability of the Internet as the key driving challenges. India is still having low literacy levels and rural electrification which are barriers to attaining the vision of the Digital India Program. India has come a long way in digitalization. There is dire need to re-think about the program and rearrange priorities to realise the dream of digital India.

Demonetization in November 2016 proved to be a significant event that facilitated the impetus of the cashless economy in India. Demonetization had not only facilitated the adoption but also changed the mind-sets of users towards the use of digital payments (Kumar & Chaubey 2017; Sobti 2019; Mani & Iyer 2022 and Kaur 2022). Gaur & Padiya (2017) explored the event of demonetization, its repercussions on the digitalisation of the Indian economy. Apart from its main objectives to control black money, corruption and terrorism financed by a counterfeit currency it unlocked the gateway to digital payments methods. During the initial cash crunch, the high adoption rate of E-wallets and mobile payments had been observed. Jain (2017) termed the event of demonetization as a shockwave to the nation which made the common man forcefully aware of alternative payment methods other than cash. The cash shortages during this period shaped the destiny for digital transactions across the country. The results demonstrated that the age-group 26-45 years and 18-25 years were more using digital payment methods. However, people under the age group 45-70 years were reluctance to use the digital modes of payments. Nataraj (2018) stated in their study that there had been a major improvement in the use of digital payment methods. The cashless transaction system was growing as the nation had to move on to cashless transactions. But there is a higher risk of cyber-crime so the proper measures to be taken by RBI and the government to ensure thorough security of digital transactions.

COIVD-19 Effect

The outbreak of COVID-19 in March 2020 has given new meanings and upsurge to digital payments. After demonetization in India in 2016, the advent of COVID-19 pandemic accelerated the usage of digital payment popularly termed as contactless payments. This time the users' were voluntarily shifted

from physical cash to digital payments for safety and hygiene reasons (Yadav & Sinha 2022). The usage of digital payment methods has much wider scope in most of the categories of types of purchases such as groceries, medicines and other essentials expected (Alkhwalidi, et al. 2022 and Al-Okaily, et al. 2022). The consequences of COVID-19 showed users' intentions to accept digital payment even post-COVID-19.

Suggestion for Future Research in this Still-Evolving Area

More qualitative studies are required to be conducted to get the insight of 'consumer payment behavior' towards various digital payment methods.

CONCLUSION

There is a radical transformation of banking services being offered and carried out today. This study was an attempt to present the evolution of technology intervention in offering internet banking. The evolution of Indian banking and payment system moved ahead by mobile banking to the emergence of a bouquet of digital payment methods which is to serve the needs of rural as well as urban populations. The emergence of internet/mobile banking has been a topic which gained huge attention by researchers since its inception. As the acceptance level is on the rise the literature review suggested that the gravity of factors influencing the adoption of internet/mobile banking is also intensifying. However, the factors affecting the adoption of internet/mobile banking continued to be the same such as trust, risk, security, PU, PEOU and computer literacy. Most of the studies were dedicated to the acceptance of technology and paid no attention to the human aspect. For a common man, the event of demonetization was like a nightmare and this event had twofold results, one the realization of having suitable alternative payment methods to meet the needs of all the citizens of India. And the second, it was such a forceful drive which made even a vegetable vendor or roadside vendors to understand and adopt alternative methods *i.e.*, Paytm to survive during the period of demonetization. Srivastava corroborated that technology can be learnt when you need it through training programmes. As per the Forbes India Report, 2017, digital banking will be the most preferred form of banking in the coming years. It's been eight years down the line to the launch of digital India programme still it has a long way to achieve its objectives but not impossible. The government along with banks need to work together to make the dream of Digital Economy possible. "I dream of a Digital India where mobile and e-banking ensures financial inclusion"- By Narendra Modi.

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