

Analysis of Digitalisation in the Financial Inclusion Ecosystem

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DECLARATION

I **Anandita Ghosh** hereby declare that this thesis on the topic entitled, "*Analysis of Digitlatisation in the financial inclusion ecosystem* " is submitted for the award of Degree of Doctor of Philosophy in Economics to the Gokhale Institute of Politics and Economics, Pune 411004.

It is an original contribution and has been completed during my tenure as a research scholar at Gokhale Institute of Politics and Economics, Pune.

This thesis has not been submitted by me elsewhere for the award of any degree or diploma-part or full. The information gathered by me elsewhere for the thesis is original, true and factual. Such material as has been obtain from other source has been duly acknowledged in the thesis. I hereby request, to consider the thesis for the award of the degree of 'Doctor of Philosophy'.

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Abstract

According to the BRICS (2021) report on digital financial inclusion, digital technology can be a game-changer in a multidecadal quest to achieving universal financial inclusion. As defined by world bank¹, digital financial inclusion refers to the deployment of the cost-saving digital means to reach currently financially excluded and underserved populations with a range of formal financial services suited to their needs that are responsibly delivered at a cost affordable to customers and sustainable for providers. Thus, digitalisation ensures financial inclusion, where all major dimensions of financial inclusion that is, access, usage, quality and welfare are encompassed. India's economy shows every sign of becoming a digital economy with the internet penetration of 61 per cent and over 600 million smartphone users, with the scaling up of the digital payments both in value and volume. Despite the exemplary progress, India still finds itself in a unique conundrum where there has been a persistent gap between access to accounts and the usage of accounts. The Global Findex report 2021² further highlights that about one-third of the account owners had inactive accounts and 540 million adults in India who have an account made no digital payments. India also has the highest share of inactive bank accounts globally at 35 per cent. Thus, the whole policy agenda towards financial inclusion is restricted to mere access. This thesis is driven by this unique conundrum of access and usage and strives to dive-deep into challenges of digital financial inclusion in India. This thesis is a stakeholder wise analysis of digitalisation in the financial inclusion ecosystem. The thesis is an attempt to study the challenges of implementing digitalisation strategy for the low-income segment both from the supply and demand side. By adopting the qualitative and the quantitative research methodology, the thesis provides some intriguing insights on the digital financial inclusion in India from the point of view of various stakeholders of financial inclusion ecosystem. The thesis provides a policy roadmap based on the challenges faced by the stakeholders and their expectations from the regulatory bodies in India.

The findings reveal the major demand side and supply side challenges of digital financial inclusion in India. The demand side-analysis is based on a Technology Acceptance model. This is an empirical study which identifies the factors that

¹ <https://www.worldbank.org/en/topic/financialinclusion/publication/digital-financial-inclusion>

² <https://www.worldbank.org/en/publication/globalfindex#sec2>

affect the actual usage of digital financial services among the low-income segment in India. The demand side analysis reveal that the problem of non-usage is rather deep rooted and gets intensified by the factors like gender and age hence, a one-size-fit-all policy will be redundant in enhancing greater usage and adoption. On the other hand, the supply side challenges are based on the perspective of the providers of the financial services as well as the point of view of the emerging stakeholders Fintechs. The supply side study is a descriptive research study based on the survey and interview method of data collection. The findings indicate that despite the exemplary success of digitalisation in India, there are still some underlying challenges from the provider's end which requires immediate focus and actions from the stakeholders of the financial inclusion ecosystem. The prominent challenges accentuated from the supply side were the high acquisition of the IT/MIS system and the lack of digital and financial literacy among the clients. The qualitative insights from the Fintech sector have unveiled its immense potential as these address the unaddressed pain points of financial inclusion by developing niche products for the underserved segment of the society. Furthermore, the key to a sustainable market strategy for fintech is collaboration and partnership with the incumbent market players.

Lastly, the thesis lays the contour of a policy roadmap based on the stakeholder wise challenges. The policy recommendations have emphasised the demand-pull financial inclusion addressing the structural peculiarities which are deeply rooted in the Indian economy. First, it is imperative to have a hybrid model of digital financial inclusion, wherein the human touch and digital innovations must work simultaneously. Second, digital products require hyper-localisation in order to be more age and gender inclusive. Third, it is equally important to fortify the trust amongst the clients with a help of grievance-redressal mechanism and a strong data security and privacy policy in place. Fourth and the most important recommendation, is an open and a collaborative market strategy followed by all the stakeholders to join hands and work in synergy towards greater usage of digital financial services contributing towards the overall welfare of the society. To conclude, the current study has uncovered some interesting facets of digital financial inclusion in India and presents a compendium of insights which can be beneficial for the regulators, financial service providers, users and fintechs.

Acknowledgements

“No one who achieves success does so without acknowledging the help of others. The wise and confident acknowledge this help with gratitude.”

Alfred North Whitehead

It is indeed exhilarating to have finally come to the end of this toughest yet enlightening journey. As I write the acknowledgement and reflect over the last four years of the PhD, it gives me immense pleasure to express my gratitude towards all those people who have helped me in my quest and contributed significantly in making this endeavour possible.

I'll begin with thanking my pillars of strength, my parents Mrs. Chavi Ghosh and Mr. Arun Ghosh for their unconditional support and encouragement. You both have always inculcated in me the virtues of courage and gallant, which has indeed helped me make some unconventional and tough life choices and fight against all odds in life. It was only because of your love and blessings throughout my PhD journey that I never gave up, kept pushing through all the uncertainties and made my way towards the completion of the PhD.

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Anandita Ghosh

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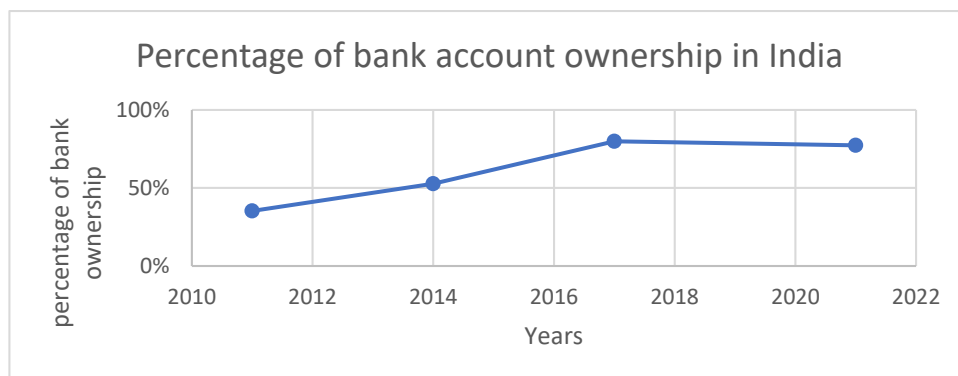
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CHAPTER 1 INTRODUCTION

India's Unique Conundrum: Access V/S Usage

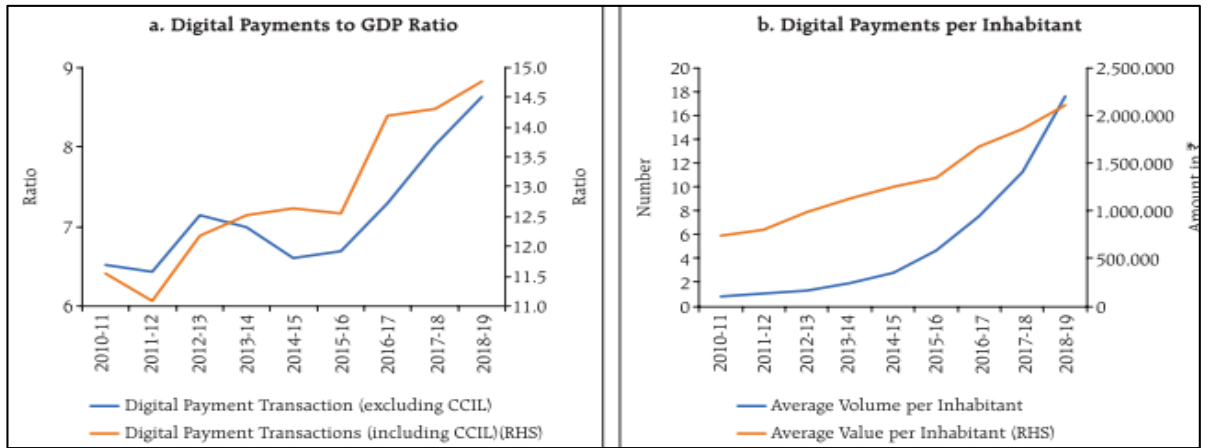
The United Nations Agenda for Sustainable Development 2030 accentuate the potential of Information and Communication technology in bridging the digital divide and accelerating human progress. Governments all across the world have started to pin their hopes on technology and digital solutions in enhancing financial inclusion and economic growth. Inclusion. Budget 2021 gave surging prominence to digital initiatives in multiple facets. The Indian Government proposed allocating Rs.1500 crore to boost the penetration of digital payments and setting up a world-class Fintech Hub which will create 150000 jobs for the youth and accelerate the use of AI, making India a centre of the Fintech universe. BRICS (2021), Digital Financial Inclusion report, stresses that for universal financial inclusion digital technology can be a game changer. Leveraging technology in the provision of financial services has immense potential in reaching out to the financially unserved and underserved population with a basket of formal financial services tailored to their specific needs and requirements. India's major accomplishments in DFS are significant scale up in access to accounts (Fig 1) and volume of transactions via digital channels, and significant scale up in digital G2P payments.

Figure 1 Percentage of bank accounts in India



Source: Global Findex Database 2021

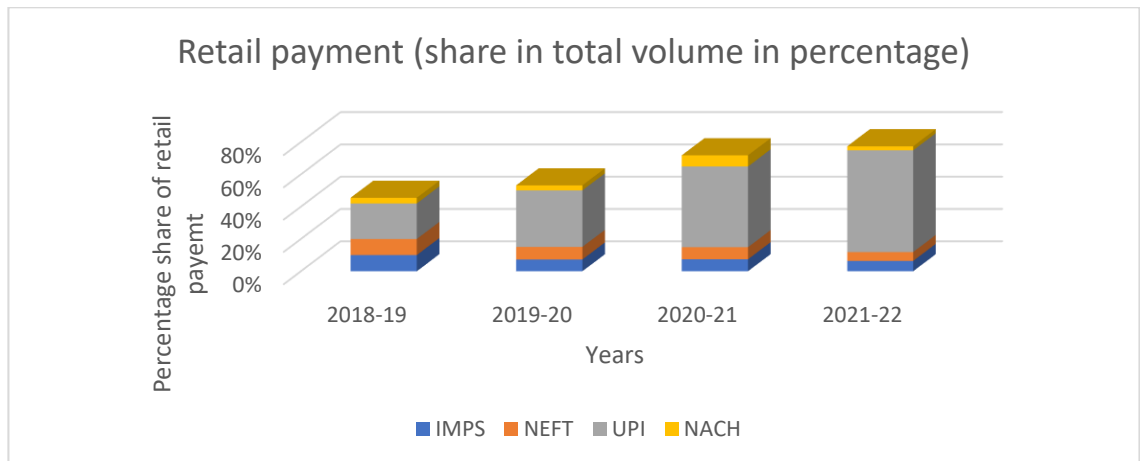
Figure 2 Digital Payments in India



Source: RBI; Payment System Indicators - Annual Turnover

The digital payments to GDP ratio in India in the last few years it has taken long strides. The per person digital payments, both in terms of value and volume, also increased concomitantly.

Figure 3 Retail Payments in India

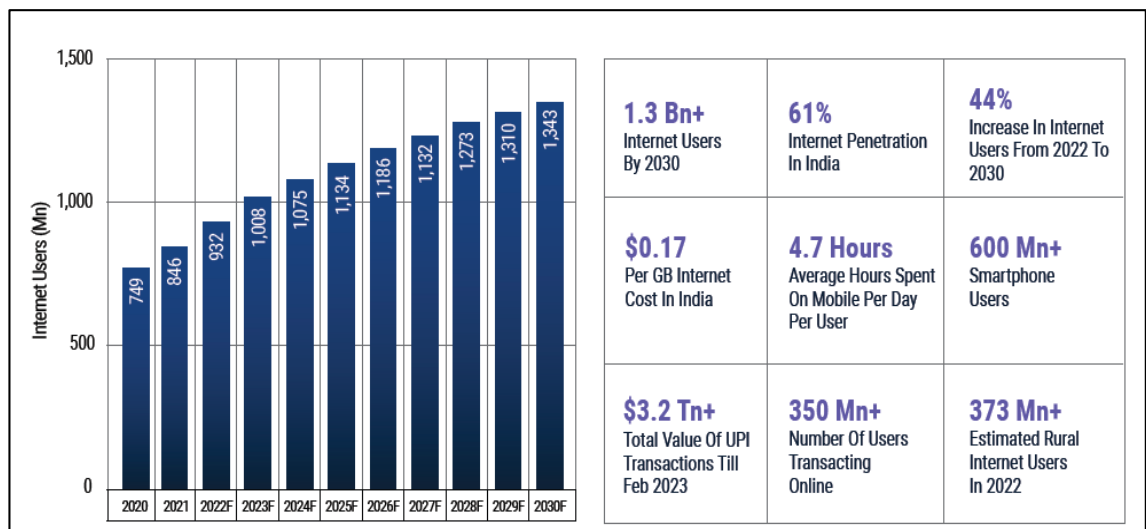


Source: RBI; Payment System Indicators - Annual Turnover

The introduction of UPI in 2016-17 altered the landscape of retail electronic payments. The share of UPI payments (shown in figure 3) has been consistently higher in India as compared to the other retails payment transactions with over 63 % contribution in the year 2022. India has been bestowed with key enablers that facilitates in the expansion of

digital financial services in India. These are in the form of a robust electronic payment system, the Biometric ID Program which gave the ability to cheaply, reliably and digitally verify and authenticate ID. India’s government-led biometric identity program, Aadhaar, established in 2009, helped broaden the reach of DFS. Aadhaar has been adopted at an extremely rapid pace. Today, over 1.2 billion Indians have an Aadhaar number, and the system is used to authenticate identity some 900 million times a month. The “India Stack” – a government-led digital infrastructure, based on a set of APIs (Application Programming Interface) – has served as a foundation for the growth of the digital ecosystem, enabling presence-less, paperless and cashless digital payments. These accomplishments can be attributed to India’s progress in terms of the availability of the digital infrastructure and its adoption. An insight from the latest Inc42 report³ presents an overview of the India’s Digital Economy in a nutshell. There is an uptick in the number of internet users in India with an expected increase of 44 per cent of the internet users by 2030. By 2021 the internet penetration in India reached to 61 per cent with over 600 million smartphone users.

Figure 4 Overview of the Digital Economy of India



Source: TRAI, NPCI, Bain & Company, Data.ai, Inc42

Undoubtedly, access to financial services in India has reached new heights. A bird’s eye view at the global findex database 2021 provides a compelling insight into the progress

³ <https://inc42.com/reports/state-of-indian-fintech-report-q1-2023/>

made by India in terms of percentage of account ownership in a financial institution, which has risen from 35 per cent in 2014 and 53 per cent in 2017 to about 80 per cent in 2021. The technological revolution and the accelerated adoption of digital solutions during the COVID-19 pandemic had further transformed access to finance.

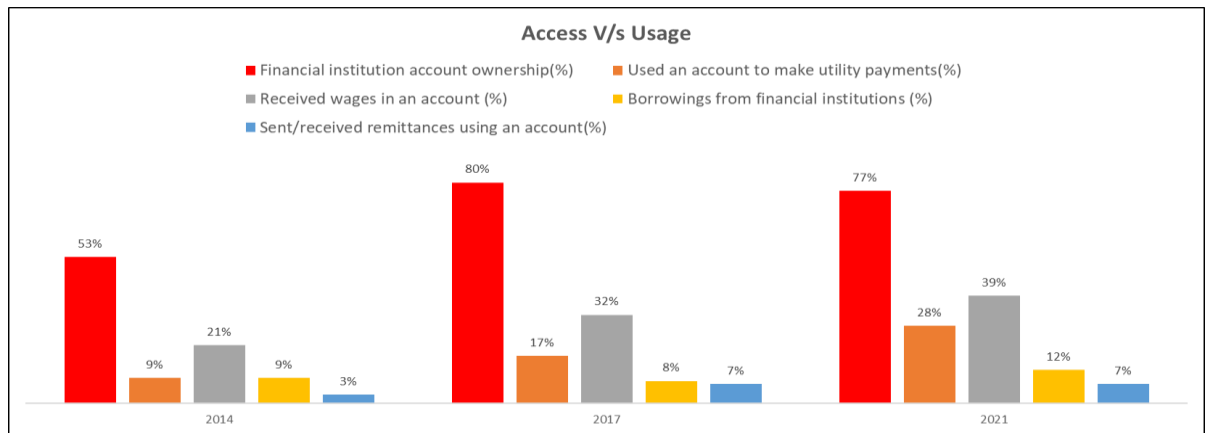
Figure 5 Financial Institutions account ownership in India



Source: Global Findex database 2021

As represented in Figure 6 below, India still lands itself in a unique conundrum where there has been a persistent gap between access to accounts and the usage of accounts. In the chart, the red column represents the bank account ownership which has increased over a span of 7 years from 53 per cent in 2014 to 77 per cent in 2021. However, the usage of bank account for various purposes such as making utility payments, sending remittances, receiving wages and borrowings, has not been in tandem with the access.

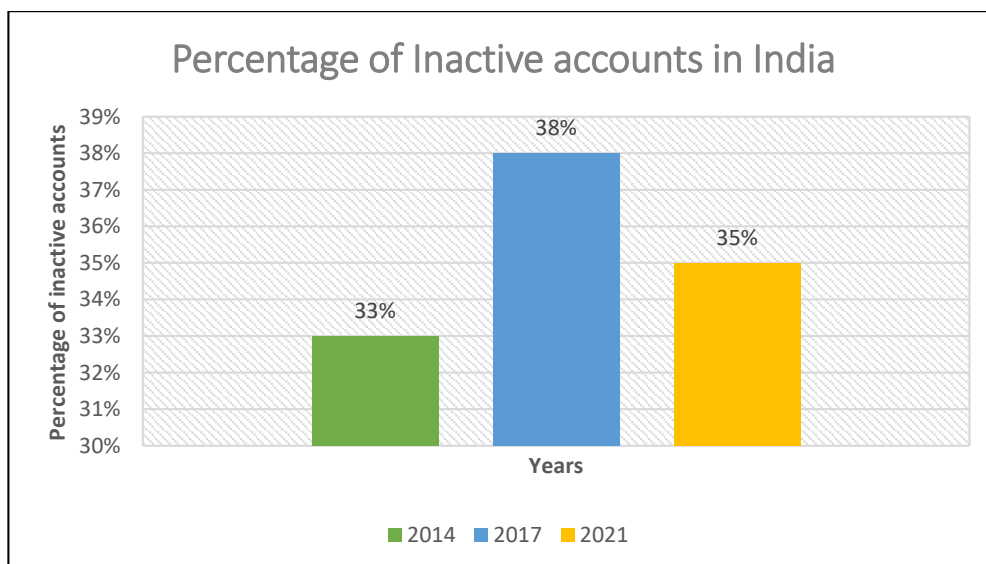
Figure 6 Access V/s Usage



Source: Global Findex Database 2021

The Global Findex report 2021⁴ further highlights that about one-third of the account owners had inactive accounts and 540 million adults in India who have an account made no digital payments. India has the highest share of inactive bank accounts globally at 35 per cent as can be seen in Figure 7. It implies that we still have to bridge the gap between access to usage of digital financial services in India.

Figure 7 Percentage of inactive accounts in India



Source: Global Findex Database 2021

Financial inclusion will remain meaningful so long it does not end itself in a mere opening up of a bank account. Actual benefit come from actively using that account for saving

⁴ <https://www.worldbank.org/en/publication/globalfindex#sec2>

money, for managing risk for making or receiving payments. It is imperative to address the challenges / hindrances faced at every level of the financial inclusion ecosystem in order to drive and enable financial inclusion. This thesis is a stakeholder wise analysis of digitalisation in the financial inclusion ecosystem. The thesis is an attempt to study the challenges of implementing digitalisation strategy for the low-income segment both from the supply and demand side. By adopting the qualitative and the quantitative research methodology, the thesis provides some intriguing insights on the digital financial inclusion in India from the point of view of various stakeholders of financial inclusion ecosystem. The thesis provides a policy roadmap based on the challenges faced by the stakeholders and their expectations from the regulatory bodies in India. However, before going further with the entire explanation of the thesis, a clarification of some key terms at this juncture is vital.

1.1 Digitalisation and Digital financial services-Game Changer in Financial Sector

Digitalization has been regarded as one of the major trends changing society and business in the near- and long-term future (Tihinen, M, et.al, 2016). Digitalisation has been defined as “the changes associated with the application of digital technology in all aspects of human society” (Stolterman and Fors, 2014). Brennen and Kreiss have defined digitalization as the adoption or increase in use of digital or computer technology by an organization, industry, country, etc. Thus, the definition of digitalisation encompasses wide spectrum of changes, changes in ways of working, roles, and business offering caused by adoption of digital technologies in an organization, or in the operation environment of the organization (Parviainen et al, 2017). Digitalisation has been a game changer for many industries, however financial services have particularly experienced some notable digital disruptions in last five years. Digitalisation has altered the business models of many organisations across the wide spectrum of the banking industry. The most recent digital disruption which the traditional banking industry has been experiencing is in the form of the Fintech start-ups which are now the new entrants of the market, giving cut-throat competition to the incumbent players. Moreover, financial services are embracing a number of technological advancements like AI, data analytics, cloud computing etc. All of these advancements are a boon to both the financial service providers and the customers for the ease and convenience it provides. Digital financial services (DFS) comprise a broad range of financial services accessed and delivered

through digital channels, including payments, credit, savings, remittances and insurance. It also includes mobile financial services.

1.2 Digital Financial Inclusion

Digitalisation of financial services has been playing a pivotal role in enhancing financial inclusion. Digital technologies offer affordable ways for the financially excluded to save, make a payment, get a small business loan, send a remittance, or buy insurance. The benefit of digital financial services pertains to the means to access additional financial service and the tailoring of the financial services according to the needs and requirements of the low-income financially excluded segment. According to the world bank's definition digital financial inclusion refers to the deployment of the cost-saving digital means to reach currently financially excluded and underserved populations with a range of formal financial services suited to their needs that are responsibly delivered at a cost affordable to customers and sustainable for providers. The **essential components of digital financial inclusion** are as follows:

- *Digital transactional platforms* enable customers to make or receive payments and transfers and to store value electronically using devices that transmit and receive transaction data and connect to a bank or non-bank permitted to store electronic value. For instance, UPI, BHIM, PayPal, Google Pay etc.
- *Devices* used by the customers can either be digital devices (mobile phones, etc) that transmit information or instruments (payment cards, etc) that connect to a digital device such as a point-of-sale (POS) terminal.
- *Retail agents* that have a digital device connected to communications infrastructure to transmit and receive transaction details enable customers to convert cash into electronically stored value ("cash-in") and to transform stored value back into cash ("cash-out").
- *Additional financial services via the digital transactional platform* may be offered by banks and non-banks to the financially excluded and underserved — credit, savings, insurance, and even securities — often relying on digital data to target customers and manage risk. Digital data is the electronic representation of information in a format or language that machines can read and understand. Here

the digital data pertains to the information of the customers which can be digitally stored

The **models** of digital financial inclusion emerging in countries around the world introduce **new market participants** and **allocate roles and risks** (both new and well known) differently from the traditional approaches to retail financial service delivery.

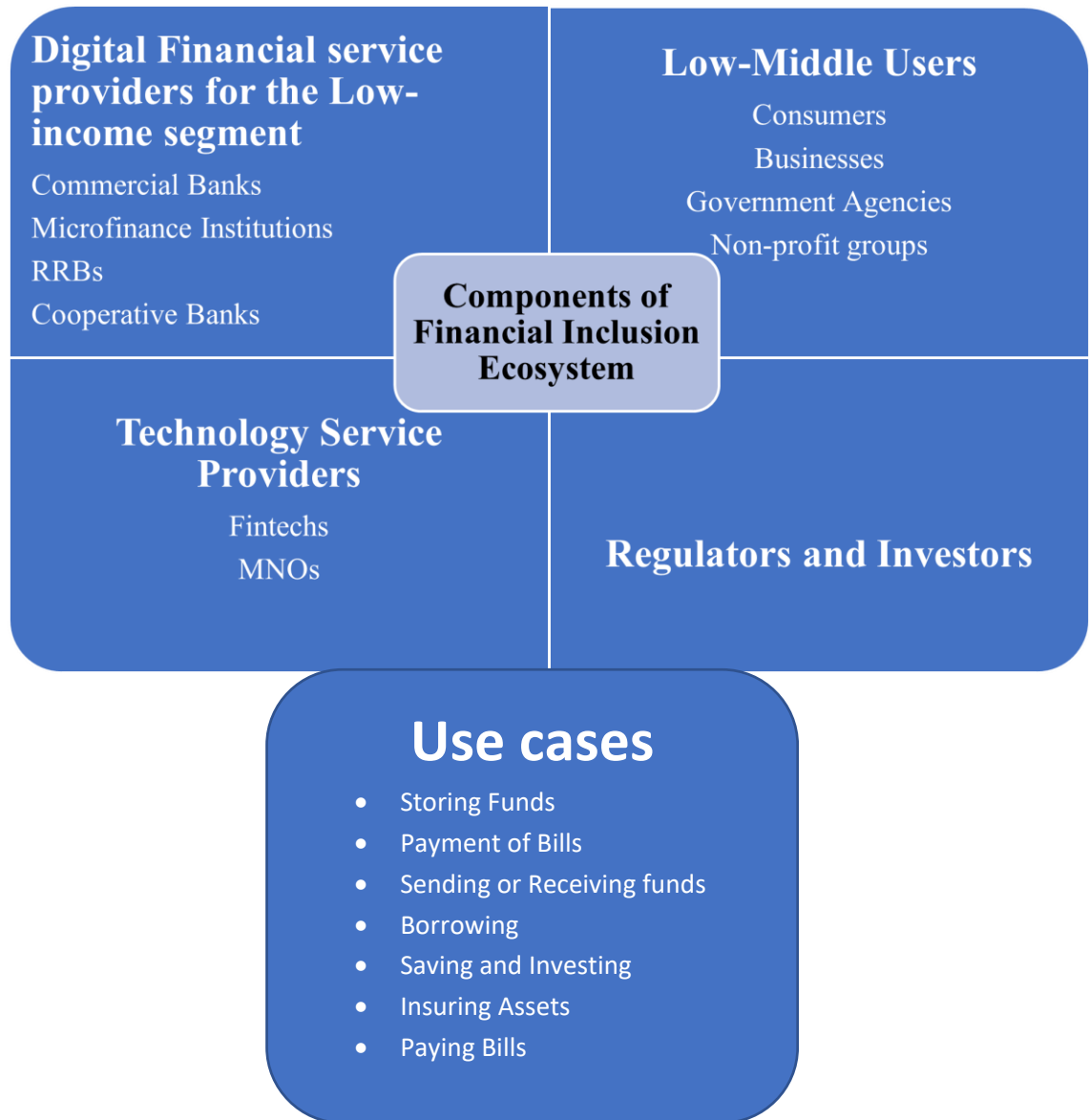
1.3 The scope of the thesis: Financial Inclusion Ecosystem Approach

The scope of the thesis broadly encompasses the financial inclusion ecosystem which consists of the all the stakeholders clustered towards the low-middle income cohort. These stakeholders in the thesis consists of the Low-Middle Income Segment of the population, Financial Service providers (Banks, MFI, Cooperative Banks), Fintech, Regulators and Investors. The subsequent sub sections explain the rationale for selecting the low-middle income cohort.

1.3.1 Financial Inclusion Ecosystem

The Financial Inclusion ecosystem consists of the low income users (consumers, businesses, government agencies and non-profit groups) who have needs for digital and interoperable financial products and services; the providers (banks, other licensed financial institutions, and non-banks) who supply those products and services through digital means; the financial, technical, and other infrastructures that make them possible; and the regulators which enable them to be delivered in an accessible, affordable, and safe manner. Each component of the financial inclusion ecosystem depends on two fundamental support structures: an enabling environment and infrastructure readiness.

Figure 8 Components of Financial Inclusion Ecosystem and its use cases



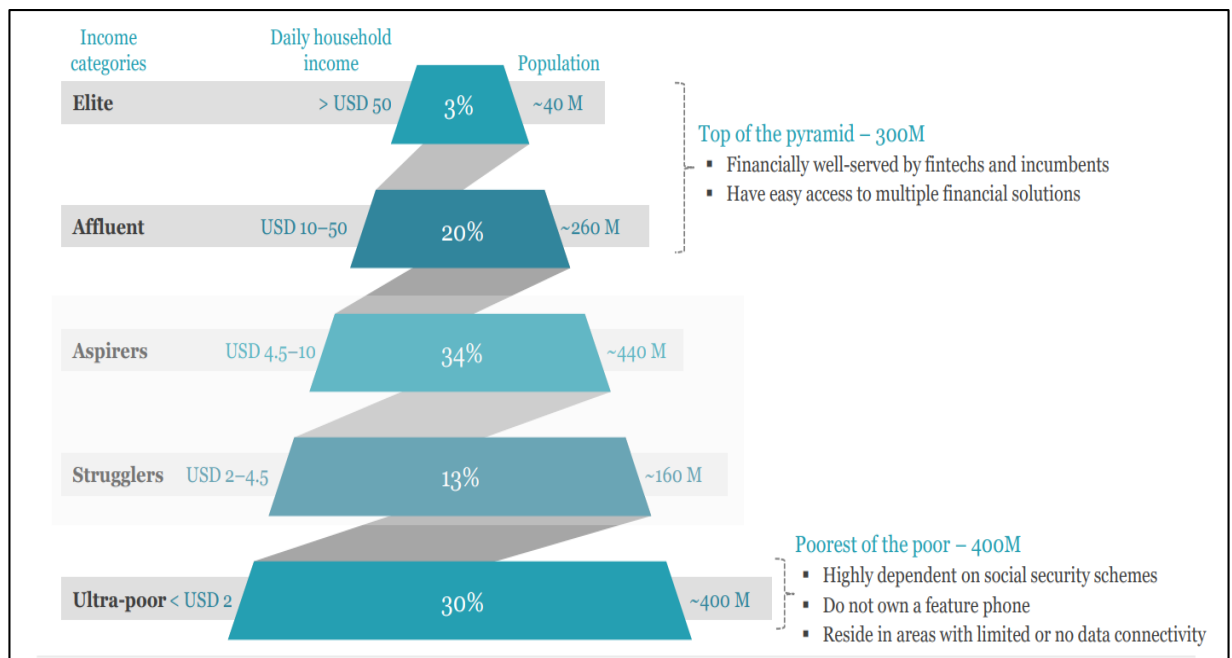
Use cases are the situations where the consumers and business use the digital financial services. Many use cases have two end users. Use cases of the digital financial services includes the following:

- a) **Storing funds-** the need to keep funds safely
- b) **Payments-** Includes both the retail payments that is payments for goods and services, and bill payments.
- c) **Sending or receiving funds-** the ability to transfer funds to or receive funds from another end user.
- d) **Borrowing-** ability to avail credit facility. It includes Micro-finance, secured and unsecured lending, and mortgage financing.
- e) **Savings and Investments-** ability to save and invest funds for future financial returns.
- f) **Insuring assets-** ability to insure lives or assets.

1.3.2 Low-Middle Income (LMI) Segment: The targeted cohort for the thesis

From the standpoint of financial inclusion, the thesis specifically concentrates on the Low-Middle Income (LMI) segment. Although, the LMI segment offers a blue ocean for all the stakeholders of the financial inclusion ecosystem- fintechs, incumbents and investors, there exists significant untapped potential of the LMI segment which needs to be addressed. According to the NCAER-CMCR, MicroSave analysis, the LMI segment consists of the households with a daily household income between USD 2 to USD 10. In the figure, the pyramid of the income categories represents that the aspirers and the strugglers which is composed of around 47 per cent of the population, represents the LMI segment.

Figure 9 Low-Middle Income Segment



Source: NCAER-CMCR, MicroSave

Not only the percentage of the contribution but according to a latest finding by the Microsave consulting report⁵, the LMI segment despite being the most challenging segment to cater to, offers significant opportunities for the stakeholders. The main reasons are:

- The LMI segment have greater willingness to adopt to the digital solutions
- They favour convenience over affordability.
- Lastly, the LMI segment is also transition towards the inflexion point wherein lesser effort to promote digital financial services will reap greater benefits. Hence, the thesis can be understood from the perspective of the LMI segment and the stakeholders who caters to the LMI segment. In the next section, we will discuss about the need for the study

1.4 Need for the study

As India embarks towards 100per cent digitalisation and fintech revolution, it still intrigues to probe on the unique conundrum which India faces where the access to digital finance has not yet fully converted into actual usage of digital financial services. There is

⁵ <https://www.microsave.net/2018/08/18/fintechs-for-lmi-segments-demystifying-myths-and-delving-into-realtie>

need to understand the overall challenges of digitalisation for financial inclusion and the policy gaps pertaining to actual usage of digital financial services which still remains to be identified and addressed. A detailed study on understanding the perception of all the stakeholders ranging from the customers, financial service providers and the technology providers is the need of the hour to eradicate all the bottlenecks to greater usage and adoption of digital financial services in India. The novelty of the study is its contribution in the scanty literature on empirical studies pertaining to digitalization and financial inclusion particularly in the Indian scenario. It is required to lay the contours of an effective policy roadmap considering all the stakeholder-wise challenges and gaps at the micro-level in India's journey to digital financial inclusion. The policy recommendations addressing all the gaps in the financial inclusion ecosystem will help in tackling some chronic and structural challenges to financial inclusion in India which will further clear the pathway to complete adoption of digitalization in the financial inclusion ecosystem. The identification of the need for the study has further led us in discovering some crucial research objectives of the thesis, which can be observed in the next section.

1.5 Research Objectives

The following are the research objectives of the thesis:

- To study the current status of the implementation of digitalisation strategy in the financial inclusion ecosystem and identifying the provider's side (commercial banks, Non-Banking Financial Company-Micro Finance Institution (NBFC-MFIs), Small Finance Banks (SFBs), Self-Help Groups (SHGs), Mobile Network Operators (MNOs), and Technology Service Providers (TSPs) challenges in delivering the digital financial services.
- To study the demand side challenges of adoption of digitalised financial services with the help of Technology Acceptance Model (TAM).
- To study the potential of Fintech start-ups in India in enhancing financial inclusion, and identify the policy intervention required specific to the Indian Fintech sector in order to make the ecosystem more inclusive.
- To recommend a policy and regulatory framework that takes into account the stakeholder wise issues of digitalisation and financial inclusion, thus helping in greater usage of financial services in India.

The next section will further help us understand the entire chapter plan of the thesis.

1.6 Chapter Plan

The present thesis is divided into six chapters. The Chapter wise outline is given below:

Chapter I deals with the overall introduction and the background of the thesis. It provides a clear understanding on the terminology and concepts related to the thesis. Furthermore, the chapter discusses the need for the study and elucidates the research objectives of the thesis.

Chapter II contains an extensive review of literature. The literature review was classified into five dimensions such as- a) Barriers to Financial Inclusion in India b) Challenges to Digital Financial Inclusion c) Empirical studies on digitalization and financial inclusion d) Technology acceptance model and, e) Banks and Fintechs- Friends or Foe. The literature review helped in identifying the existing gaps in the extant literature that further helped in building up the research objectives of the thesis.

Chapter III is the demand side analysis of behavioural factors that affects the usage of digital financial services. This is an empirical study which identifies the factors that affect the actual usage of digital financial services among the low-income segment in India based on a Technology Acceptance Model. Non-probability convenience sampling method was employed to collect the data. The respondents were the members of the Annapurna Mahila Cooperative Credit Society from the urban district of Pune and the clients of a Regional Rural Bank of Uttar Pradesh. The respondents belonged to the LMI segment and were the users of the digital financial services. The respondents belonged to both the urban and the rural parts of India. For the data analysis Structural Equation Modelling (SEM) was employed. This method is used to test the causal relationships between dependent variable (intention to use) and the independent variables (perceived usefulness, perceived ease of use, perceived trust and attitude). Partial least square (PLS) is a parameter estimation method of SEM. We use the PLS-SEM method where measurement model is analysed to test the validity and reliability and then SEM is used to for testing the hypothesis. The chapter discusses the findings from the results of the analysis which helped us identify the behavioural and the socio-economic factors that affects the usage of digital financial services in India.

Chapter IV takes into account the perspective of the providers of the financial services towards the implementation challenges of adopting a digitalisation strategy in India. This chapter mainly focuses on the supply side challenges of digital financial services in India for the LMI segment. The chapter aims to study the current Status on the implementation of a digitalization strategy in India, understanding the challenges of adopting a digitalization strategy for the overall banking, to study the perception on the benefits of a digitalization led financial inclusion and to recommend suggestions from the point of the providers to accelerate the adoption of digitalized financial services. The study is a descriptive research study based on the survey and interview method of data collection.

Chapter V solely focuses on one of the pertinent and the emerging stakeholders of the financial inclusion ecosystem in India, the Fintechs. The chapter discusses about the innovative business models adopted by the new Fintech firms in India especially in the domain of financial inclusion, dealing with the LMI segment. The chapter strives to answer some burning questions with regards to fintechs and its role for financial inclusion as - Has the Fintech landscape in India evolved to offer opportunities to the upcoming new business models? What potential do the Fintech start-ups hold to overcome the challenges of Financial Inclusion in India? What market strategy is best suited for the Fintech Start-ups to remain sustainable? And finally, what policy intervention is required specific to the Indian Fintech sector in order to make the ecosystem more inclusive?

Lastly, Chapter VI is a compendium of policy recommendations based on the perspective and challenges identified from various stakeholders of the financial inclusion ecosystem.

CHAPTER 2: REVIEW OF LITERATURE

This chapter critically examine the extant literature on the demand side and supply side challenges of financial inclusion and digitalization in India in order to answer the aforesaid questions and understand the gaps in the current literature to frame the research objectives for overall thesis. There are five interrelated strands of literature relevant for the study has been reviewed and classified as:

- a) Barriers to Financial Inclusion in India
- b) Challenges to Digital Financial Inclusion
- c) Empirical studies on digitalization and financial inclusion
- d) Technology acceptance model
- e) Banks and Fintechs- Friends or Foe?

2.1 Barriers to Financial Inclusion in India

“The test of our progress is not whether we add more to the abundance of those who have much; it is whether we provide enough for those who have too little.”

- Franklin D. Roosevelt

Financial Inclusion describes a whole set of policy efforts towards enabling individuals to have access to basic financial services that meets the four important dimensions of access to financial services as a) reliability, b) convenience, c) continuity, and d) flexibility (Morduch and Rutherford, 2003). In India various committees have defined financial inclusion in broader terms. The RBI report (2008) defined financial inclusion as ‘the process of ensuring access to financial services and timely and adequate credit where needed by vulnerable groups such as weaker section and low-income groups at an affordable cost’. The Committee on Financial Sector Reforms, RBI (2013) further extended the scope of financial inclusion by adding not only the access to banking services, but also other financial services as insurance and equity products. The Committee on Medium-term Path on Financial Inclusion, by Mohanty (2015), against the backdrop of J-A-M trinity, acknowledges that the inclusion drive has gone beyond the confines of various financial regulators and assumed the character of a broader national development policy goal. This strand of literature is mainly focused towards identifying the existing challenges of financial inclusion. The RBI Report (2008) while assessing the financial inclusion landscape in India addressed some stakeholder wise issues of financial inclusion. The inefficiency of the Business Correspondent Model, uneven spread of SHG

Bank Linkage Model, lack of vernacularisation of forms, inadequate infrastructure and lack of proper training programs are some of stakeholder wise issues highlighted in the report.

The Demirgüç-Kunt and Klapper (2012), points out that 500 million adults in India have no formal accounts and the most commonly reported barrier to access was lack of enough money and some other family member holding a bank account. Moreover, distance, cost and lack of necessary documentation were a few other reported barriers.

The working paper by Singh et al (2014), addressed the key issues pertaining to financial inclusion in India. The paper is based on field research in the villages of Tumkur district Bangalore. The key issues to financial inclusion were low penetration of financial services, lack of innovation in the banking technology, lack of trust in the BCs and hesitation in using mobile phones for availing financial services.

Chattopadhyay (2011), aimed to study the extent of financial inclusion, by constructing an Index of Financial Inclusion. The index was developed using three supply-side dimensions: a) banking penetration, b) availability of banking services, c) Usage of the Banking System. The paper by Garg and Agarwal (2014), takes a deep-dive into understanding the reasons for financial exclusion in India. The study is descriptive in nature and is based on the secondary source of data. The most important reason for not having a bank account in India is the lack of enough money. Other reasons were distance, cost and other bank account in the family

A world bank (2007) report, identifies some of the barriers to access of financial services. Some of the demand side barriers identified were physical access barriers, lack of proper documentation, minimum account balance requirements, high transaction cost, lack of education and lack of appropriate product and services. Some of the supply side barriers were dependence of the microfinance sector on grants and subsidies, microcredit used for consumption purposes, higher interest rates and lack of proper savings mobilisation.

Beck et al (2008), develops indicators of barriers to banking services and find their correlation with measures of outreach and a number of bank and country characteristics. The new indicators of barriers to banking services was developed using survey data from 209 banks in 62 countries. The indicators of barriers to banking services across countries were (i) Physical access- which includes outreach and distance (ii) Affordability – which includes minimum amount required to open an account, minimum account balance

requirement, annual fee, minimum amount for consumer loan, cost to transfer funds, fees for using ATM card (iii) Eligibility- which includes the documentation process for opening a bank account.

Steering the literature review towards addressing the issues of financial inclusion in rural areas specifically, RBI (2005) report took both the demand and supply side perspective into consideration. Some supply side factors are responsible for existing gaps in the financial services are: persons are unbankable in the perspective of the banks, loan amount too small, high transaction costs, lack of database of credit history etc. And the demand side factors are: high transaction cost at client level (wage loss, travel cost), lack of awareness, documentation, small size of transaction, prior experience of rejection.

Similarly, Rajan (2009) assessed the strategy for financial inclusion in India and highlighted the challenges of financial inclusion. The report addressed the fact that the financial inclusion strategy in India has heavily relied on expanding rural bank branches and setting up of a special purpose Government sponsored institutions. However, quite contrary to the expectation, universal inclusion in India is still a distant dream. This is because the rural branches have not been profitable because of high transaction costs and the predominant lender to the poor is still the moneylender. Moreover, the focus on increasing credit in the absence of an appropriate product for risk mitigation led to over indebtedness among the poor.

Varghese and Vishwanathan (2018), states that the rural population get trapped in the vicious circle of poverty, debt and debt repayment as a majority of them rely on the informal sector for availing finance at high interest rates. As a consequence, the rural population fails to come within the ambit of the formal financial services. Lack of financial literacy (where the rural population remain ignorant of the basic financial product such as insurance, bank account etc) is the major impediment to rural financial inclusion. Lack of financial literacy can also hamper the use of technology in facilitating the financial services in rural and semi-urban areas.

Apart from the lack of financial literacy as a major impediment to rural financial inclusion, distance from a bank is also a mostly commonly cited barrier to basic financial inclusion. As pointed out by Christabell and Raj (2012), financial inclusion in countries with a large rural population has a geographical dimension. The rural residents have to travel great distances to reach a bank branch. Poor infrastructure and telecommunication

further add to the problem of geographical exclusion in rural areas. A report by Grant Thornton India (2020), discussed about the scenario of financial inclusion in rural India. The report purports that the financial institutions face numerous challenges in providing financial services in rural India. Firstly, there is high cost of delivery services because of poor transportation infrastructure and low population density. Secondly, building trust and attracting customers in rural areas is another challenge faced by the financial institutions. Majority of the rural population lack financial and internet literacy, and prefers personal relationship over digital transactions which make it a herculean task to build trust amongst the rural customers.

Steering our literature towards the peculiarity of the microfinance sector can uncover some interesting facets about the financial inclusion challenges. A paper by Banerjee et al (2014) takes deep-dive into analysing the actual scenario of Microfinance based on the randomized evaluation of a group lending microcredit program in Hyderabad, India. The study found that demand for microloans was very less among those households which relatively had high propensity to take up microcredit. Also, access to microcredit did not lead to any significant increase in the monthly consumption. Apart from that, there were no significant effect of microfinance on education, health, or women empowerment.

Bateman and Change (2012), accentuates the fact that the benefits of microfinance peter out in the long run, hence providing only short-term advantages. It was further revealed that microfinance ignores the role of scale economies. The lack of local demand for microcredit and an oversupply of microcredit negatively affected the both new and incumbent microenterprises. Microfinance hinders the industrial development of the developing economies and also leads to destruction of solidarity and a sense of local community in the developing countries.

In an article by Hulme (2000), there were some trenchant arguments against the concept of Microfinance. It was mentioned that MFIs (Microfinance Institutions) never worked with the “poorest of the poor”, rather a high proportion of the clients are non-poor. Also, the MFIs hinders the development of full range of services and products for the poor people.

Viada and Gaul (2012) in their study investigates about the Microfinance Institution’s lending activity and the rising indebtedness of the clients and the operational inefficiency of the Microfinance Institutions. The article focused on the debt financing option of the

Microfinance Institutions for the year 2010 by taking into account the source of funds and types of lenders for several countries. The study revealed that on an aggregate level, as the supply of funds were increasing the portfolio quality started to decline. Hence, excess supply of microloans leads to less rigorous credit standards leading rising indebtedness and defaults.

Cull, Kunt and Morduch (2007), in their empirical paper aims to examine the profitability of the Microfinance Institutions along with high loan repayment rates. The study analysed the data on the pattern of profitability, loan repayment and cost reduction for 124 institutions across 49 countries. The data was collected through surveys. For Microfinance Institutions a glaring challenge is to translate high repayment rates into profits. However, the findings of the study indicate that there is trade-off between the possibility of earning profits and serving the poorest.

A working paper by Honohan (2005) seeks to provide a conceptual framework of measuring microfinance access. The framework was built-up based on the review of diverse data collected through user surveys, surveys of providers and surveys of the experts. It was mentioned that both demand and supply side must be taken into consideration while measuring the microfinance access. Moreover, the barriers to microfinance access were categorised into: (i) Price barrier- which is the cost of accessing the financial services that consists of the price charged by the provider and the additional cost incurred by the client. The price charged by the provider depends on the technical efficiency, regulatory and tax factors and competition. (ii) Information barrier- this refers to the lack of a mechanism which accurately assesses the credit-worthiness of a client (iii) Product and service barrier- which refers to the failure to provide financial products and services which best suits the needs and requirements of the client.

Therefore, barriers to financial inclusion are on account of both demand side and supply side. Demand side factors include gender of the respondents, age-group, literacy, level of income, type of occupation etc. The main supply side factors for financial inclusion are distance from the bank, branch timings, lengthy documentation procedures, unsuitable products etc. Thus, obstacles such as identity requirements, the terms and conditions of bank account, bank charges and physical access barriers are all important (World Bank 2007, Asian Development Bank 2007;

and Kempson et al 2004). It was also observed that the major challenges are skewed towards the supply-side than the demand side challenges of financial inclusion.

2.2 Challenges of Digital Financial Inclusion

As we have observed in the previous section that financial inclusion is constraint by both the demand and supply challenges. Steering the literature towards the digital financial inclusion, it is observed that India is on the cusp of becoming a digital giant given the progress in the adoption and the gigantic efforts of the Government and policy makers towards digitalisation. However, the switch from the traditional financial services to the digitalised financial services remains to be a challenge both for the financial service providers and the customers in India. This section highlights the challenges of digital financial inclusion in India.

In a recent paper by Malladi et al (2021), some issues relating to digital financial inclusion in India were elucidated. These ranged from infrastructural constraint in the form of lack of a stable last mile connectivity infrastructure and affordable smartphones to incoherent Government database, lack of data privacy policy and lack of enough income to transact by the customers. Moreover, the digital divide on the basis of area, gender and education further adds to the problem of digital financial exclusion in India. The BRICS financial inclusion report 2021, acknowledges that with great opportunities associated with digital financial inclusion comes several risks and challenges. The digital divide, cybersecurity issues and customer data issues were highlighted as some of the major challenges of digital financial inclusion in the BRICS economies. Draboo (2020), highlights that the callous attitude of the stakeholders, the inherent feature of the dominance of a cash-based and informal economy and the prevalent socio-economic factors are some of the pertinent bottlenecks faced by digital India with respect to financial inclusion.

RBI (2019) report accentuates the issues and challenges of digital payments in India after considering various payment systems (RTGS, NEFT, ATM/DEBIT AND CREDIT CARDS). Cost of digital payments and restricted acceptance infrastructure are the major issues of digital payments in India. Apart from the aforesaid issues and some other issues includes, network and connectivity issues and market structure issues.

The Watal (2016) report presented a roadmap for strengthening the Digital Payment scenario in India. The report put forth trenchant arguments in favour of digitalisation, as payment in cash can be expensive as it involves latent and implicit cost while digital payment allows for the services to be delivered at lower cost. Though a great deal of progress has been made in India in the digital payment space, yet there exist gaps which hinder complete adoption of the digitalisation. The report accentuates the existing gaps in the payment system encountered by all the stakeholders – Government, providers and the consumers. Among the consumers, there is lack of awareness and consumer's confidence in the digital payment. Most of the consumers prefer cash due to the freedom of negotiations and faster settlement. The providers face the problem of inadequate value proposition for the merchants and of inadequate acceptance infrastructure with the lowest number of ATMs and POS terminals per million of the population. They face entry barriers due to lack of neutrality in ownership, lack of open access and interoperability. Also, the Government Department/ officials are not well equipped to receive payment digitally.

The report by IWWAGE (2019) succinctly provides a panoramic view of the digitisation initiative undertaken by the NRLM/SRLM backed programmes associated with the SHGs, while highlighting the digitisation trajectory along with the key gaps that exist at the implementation level. The methodology adopted for the study was extensive secondary research of the stakeholder's mapping of the SHG landscape in India. It was then followed by in-depth semi-structured interviews of the demand and supply side stakeholders. The key gaps existed at the program level were identified as limited resources, lack of a multi-focus approach for digitisation, and manpower shortages. At the SHG level, the major implementation challenge identified was the lack of digital and financial literacy among the group leaders and the members.

A report by Vishwanathan and Roy (2018), aimed to study various technological disruptions in the Indian banking system and the workforce challenges faced by the banking sector due to the technological disruptions. For identifying various challenging factors both the primary and the secondary sources of information were used. The challenging factors were identified with the help of the literature review of various articles and reports and also with the help of Focused Group Discussions and collection of expert opinions. The challenging factors identified were skill deficiencies, work management, employee's adaptability to change, performance management, training exposure, skill

transformation and employee's compensation. The impact assessment was also carried out of the workforce challenges in the Indian banking sector and the most crucial challenge identified for the public sector bank was employee's adaptability to change and skill deficiency for the private sector banks.

The research paper by Agarwal and Sen (2017) aimed to examine the challenges of digitisation in the Microfinance sector. The analysis was explanatory in nature based on the secondary data of the digitised economy and Microfinance inclusion in India. Few of the challenges exemplified were- lack of financial literacy, lack of infrastructure (transportation, communication, electricity in rural and remote areas), the cost constraint for the Microfinance Institutions to extensively adopt digitisation and the lack of proper client protection system.

The working paper by Ray, Paul and Miglani (2018) mentions about the emerging challenges of integrating digital technology in the Microfinance sector. The benefits of the technological innovation in the Microfinance sector were limited to only those MFIs with large scale operations since only such MFIs can afford to adopt the digitisation process. Another trenchant argument put forward was that technological integration reduces the 'human touch' in microfinance operations. Also, the MFIs have to face increased competition from the technology driven fintech companies.

A special report by AFI (2017), highlights some of the challenges of digitisation that the Microfinance providers face such as lack of affordable technology/platform providers, poor infrastructure (electricity, connectivity), data safety, security and protection, inexperienced personnel lacking necessary skills, budget constraints. Apart from the challenges, the report also mentioned some of the risks of digitisation for microfinance providers such as operational risks, strategic risks and consumer protection risks. Mujeri and Azam (2018) in their working paper studies the role of Digital Financial Services in Bangladesh and their risks and challenges which is accompanied by the opportunities it provides. These risks were highlighted as novelty risks for customers, agent-related risks and the digital technology related risks. Little Castle Partners (2019) highlights the state of digital Microfinance in Bangladesh, there were some challenges which were faced due to the digital transformation. The demand side challenges were low technical literacy and additional cost burden. And at the supply side, lack of IT infrastructure and obsolescence of some of the credit officers' task, were some of the challenges.

Thus, to summarise digital financial services adoption is constraint by both the demand and supply side factors. The pertinent demand side factors encompass issues like lack of digital and financial literacy as well as customer's trust and confidence in the digital solutions. The supply side are primarily clustered around infrastructure and policy issues.

2.3 Empirical studies on digitalization and financial inclusion

After delving into the challenges of financial inclusion and digitalization, the next section deals with the empirical studies which analyse the implications of digitalisation for financial inclusion. A paper by Laxmikanthanayaka and Laxman (2018), aimed to analyse the implication of the digitisation exercise for banks and their customers. The study is descriptive and exploratory in nature. Primary data from 60 bank officers was collected through interview schedules. Non-parametric statistical tests were used to check for the validity about the relationship between the qualitative characters. It was found that post digitisation it was easy for banks to seek out new retail customers and to easily cross sell financial services and insurance and banking products.

Agyekum, Locke, Wellalage (2016) in their empirical paper checks for the relationship between increasing accessibility to digital financial services and financial inclusion in lower income countries. The empirical model consists of financial inclusion as a dependent variable which represents user's account ownership. The independent variables consist of ICT (mobile phone, internet usage per population), Macroeconomic Indicators (MEI) and Economic Freedom Indicators (EFI). The data set covers a period of 1996-2014, extracted from World Bank's Development indicators, Global Findex database and Heritage Foundation's Index of Economic Freedom. The study employed OLS model for the macro dataset and logistic regression for the micro dataset. The results of the study revealed that technological infrastructure and mobile phone penetration positively affects financial inclusion. This finding provides strong empirical evidence about the positive impact of digitalisation on financial inclusion.

The empirical paper by Harigaya (2016) studied the effect of mobile banking on the savings behaviour of the Microfinance Institution's clients in Philippines using a randomized experiment evaluation. The bank targeted for the evaluation was a rural bank in the Philippines which had introduced mobile banking in 7 Microfinance centre. The study made use of three sets of data- administrative data of the banks, bank survey data

and a household survey data. The sample size for the study was 575 members of the Microfinance Institutions. To assess the effect of mobile banking on the savings behaviour, a difference-in-difference model was used. The functional form of the model consisted of treatment level indicators, post-intervention indicators, time fixed effect term and the centre-pair fixed effect term. The bank introduced mobile banking in three out of the seven centres. Thereafter, the average treatment effect over the years was estimated. The results obtained were quite heterogeneous. The members who lived far from the transaction point adopted new technology and maintained a savings balance. On the contrary, for the members who lived near the transaction point, there was a 28per cent decline in their average daily savings. The decline was because the technological intervention increased the perceived cost of deposit. Hence, the study ostensibly takes into consideration the willingness to pay aspect of the client while adopting the digitisation process. Furthermore, the findings highlight the impact of mobile banking in influencing a shift towards the digital mode of transactions.

The empirical study by Scott, Reenen and Zachariadis (2017), seek to examine the effect of the adoption of SWIFT on the bank's performance. SWIFT is a financial digital network innovation developed in 1970 to provide an infrastructure for worldwide interbank payment communication. The paper constructed and analysed a new data set which composed of the data on SWIFT adoption history from 1977 to 2005 and bank performance (in terms of profits) for US, Canada and 27 European countries. It was a quantitative analysis with an in-depth field study. Data set was a longitudinal panel data. The data was analysed using basic regression analysis. The functional form of the model consists of the profit margin which is defined as the ratio of pre-tax profits to sale of the firm as a dependent variable. The independent variables consisted of the variable SWIFT which is the adoption variable that is a binary dummy variable as well as a control variables, along with the fixed effect term and a time dummy to capture the macroeconomic shock. The results of the analysis revealed that SWIFT had a significant positive impact on the bank's profitability exhibiting significant network effects on bank's performance. The findings of the study are crucial as this further highlights the benefits of digitalisation for the financial service providers.

Mantel and McHugh (2001) in their empirical analysis seeks to understand consumer's adoption of card-based payment instruments. The study made use of 1300- person survey data on consumer's decision making. The data contained information on consumer's demographic characteristics, payment behaviour, payment preferences and evaluation of different payment options. The data was analysed using a series of binomial logistic regressions. The functional form of the logistic model consisted of usage of debit card as the dependent variable and the demographic characteristics of the users such as age, lifestyle, financials of the consumer, convenience, new product adoption, incentives, privacy and security were the independent variables. The results of the study conform with the fact that consumers while choosing to adopt any financial innovation considers a variety of factors. These factors are their wealth, time, availability of payment infrastructure, age, consumers' distrust and the 'new product adoption' factor. The study provides empirical evidence on the adoption of digital mode of payments from the perspective of the users.

The empirical paper by Hirschman (1982) was a deep-dive into studying several important attributes of different payment systems and how can these attributes affect their usage and preference among the customers. For five different payment systems namely- cash, bank credit cards, store credit cards, travel and entertainment cards and personal cheques, 11 essential attributes were identified which were budgeting, control spending, documentation, reversibility, transaction time, security, social desirability, transfer time, acceptability, leverage potential and transaction record. Both quantitative and qualitative data was considered for the study. The qualitative data was collected through a series of focused-group interviews and the quantitative data consisted of a nationally representative consumer mail panel data. There were two hypotheses constructed for the study- 1) There were significant difference present in the attribute structure of the payment systems 2) The contribution of each attribute significantly affects consumer's perceptions, attitude and behaviour. The first hypothesis was tested by performing Scheffe post hoc contrast and the second hypothesis using simultaneous multiple regression analysis. The result of the study showed that there were significant differences in the attributes of the payment systems which significantly affected perception of the consumers.

Carow and Staten (1999) examined the reasons for consumers to use cash, credit, or debit cards for making purchase transaction. The study undertook a mail survey of gasoline

credit cardholders to collect consumer's responses on the choice of the payment methods. 5164 responses were collected. The data was analysed using a multinomial logit model. The variables included the demographic characteristics such as age, education, income and the usage of cash and non-cash transactions. The results of the study revealed that respondents with more education, greater income, and a greater number of cards holding used card payment system rather than the cash. This study is crucial for as it empirically provides demand side factors which can influence the choice between the cash and the non-cash mode of payments.

Kennickell and kwast (1997) analysed the demand side constraints of using electronic banking based on the survey data from the 1995 survey of consumer finance. The consumer finance survey collects extensively detailed data on the respondent's use of financial services, their assets and liabilities, income and expenses and their demographic characteristics. Using a series of probit regression analysis, the independent effect of the respondent's financial asset holding, income, age and education on the use of electronic banking was analysed. It was found that the asset holdings, income and the level of education of the respondents had a positive effect on the usage of electronic banking. Moreover, the age of the respondents had a mixed effect because older people are less likely to adapt themselves to any technological upgradation. The research is essential for identifying the demand side demand side factors affecting the usage of digitalisation.

In another paper by Casolaro and Gobbi (2007) the effect of investment in Information Technology on the productivity growth of the banking industry was analysed. The study made use of panel of more than 600 Italian from 1989-2000. The data included information on the investments and expenses made on computer and software. Also, stochastic cost and profit functions were estimated. The relationship between total factor productivity changes and the use of Information Technology was studied. The results of the study indicated a positive correlation between the cost and the profit function and the Information Technology (IT) capital accumulation. This research study further adds to the importance of digital infrastructure and the profitability from the provider's perspective.

The empirical literature on the digitalisation oscillates between the impact analysis of digitalisation both on the provider's performance as well as on the consumers

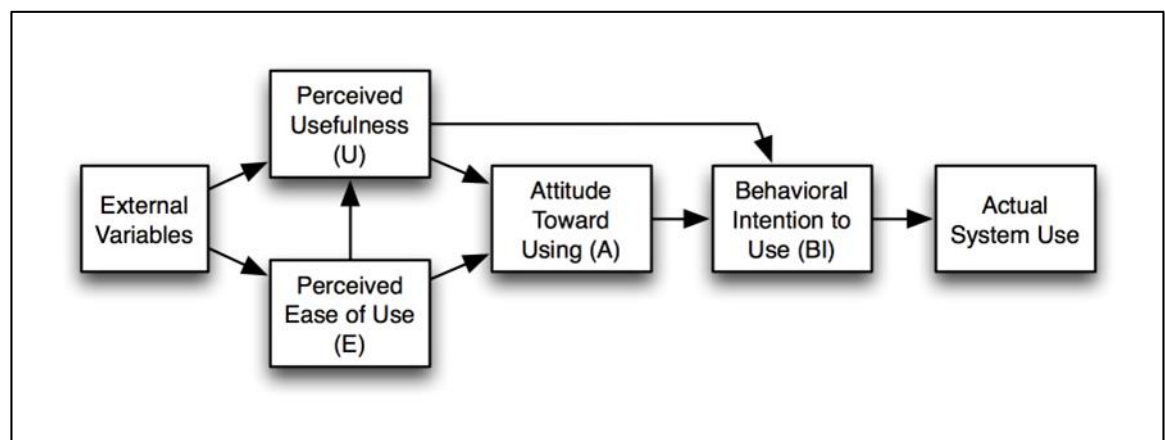
financial behaviour. It is interesting to observe that digitalisation mostly has a positive influence both for the banks as well as the customers. Leveraging digital technology in the financial services domain helps the banks in seeking out potential clients and improve their profitability. Moreover, digital technology also has immense potential in improving access and usage of overall digital financial services.

2.4 Technology Acceptance Model

The behavioural inertia in the adoption of digital financial services is one pertinent impediment to greater adoption and actual use of digitalisation especially among the low income and financially underserved clients. It indeed becomes imperative to understand the behavioural intent of the clients to use the digital financial services along with the factors which would influence the actual usage. One such model that would help in our quest to study such behavioural factors is the Technology Acceptance Model (TAM). This part of the review is dedicated to the Technology Acceptance Model and its application.

In 1989, Davis proposed the Technology Acceptance Model (TAM) to explain the potential user's behavioural intention to use a technological innovation. TAM is based on the theory of reasoned action (TRA), a psychological theory that seeks to explain behaviour. TAM involved two primary predictors – perceived ease of use (EU) and perceived usefulness(U) and the dependent variable is behavioural intention (BI).

Figure 10 Technology Acceptance Model as proposed originally by Davis (1989)



Source: Davis (1980)

In one of the papers by King and He (2006), the statistical meta-analysis of the TAM based on the 88 published studies, revealed that TAM is a valid and a robust model with wide applicability. Porter and Donthu (2006) in their analysis made use of the Technology Acceptance model to explain how the attitude of an individual determine the internet usage and the role of access barrier and demographic in affecting the attitude of an individual towards using the internet. The aim of the study was to understand differential rates of internet use due to age, education, income and the race of an individual. The authors extended the TAM model to test the significance of the demographic variables and the perceived access barriers towards the attitude. Primary data was collected through the survey method from a convenience sample of real consumers in a major South-eastern US metropolitan area. A total of 614 surveys were undertaken. The responses on Perceived Usefulness, Perceived Ease of usefulness and attitude towards the internet usage was collected using a Likert scale. The collected responses were then analysed using a Confirmatory Factor Analysis. The results of the study indicated that the model was indeed in good fit. Perceived ease of use and perceived usefulness positively affect the attitude towards internet usage. Moreover, demographic variables such as age, income and education significantly affect the attitude towards using the internet. The limitation with their analysis is that the personal goals for using the internet should also have to be taken into consideration.

The research paper by Nadim and Noorjahan (2008), aimed to test the effect of perceived usefulness, ease of use and security and privacy on customer adaption mediated through customer attitude in the context of e-banking. A sample of 227 customers of private commercial banks in Bangladesh was selected for the analysis. A structured questionnaire was used to collect the data. The results of the study indicated that perceived usefulness, ease of use, security and privacy and customer attitude are significantly and positively related to customer adaptation.

In another by Hosein (2009), TAM model was used to study about the adoption rates of internet banking in Midwest community banks of the USA. The data was collected on customer's behaviour, satisfaction and service quality through in-depth interviews with the bankers. The results were analysed using Structured Equation Modelling and the hypothesis were tested. It was found that perceived ease of use affected customer's adoption of Internet Banking.

The research paper by Hong and Walker (2015) made use of the enhanced Technology Acceptance Model to study and test the factors that would drive the acceptance of digital banking in South Africa. The study was undertaken with the help of online surveys and structured interviews. The participants were mainly the users of digital banking services. A total of 252 participants were identified and interviewed. The responses were collected on factors such as perceived usefulness (PU), perceived ease of use (PEU), credibility, attitude, trust, perceived risk and compatibility associated with digital banking. The hypothesis was formulated and tested using linear regression analysis. Following were the results of the study- (i) compatibility had a significant positive impact on PU, (ii) Perceived risk had a negative impact on the attitude, (iii) trust had a positive impact on PU, (iv) PU had a positive impact on the attitude, (v) PU had a positive impact on the behavioural intention, (vi) PEU had a positive impact on trust, (vii) PEU had a positive impact on the attitude.

A study by Safeena, Date, Kammani and Hundewale (2012) on acceptance of mobile banking by the customers adopted the Technology Acceptance Model. The study considered four factors that would affect the acceptance of mobile banking. These factors were perceived usefulness, perceived ease of use, perceived risks and consumer's awareness about mobile banking. The data was collected through surveys and structured questionnaire. Likert scale was used to gather information about the perception of the respondents. The respondents were the students of business and economics and were well aware about the concept of mobile banking. The sampling technique used was convenience sampling. Principal component factor analysis with a varimax rotation was conducted. The results revealed that all the four factors were significant in determining mobile banking adoption.

Lema (2017) used the TAM model to study the factors influencing the adoption of mobile financial services in the unbanked population of Africa. The data about the study had a cross-sectional design. Purposive sampling technique was adopted to select the respondents for the study with a sample size of 250 respondents. The responses were collected using a self-administered questionnaire particularly for six variables (based on the TAM methodology) as Perceived Usefulness, Perceived ease of use, Perceived trust, Perceived cost, Perceived Risk, and Social Influence. The reliability of the study was established through the coefficient alpha and the construct validity was established using Structural Equation Modelling. The hypothesis was tested using Multiple regression

analysis. The results of the study revealed that Perceived Usefulness and Social Influence had a significant positive influence on the adoption of mobile financial services and Perceived Cost had a significant negative influence on the adoption of mobile financial services. The variables such as Perceived Ease of use, Perceived trust, and Perceived Risk had no significant relationship with the dependent variable. Thus, customers would prefer using those mobile financial services which are useful, affordable, and in tandem with the social norms. A significant drawback of this study was it lacked a longitudinal approach to study the perception of the customers.

In another study by Aboelmaged and Gebba (2013), the impact of technological and social factors on the usage of the mobile banking system was studied by integrating the TAM model and the theory of planned behaviour. A convenient sample of 300 undergraduate and post graduate students of UAE University was chosen. The responses were collected with the help of a self-administered questionnaire. The construct validity was tested with the help of a Confirmatory Factor Analysis Technique. Thereafter, the regression analysis was undertaken to test the hypothesis. The results of the regression indicate a significant positive effect of two variables, that is, Attitude towards mobile banking and subjective norms, on mobile banking adoption. Moreover, there was a significant positive effect of perceived usefulness on attitude towards mobile banking. Surprisingly, the effects of behavioural control and usefulness on mobile banking adoption were insignificant. However, the study had some limitations of selection bias and low explanatory power of the model, thus leaving a further scope of adopting qualitative case-study based research.

The research paper by Vukovic et.al (2019) aimed to determine the motivation of using internet banking based on the two elements of the TAM model that is, Perceived ease of use and Perceived Usefulness. The research work was carried out in Split, the second largest city in Croatia. For the purpose of the research, survey method of data collection was adopted focusing on the working population of Split. A sample size of 282 working residents of Split was selected based on stratified and quota sampling. The questionnaire used consisted of the questions both regarding the Perceived ease of use and perceived usefulness of Internet Banking and the respondent's demographic and economic characteristics. The data was analysed using the statistical packages SPSS and STATA. Exploratory Factor Analysis technique was used to define the underlying structure among the variables in the analysis. Thereafter, logistic regression model was used to test the

research hypothesis. There were two models in the study. Both models had adoption of Internet Banking as the dependent variable and the effect of Perceived Ease of use and Perceived usefulness was studied separately as independent variables along with demographic and the economic characteristics of the users. The results of the logistic regression revealed that both Perceived Ease of Use and Perceived Usefulness had a significant positive impact on the adoption of Internet Banking. Moreover, age had a significant negative impact on the adoption of the Internet Banking. Also, variables such as income and usage of Internet had a significant positive impact on Internet Banking adoption. Hence, a younger respondent with a higher level of education and high usage of internet and high level of income would find using Internet banking easy and useful and hence would be willing to adopt Internet Banking. However, the research suffered from the limitation of a biased sample.

In similar lines Yasa et.al (2014), studied the clients of five major banks in Denpasar to analyse the adoption of internet banking using the TAM model. The study tried to validate the findings of the other studies. Both Perceived Ease of use and Perceived usefulness were used as an indicator to have an influence on the attitude towards using internet banking. The data for this study was obtained through surveys by a well-structured questionnaire. A purposive sampling technique was adopted and a sample of 115 respondents was fixed. The data was analysed using Structural Equation Modelling technique. The results of the study showed that Perceived ease of use and Perceived Usefulness had a significant positive impact on the actual usage of internet banking. The limitation of the study is that it should be validated in a larger context.

The Technology Acceptance model got further extended as few of the other factors were added to the original Technology Acceptance Model. In a research paper by Celik and Yilmaz (2011) the extended Technology Acceptance Model was used to study consumer acceptance of e-shopping in Turkey. The factors that were further added were perceived information quality, perceived service quality, perceived system quality, perceived enjoyment, and perceived trust. E-survey method of data collection was used in the study. A 5-level Likert scale was adopted as a measurement device to collect the responses on the acceptance of e-shopping. 606 internet users were interviewed. Probability based sampling method was deployed for the study. The data collected was analysed through Structural Equation Model. The findings of the study indicated that the new factors added

in the classical Technology Acceptance Model significantly affected the acceptance of e-shopping.

The extant literature on the TAM model laid the contours for implementing the model to understand behaviour of the Low-middle income customers towards the digital financial services. The extended versions of the TAM model along with its broad application in the domain of digital technology/ digital finance provides a substratum to build an extended version of the TAM model for the thesis.

2.5 Fintechs and Bank Partnership-Friends or foe?

The financial service sector is in the middle of a digital revolution that represents the most significant change in banking for centuries. One such digital revolution is the emergence of the FinTechs in the financial services sector. FinTech has many aspects, some related to its technological aspects and some to its financial aspects. The most relevant definition of Fintech has been provided by the FSB (2019) report as the technology driven innovation in the provision of financial services.

2.5.1 Skewed Evolution

Fintech industry in the developed countries has evolved across five areas of focus such as finance and investment, risk management, payment and infrastructure, data security and consumer interface and Robo-advisory services. On the contrary, in the emerging markets of Asia and Africa the Fintech development has been primarily driven by the Government initiatives focused mainly on financial inclusion and economic development. In Africa, the Fintech development is majorly driven by the underdeveloped level of banking and financial services and the rapid spread of mobile technology. In the Asia- Pacific region, the driving factors identified were: slower IT spending by APAC traditional banks; public distrust of the state-owned banking system (due to corruption and inefficiency); limited branch network distribution; and very high mobile telephone penetration rates, particularly smartphones. However, an exploratory study by Zalan and Taufaily (2017), based on the interactions with stakeholders of the financial ecosystem in the Middle East and North America (MENA), reveals that the Fintech sector is still in the nascent stage and is likely to be disruptive in selected products and customer segments.

2.5.2 Changes in the Market Structure

The disruptive technology has the potential to set in place the improvement cycle whereby the pace of technological progress eventually outstrips customer's ability to use the technology and the previously not so good technology improves enough to intersect with the needs of more demanding customers in the mainstream (Zalan and Taufaily 2017). The data shows improvement in bank performance and consolidation of the industry during the deployment of new technique. (Berger 2003). A FSB (2019) identifies the changes in the market structure in financial services brought about by the Fintech. The market structure changes in terms of concentration, contestability and composition. The disruption caused by the Fintech may lower barriers to entry by reducing costs, enhancing economies of scale, and solve the problem of high transaction cost and information asymmetry. There is also unbundling of financial services.

Positive externalities of Fintech- Increased Access to Finance

Parlour et al (2019), studies the impact of Fintech competition on payment services on monopolist banks that offer payment processing and lending services. In the analysis, it was found that by directly competing with the banks, Fintech entrant disrupts the information spill over and can directly affect the price of the payment service charged by the banks. Fintech competition reduces the market share of banks in payment processing by attracting consumers with low bank affinity. Hence, the overall consumer welfare depends on the consumer's affinity for bank services. Those with high affinity may be worse off, whereas those with low affinity may benefit from cheaper access to payment services. Fintech has the potential to change the basis of competition as well as increasing the pace of technology, laying a solid foundation for the future disruption of the financial ecosystem. The ideal market response is either the incumbents upgrade their processes by making strategic investments in innovative technology or they partner with the Fintech start-ups (Gada 2018).

By partnering with each other, Fintech start-ups and incumbents can meet organizational legitimacy needs and can achieve a mid-way approach that harness each other's expertise and attain competitive advantage in the financial ecosystem transforming around new technologies (Svensson et al 2019). According to Zalan and Taufaily (2017), the incumbent's strategy to face the Fintech disruption is the bank-fintech collaboration which will create new value for the ecosystem partners

and speed up innovation. A PwC (2016) report assessed the potential impact of Fintech on the market players using the primary data collected from a global survey of the top-tier managers involved in the digital transformation, and secondary data from DeNovo PwC's strategy and Platforms. Based on the survey results, the rise of the Fintech firms can substantially reduce the cost by simplifying the core processes, provide a variety of differentiated financial products and services, improved retention of the customers and can contribute in generating additional revenues.

2.5.3 Need for Timely Policy Response

Ehrentrand et al (2020), recognize that Fintech presents policymakers with trade-offs and challenges of financial stability, market integrity, consumer and investor protection, efficiency and competition, and financial inclusion. A cross country overview of the regulatory responses reveals a range of approaches followed when regulating Fintech activities. Chiu (2016) provides a framework for analysing the disruptive potential of Fintech and regulatory implications. Fintech products have the potential to countervail the sub-optimal principal-agent problems in conventional financial intermediation and a high-level framework of studying the change, substitutive potential and structural impact of Fintech innovations in financial products, intermediation and markets. Such a framework is useful for the regulators to consider the objective of investor protection and financial stability along with updating and adapting to new practices and methods.

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the Middle East and North America (MENA), reveals that the Fintech sector is still in the nascent stage and is likely to be disruptive in selected products and customer segments.

The disruptive technology has the potential to set in place the improvement cycle whereby the pace of technological progress eventually outstrips customer's ability to use the technology and the previously not so good technology improves enough to intersect with the needs of more demanding customers in the mainstream (Zalan and Taufaily 2017). The data shows improvement in bank performance and consolidation of the industry during the deployment of new technique. (Berger 2003). An FSB report (2019) identifies the changes in the market structure in financial services brought about by the Fintech. The market structure changes in terms of concentration, contestability and composition. The disruption caused by the Fintech may lower barriers to entry by reducing costs, enhancing economies of scale, and solve the problem of high transaction cost and information asymmetry. There is also unbundling of financial services. Yet to date, Fintech firms have found new niches- platform for P2P lending, crowdfunding, and underserved clients.

Impact of Fintech on the financial services sector is important for access to finance. Parlour et al (2019), studies the impact of Fintech competition on payment services on monopolist banks that offer payment processing and lending services. In the analysis, it was found that by directly competing with the banks, Fintech entrant disrupts the information spillover and can directly affect the price of the payment service charged by the banks. Fintech competition reduces the market share of banks in payment processing by attracting consumers with low bank affinity. Hence, the overall consumer welfare depends on the consumer's affinity for bank services. Those with high affinity may be worse off, whereas those with low affinity may benefit from cheaper access to payment services. Fintech has the potential to change the basis of competition as well as increasing the pace of technology, laying a solid foundation for the future disruption of the financial ecosystem. The ideal market response is either the incumbents upgrade their processes by making strategic investments in innovative technology or the incumbent partner with the Fintech start-ups (Gada 2018).

By partnering with each other, Fintech start-ups and incumbents can meet organizational legitimacy needs and can achieve a mid-way approach that harness each other's expertise and attain competitive advantage in the financial ecosystem transforming around new

technologies (Svensson et al 2019). According to Zalan and Taufaily (2017), the incumbent's strategy to face the Fintech disruption is the bank-fintech collaboration which will create new value for the ecosystem partners and speed up innovation. A PwC (2016) report assessed the potential impact of Fintech on the market players using the primary data collected from a global survey of the top-tier managers involved in the digital transformation, and secondary data from DeNovo PwC's strategy and Platforms. Based on the survey results, the rise of the Fintech firms can substantially reduce the cost by simplifying the core processes, provide a variety of differentiated financial products and services, improved retention of the customers and can contribute in generating additional revenues.

The research paper by Klus et al (2019), dive-deep into studying the motives of both banks and the Fintech to join hands and work harmoniously. Motives for the banks were to reap the benefits of outsourcing, innovation, new business models and to attain a competitive advantage to increase customer value. Moreover, Fintech collaborate with the banks to gain the trust and credibility built up by the banks over several years among their customers

Apart from the market response, it is imperative to understand the policy and the regulatory response to the Fintech disruption. Ehrentrand et al (2020), recognize that Fintech presents policymakers with trade-offs and challenges of financial stability, market integrity, consumer and investor protection, efficiency and competition, and financial inclusion. A cross country overview of the regulatory responses reveals a range of approaches followed when regulating Fintech activities. From Fintech specific licensing regime, digital IDs system, open banking initiatives to data protection laws, cyber security framework and innovation facilitators, all are some of the regulatory responses to the Fintech disruptions from various regulatory authorities. Chiu (2016) provides a framework for analysing the disruptive potential of Fintech and regulatory implications. Fintech products have the potential to countervail the sub-optimal principal-agent problems in conventional financial intermediation and a high-level framework of studying the change, substitutive potential and structural impact of Fintech innovations in financial products, intermediation and markets. Such a framework is useful for the regulators to consider the objective of investor protection and financial stability along with updating and adapting to new practices and methods.

Li et al (2017), examined the role of Fintech digital banking start-ups in the financial industry by examining the effect of the funding of such start-ups on the stock returns of 47 incumbent US retail banks. For the analysis, secondary data from the venture finance-data firm 'CB Insights' was used. The data on the dollar-volume of funding and number of deals and the stock returns was gathered. Using panel data regression analysis, the impact of funding and deals on the stock return of the retail banks was analysed. The results of the study suggest a positive relationship between the growth of FinTech funding and the stock returns of the incumbent retail banks. Hence, suggesting complementarity between FinTechs and traditional banking.

The PwC (2016) report assessed the potential impact of FinTech on the market players using the primary data collected from a global survey of the top-tier managers involved in the digital transformation, and secondary data from DeNovo PwC's strategy and Platforms. The report put forward a trenchant argument in favour of the FinTech firms which provides a behemoth opportunity for the financial service industry. Based on the survey results, the rise of the FinTech firms can substantially reduce the cost by simplifying the core processes, provide a variety of differentiated financial products and services, improved retention of the customers and can contribute in generating additional revenues.

The Accenture report (2015) mustered views of 25 influential financial services executives, acknowledging the need for banks to collaborate and not compete with the Fintech financial service providers. A critical theme of "Openness, Collaboration and Investment" emerges for the incumbent banks in order to reap the benefits of the digital disruptions caused by the Fintechs. The banks should reimagine themselves digitally by adopting the three behaviours in relation to Fintech. The first is "openness" which implies the process of engaging with the external technology, resources and knowledge. The Second, "Collaboration" which implies the complementary alliance between the banks and the Fintechs. And third, "Investment" which conforms to the venture capital investment in the FinTech firms. Hence, the banks have recognised the threats posed by the digital disruption and recognise the importance of adopting the approach of openness, collaboration and investment.

A report by Manatt, Phelps and Phillips, LLP (2016) which was on the survey responses of senior executives from the regional and community banks, fintech companies and the

venture capital firms, revealed that majority of these responses were in favour of the Banks and the Fintech collaboration. The benefits of the collaboration accrue to both the parties. For the banks, the Fintech firms help in expanding the mobile banking functions and in lowering capital expenditure and cost of doing business. For the Fintechs, the collaboration helps in gaining a partner with market credibility, opening access to customers in new geographies and having a partner with an established legal and regulatory footprint.

A paper by Arner, Barberis and Buckley (2016), discusses about the evolution of the fintechs and put forward the rationale in support of setting up of the Fintech start-ups in the developing economies of Asia. These economies offer a fecund land of opportunities as they have inefficient financial and capital markets with digitally equipped population which offers a great scope for informal alternatives. Hence, Fintechs can be used in these three areas- payments, financing and deposits.

The report by EY (2017) aimed to study the prospects and potential of Fintechs and Bank Partnership with banks and Fintechs collaborating to be mutually beneficial to each other. The report is based on the analysis of 45 major banks over the of three years. The results show that for banks, collaboration with the Fintech firms is a preferred engagement strategy as they can develop new technology standards. Banks can benefit from such a partnership as Fintechs drives innovation providing better financial services at lower cost and help re-connecting with the customers.

Vives (2016) in one of his articles, examined the impact of the Fintech firms on the banking sector. The main argument put forward in the article was that Fintech firms can enhance the efficiency of the banking sector as the fintech firms have the potential to lower the cost of lending, provides a payment system, financial advisory and insurance services and widen the access to finance. Fintech firms are able to reduce the cost by solving the problem of asymmetry between the banks and the customers, hence, promoting innovation in the banking industry.

The research paper by Klus et al (2019), dive-deep into studying the motives of both banks and the Fintechs to join hands and work harmoniously. The paper provides an exploratory insight into the strategic alliance between banks and the fintechs based on both the primary and secondary data. The paper adopted a case-study approach to study the motives behind the banks and fintech partnership. The secondary data consisted of

press releases, news sources and databases. For the primary data collection, semi-structured interview with open-ended questions was undertaken with the officials of the banks and the fintech firms. A sample of 19 banks who had announced the alliance with the Fintech firms in Germany was chosen. The data was analysed using Gionia methodology. The findings of the study revealed five motives for the banks and 4 motives for the fintechs to undertake the strategic alliance. Motives for the banks were to reap the benefits of outsourcing, innovation, new business models and to attain a competitive advantage to increase customer value. Moreover, Fintechs collaborate with the banks to gain the trust and credibility built up by the banks over several years among their customers.

Klus et al (2018) in their working paper probed into the factors which led to the alliance of banks and Fintech firms. The hypothesis was formulated stating that the banks that have implemented /adopted a digitalisation strategy and have appointed a CDO (Chief Digital Officer) are more likely to form an alliance with the Fintech firms. The hypothesis was tested with the help of hand-collected information on strategic alliance made over the period of 2007-2017 by 100 largest banks in the countries of Canada, France, Germany, and UK. Panel Probit Regression analysis was undertaken to test the hypothesis. The results of the study revealed that banks who have adopted digitalization are more likely to collaborate with the Fintech Firms. Also, the stocks of digital banks perform better since banks are better able to internalise the Fintech's expertise.

Bömer and Maxin (2018) in their research paper developed a conceptual framework to examine the reasons as to why the Fintech firms cooperate with banks. The analysis was exploratory in nature based on multiple-case studies. The study identified fourteen German Fintech-bank collaborations from 2016-17. The primary data set consisted of responses of the Fintech CEOs, bank managers and industry experts collected through semi-structured interviews. The secondary data set consisted of industry reports, press release, marketing material, newspaper articles and homepages. The data set was analysed using a 4-step cross-case analysis. After the careful investigation, the study put forward some trenchant arguments in favour of the cooperation between Fintechs and banks. Fintech firms benefit from such a partnership as they are able to increase their profits and the banks help facilitate new products and fintech's market entry.

2.5.4 Potential Risks

According to the Capegemini (2018), world fintech report, both the FinTech firms and traditional financial institutions have competitive advantages over one another which makes the collaboration a “win-win” situation as the strengths is swapped and the mutual needs are identified. FinTech firms have competitive advantage of agility, innovation, cost reduction, customer experience, new products and data handling. On the contrary, traditional financial services firms have an upper hand in terms of better risk management, infrastructure, regulations, customer trust, economies of scale, brand name and capital. Hence, 70 world per cent of the FinTech firms in general prefer to collaborate with the traditional financial services firms. The report also purports that globally 7500 FinTech firms have raised over 109.8 billion yet most will likely fail as the collaboration often gets jeopardize because of cultural differences and technical challenges. Based on the survey, most of the Fintech firms cited partner’s lack of agility and inadequate IT engagement as major roadblocks in the collaboration.

A research paper by Zveryakov et al (2019) aimed to analyse the possibility of providing the financial products and services without banks and evaluating the emergence of FinTech firms and their partnership with the banks. The methods used for evaluating the FinTech and the banking sectors were statistical monitoring and dynamic and structural analysis. Based on the aforesaid methodology, the results of the study revealed that although the bank and FinTech partnership cooperation provides numerous mutually beneficial opportunities, there are some unavoidable risks that may arise from such a partnership. Both the customers and the banking system are prone to the threats/risks arising from the partnership. The customers can face issues such as confidentiality and data security issues and unacceptable marketing practices. Banks and the banking sector have to face strategic and profitability risks, operational risks, money laundering risk, liquidity risk and compliance risk. Hence, cooperation must involve the development of a new business models by banks.

Similarly, Temelkov (2010) in his paper discusses about the synergetic effect of the alliance between the banks and the FinTechs. Such an alliance can be advantageous for both banks and FinTech companies in terms of the decrease in capital expenditure and customer base. But there can be some adverse effect of the cooperation in terms of numerous risks such as cybersecurity risk, investment risk, and regulatory and compliance risks.

Drummer et al (2016) highlights that the growing competition from the FinTechs can cause banks to lose around 29per cent-35per cent of their revenues due to loss of customers and reduced margins. A report by Manatt, Phelps and Phillips, LLP (2016) revealed about the potential risks and concerns arising out of the Banks and the Fintech collaboration. For the banks the major challenge is difficulty in hiring qualified personnel and the legal and the regulatory issues. Amongst the legal and the regulatory issues, the most pressing issues are the security of bank information, customer data privacy and security of digital/online payments. For the Fintechs the major risks/concerns are the cybersecurity issues, inadequate returns available from their customer base and excessive overhead involved in adding fintech functions to their systems. But despite the risks and concerns the collaboration indeed has become an indispensable phenomenon as the financial industry is evolving with new uses of technology.

A thesis by Pejkovska (2018) studied the negative effects of the FinTech elements (blockchain and cryptocurrencies, alternative payment methods and investment and banking) on the global financial services. The research focused on the samples of three political and geographic regions of EU, India and USA. The methodology followed was based on studying the secondary source of the information gathered by several consulting and auditing houses (such as Accenture, KPMG, EY, etc). Upon analysis it was found that there are threats related to Fintechs which can have a negative impact on the global financial sector. The lack of appropriate regulations in the Fintech sector could lead to money laundering and tax evasion by the people which can demolish the general public's trust in the sector. Furthermore, there are threats of corruption of cybersecurity and data privacy infringement by the FinTech elements.

2.6 Research gaps and Limitations in the Extant Literature

The comprehensive literature survey has led to the identification of the following research gaps:

- There is lack of a concrete and a comprehensive stakeholder wise detailed study on understanding the challenges of digitalization in the financial inclusion ecosystem of India. A detailed study on understanding the perception of all the stakeholders ranging from the customers, financial service providers and the technology providers is the need of the hour to eradicate all the bottlenecks to greater usage and adoption of digital financial services in India.

- There is a dearth of empirical studies pertaining to digitalization and financial inclusion particularly in the Indian scenario.
- The TAM model and its applications in the domain of digital financial services lacks the element of financial inclusion. All the studies have been undertaken considering the customers in general without any emphasis on the low-income and the vulnerable segment of the population. A distinct model considering the perception of the low-income clients on the usage of digital financial services in the Indian context is yet to be explored. Furthermore, the impact of the socio-economic factors on the perception of the low-income clients gives us the further scope of exploration.
- With regards to the Fintechs and its role for financial inclusion, there is a need to identify an ideal market strategy to be adopted by the Fintech start-ups in India and the incumbents and an ideal policy response specific to the Indian context.
- It is required to lay the contours of an effective policy roadmap considering all the stakeholder-wise challenges and gaps at the micro-level in India's journey to digital financial inclusion. The policy recommendations addressing all the gaps in the financial inclusion ecosystem will help in tackling some chronic and structural challenges to financial inclusion in India which will further clear the pathway to complete adoption of digitalization in the financial inclusion ecosystem.

The gaps identified through the literature review helped in framing the research objectives for the thesis. The research gaps helped us identify the further scope of study and the areas in which the thesis can contribute. The thesis is an attempt to analyse stakeholder wise challenges of adoption of digital financial services in India. By understanding the perspective of all the stakeholders in India, the thesis further aims to suggest policy recommendations that can effectively bridge the gap between access and usage of digital financial services in India. Therefore, following are the research objectives of the thesis:

- To study the current status of the implementation of digitalisation strategy in the financial inclusion ecosystem and identifying the provider's side (commercial banks, Non-Banking Financial Company-Micro Finance Institution (NBFC- MFIs), Small Finance Banks (SFBs), Self-Help Groups (SHGs), Mobile Network Operators (MNOs), and Technology Service Providers (TSPs) challenges in delivering the digital financial services.

- To study the demand side challenges of adoption of digitalised financial services with the help of Technology Acceptance Model (TAM).
- To study the potential of Fintech start-ups in India in enhancing financial inclusion, and identify the policy intervention required specific to the Indian Fintech sector in order to make the ecosystem more inclusive.
- To recommend a policy and regulatory framework that takes into account the stakeholder wise issues of digitalisation and financial inclusion, thus helping in greater usage of financial services in India.

3. CHAPTER 3: The adoption of Digital Financial Services for financial inclusion: Using TAM model

This Chapter aims to bring out the demand side challenges of digital financial services with the help of a perception study which is mainly focused on the LMI segment. The advent of growing technology in the finance sector is the emergence of digital financial services which are now becoming integrated at all levels of the financial inclusion ecosystem. Digital financial services (DFS) are defined as the financial services which rely on digital technologies for their delivery and use by consumers (Pazarbasioglu, et al, 2020). There are two types of digital financial services business model: a) Bank-led model, in which the bank is the primarily responsible in the development and delivery of the product or service, its marketing, branding and, managing the customer relationship b) Non-bank led model in which the non-banks (including the third party providers, fintech firms, other non-bank financial institutions) may undertake the sole task of developing and delivering the digital financial services or product to the end-all customers. Digital financial services offer a plethora of benefits in terms of reduced costs, convenience, and tailored financial services. Thus, fostering financial inclusion. In India, digital finance is a key driver of financial inclusion and an imperative channel of distribution of financial services to the financially excluded and unbanked. However, despite the progress made in the expansion of digital financial services in India, user adoption and usage still remain to be roadblock as issues like dormancy of bank accounts, millions of unbanked populations and the dominance of a cash-based economy, are of prominence. The transformation in the form of switching from the traditional form of banking to the digitalised form of banking, may lead to voluntary exclusion of the users from the use of digital financial services. The behavioural inertia, lack of awareness and digital literacy could be the potential cause for such an exclusion. Hence, a demand side analysis of the factor affecting the usage of digital financial services may provide a better understanding of the problems of user adoption.

A key factor to the success of any digital technology is the individual acceptance (Sharma and Govindulari, 2004). IT acceptance has been an interesting and much discussed area of research in the past two decades. Acceptance and use of technology have several

theoretical underpinnings provided both at the individual and organisational level. Once such theoretical and conceptual framework which has received much attention and is widely used is the Technology Acceptance Model (Plouffe,2001). Technology Acceptance Model has become one of the most widely applied individual level models in the IS (Information System) literature. TAM was first proposed by Fred Davis in 1989 to explain IS adoption in a variety of contexts. The model has its theoretical foundation which is derived from the psychology-based theory of reasonable action (TRA) and theory of planned behaviour (TPB). The original TAM model had two latent variables called perceived ease of use and perceived usefulness which were assumed to play a mediating role between external variables and the actual system usage. TAM is often employed because of its parsimony and robustness. Based on the meta-analysis of several empirical studies based on TAM model, it was concluded that TAM is a powerful and robust predictive model with potential of wider applicability (King and He, 2006).

The application of TAM in the context of digital financial services is restricted to internet/mobile banking. Some empirical papers have tried to identify factors affecting the adoption of Internet banking/mobile banking in developing countries (Afshan et al., 2018; Marakarkandy et al.,2017; Kesharwani and Singh Bisht, 2012; Malhotra and Singh, 2007). There are studies which have also tried to study mobile banking adoption through the application of TAM (Koksal, 2016; Alalwan et al., 2016; Mohammadi, 2015; Mortimer et al., 2015; Hanafizadeh et al., 2014; Jeong and Yoon, 2013; Cheah et al., 2011; Kim Mirusmonov and Lee, 2010). However, digital financial services have much wider scope than internet banking or mobile banking services. There is also a need to understand the adoption of digital financial services against the backdrop of financial inclusion in India. This current study aims to fill these gaps. Thus, this empirical study contributes to the literature by identifying factors that affect the actual usage of digital financial services among the low-income segment in India. The original TAM is further extended to incorporate perceived trust as a construct other than two originally used perceived usefulness and perceived ease of use and also incorporating the demographic factors as a moderating variable to identify their moderating effects on the adoption.

3.1 Conceptual Framework and Hypothesis Development

To understand the conceptual framework of the TAM model it is imperative to delve into the theories models which preceded and influenced the development of the overall TAM model. The theory of reasoned action (TRA) and the theory of planned behaviour (TPB)

represents the origin of TAM (Marangunić and Granić, 2015). The theory of reasoned action was first proposed by the psychologists' Martin Fishbein and Icek Ajzen as an improvement of the information integration theory, another model of human behaviour. Fishbein and Ajzen (1977) explains links between beliefs, attitude, norms, intentions and behaviour of an individual. They developed a theory to predict the behaviour of an individual. According to the theory of reasoned action, a person's behaviour is determined by its behavioural intention to perform it. Furthermore, the theory of reasoned action got extended to study determinant of the behavioural intention. It was the theory of planned behaviour that explained that attitudes towards a behaviour, subjective norms and perception of an individual are the determinants of behavioural intention. However, these theories lacked measurable variables, perceived behavioural control variables and personality and demographic variables. The technology acceptance model extended the theory of reasoned action and theory of planned behaviour by incorporating the measurement variables and the perceived behavioural variables.

The TAM model is based on the structural equation modelling technique. The choice of the modelling technique for the thesis was based on the advantages and suitability of the SEM modelling technique over the multivariate framework as it allows for the inclusion of multiple variables and investigation of both mediating and moderating variables (Larsson et al.,2021). Moreover, SEM technique also aids in incorporating latent variables in framework which cannot be directly observed (Fukomota et al 2021; Hair et al 2016; Schumacker & Lomax 2014). The structural equation modelling extends factor analysis and multiple regression analysis to identify the causal relationship between latent and observed variable (Crowley & Fan, 1997; Fornell & Larcker,1981; Golob, 2003). Lastly, the choice between the SEM and multivariate modelling is based on the research questions raised and the availability of data (Nusair & Hua, 2010). For a study that addresses a relationship between the latent variables, SEM is a preferred choice. On the contrary, when the data used is truncated, time-series or panel with research questions related to probability, multivariate analysis would be a better choice. Furthermore, table 1 provides an inter comparison between the SEM and the other first-generation models. Therefore, given the analysis for the thesis, structural equation modelling framework was adopted.

Table 1 Comparison of SEM with other first-gen models

Arguments	Structural Equation Modelling	Other First-Generation models (multiple regression, logistic regression, ANOVA)
Postulation of a complex model structure	Supported	Not supported
Requiring variables to be both observed and unobserved	Supported	Not supported (only observed variables)
Allowance for measurement error	Supported	Not supported
Takes into account interaction effect between the posited variables	Supported	Not supported

By the author

The original TAM model had two drivers: Perceived usefulness and perceived ease of use which would impact an individual's attitude which in turn would affect an individual's behavioural intention to using new computer system (Davis, 1989). Davis defined perceived usefulness as the degree to which the person believes that using the system would enhance her/his job performance, whereas the perceived ease of use was defined as the degree to which the person believes that using the system would be free of effort (Sharp 2007). The TAM model has undergone several modifications by subsequent researchers. As result, TAM has become so popular that it has been cited in most of the research that deals with user acceptance of technology (Lee et al 2003). Venkatesh and Davis (1996) extended the TAM model by including variables like subjective norms, image, job relevance, output quality and result demonstrability. Thereafter, the model also incorporated external variables and moderator such as personality traits (Gefen and Straub, 1997) and demographic characteristics (Venkatesh, 1999; Venkatesh and Morris, 2000) or computer self-efficacy construct (Chow et al, 2012). TAM has been extended and applied in various context ranging from information and computer technology (Hu et al, 2019), to internet adoption (Serenko , 2008 and Lee et al, 2013) to wireless internet and mobile acceptance. Moreover, some empirical studies have identified factors like lack of perceived trust, perceived financial cost, and perceived risk in explaining behavioural intention (Shcoorman et al, 1996; Lee, 2009; Bansal et al, 2010).

In this study, TAM model is extended and applied in the context of digital financial services and its usage among the low-income clients. As observed in figure 11, the proposed model has five latent variables as perceived usefulness, perceived ease of use,

attitude to use, behavioural intent to use and also perceived trust. Furthermore, the moderating effects of socio-economic variables as age, gender, education and income were also proposed in the model.

3.2 Hypothesis Development

Perceived Usefulness

Perceived usefulness is defined here as the degree to which a person believes that using a particular system would enhance his or her job performance (Davis, 1989). It is the extent to which an individual believes that the use of technology/systems will improve the performance of his/her work. Therefore, the more useful a technology, higher will be an individual's desire to use it. Several studies have confirmed that perceived usefulness positively influence the attitude (Wang et al. (2003); Lee,2009, Kesharwani & Singh Bisht, 2012; Lee, 2009; Venkatesh & Davis, 2000). In the context of digital financial services, perceived usefulness is an important factor in influencing the consumer's acceptance of digital financial services (Ismail et al, 2021; Luarn and Lin, 2005). Thus, based on the extant literature, the following hypothesis has been postulated in the context of digital financial services:

Hypothesis 1 (H1): *Perceived usefulness have a positive impact on the attitude towards using digital financial services.*

Perceived Ease of Use

Perceived ease of use refers to the degree to which a person believes that using a particular system would be free of effort (Davis, 1989). According to Venkatesh and Davis (2000) technology will be more useful if it is easier to use. The more difficult the system is to use, the less likely the customer uses. In several empirical studies perceived ease of use had a significant positive influence on the attitude to use (Widianto et al, 2020; Pikkarainen et al, 2004; Bashir & Madhavaiah, 2015; Rahi, 2016; Wang et al., 2003). The following hypothesis has been formulated:

Hypothesis 2 (H2): *Perceived Ease of Use have a positive impact on the attitude towards using digital financial services.*

Perceived Trust

In the context of overall online services, trust is considered a crucial factor for adoption. The technology acceptance model was further extended to integrate trust along with the

other latent variables. Trust was first integrated to the model in the context of e-commerce (Gefen et al 2003) because of two inherent difficulties of digital means: the uncertainties and the risk of vulnerability. As defined by Mayer et al (1995), “trust is the willingness of a party to be vulnerable to the actions of another party based on the expectation that the latter will perform particular actions which are important to the former”. Therefore, trust ensures an understanding of the social surrounding of the interchange (Pavlou, 2003), and of the behaviour of others which in turn helps in reducing the vulnerability and uncertainty. This is indeed a very important reason why trust is considered an influential variable in studies concerning online services. The research papers by Nuryanto et al (2020), Sugandini et al (2016), Kim et al (2008), have all shown that Perceived trust positively affects attitude towards using. The following hypothesis is thus formulated:

Hypothesis 3 (H3): *Perceived Trust have a positive impact on the attitude towards using digital financial services.*

Attitude to use and Behavioural Intention

Fishbein and Ajzen 1977, have defined attitude as the affective evaluation towards a given task. It means the degree to which a user likes or dislikes using technology. Intention on the other hand is an indicator to denote the factors that influence a desired behaviour (e.g., use technology). It also indicates how much effort an individual would commit to performing a behaviour (Ajzen and Fishbein 1980). The attitude—intention relationship was highlighted in the TRA and TPB, which suggests that an individual’s attitude is an evaluative predisposition to the behaviour as a function of its determinant personal consequences (Ajzen 1985). Several studies have confirmed that in technology field attitude has a significant influence on behavioural intention (Al-Ajam & Md Nor, 2015; Kesharwani & Singh Bisht, 2012). Some empirical studies in the context of e-banking and e-business services have all shown that a positive attitude has a positive influence on the behavioural intent to use (Lee, 2009; Aboelmaged and Gebba, 2013; Hu et al, 2019; Püschel et al, 2010). In the context of digital financial services, we hypothesise the following:

Hypothesis 4 (H4): *Attitude to use digital financial services have a positive impact on the behavioural intention to using digital financial services.*

Moderating Effects

Age

The empirical evidences from several research studies have considered age as an important demographic variable which has shown to have direct and moderating effects on behavioural intention, adoption, and acceptance of technology (Chung et al, 2010; Porter & Donthu, 2006; King & He, 2006; Venkatesh et al., 2003; Wang et al., 2009). Moreover, inclusion of age as a moderating variable has proven to increase the explanatory power of the theory of planned behaviour (Chung et al, 2010). For example, Venkatesh et al (2003) in their research paper have shown that inclusion of age in the model has increased the explanatory power of the model to 47 per cent. However, other studies have failed to replicate the effect of age (Wang et al, 2009; Chung et al, 2019). In the context of the current study the following hypothesis has been proposed:

Hypothesis 5(H5): *The influence of determinants (perceived usefulness, perceived ease of use*

and perceived trust) on attitude to use is moderated by age

Hypothesis 6 (H6): *The influence of attitude on behavioural intent is moderated by age*

Gender

The gender schema theory (Bem, 1981) introduced gender in the model of behaviour followed by other technology acceptance model (TAM 2 and TPB). Venkatesh and Morris (2000), have shown that men and women use different socially constructed cognitive structures while making decisions. Gender plays an important role while predicting usage behaviour (He & Freeman, 2010; Venkatesh & Morris, 2000; Venkatesh et al., 2003; Wang et al., 2009). The moderating effect of gender had been studied in the context of online shopping purchase (Zhang and Prybutok, 2003), bank technology (Wan et al, 2005), internet banking (Akinici et al, 2004) and mobile banking (Amin et al, 2008). It was found that males were more inclined in adopting the technology as compared to females. Thus, in the context of digital financial services, the following hypothesis has been proposed:

Hypothesis 7(H7): *The influence of determinants (perceived usefulness, perceived ease of use*

and perceived trust) on attitude to use is moderated by gender.

Hypothesis 8 (H8): *The influence of attitude on behavioural intent is moderated by gender.*

Education

Education level is an important variable in affecting the behaviour towards acceptance of IT. Education was not included in the UTAUT model but later on was studied as a moderating variable in some studies (Tikno and Amelia, 2019; Chawla and Joshi, 2017; Shanab, 2011). However, there are only a few studies which have incorporated education level in the model. In the context of the current study, the following hypothesis has been formulated:

Hypothesis 9(H9): *The influence of determinants (perceived usefulness, perceived ease of use*

and perceived trust) on attitude to use is moderated by level of education.

Hypothesis 10 (H10): *The influence of attitude on behavioural intent is moderated by level of education.*

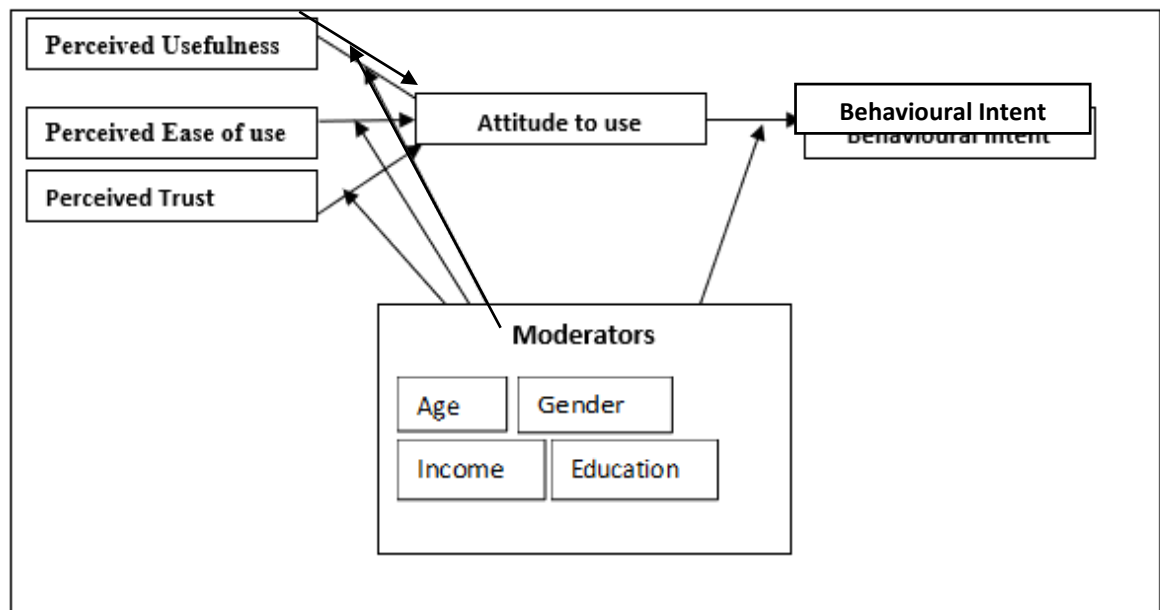
Income

There are also some empirical evidences which have studied the moderated impact on the relationship between the independent variables and dependent variable through respondent's income level (Park et al, 2021; Torres et al, 2017; Jayasiri et al, 2016 and Eze and Poong, 2013). The following hypothesis has been formulated:

Hypothesis 11(H11): *The influence of determinants (perceived usefulness, perceived ease of use and perceived trust) on attitude to use is moderated by level of income.*

Hypothesis 12 (H12): *The influence of attitude on behavioural intent is moderated by level of income*

Figure 11 Conceptual Framework



3.3 Data Collection and Sample characteristics

Pilot Survey

A pilot survey was undertaken in the Mohadi village of the Nashik District Maharashtra in December 2019 to test the feasibility of the study. The pilot survey helped in testing the questionnaire using a small sample and whether the respondents in the sample are able to follow the directions as indicated. Moreover, to provide better information on whether the type of survey is effective in fulfilling the purpose of the study. The purpose of the survey was to identify the demand side constraint of adopting online banking. The questionnaire was distributed among the members of the SHGs. The members belonged to 8 different SHGs, linked to a Public Sector Bank. The pilot survey had some important takeaways. It was found that there was a gender bias in accessing the online banking platform. This is because most of the female respondents commented that their husband / son /brother uses their account on their behalf. Moreover, their male counterparts have a smartphone and they use a basic feature phone. The pilot survey helped in modifying and refining the questionnaire.

Data Collection

The main objective of this study is to determine the key factors that affect consumer's acceptance of digital financial services among the low-income clients analysing their

behavioural intention to use digital financial services. We used non-probability convenience sampling method. The respondents were the members of the Annapurna Mahila Cooperative Credit Society and the clients of a Regional Rural Bank of Uttar Pradesh. Annapurna Mahila Cooperative Credit Society is an NGO which provides small repetitive loans to poor self-employed women by forming their Joint Liability Groups (JLG). They are operational in Pune and Mumbai. For the study the respondents were chosen from the urban district of Pune in Maharashtra. Pune is a well-known second-tier city with a highly developed infrastructure: it is the knowledge and IT hub of India. The logic behind the selection of these areas is that the policy initiatives for digitalization focus on providing access, increasing awareness, building internet infrastructure, providing free wifi, etc. A report released by Pune Municipal Corporation (2018) emphasized on the digital strategy to be adopted in Pune. The report also highlights the progress made in the city with regards to the provision of the digital infrastructure with having around 200 wi-fi hotspots, web portals for various entities (Pune city, PMC, PSCDCL, Smart Governance Portal), a digital strategy emphasizing the creation of multiple cashless payment channels, instapay services, UPI, BHIM, third party payment websites, Pune Data Store – which is an open data initiative to provide citizens access to datasets under every PMC department, and schemes to implement Direct Benefit Transfer by creating a Aadhaar Ecosystem (Kulkarni and Ghosh, 2021).

On the contrary, the sample also consisted of the respondents belonging to the rural district of Amethi in Uttar Pradesh. These respondents were the low-income clients of a Regional Rural Bank operating in Uttar Pradesh. Uttar Pradesh although having 70 percent of rural population, is making progress in its digitalisation efforts. According to Digital States of India – A Comparative Analysis report, Uttar Pradesh is ranked as 10th among the 36 ‘states and union territories’ of the country. In Uttar Pradesh, 50+ services of 14 government departments are being offered through the eDistrict platform. To boost rural connectivity, broadband is being provided in 3600 Gram Panchayats under the BharatNet initiative. However, at the grass root levels the reality of digital financial services is not very encouraging. For the study, Amethi district of Uttar Pradesh was chosen. Amethi is a small district covering an area of 2329.11 km² with a population of 447,330 as per Census 2011. It was an ideal choice to represent the penetration and acceptance of digital financial services in the rural parts of India. Hence, the sample for

the study consists of a blend of both rural and urban clients/users of digital financial services.

The data was collected through a field survey. The questionnaire was designed meticulously based on the already established scales. The responses were recorded on a 5-point Likert scale. The questions were pertaining to the perception of the respondents on digital financial services. We adopted the A-priori sample size determination method for calculating the sample size. The A-priori sample size for structural equation models (Soper, 2020) is a popular method of determination of the sample size. We used Daniel soper online tool to calculate the sample size. It is a 'mini' online power analysis application that determines the sample size needed for research that uses the structural equation modelling (SEM) technique. It requires inputs for the number of observed and latent variables in the model, the size of the expected effect, as well as the anticipated probability and level of statistical power. Because of its ability to determine a study-specific minimum sample size (based on the number of latent and observed variables), it is deemed superior to other online sample size calculators. It can be considered for any research design regardless of whether the research employs a probability or non-probability sampling technique for data collection. The effect size chosen was 0.3 with desired statistical power 0.8 and probability level of 0.05 for the model, the minimum sample size was calculated as 150. However, a total of 303 respondents completed the survey. To test the hypotheses SMART PLS v.3.39, which is a complete Structural Equation Modelling (SEM) tool, was employed. Figure 12 and 13 represents some snippets from the survey.

Figure 12 Field Survey in Pune



Figure 13 Field Survey in Amethi District



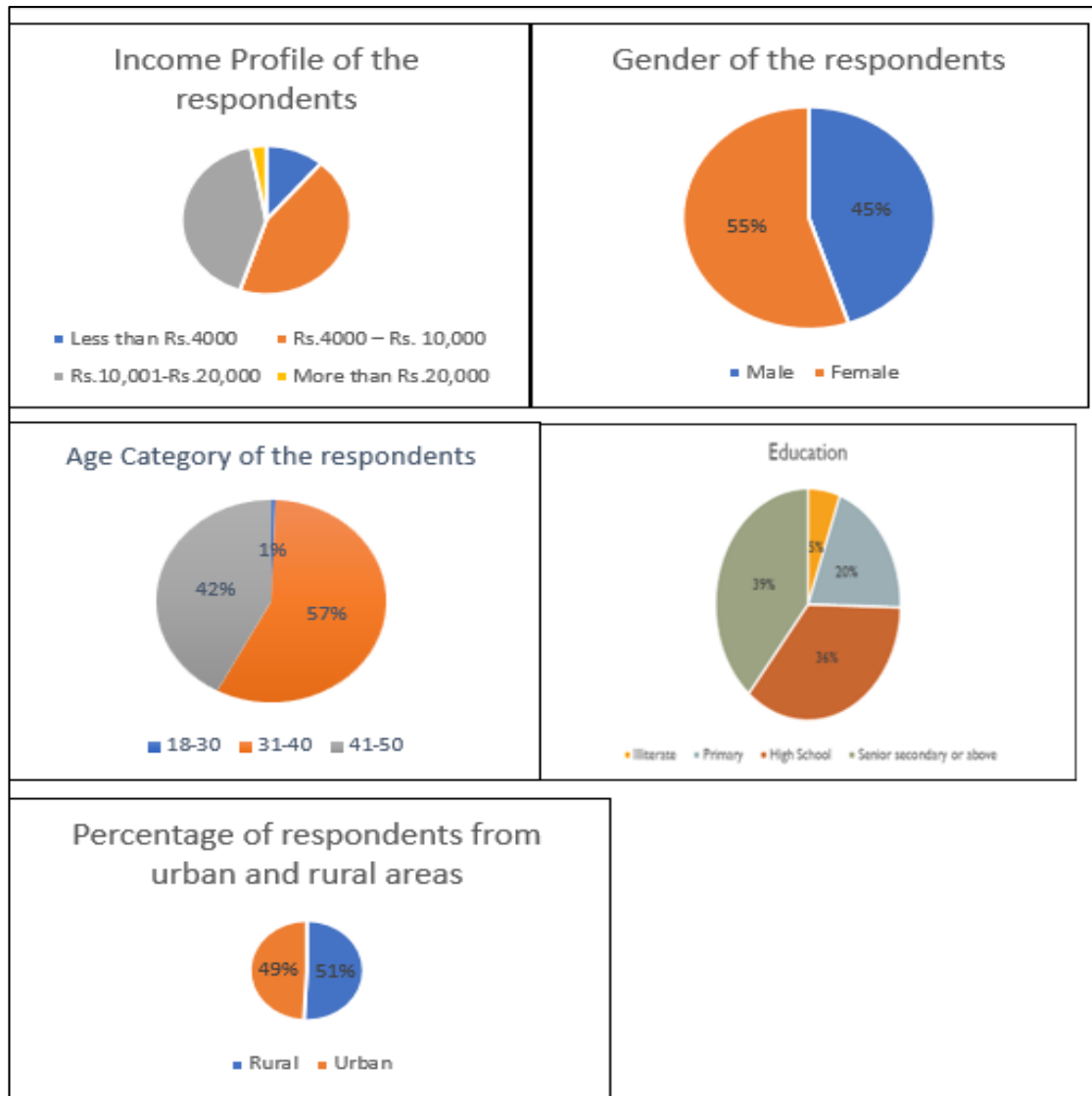
Table 2 Respondent's Profile

Variables		Frequency	Percentage
Gender	Male	136	44.9

	Female	167	55.1
Age	18-30	54	0.6
	31-40	165	57.14
	41-50	84	42.20
Education	Illiterate	17	5.61
	Primary	60	19.81
	High School	108	35.64
	Senior secondary or above	118	38.94
Income	Less than Rs.4000	34	11.22
	Rs.4000 – Rs. 10,000	133	43.89
	Rs.10,001-Rs.20,000	127	41.91
	More than Rs.20,000	9	2.98
Preferred method to use the bank account	By going to the bank	140	46.20
	Online banking	30	9.91
	Both	133	43.89
Area	Rural	154	50.83
	Urban	149	49.17

Source From the field survey

Figure 14 Sample Characteristics



Source From the field survey

As depicted in the table 1 and the charts under figure 14, the sample was almost equally divided on the basis of gender with 55.1 per cent of the female respondents and 44.9 per cent of the male respondents. Similarly, in terms of the urban-rural divide, the respondents were equally distributed with 49 per cent of the respondents belonging to the urban area and 51 per cent of the respondents belonging to the rural area. Majority of the respondents (57.14 per cent) belonged to the age group of 31-40 age, followed by 42.20 per cent of the respondents belonging to the age group of 41-50 years and lastly a meagre 0.6 per cent in the age bracket of 18-30 years of age.

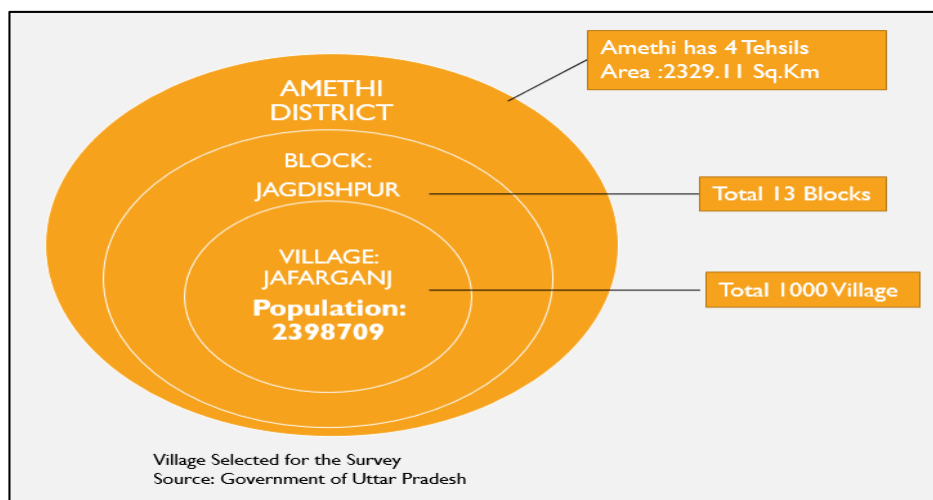
Around 94 per cent of the respondents in the sample were have acquired the basic schooling education. Around 35.64per cent of them had completed their high school education and 38.9 per

cent were have completed their secondary schooling education. 43.89 per cent of the respondents had income in the range of Rs. 4000-Rs.10,000 per month. And 41.91 per cent of the respondents had the income in the range of Rs.10,000- Rs.20,000 per month. We have actually had a sample of low-income respondents. Most of the respondents either preferred going to the bank physically (46.20 per cent) to make use of their bank accounts or preferred both the online and the physical means (43.89 per cent) to use their bank accounts. Around 64 per cent of them had internet access either in the form of Wi-Fi or the mobile service provider’s data packs. Furthermore, google pay was reported to be highly preferred application among the respondents.

3.4 About the Area of Selection: Demographic Profile

As depicted in figure 15, for the rural sample of Uttar Pradesh, the district selected was Amethi with a total population of 18,47,678 as per the data from the government of Uttar Pradesh. Amethi district has a total of 13 blocks. Further, the block Jagdishpur was selected and village Jafarganj was finalised. The population of Jafarganj is 2398709(depicted in figure 16). Interestingly, as per the RBI statistics UP-Baroda Gramin bank has the highest number of the functioning offices in Uttar Pradesh around 3397 as of 2022 as represented in figure 17.

Figure 15 Village selection for the Survey (Amethi District)



Source Government of Uttar Pradesh⁶

⁶ <https://amethi.nic.in/>

Figure 16 Population of Amethi District

Gender	Total Population
MALE	945,235
FEMALE	922,443
Total	18,67,678

Source Government of Uttar Pradesh⁷

Figure 17 Number of functioning offices of Baroda-UP Gramin Bank

Area	Number of functioning offices of Baroda-UP Gramin Bank
Rural	1652
Urban	93
Semi-Urban	1652

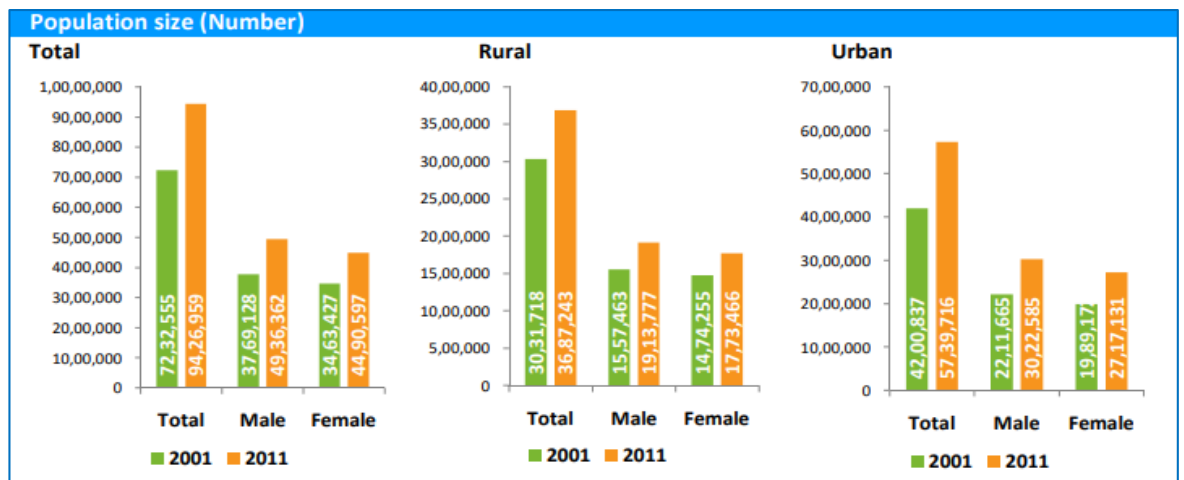
Source RBI⁸

Figure 18 and 19 represent the demographic profile of Pune district as per Census 2011. For the urban sample of Pune district, the demographic profile is extracted from the census 2011 with a population 94,26,959. Moreover, the share of urban population as a percentage of total population stood that 61 per cent, making Pune an apt representation of urban sample.

⁷ <https://amethi.nic.in/>

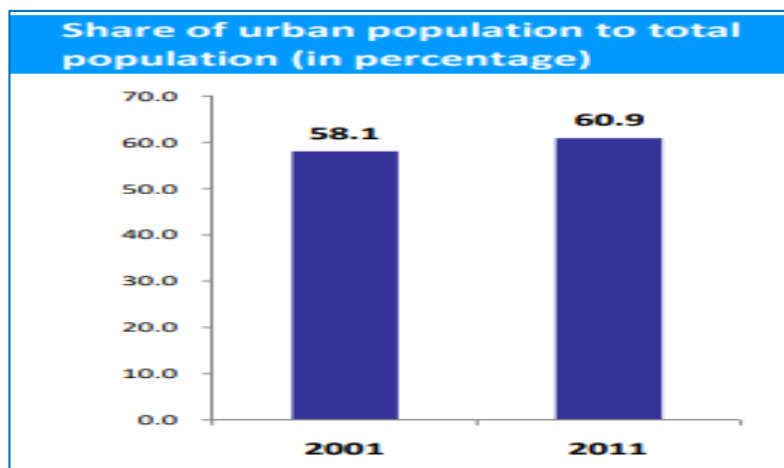
⁸ <https://www.rbi.org.in/commonperson/English/Scripts/BanksInIndia.aspx>

Figure 18 Population size of Pune



Source Census 2011⁹

Figure 19 Share of Pune's Urban Population



Source Census 2011

3.4 Measurement Instrument

The instrument was developed based on rigorous review of literature. The measurement scale was composed of five constructs or the latent variable, and a total of 20 items expressed by a 5- point Likert scale 1 (strongly disagree)- 5 (strongly agree). The measurement variables are shown in the table 2 below:

⁹ <https://www.census2011.co.in/census/district/359-pune.html#:~:text=In%202011%2C%20Pune%20had%20population,percent%20of%20total%20Maharashtra%20population.>

Table 3 Instrument Variables

Construct	Item	Source
Perceived Usefulness	PU1 I can accomplish my banking task more quickly using DFS PU2 DFS allows me to manage my banking activities more efficiently PU3 DFS enables me to complete my banking activities conveniently PU4 Using DFS improves functioning of my banking activities PU5 Overall, I find DFS very useful for carrying out my banking activities PU6 In general, I find DFS advantageous	Li and Lai (2011) Giovanis et al. (2012); Cheng et al.(2006)
Perceived ease of use	PEOU1 It is easy to use DFS PEOU2 Learning to use DFS is easy. PEOU3 I find it easy to remember how to use DFS PEOU4 Overall, I find the use of the DFS easy	Cheng et al. (2006); Giovanis et al. (2012)
Perceived Trust	TRT1 I believe that DFS is trustworthy. TRT2 I trust in DFS. TRT3 I feel assured that legal and technological structures adequately protect me from problems on DFS. TRT4 DFS has the ability to fulfil its task.	Gefen et al. (2003)
Attitude	ATT1 In my opinion, it is desirable to use DFS ATT2 I think it is good for me to use DFS ATT3 Overall, my attitude towards DFS is favourable	Li and lai (2011)
Intention to use	ITO1 I will use DFS on a regular basis in the future. ITO2 I will frequently use DFS in the future. ITO3 I will strongly recommend others to use DFS	Li and lai (2011)

Source From the field survey

Furthermore, for data analysis structural equation model (SEM) method was employed. This method is used to test the causal relationships between dependent variable (intention to use) and the independent variables (perceived usefulness, perceived ease of use, perceived trust and attitude). Partial least square (PLS) is a parameter estimation method of SEM. We use the PLS-SEM method where measurement model is analysed to test the validity and reliability and then SEM is used to for testing the hypothesis.

3.6 Results

3.6.1 Measurement Model Assessment

Convergent Validity

Measurement model assessment requires testing for reliability, convergent validity and discriminant validity. Reliability implies the internal consistency of the measurement items based on three criteria: Cronbach's alpha, composite reliability and average variance extracted. The values of Cronbach's alpha and composite reliability should ideally be greater than 0.70. Moreover, average variance extracted greater than 0.5 is preferred. The table indicates higher values of all the three criteria. The results in table 3 indicate that the variables are reliable and valid- convergent validity is ensured, hence the model is consistent.

Table 4 Reliability and Validity measures

Construct	Items	Loadings	AVE	CR	Cronbach's Alpha
Perceived Usefulness	PU1	0.903	0.846	0.971	0.964
	PU2	0.917			
	PU3	0.942			
	PU4	0.927			
	PU5	0.928			
	PU6	0.901			
Perceived ease of use	PEOU 1	0.946	0.912	0.976	0.968
	PEOU 2	0.955			
	PEOU 3	0.966			
	PEOU 4	0.954			
Perceived Trust	PT 1	0.965	0.910	0.976	0.967
	PT 2	0.969			
	PT 3	0.948			
	PT 4	0.932			
Attitude to use	ATT 1	0.964	0.937	0.978	0.966
	ATT2	0.980			
	ATT3	0.959			
Behavioural Intent	BI 1	0.973	0.938	0.979	0.967
	BI 2	0.984			
	BI 3	0.948			

Source From the primary survey

Discriminant Validity

Discriminant validity reflects the extent to which measurement items of each variable is not correlated and hence the measurement of each variable measures what it needs to measure. The first criteria used is Fornell-Larcker criterion which states that the square root of AVE must be greater than the correlation of the reflective construct with all other construct. The second criterion is cross-loadings which states that the loadings of all indicators should be higher than its loadings on all other latent variables. As shown in the table (4) the square root of AVE is greater than the correlation coefficient of each latent variable. The results of table 4 shows that the discriminant validity of each variable is satisfactory.

Table 5 Discriminant Validity of the constructs: Fornell-larcker criterion

	Attitude to use	Behavioural Intent	Perceived Ease of use	Perceived Trust	Perceived Usefulness
Attitude to use	0.968				
Behavioural Intent	0.813	0.969			
Perceived Ease of use	0.772	0.747	0.955		
Perceived Trust	0.809	0.75	0.728	0.954	
Perceived Usefulness	0.794	0.753	0.806	0.731	0.92

Source: From the primary survey

Recently, the heterotrait-monotrait ratio of correlations (HTMT) has become the primary criterion for assessing discriminant validity. HTMT ratio below 0.9 is acceptable. As shown in table 5, all variables have a critical value below 0.9, hence confirming discriminant validity.

Table 6 Discriminant Validity

	Attitude to use	Behavioural Intent	Perceived Ease of use	Perceived Trust
Attitude to use				
Behavioural Intent	0.84			
Perceived Ease of use	0.798	0.771		
Perceived Trust	0.835	0.774	0.752	
Perceived Usefulness	0.822	0.78	0.834	0.756

Source From the primary survey

3.6.2 Structural Equation Modelling and Hypothesis testing

a) Direct Effect

Bootstrapping procedure was used to examine the significance of the path coefficients. In general, if $t > 1.96$ the hypothesized test is significant at the $p < 0.05$ confidence level. With respect to the hypothesis testing, all the four hypotheses were accepted. The results in table 6 show that perceived usefulness, perceived ease of use and perceived trust have significant and positive impact on the attitude to using the digital financial services. Furthermore, attitude to use positively and significantly impact the behavioural intention to use digital financial services. The overall path model is represented in figure 21. The path diagram represents the cause-and-effect relationship between the variables. The path diagram consists of the path coefficient values along with the subsequent p-values in brackets. The direct effect of a variable on another variable is represented by the path coefficient. The path coefficient values are standardised as it is estimated from correlations. The relationship between the latent variables such as perceived usefulness, perceived ease of use and perceived trust on attitude to use is significant and positive. Furthermore, the attitude to use digital financial services exhibits positive and significant relationship with the behavioural intention to use digital financial services.

Figure 20 SEM Path Analysis using SmartPLS

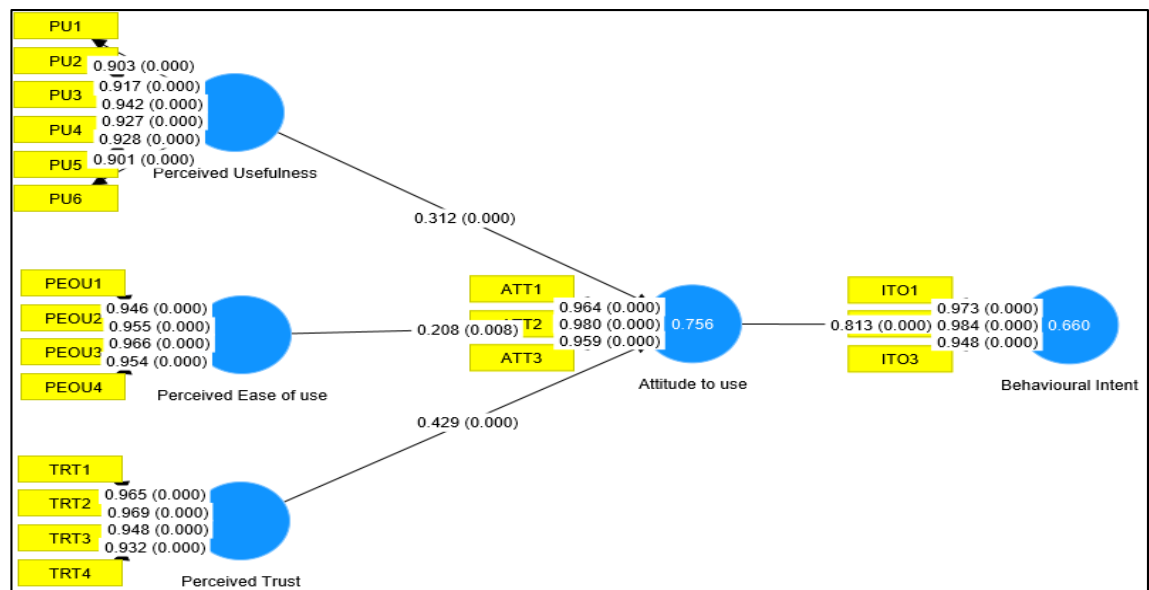


Table 7 Path Coefficient

Hypothesis		Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Value
H4	Attitude to use -> Behavioural Intent	0.813	0.812	0.025	32.272	0
H2	Perceived Ease of use -> Attitude to use	0.208	0.205	0.078	2.682	0.008
H3	Perceived Trust -> Attitude to use	0.429	0.43	0.062	6.877	0
H1	Perceived Usefulness -> Attitude to use	0.312	0.314	0.071	4.385	0

Source From the primary survey

Total Effect

Table 8 below represent the total effect including the indirect effects. It can be seen that all indirect effects the such as the effect of perceived ease of use, perceived usefulness, perceived trust on behavioural intent to use digital technology were all positive and significant.

Table 8 Total Effect

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
Attitude to use -> Behavioural Intent	0.813	0.812	0.025	32.272	0
Perceived Ease of use -> Attitude to use	0.208	0.205	0.078	2.682	0.007
Perceived Ease of use -> Behavioural Intent	0.169	0.167	0.064	2.647	0.008
Perceived Trust -> Attitude to use	0.429	0.43	0.062	6.877	0
Perceived Trust -> Behavioural Intent	0.349	0.349	0.051	6.809	0
Perceived Usefulness -> Attitude to use	0.312	0.314	0.071	4.385	0
Perceived Usefulness -> Behavioural Intent	0.254	0.255	0.058	4.356	0

Source From the primary survey

Gender

The analysis of the moderating role of gender was undertaken. Results reveal a significant negative moderating effect of gender on the relationship of perceived ease of use and attitude to use supporting the hypothesis H8. Moderation analysis summary is presented in table 9.

Table 9 Moderating Effect of Gender

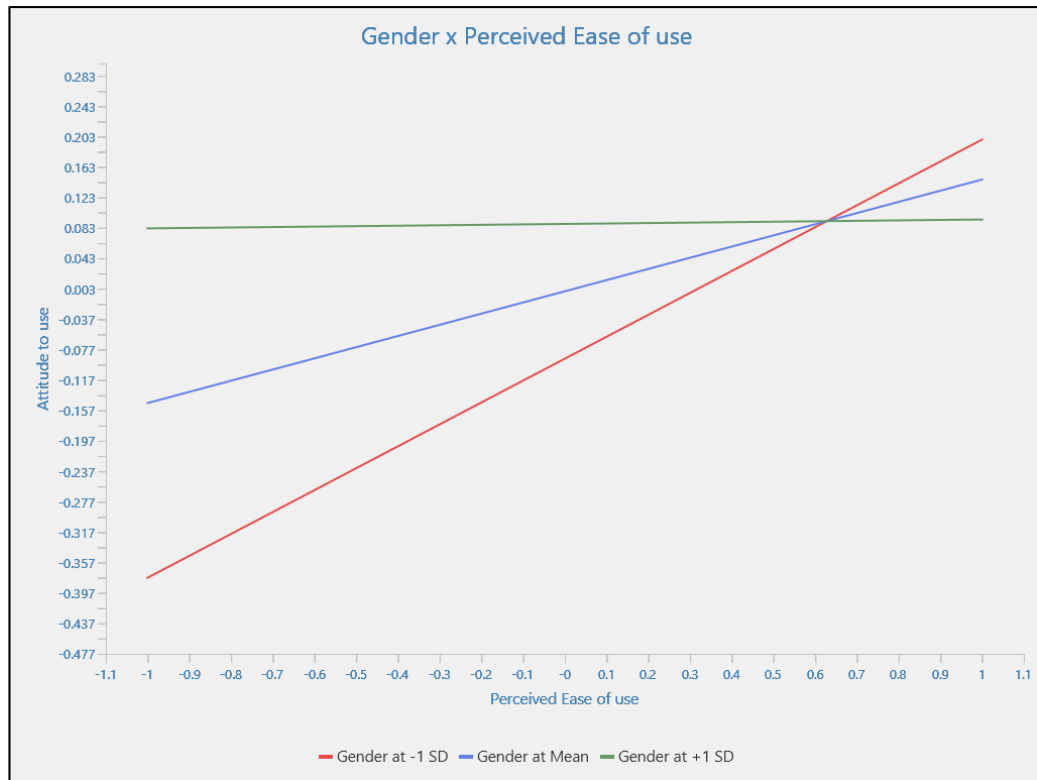
Proposed Hypothesis	Effect type	t-stat	p-value	Significance
H7: Gender x (PU, PEUO, PT) →Attitude	Moderating effect	PT- 0.017	0.986	Not Significant
		PEOU- 2.333	0.019*	Significant
		PU- 0.833	0.405	Not Significant
H8: Gender x Attitude →Behavioural intent	Moderating effect	2.444	0.807	Not Significant

p < 0.10; **p < 0.05; ***p < 0.01.

Source From the primary survey

We further conducted a slope analysis as represented in figure 22, to give a better understanding about the nature of the moderating effect. A negative moderating effect of gender means that for men the relationship between perceived ease of use and attitude to use is weak as compared to women. On the contrary, for women clients, the relationship between perceived ease of use and attitude to use digital financial services is strengthened. This result points towards the opportunity for a more gender inclusive digital financial inclusion by accentuating the role of the ease-of-use feature for the digital financial services.

Figure 21 Slope analysis for gender



Source From the primary survey

Age

The table 10 represents the moderating effect of age. It was found that age significantly and negatively moderating the relationship between attitude to use and behavioural intent to use digital financial services. It means higher values of age will dampen the relationship between attitude to use and behavioural intention to use digital financial services and lower values of age will enhance or improve the relationship. In the context of the current study, it implies that for an older user or customer a positive attitude to use digital financial services may not necessarily guarantee a positive behavioural intent or actual usage of digital financial services. An older customer despite having a positive attitude may not actually use digital financial services. On the contrary, for a younger customer a positive attitude to use will most likely lead to the actual usage of digital financial services. Hence, age of a person is an important demographic variable having a significant moderating effect on the attitude and the actual usage of digital financial services.

Table 10 Moderating effect of age

Proposed Hypothesis	Effect type	t-stat	p-value	Significance
H5: Age x (PU, PEUO, PT) →Attitude	Moderating effect	PT- 0.758	0.448	Not Significant
		PEOU- 1.424	0.154	Not Significant
		PU- 1.085	0.278	Not Significant
H6: Age x Attitude →Behavioural intent	Moderating effect	1.85	0.064*	Significant

*p < 0.10; **p < 0.05; ***p < 0.01.

Source From the primary survey

Education

Although table 11 shows that education does not have significant moderating effect on all the relationships. However, in the total effect result findings it was discovered that education has a direct, positive and a significant effect on the behavioural intention to using digital financial services with t value 3.024 and the corresponding p-value as 0.003.

Table 11 Moderating effect of education

Proposed Hypothesis	Effect type	t-stat	p-value	Significance
H7: Education x (PU, PEUO, PT) →Attitude	Moderating effect	PT- 0.139	0.890	Not Significant
		PEOU-0.344	0.731	Not Significant
		PU- 0.035	0.972	Not Significant
H8: Education x Attitude →Behavioural intent	Moderating effect	0.464	0.643	Not Significant

p < 0.10; **p < 0.05; ***p < 0.01

Source From the primary survey

Income

As shown in table 12 income did not have any significant moderating effect on any of the relationships proposed in the model. A likely reason for the insignificant moderating effect of income could be the fact that all the respondents in the sample were belonging to the low-income category without much of the variability in the income levels.

Table 12 Moderating effect of income

Proposed Hypothesis	Effect type	t-stat	p-value	Significance
H9: Income x (PU, PEUO, PT) → Attitude	Moderating effect	PT- 0.185	0.853	Not Significant
		PEOU-1.523	0.128	Not Significant
		PU- 1.497	0.134	Not Significant
H10: Income x Attitude → Behavioural intent	Moderating effect	0.783	0.434	Not Significant

Source From the primary survey

3.7 Discussion and Conclusion

The results of the study (provided in table 7) show that actual usage of digital financial services significantly depends on an individual's perception on whether it is easy to use, useful and trustworthy. For digital financial inclusion to be successful it is imperative to understand the behaviour and perception especially of the low-income clients. A TAM analysis helped us know the crucial factors which are required to be addressed while developing the digital financial products for the low-income clients. In order to capture the financial inclusion market while addressing the gender disparity, it is essential to design the digital financial products and services in a way that it is simple and easy to use and operate and simultaneously offers utility to its clients. The digital financial services also require trust of its clients because of the inherent difficulties of digital means: the uncertainties and the risk of vulnerability. For the low-income clients to use a digital financial product, winning their trust is equally important along with providing them the utility and ease of use from the digital financial product.

This study extended the TAM to include perceived trust as a determinant, as well as gender, age, education, and income as moderators, to investigate the extent to which of these variables affect the behavioural intention to using digital financial services. The results show that PU, PEOU, and PT had a direct influence on the attitude and indirect and significant influence on behavioural intention to use the digital financial services (Based on table 7 and table 8). Gender as a moderator had a significant moderating effect on the relationship between Perceived Ease of Use and Attitude to use. The results revealed that the impact of perceived ease of use on the attitude to use was much stronger for men than for women. This means that an effort to make digital financial services easy to use can go a long way for men clients in terms of its adoption and usage. If a woman client finds digital financial services easy to use, she will most likely be adopting and using the same. However, this might not necessarily be true for men. The ease-of-use feature of digital financial service may not have significant impact on greater adoption and usage amongst male clients.

Age as a moderator had negative and significant moderating effect on attitude to use and behavioural intent to using digital financial service. It was found that age as a factor altered the relationship between attitude and behavioural intention to use digital financial services. In the context of the current study, it implies that for an older low-income client a positive attitude to use digital financial services may not necessarily guarantee a positive behavioural intent or actual usage of digital financial services. An older individual, despite having a positive attitude may not actually use digital financial services. On the contrary, for a younger low-income client, a positive attitude to use will most likely lead to the actual usage of digital financial services. Hence, for greater usage of digital financial services among the low-income clients, it is important to tap into the potential of younger clients in terms of the adoption and acceptance. A younger individual with a positive attitude towards the digital financial services is more likely to use the digital financial services.

Interestingly, education levels were found to have a direct and significant influence on the behavioural intention to using digital financial services. Overall, the proposed model achieves acceptable fit and explains for 75.6per cent of its variance without the moderators and 77.2 per cent of its variance with the moderators, which is higher than that of the original TAM. This reveals the adequate ability of the proposed model to predict and explain behavioural intention to use digital financial services.

The findings of the study suggests that in order to enhance usage of digital financial services among the low-income clients it is imperative to work around making the digital financial services ease to use, offering utility for the clients. The trust factor equally plays an important role in building a positive perception among the low-income women clients. Besides, for a greater usage of digital financial services tapping in the potential of younger clients through continuous awareness and education can prove to be a game changer.

An extension of TAM to incorporate the demographic factors further helped us to understand how gender, age and education can moderate/alter the overall behaviour and attitude of a low-income clients towards digital financial services. The analysis also revealed that education had a direct influence on the behavioural intention to use digital financial services. It means that the more educated a person is, the more positive behavioural intention will she have to use digital financial services. This chapter uncovered some interesting facet about the perception of the low-middle segment of India, with age and education as an influential factor affecting the overall behaviour.

4. CHAPTER IV: Banking the unbanked: Perspective of the Financial Service Providers in India on Digitalisation led financial inclusion

Financial services providers are an indispensable part of the financial inclusion ecosystem and act as a key enabler in the expansion of digital financial services. This chapter is an exploratory analysis of the perception and expectations of providers of the financial services in India. India has been following a bank-led model for achieving financial inclusion where RBI has provided conducive regulatory environment and supported banks in accelerating financial inclusion. Financial inclusion efforts have been focused around expanding the bank branch network, setting up of Urban Co-operative Banks (UCBs), Regional Rural Banks (RRBs) and Local Area Banks (LABs) and the recently evolved Small Finance Banks. There has been tremendous growth in the Microfinance Institutions and SHG-Bank Linkage in India. The recent initiative of Pradhan Mantri Jan Dhan Yojana (PMJDY) successfully led to opening of over 190 million Jan Dhan accounts in October 2015. Another significant step towards financial inclusion regulation is the relaxation of norms for business correspondents to provide last-mile connectivity in remote locations. RBI's effort to encourage large financial institutions to customize products for the low-income segment led to the setting up of 11 payment banks in the year 2015. Hence, the financial service providers are the primary channels of implementing financial inclusion policy in India. The financial institutions uphold the responsibility of nurturing and providing for the low-income segment and acts as a supplier of financial services for the low-income market segment.

The success of the spread and expansion of Digital financial services in India also rests on the providers of financial services. Digital financial services encompass a broad range of financial services accessed and delivered through digital channels including payments, credit, savings, remittances, and insurance. The Government's initiatives for Digital India are supported and accelerated by the public sector and the private sector banks, Microfinance Institutions, and the Fintech start-ups. These Institutions have been successfully providing the digitalised financial services in the form of Direct benefit Transfer (DBT) and Government-to-Person (G2P) payments, issue of Rupay Debit cards, implementation of Aadhaar linkage and India stack and providing UPI services in every

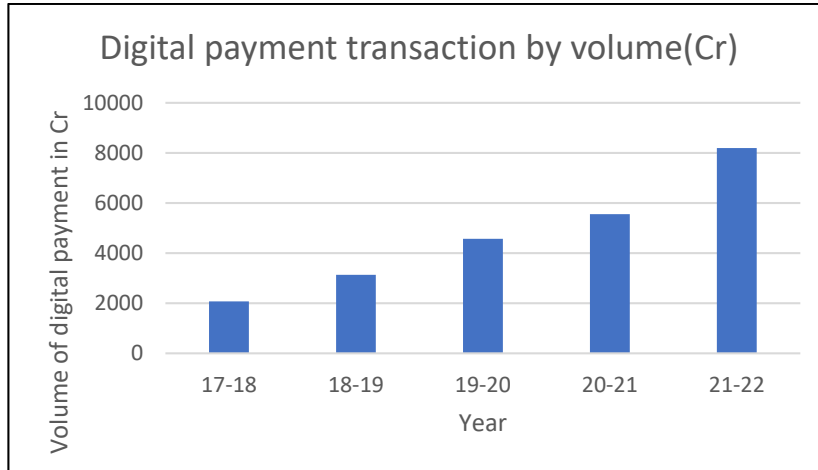
nook and corner of the country. Thus, it becomes imperative to take into consideration the perspective of the providers of financial services towards the scope of digital financial inclusion and understand the status of implementation of digitalisation strategy for the low-income segment along with the implementation and regulatory hurdles which are faced by these institutions. But before delving into the insights from the providers let us shed some light on the status of digital financial services in India and the financial services providers.

4.1 Status of Digital Financial Services in India: A promising future

India's journey in the digital financial service path can be characterized as a two-phase growth process. The pre and post demonetisation phase. In the pre-demonetisation phase digital financial transaction volume grew steadily by 2 per cent per month (starting from early 2014) (USAID, 2019). In the post demonetisation phase, the adoption of digital means of payments especially via POS and mobile banking has witnessed a significant boost (Fouillet et al., 2021). Thereafter, the Unified Payment Interface (UPI) and NPCI's (National Payments Council of India) digital payments platform took the lead in terms of value and volume of transactions.

In the recent years, India has been making impressive and consistent progress in terms of the spread and adoption of digitalised financial services through introduction of innovative business models and a more digitally inclined financial system. This vortex of digitalisation of financial services in India holds a promise to accelerate greater financial inclusion in order to reach the most vulnerable, marginalised, and remote population of the country. Figure 22 shows the increase in the volume of overall digital payment transactions in the last five. In the last five years the volume of digital transactions has increased manifold times from over 2000 Crores in 2017-18 to over 8000 Crores in the year 2021-22.

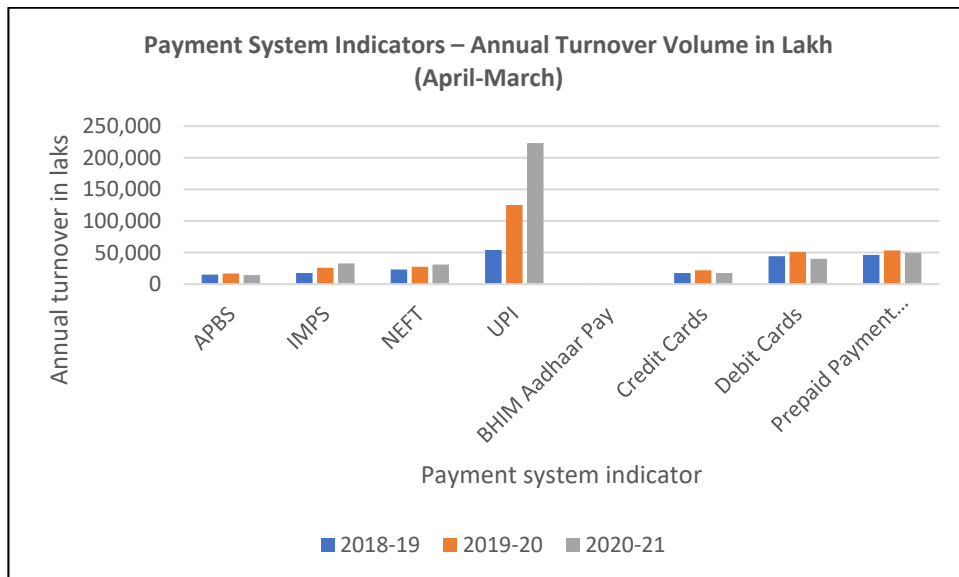
Figure 22 Digital Payment transaction



Source: RBI, NPCI and Banks

Figure 23 shows various payment system indicators and the transaction in volume. UPI as a payment system indicator has been consistently leading in last three years in terms of volume of transactions followed by Debit Cards and PPIs.

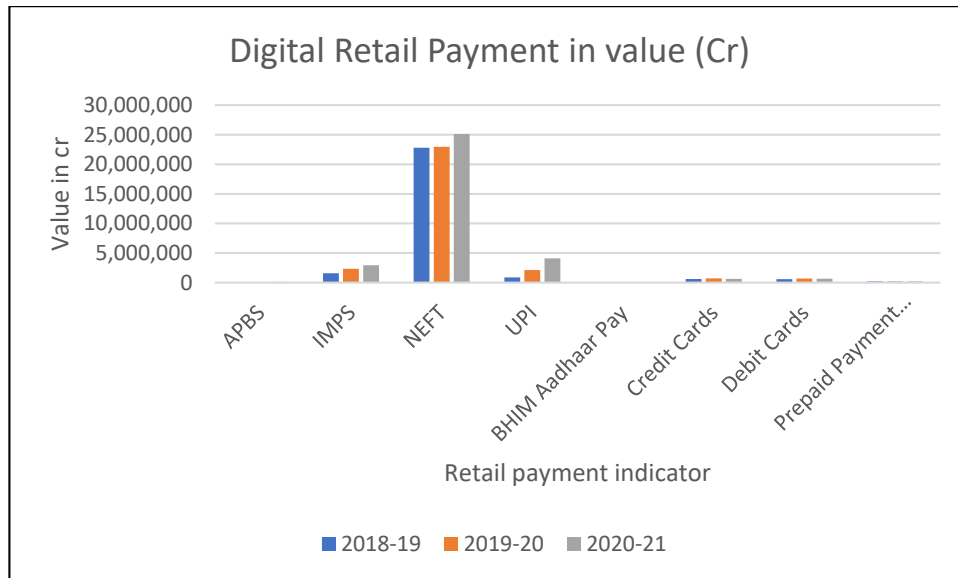
Figure 23 Retail Digital Payments in Volume



Source: RBI

However, in terms of value of transactions, NEFT transactions have been leading in last three years followed by IMPS and UPI. (Figure 24).

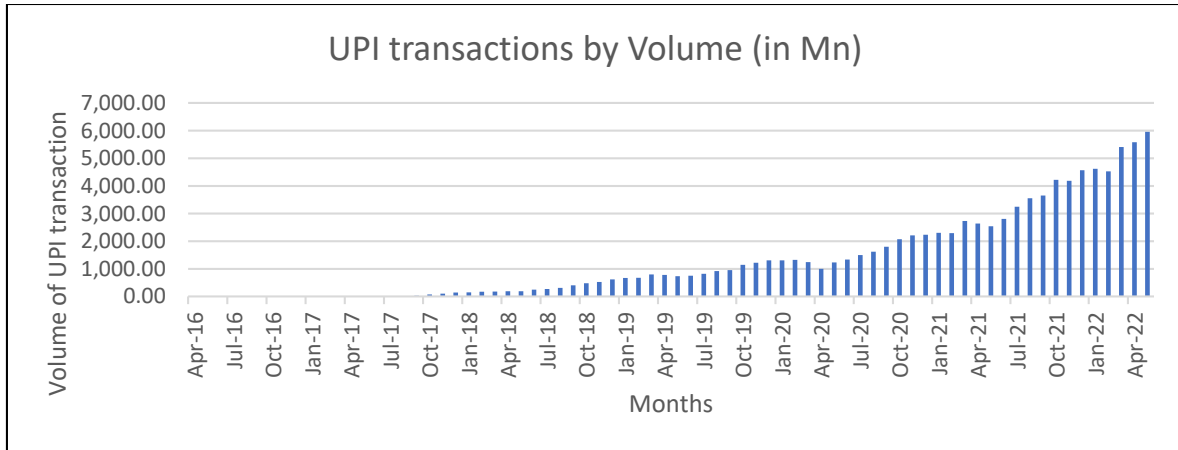
Figure 24 Digital Retail Payments in Value



Source: RBI

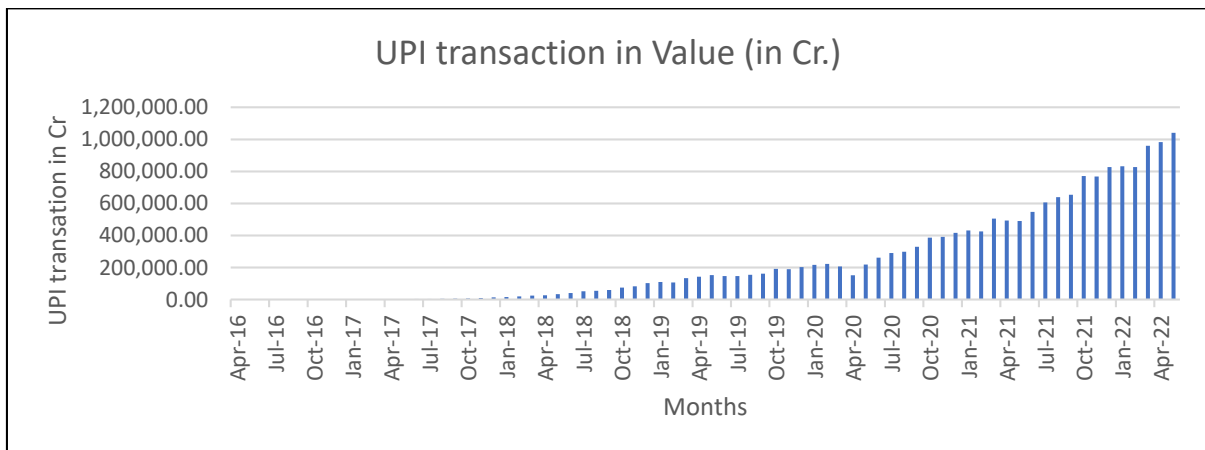
In the last three years UPI transactions in India have been seen some big jumps both in terms of volume and value. As observed in Figure 25 and 26 post 2019 there has been steeper rise in the UPI transactions in India after 2020. The most prominent reason for these jumps has to be the global pandemic followed by the lockdown which underlined the importance of going digital. Moreover, the convenience, cost benefit and the interoperability among payment systems offered by the UPI platforms has facilitated ease of transactions which is unparalleled to other banking services. UPI has indeed been a game changer especially for financial inclusion given its outreach in both urban and rural areas.

Figure 25 UPI Transaction in Volume



Source: NPCI

Figure 26 UPI transactions in Value



Source: NPCI

4.2 Supply Side Overview of Digital Financial Services in India

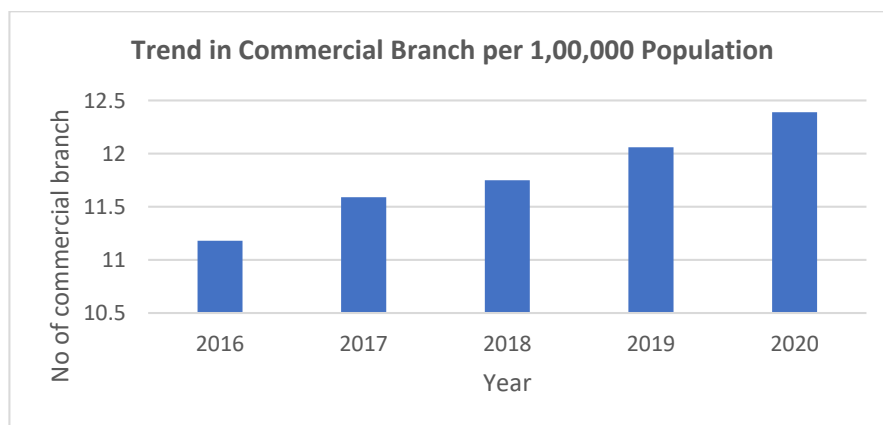
Digital financial services in India are provided by various stakeholders ranging from the new entrants in the financial inclusion ecosystem as Fintech firms to the incumbents as banks, microfinance institutions and small finance banks, insurers, and asset managers. Currently, there are three business models adopted in India in the provision of Digital Financial services. The first one is Bank Account based, wherein the bank accounts are accessed by the clients with help applications, internet banking and digital channels provided by the banks in which they have their accounts. The customers can avail a plethora of digital banking services as mobile banking, inter-bank transfers through

NEFT/IMPS etc, made available by their respective banks. The second model is the semi-closed prepaid wallets. In such a model the customers are provided with only the cash-in facility. These services are mainly provided by mobile operators. For example: Airtel money or Vodafone M-Pesa. The third model is the open prepaid loop wallet. The providers are the MNOs and other Technology providers linked with a bank. These provide both cash-in and cash out facility to the customers. For Example: Paytm, Mobikwik, Amazon Pay, etc (Kumar et al, 2019). For this Chapter, the focus will be on the Bank account based/ Institution based digital financial services.

4.3 Banking Institutions

Indian Banks are in the forefront in leveraging technology to carry out their banking operations and also to provide the digitalised financial services to their customers. The banks are perpetually working towards adopting technology to develop financial services and products which is accessible, affordable and easy to understand for the masses. There has been consistent progress in the growth of banking outlets in India. However, in terms of banking outlets per 1 lakh population there are a meagre 11-12 commercial bank branches per 100,000 of the population as observed in the figure over a span of 5 years. For rural and semi-urban there are only 7.5 branches per one lakh Indians. (PwC report 2015).

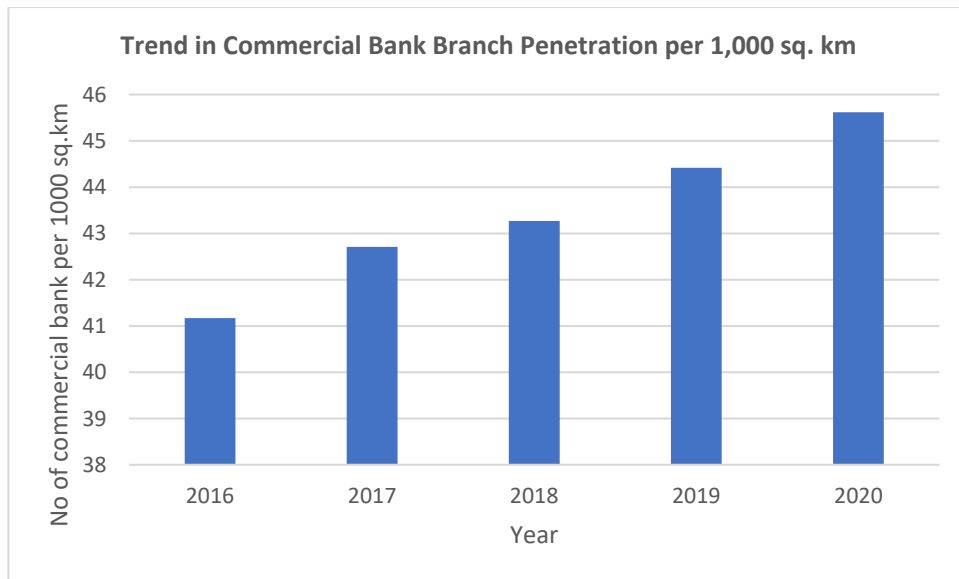
Figure 27 Demographic penetration of commercial banks in India



Source: Compiled from bank branch statistics of RBI; Geographical area as per Census 2011.

In terms of the trends in the geographical penetration (figure 27) measured in terms of number of bank branches per 1000 sq.km, only 41-45 branches per 1000 sq.km are available

Figure 28 Geographical penetration of commercial banks in India



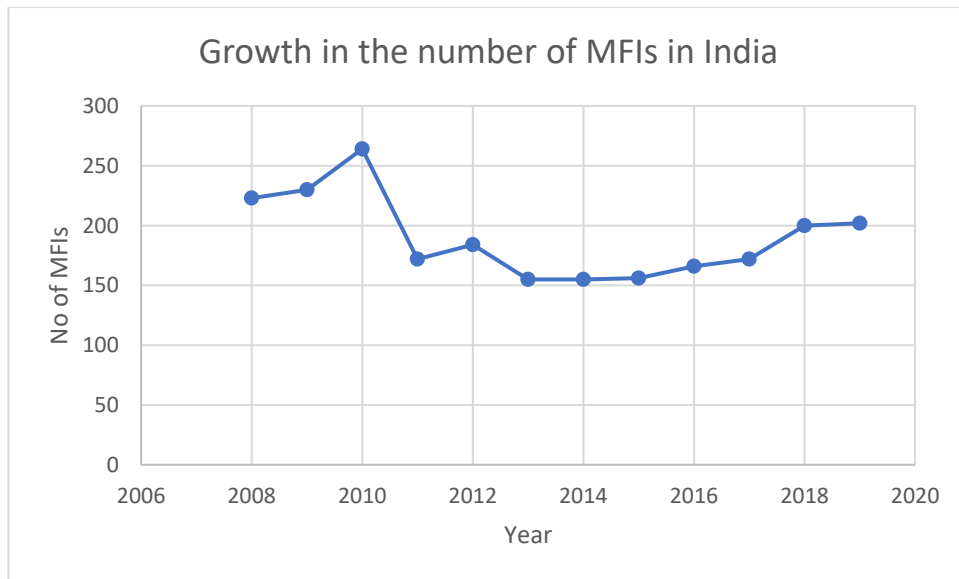
Source: Compiled from bank branch statistics of RBI; Geographical area as per Census 2011.

The banking industry snapshots as represented with the help of the figure 28 points out to the constraint in the financial infrastructure available especially for the rural and semi-urban population. Moreover, there are also fewer touchpoints for accessibility.

4.4 Microfinance Institutions

Microfinance sector has been growing rapidly both in terms of growth in deposits and credit. Microfinance sector in India is regarded the largest in the world. The microfinance institutions in India operates in various legal forms. They function either as non-bank financial intermediaries as NBFC-MFIs either for profit or as not-for-profit MFIs. In addition to NBFC-MFIs, the other legal forms could be cooperatives societies, trusts, U/S 8 companies.

Figure 29 Number of MFIs in India



Source: Annual reports of Bharat Microfinance

It can be observed in the above figure (29) that the growth of microfinance institutions post 2010 decreased and then became steady thereafter. The reason for the decline can be attributed to the Andhra Crisis wherein the rampant and unregulated growth of the MFIs decreased because of the RBIs implementation of regulations. According to the KPMG report 2021¹⁰, the adoption of technology has been an integral part of the Microfinance sector in India. A whole array of software such as Management Information Systems (MIS), Loan Management Systems (LMS) to Customer Relationship Management Software (CRM) are adopted by the Microfinance institutions in India since 2000. The greater penetration of mobile and internet and the technology push from the Government in the form of India stack and Jan Dhan-Aadhar-Mobile Trinity (JAM) played catalytic role in the technology adoption by the MFIs. Apart from this, MFIs have also employed the emerging technology for customer onboarding such as e-KYC and also for loan disbursement through NEFT/RTGS/IMPS transfers. They are also collaborating with the Fintech companies to offer better customer experience and customise financial products according to the need of the customers.

Another important initiative towards leveraging digital technology for greater outreach and cost effectiveness is the licensing of new tier of Small Finance banks. These banks have been set up with the sole objective of furthering financial inclusion through the

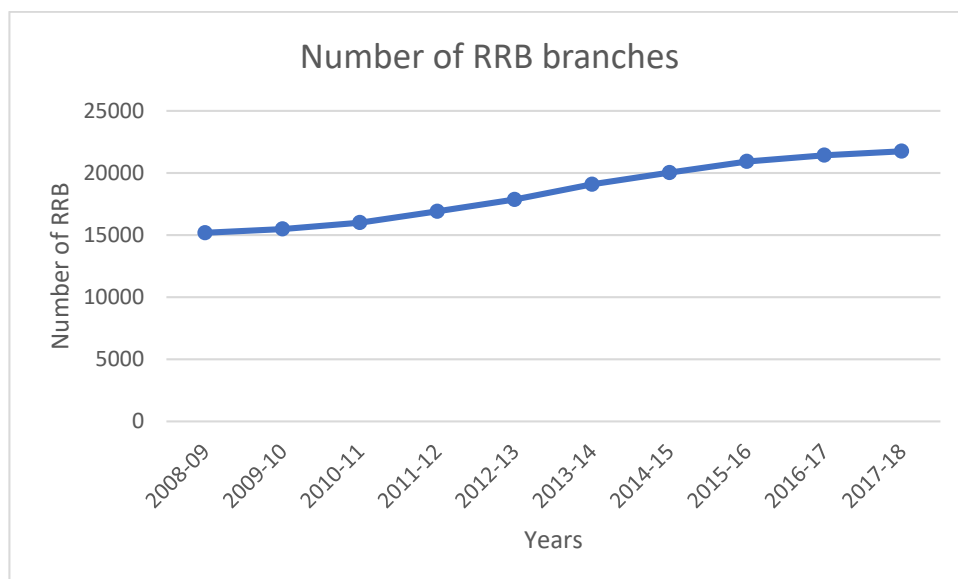
¹⁰ <https://assets.kpmg.com/content/dam/kpmg/in/pdf/2021/03/microfinance-digital-fintech-mfi-technology-finance.pdf>

provision of deposits and credit facilities to the underserved section of the society such as small business units; small and marginal farmers; micro and small industries; and other unorganized sector entities, through high technology-low-cost operations. The total number of loan accounts as of June 2018 was 17.6 million, up from 17.3 million a year earlier and 15.8 million in 2016 (MFIN, Micrometre report). In latest FE BFSI Summit, the founders and CEOs of various Small Finance Banks were of the view that digital transformation is will immensely help the Small Finance Banks with not just customer acquisition or bringing the cost down but will also aid in customer and employee retention.

4.5 RRBs

Regional Rural Banks in India were established with the sole objective of uplifting the rural economy by promoting industrial, agricultural and trade activities in rural areas, as well as providing the financial services and products especially to the small and marginal farmers, agricultural labourers, artisans and small entrepreneurs. In 1975, on the recommendation of the Narshimham Committee, five Regional Rural Banks were set up. Ever since the setup of the RRBs, the number of RRBs and its branches have had amplified growth. As seen in the figure 30 below, there is steady and consistent in the branches of RRBs in India between 2008-18.

Figure 30 Growth in the number of RRB branches



Source: RBI

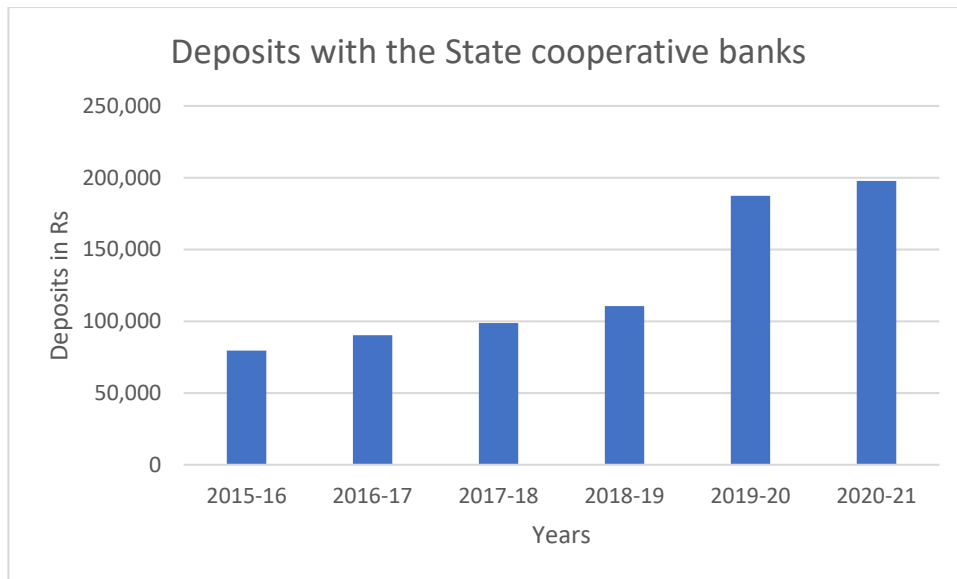
In the era of digital banking the RRBs, who have majorly relied on traditional, in-person and community-oriented banking, are finding their way in the changed landscape of banking. They are enabling Para-Banking facilities like debit as well as credit cards, internet banking, mobile banking and UPI, etc. RRBs hold an immense potential in the expansion of digital financial services in the rural areas. They have a deeper understanding of what customers need and know how to build lasting, trusted relationships. Moreover, regional rural banks promote and raise awareness about the Government's many financial inclusion programs along with the added safety and benefits of carrying out transactions online. Such awareness initiatives instil trust among the customers which encourage them to become the part of the digital ecosystem.

4.6 Cooperative Banks

Cooperative banks are the financial entities formed under the cooperative societies act 1912. These are regulated by the Reserve Bank of India and National Bank for Agriculture and Rural Development (NABARD). These are formed by the members belonging to same local community having common interest. The members of the cooperative bank are also its customers. The primary objective of cooperative banks is the upliftment of the weaker section of the society through affordable and tailored financial product and services. The cooperative banks operate at state level as cooperative banks, as central cooperative banks at district level and as primary agricultural society at the village level. The cooperative banking structure in India is multi-tiered with Urban and rural cooperatives as its main constituents.

As per the RBI's report on trends and progress of banking in India 2021, the number of urban cooperative banks has increased from 1307 in 1991 to 2105 in 2004 with 18per cent compounded annual growth rate of deposits. By the end of March 2020, there are a total of 33 state cooperative banks, 351 district central cooperative banks, and 95,509 of the Primary agricultural credit societies. Primary agricultural credit societies have reached 644,089 villages, serving 13.8 crores members and 5.3 crores borrowers. The figure (31) represents the growth in the deposits with the state cooperative banks between 2015-21.

Figure 31 Growth in deposits with state cooperative banks



Source: RBI

The need to digitise the operations of cooperative banks has been felt by the regulators. The first step taken by the regulators was the investment in computerisation of the sector, wherein RBI had allocated Rs. 4 lakhs per Cooperative Urban Bank (UCB) for Computerisation and maintenance cost of Rs. 15,000/- per month for a period of 3 years for post-implementation period. The Government of India in their Budget for the year 2017-18 allocated Rs. 1900 Crore towards Computerization of PACS, the bottommost tier of the Short-term Cooperative Credit Structure. However, a full-fledged adoption of digitalisation by the Cooperative banks would require a huge shift in their banking practices. The cooperative banks can work towards easy onboarding of customers through e-KYC, developing mobile banking application, enabling interoperability and interconnectivity through secured transaction, etc.

4.7 Objective

The overview of the financial service providers in India in the previous section provide a strong indication that they are the key drivers in the growth and expansion of digital financial inclusion in India. The success of the Government's initiatives towards a digital India depends on the financial service providers, who acts as sole executive body in channelling the technological innovation towards inclusive growth and poverty reduction. However, the current literature has highlighted the supply side constraint of implementing digitalisation which the financial service providers often face. It indeed becomes

imperative to understand the perspective of the financial service providers in India regarding the challenges they face and also their expectations from the other stakeholders of the financial inclusion ecosystem. Such a perspective study will help us in developing policy innovations and initiatives that would ensure greater digital financial inclusion across the country. Hence, the objectives for the current study are as follows:

- 1) To study the current Status on the implementation of a digitalization strategy
- 2) Understanding the challenges of adopting a digitalization strategy for the overall banking operations
- 3) To highlight the factors that drive the implementation of a digitalization strategy
- 4) To study the perception on the benefits of a digitalization led financial inclusion
- 5) Recommendation to accelerate the adoption of digitalized financial services

4.8 Methodology

The study is a descriptive research study based on the survey and interview method of data collection. A descriptive research study is useful in obtaining pertinent and precise information concerning the existing status of phenomena and, whenever possible, to draw valid generalisations for the facts discovered without making any interference or control over the situation. The research design for the study revolves around explaining the perspective of the providers of the financial services in India on the challenges and the benefits of leveraging technology to carry-out the banking operations and reaching out to the underserved and the underbanked segment of the population. The participants of the study are the important stakeholders of the financial inclusion ecosystem who work towards providing financial services to financially excluded and the low income segment of the society. These stakeholders are the Microfinance Institutions (NBFC-MFIs, NGO-MFIs and Small Finance Banks), Scheduled Commercial Banks (Public and Private Sector), Regional Rural Bank and Cooperative Bank.

The study was undertaken in two stages:

1. In the first stage an online survey was conducted involving primarily the Microfinance Institutions in India.
2. In the second stage Semi-structured In-depth interviews were conducted with the bankers in India.

Online Survey Method

An online survey was designed that contained questions concerning the status of implementation of the digitalisation strategy, perceived benefits and challenges of digitalisation for the Institutions and the entire financial inclusion ecosystem. An email invitation to complete an electronic form (google form) of the survey was sent to the Institutional/ Operations Head of the Microfinance Institutions. The survey was conducted between October 2021- February 2022. A total of 34 Microfinance institutions Signed-up for the online survey.

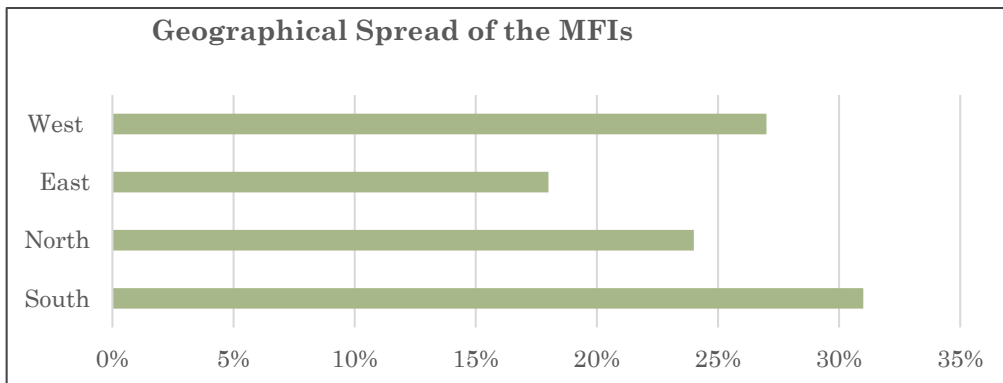
Interview Method

In the second stage of the study, in order to gain a comprehensive coverage of the providers of financial services and to complement the online survey, in-depth interviews with the Bankers were conducted. The interviews were conducted with the Managers/ Chief managers working in the public sector and private sector banks, Regional rural banks and cooperative bank. A total of six semi-structured in-depth interviews were conducted. All the interviews were conducted via telephone and were transcribed verbatim.

4.9 Sampling and Sample Description

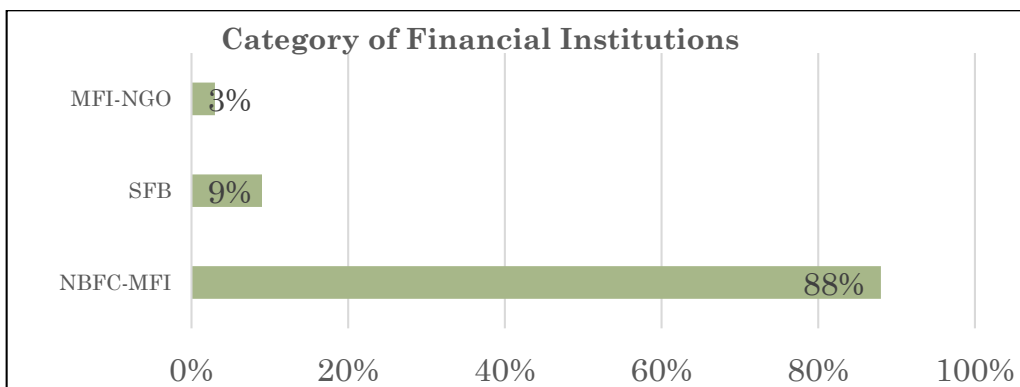
The study used a purposive non-random sampling strategy, which entails ‘selecting information-rich cases for study, to permit inquiry into and understanding of phenomena yielding insights’ (Patton, 2002). The sample size determination was guided by the criterion of information redundancy, that is, sampling can be terminated when no new information is elicited. The ‘principle of saturation’ was applied to determine the sample size of 40 respondents, as adding more participants did not result in obtaining additional information and no new codes could be generated. The respondents of the online survey were 34 Microfinance Institutions spread across different regions. The following figures 32 and 33 describe their geographical spread, type, cliental outreach, and operational branches.

Figure 32 Geographical spread of the MFIs



Source: Based on the online survey

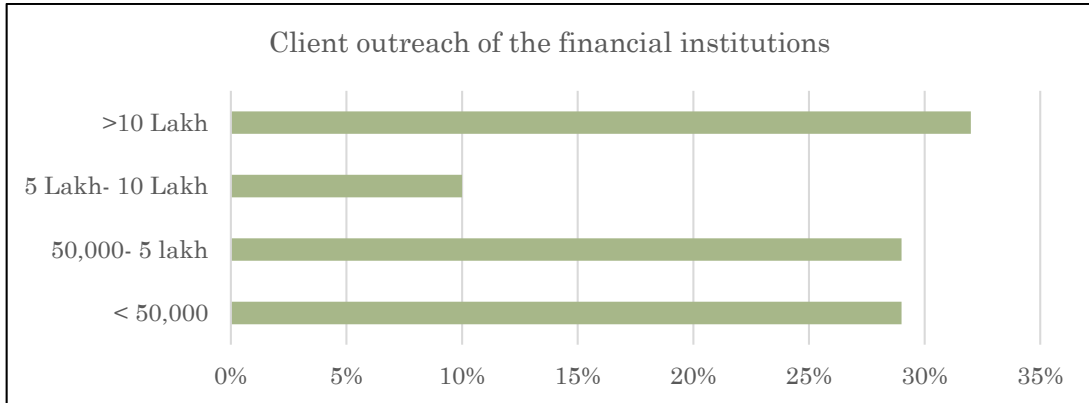
Figure 33 Category of Financial Institutions



Source: Based on the online survey

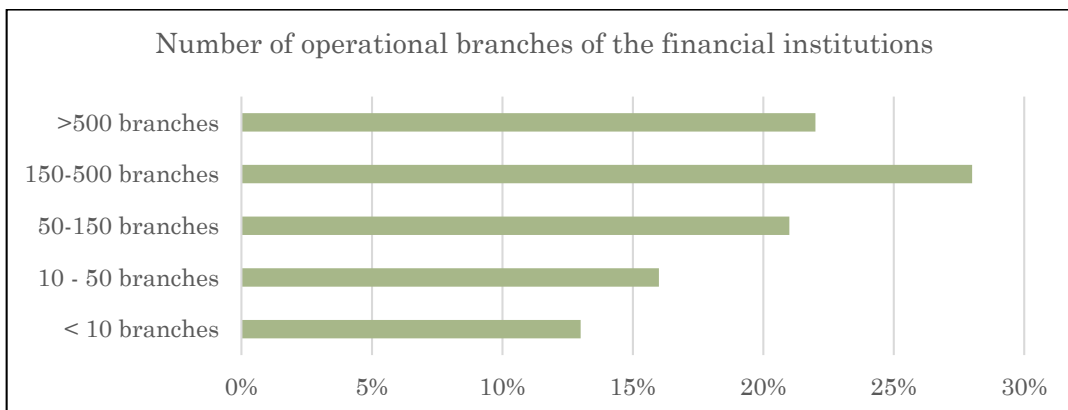
The Microfinance Institutions in the sample were spread across different regions with majority of them (31per cent) having their area of operations in the Southern region. In terms of type of the Microfinance Institutions, the sample primarily consist of the NBFC-MFIs (88per cent) followed by Small Finance Banks and NGO-MFIs.

Figure 34 Cliental outreach



Source: Based on the online survey

Figure 35 Number of operational branches



Source: Based on the online survey

The cliental outreach of these institutions as represented in the figure 34 ranged from less than 50,000 clients to greater than 10 lakh clients. More than 31 per cent of the sample reported to have a cliental outreach of more than 10 lakh clients. In terms of the operational branches in the figure 35, it ranged from less than 10 to more than 500 operational branches. Majority of the Microfinance Institutions in the sample (28 per cent) had operational branches between 150-500.

4.10 Analysis

The completed questions were recorded for their cumulative responses over different MFIs. The responses were automatically recorded by Google Forms. The tabulated responses to the survey were then analysed. A visual qualitative analysis of the percentage responses was performed for the data. For the interviews, the recordings were transcribed using otter.ai software. The interview transcripts were then analysed with the help of atlas.ti software. Codes were generated and the recurring codes helped in identifying the major theme for the analysis.

4.10.1 Results (Online Survey)

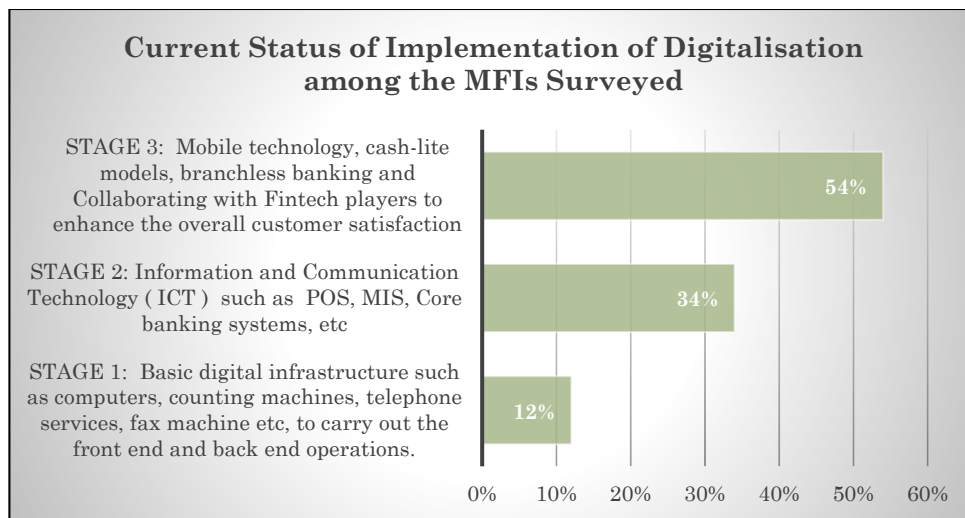
The online survey provided insights on the status of the implementation of digitalisation strategy, institutional and client readiness in adoption, factors that drive the adoption of digitalisation and the challenges faced by the Microfinance Institutions.

Status of Digitalisation: The worrisome 12%

In terms of the status of digitalisation, the first step was to enquire at what stage of digital adoption are the Microfinance Institutions at. The various stages of digitalisation at the institutional level were categorised as:

1. **Stage 1:** The stage of digitalisation would imply installing just the basic digital infrastructure such as computers, counting machines, telephone services, fax machine etc, to carry out the front end and back-end operations.
2. **Stage 2:** At the second stage, the Institutions along with the basic digital infrastructure would also have Information and Communication Technology (ICT) such as POS, MIS, Core banking systems, etc.
3. **Stage 3:** The last stage is the most advanced stage which is characterised with having the following features such as Mobile technology, cash-lite models, branchless banking and collaborating with Fintech players to enhance the overall customer satisfaction.

Figure 36 Status of Digitalisation among the MFIs



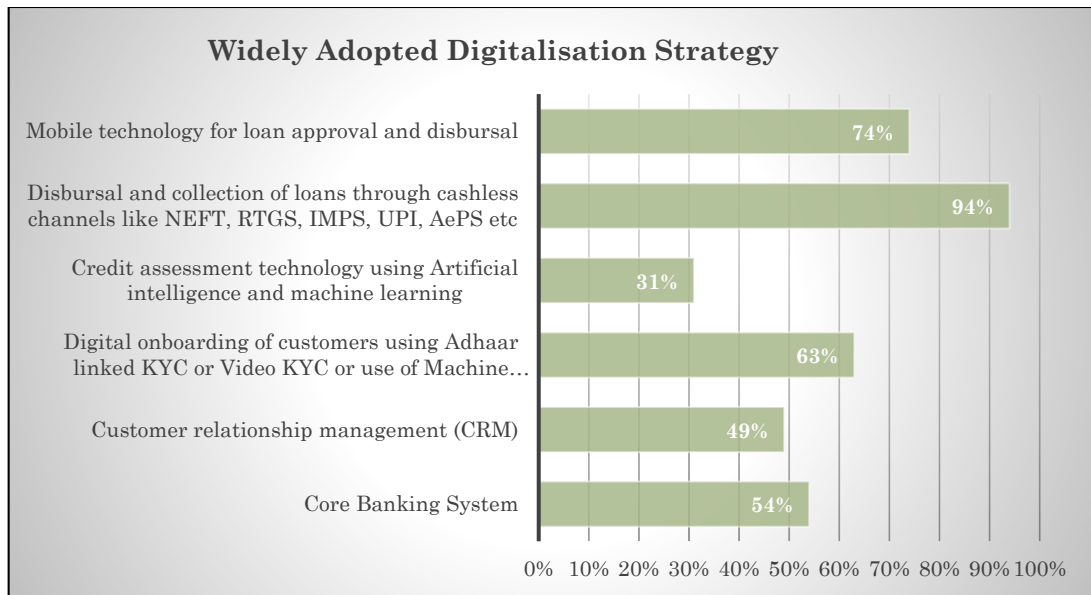
Source: Based on the online survey

The above figure 36, reveals that 54 per cent of the MFIs in the sample are at Stage 3 of the digital adoption and Implementation. This implies that the area of focus for majority of the Microfinance Institutions in India is the customer satisfaction and convenience. The Microfinance Institutions are focused on adopting mobile banking technologies, cash-lite models of banking and are collaborating with the Fintech firms to deliver tailor-made financial services as per the needs of low income and the underserved clients. However, 12 per cent of the Microfinance Institutions are still at Stage 1 of digital strategy implementation. This implies that there still exists a certain percentage of the Microfinance Institutions which can only install the basic digital infrastructure to carry out their operations. There is a need to identify the reasons for such MFIs to remain at Stage 1 of digital adoption.

What are preferred digital strategies by the MFIs in India?

Another important dimension to the Status of implementation of digitalisation is the area of banking operations where the technology can be leveraged the most. The banking operations range from loan collection and disbursal to onboarding of customers to credit assessment, etc. It was imperative to find out the widely adopted strategy by the Microfinance Institutions in India.

Figure 37 Digitalisation Strategy



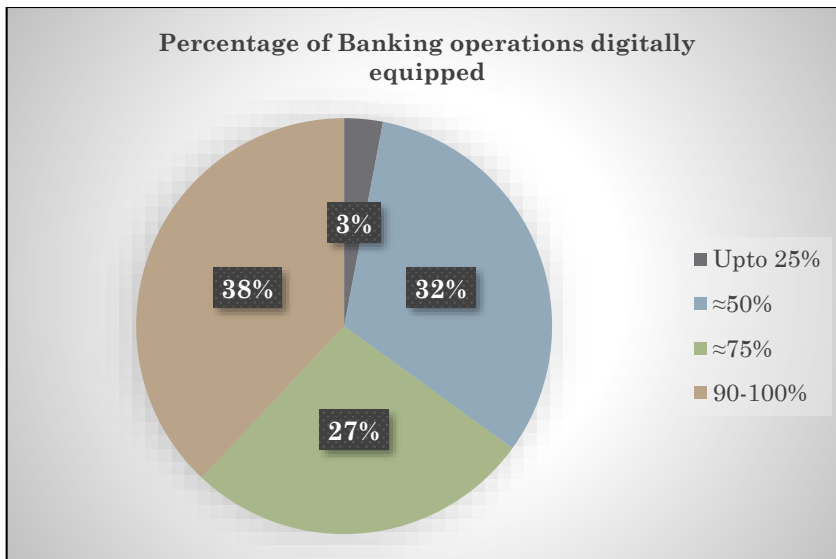
Source: Based on the online survey

The above chart in figure 37 reveals that for loan collection and disbursal a vast majority of the Microfinance Institutions (94per cent) have been implementing digitalisation through cashless channels like NEFT, RTGS, IMPS, UPI and AePS. Another important digitalisation strategy has been the use mobile technology for loan approval and disbursal. It was interesting to know that 63 per cent of the MFIs are using eKYC and video KYC for digital onboarding of their customers. However, one such are of banking operations that still needs a greater push is the credit assessment through Artificial Intelligence as only 31 per cent of the MFIs in the sample have been reported to have adopted the same.

Cliental Readiness is still a major challenge:

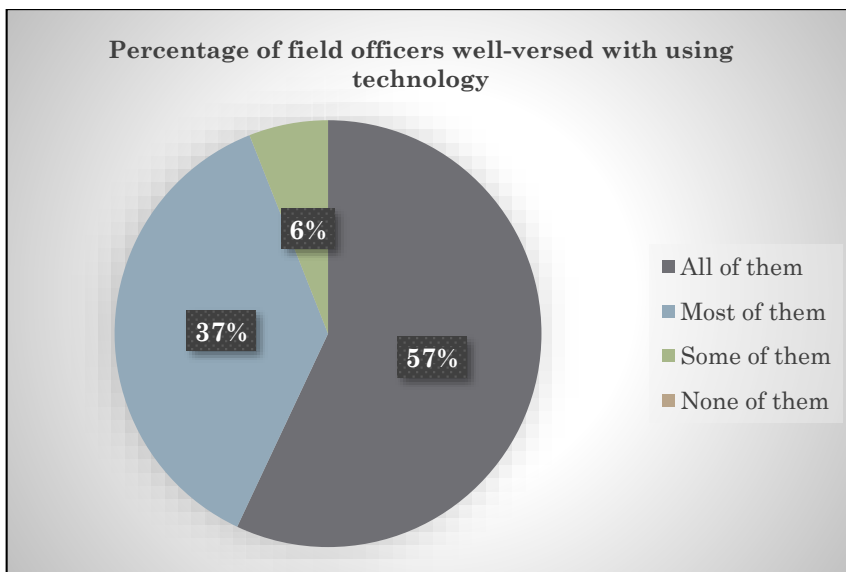
To understand the institutional readiness in implementing digitalization an enquiry was made on the percentage of bank operations have been digitally equipped and percentage of field officers who were well versed with the implementation of digitalization. The results are presented in the following charts:

Figure 38 Percentage of banking operations digitally equipped



Source: Based on the online survey

Figure 39 Percentage of field officers well-versed with using technology

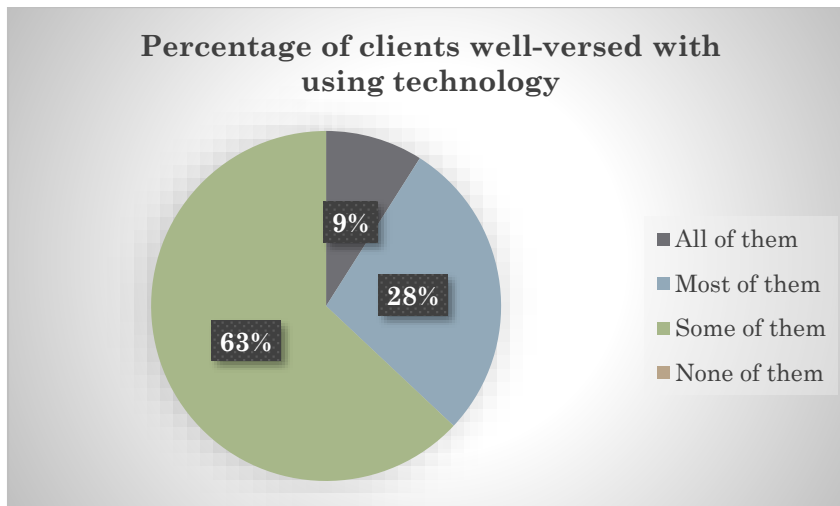


Source: Based on the online survey

The charts in figure 38 and 39, highlight that majority of the MFIs (38per cent) in the sample have 90-100per cent of their banking operations digitally equipped. With respect to the field officer's competency in the use of technology to carry out the digital banking operations, 57per cent of the MFIs in the sample have reported that all of their field officers are well-versed with the use of technology. This in totality presents an

encouraging picture on the institutional readiness in adoption and use of digitalised banking operations. However, with respect to the cliental readiness (Table 40) and awareness in the use of digital banking activities, the results are in sharp contrast.

Figure 40 Cliental Readiness



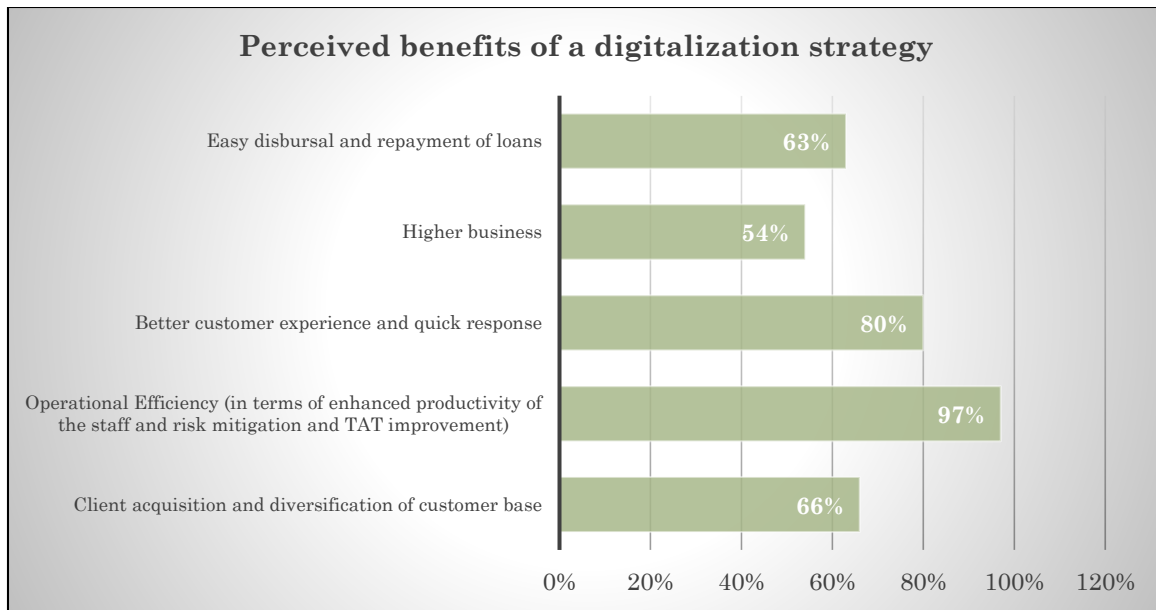
Source: Based on the online survey

A majority of the MFIs (63per cent) in the sample have reported that some of their clients are well-versed with using the technology to carry out their banking operations. These results reveal that lack of awareness among the clients of the Microfinance Institutions in India is a pertinent roadblock in the adoption and usage of digital financial services.

Digital strategy and Enhanced Operational efficiency

The next area of focus was the perception of the Microfinance Institutions on the benefits of a digitalisation strategy. Digitalisation offers a plethora of benefits to the Banking institutions in terms of Operational efficiency, quick and easy banking operations, risk mitigation, diversification of customer base and higher business. These benefits help the Microfinance Institutions in reducing the cost of operations and generating greater revenue.

Figure 41 Perceived benefits of a digitalization strategy



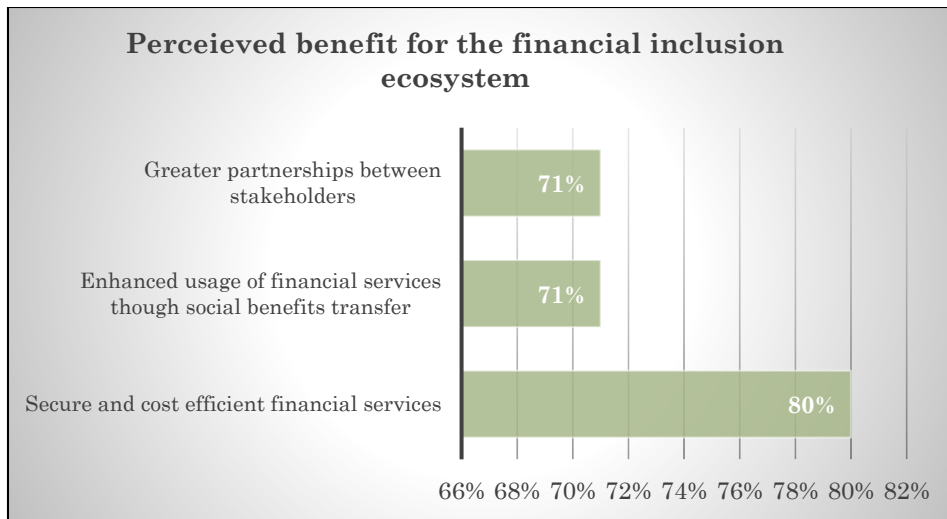
Source: Based on the online survey

The survey results in figure 41 revealed that 97per cent of the Microfinance Institutions perceive that enhanced operational efficiency through greater productivity of the staff, risk mitigation and improved Turnaround time is the benefit of digitalisation. Risk mitigation includes: prevention of cash theft and staff fraud, minimisation of calculation errors/mismatch, mitigation of threat to safety of field and branch staff. Moreover, improvement in turnaround time for key processes realised through improved cash management practices and rationalisation of staff time is attributed to higher operational efficiency resulting from digitalised banking operations. Besides operational efficiency, better customer experience and quick response was also a highly reported perceived benefit by the Microfinance Institutions. It was also interesting to discover that digitalisation also helps Microfinance Institutions in client acquisition and diversification of customer base.

Enhanced digital financial inclusion

Figure 42 reveals that the Microfinance also perceive that digitalised financial services facilitate financial inclusion through secure and cost-efficient financial services offered to the clients, enhanced usage among the clients and greater partnerships between the technology service providers and the traditional financial service providers.

Figure 42 Perceived benefits for financial inclusion ecosystem



Source: Based on the online survey

Experiences of the MFIs in the implementation of Digitalisation of Banking operations

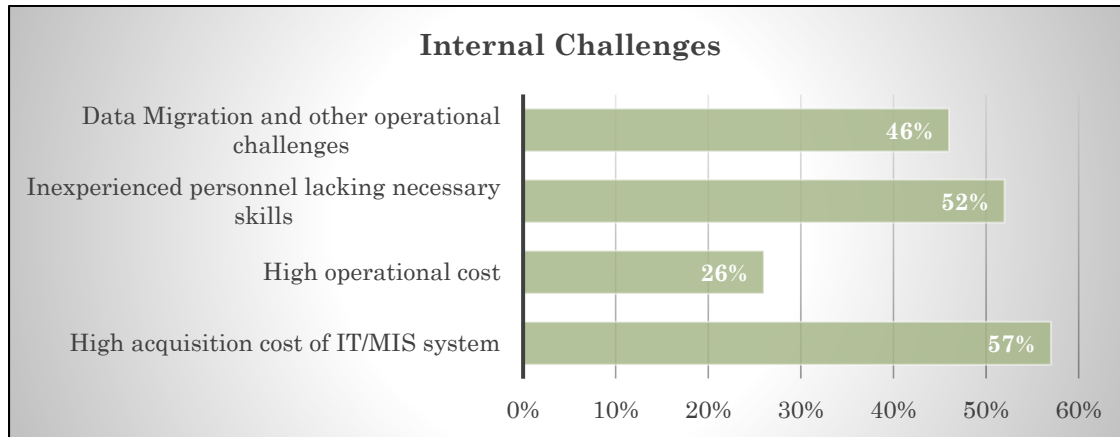
The survey revealed some prominent internal and external challenges faced by the Microfinance Institutions in India while implementing and leveraging technology to carry out their banking operations. This section focuses on the experiences of the Microfinance Institutions while implementing a digitalisation strategy. A Microfinance Institutions while embracing technology is faced by certain unique challenges as they often deal with stakeholders with limited formal education and financial literacy¹¹. Moreover, the microfinance sector has been built on a human-touch model with the major focus on cash-driven transaction, thus, a shift towards digital transaction poses risk to the group dynamics of the sector. It becomes imperative to understand both the internal and external sets of challenges faced by the Microfinance Institutions in India, as it would help these institutions to redefine their value propositions while switching to the digital banking operations.

High Acquisition Cost: A pain point for the MFIs

The most prominent internal challenge reported by the majority of the Microfinance Institutions in the survey (57per cent) as per figure 43 was high acquisition cost of IT/MIS system followed by 52 per cent of the MFIs reporting inexperienced personnel lacking the necessary skill set to leverage technology in the most effective and efficient way.

¹¹ <https://assets.kpmg.com/content/dam/kpmg/in/pdf/2021/03/microfinance-digital-fintech-mfi-technology-finance.pdf>

Figure 43 Internal Challenges

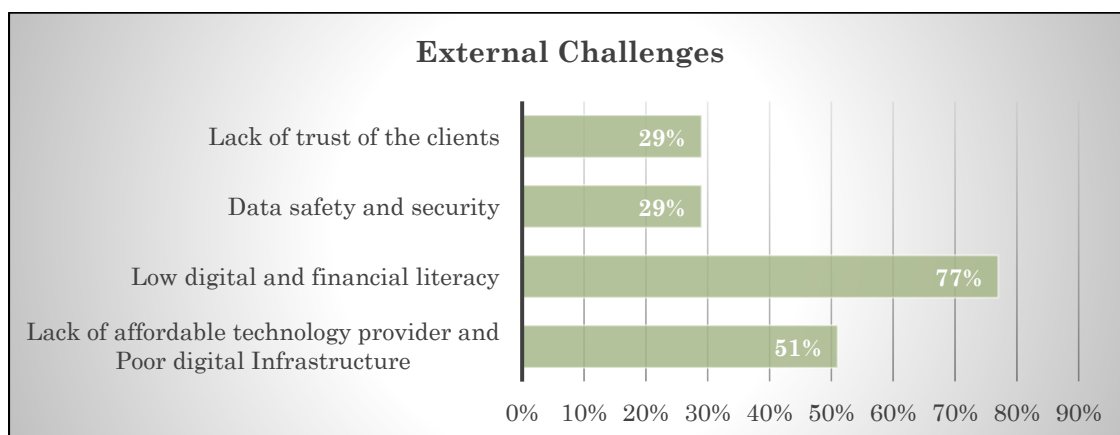


Source: Based on the online survey

Digital and financial literacy: A crucial external challenge

With reference to the external challenges figure 44, 77per cent of the MFIs in sample have reported low digital and financial literacy amongst the clients as the most prominent external challenge. Another important external challenge reported by 55per cent of the MFIs was the lack of affordable technology service providers. Hence, the external challenges for the Microfinance Institutions in India are all stakeholder related challenges that are the roadblocks in the implementation of a digitalisation strategy.

Figure 44 External Challenges

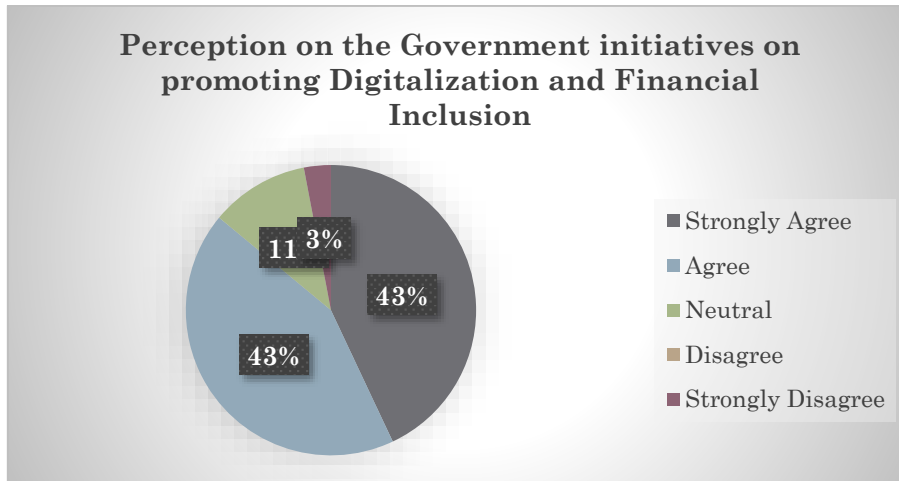


Source: Based on the online survey

In favor of the regulatory stance

The Microfinance Institutions in the sample were also questioned on whether they agree that the Government initiatives towards digitalisation of financial services are beneficial for financial inclusion.

Figure 45 Perception on the regulatory stance



Source: Based on the online survey

The chart above in figure 45, reveals that 43 per cent of the MFIs in the sample strongly agree and agree respectively that the government initiatives towards digitalisation of financial services have indeed played a catalytic role in terms of improving the access and penetration of financial services especially for the underserved and underbanked strata of the society.

4.10.2 Results (Interview Method)

The findings from the interview are an interesting compendium of the viewpoints of the bankers in India. The bankers interviewed belonged to different categories of the banking institutions from Public Sector, Private Sector to Cooperative Banks and Gramin Banks. They held strong opinions and recommendations on the Challenges and benefits of Digitalisation for the low-income underserved strata and also the policy roadmap for greater penetration and usage of digital financial services.

A Game Changing Digital Innovation for Financial Inclusion

The bankers interviewed pointed out some of the digital innovations that has significantly benefitted the customers. UPI and eKYC were the popular choice amongst the bankers in regards to the game changing digital innovation that has benefitted all the customers coming from

different income categories and areas (urban/rural). While the process of eKYC has enabled easy onboarding and authentication of the customers, UPI on the other side has made money transfers hassle free and cost effective. These features help in greater spread and usage of financial services for the customers. As rightly pointed out by one of the bankers of a private sector bank, “*eKYC and UPI have helped a lot to people belonging to any income groups*”. For the customers belonging to the rural areas Rupay debit cards has greatly benefitted them. “*I would say rupay cards and UPI are the two channels, that have really played a very important role in financial inclusion*”, Chief manager Saraswat bank.

However, interestingly there is also a set of belief amongst the bankers that there is no unique digital product that would cover all the dimensions of financial inclusion. As quoted by the manager from State Bank of India, “*I don't think there is any product in the technology space, that has been tried in the financial inclusion space, that would meet all the four dimensions of Financial Inclusion. These digital products do not include many aspects of financial services like lending, borrowing, and non-financial based services.*”

Challenges faced by the Bankers in India while implementing digitalization strategy

The following challenges were highlighted by the bankers:

- A. Difficult to sell digital products to the low-income segment as they do not attach any value proposition to the product. “*It is very difficult to even sell the technology proposition because they don't see any benefit in it*”, Chief Manager State Bank of India. Lack of awareness is a reason why the low-income customers are unable to adopt and use the digital product. There is a need to educate the customers about the benefits and convenience that the digital product can offer.
- B. No MDR (Merchant Discount Rate) on UPI transaction leads no income generation for the banking Institutions, hence the expenditure for processing the transactions is fully borne out of the pockets of the banks, creating greater cost burden on banks. “*There is no MDR on UPI transactions. Hence, the interchange is also cancelled, which is the revenue income for the issuer bank. So, when this money is taken out, all the expenditure whether it be capital expenditure, whether it be an operating expenditure is out of pocket, without there being any inflow of money*”.
- C. Lack of necessary skill set to implement technology after assessing the needs and requirements of the customers. “*If we have to implement this technology, it requires specific*

skill sets and we require people with this specific skill sets. These are highly skilled people and to get these resources from the market and employ them is also a difficulty”.

4.11 Conclusion and Discussion

The study has focused on the experiences of the Microfinance Institutions and the overall banking sector on the implementation of Digitalisation of financial services for the low-income clients. Through a qualitative analysis of the survey with the MFIs and Banks in India there are striking revelations made on the adaptation and the perception of the financial service providers on the importance and challenges of digital financial inclusion. Digital transformation of the Microfinance Institutions and the banking sector has come a long way. The status of implementation of digitalisation is indicative of the same. For the Microfinance Institutions although the digital adaptations have been slow but it has benefitted them in terms of enhanced operational efficiency, easy disbursement and repayment of loans, higher business and diversified customer base. Even the bankers in India have acknowledged the importance of the innovative digitalised financial products for the low-income segment. However, our findings indicate that despite many notable successes of digitalisation there are still some underlying challenges from the provider's end or the supply side which requires immediate focus and actions from the stakeholders of the financial inclusion ecosystem. Both MFIs and the Bankers in India have their respective sets of recommendations which can help us frame a policy roadmap and framework for greater usage and penetration of digitalised financial services for the underserved and the excluded.

The study succinctly presents the perception of the providers of the financial services on the promises of the digitalisation for greater financial inclusion. The study helped us identify the supply side challenges of implementing digitalisation strategy for the low-income and financially excluded segment of the society. The policy recommendations presented can help the providers eradicate the pain points of financial inclusion and gives the Government and the regulatory bodies a food for thought for furthering the scope of financial inclusion through digitalised financial services.

5. CHAPTER V: Unleashing Potential of the Indian Fintech Start-Ups for Financial Inclusion: A Qualitative Analysis

The stakeholder wise analysis from the perspective of the financial service providers and the customers further intrigues us to understand the potential of the most emerging sector in India: the Fintech market. Financial Technology, popularly known as 'Fintech,' can be seen as a game-changer, transforming the financial landscape where consumers can choose from a wide range of financial products tailored to their needs at lower cost, delivered most efficiently. A straightforward definition of Fintech is companies that combine financial services with modern, innovative technologies offering internet-based and application-oriented products (Dorfleitner et al 2017). In this paper, the term Fintech denotes the newly emerging sector consisting of financial technology firms. Globally, the Fintech sector has emerged as one of the most promising sectors with more than \$17 billion in funding and over 1400 deals in 2016¹². Thus, the Fintech entrants in the financial sector ecosystem can create collaboration and competition with the incumbent firms depending on the incumbent's response and product profile.

The Fintech revolution has many ramifications for the financial market microstructure, regulatory framework, and entire society. India is witnessing the explosive growth of the Fintech sector both in terms of the uptick in the number of start-ups and investment-making India the third largest Fintech Ecosystem globally (Mankotia 2020). One crucial dimension where Fintech has been a critical enabler is the growth of financial inclusion, i.e., the access to and usage of financial services by the unbanked and underserved population. As pointed out in the recent report of AFI (2018), the real opportunities which Fintech offer is the development of an entire digital financial ecosystem that meets the need of the individuals and small business enterprises. Fintech has the potential to address several financial frictions as a) cost barriers for developing financial services, information asymmetries, lack of verification, and the lack of suitable products for a low-income segment (IMF 2019).

¹² <https://www2.deloitte.com/content/dam/Deloitte/in/Documents/financial-services/in-banking-fintechs-in-india-key-trends-noexp.pdf>

Bazarbash (2019) shows that Fintech credit could increase financial inclusion by lending to underserved populations relying on credit scoring and reducing the time of credit decisions, and offering lower lending rates. Fintech has facilitated access to accounts, transactions, and credit ranging from poor households to SMEs, opening opportunities for a more comprehensive section of the population to participate in formal economic activity (Beck 2020). Studies claim that the adoption of new technology by formal financial institutions will benefit marginalized segments of people with customized products and lower costs (Arner et al., 2020; Boot et al., 2020; Philippon, 2020; Thakor, 2020; Suri and Jack, 2016; Bachas et al., 2017; Ouma et al., 2017; Lee et al., 2021). However, the effect of Fintech on financial inclusion is more prominent in higher-income countries (Demir et al. 2019). Saka et al. (2021) prove that heterogeneity in age, income, and employment has played a role in the digital divide in the pandemic-initiated adaption to new technologies.

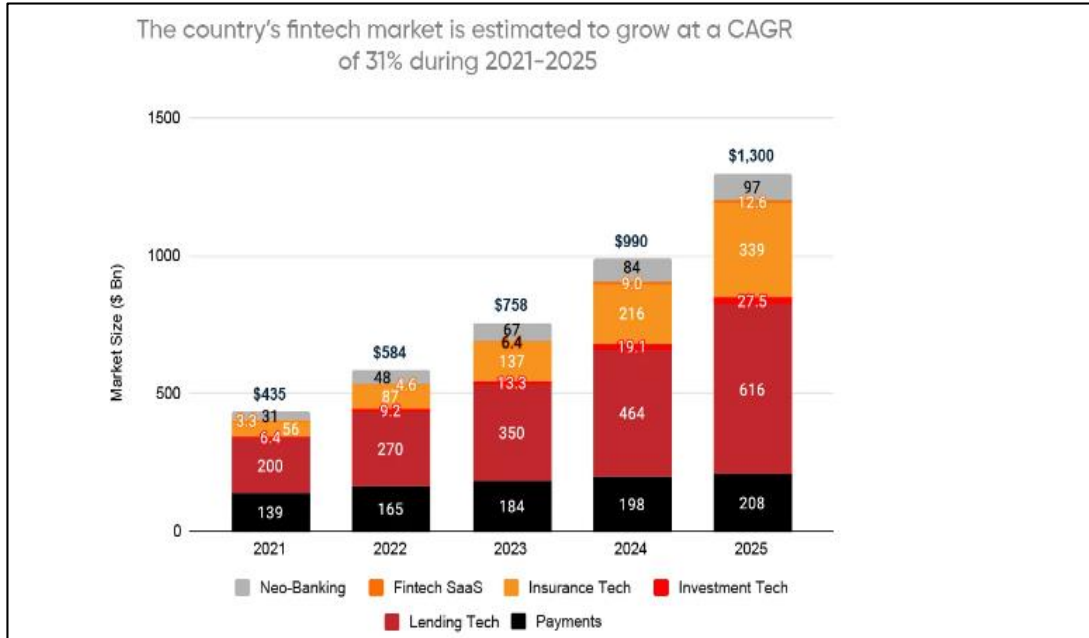
The policymakers in India have begun to pin their hopes on digital initiatives and the Fintech for Financial Inclusion. Since they believe that the Fintech can lead to better access to finance and thus betterment of the marginalised segments. Indian budget, 2021 proposed allocating Rs.1500 crore to boost the penetration of digital payments and setting up a world-class Fintech Hub which will create 150000 jobs for the youth and accelerate the use of AI, making India a centre of the Fintech universe. It is necessary to find answers to the following questions. Has the Fintech landscape in India evolved to offer opportunities to the upcoming new business models? What potential do the Fintech start-ups hold to overcome the challenges of Financial Inclusion in India? What market strategy is best suited for the Fintech Start-ups to remain sustainable? And finally, what policy intervention is required specific to the Indian Fintech sector in order to make the ecosystem more inclusive? This chapter deconstructs the potential of the Indian Fintech start-ups for financial inclusion.

5.1 An overview of the Indian Fintech landscape

Indian FinTech ecosystem has emerged as a formidable global force as India is the third largest FinTech market, following the US and the UK, with several FinTech unicorns, startups, and funding. According to the Tracxn database, as of July 2022, the number of FinTech startups in India was over 7300. The total volume of FinTech funding till June 2022 has been approximately \$30.2 billion. With a funding CAGR (2016-2022) of 34 per

cent and an estimated Market Size CAGR (2022-2030) of 18 per cent, the overall estimated size of The Fintech Market By 2030 will be \$2.1 Trillion.

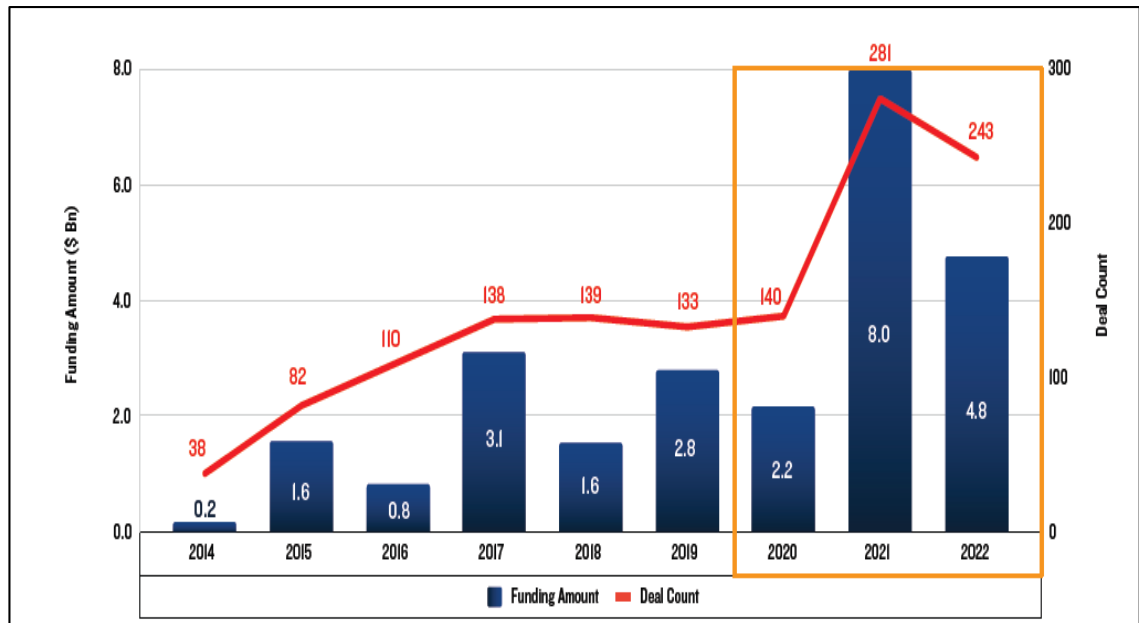
Figure 46 Fintech Market size



Source: Inc42 Plus, Other Secondary Sources

As can be observed in the chart in figure 46, the overall Fintech Market Opportunity in India, Lendingtech emerges as the most lucrative sub-sector of the Fintech Market which is likely to account for 47per cent (\$616 Bn), followed by insurtech at 26per cent (\$339 Bn) and digital payments at 16per cent (\$208 Bn).

Figure 47 Overall Funding



Source: Inc24 Plus

As seen in figure 47, in terms of the equity funding in the first half of 2022, the market witnessed a sharp decline in equity FinTech funding which could be attributed to the macroeconomic and geopolitical factors such as the Ukraine war, increase in inflation and uninspiring financial and public market performance of major FinTech companies, creating a dent in investors' confidence in the future exit prospects. Moreover, India has emerged as a Unicorn Farm, with around 22 Fintech unicorns, 33 Fintech Soonicorns having a combined valuation of \$68 billion as of the first quarter of 2023.

A careful survey of into the existing literature on the Fintech disruption and its impact on the market and regulation and gaining insights from the global lessons, it urges us to study the factors that has led to the Fintech disruption in the Indian scenario, what drives the adoption of Fintech innovation in India, how has the market and the regulatory bodies been responding towards the Fintech disruption and the policy framework required specific to addressing the trends of Fintech innovations in India with regards to the financial products and services. Hence, the objectives of the current study can be enumerated as:

1. To understand the evolution of the Fintech sector in India.
2. To examine the role of the Indian Fintech start-ups for financial inclusion.

3. To identify the ideal market strategy for the Fintech start-ups to remain sustainable.
4. To identify the regulatory and policy interventions specific to the Indian Fintech sector to make the ecosystem more inclusive

5.2 Materials and Methods

Study design

We designed a qualitative study to capture various perspectives on the evolution of the Indian Fintech landscape, the innovative digital solutions employed by the Indian Fintech start-ups to eradicate the pain points of the financial services, the market strategy adopted and the current regulatory stance. The data collection method of the study was in-depth interviews with key informants who are the stakeholders of the Fintech ecosystem. The interviews were conducted over the span of three months (September-November) and were held via telephone and web conferencing.

Key Informants

The qualitative data collection method with key informants was given importance in this study. Key informants were identified from the stakeholders of the Fintech ecosystem consisting of CEOs and founders of the Fintech start-ups, consultants, investors, and policy expert on the basis of their experience, expertise, background knowledge on the subject, and contribution in respective fields. The following tables 13 and 14 highlights the profile of the key informants.

Table 13 Profile of the Fintech Start-up

Fintech Firm	Year of Establishment	Types of services offered	Clients catered
Credible India	2017	Risk management, remote sensing, and data science	Insurance companies, farmers, government agencies.
Bridge to Capital	2018	Supply Chain Finance, Savings, Insurance, and Working Capital Loan	Small businesses
GramCover	2016	Rural Insurance	Farmers
Aggois AgriTech	2018	Agriculture, Institutions, Risk Management, and Finance Management	Small and marginal farmers

XaaS Tag	2017	Agritech, Finance, Market Linkage, and Farm Contracts	Agri SME, Village Entrepreneurs, Farmers
Entitled Solutions	2019	Emergency funds, rewards, saving programs and counselling	Blue collared workers
Credright	2016	MSME Loans, Digital Lending, and NBFC	Micro & Small businesses
KredX	2015	Invoice financing, collateral-free working capital,	Businesses and corporates
Ftcash	2015	Enable offline payment transactions.	Micro-merchants, small businesses
Davinta Finserve	2019	Artificial Intelligence, Financial Services, Digital Platform, and Financial Inclusion	Underserved customers and low-income customers
Pay Pal	1998	Online Payments, Mobile Commerce, Payment Security	

Source: From the primary survey

Table 14 Profile of the other key informants

Organisation	Role
Microsave Consulting	Partner
Microsave Consulting	Managing Director
-	Angel Investor
AFI	Policy expert

Source: From the primary survey

5.3 Data Collection and Sampling

The data was collected with the help of the interview method. We preferred to adopt a semi-structured questionnaire as it allowed greater flexibility while conducting the interviews. The study used a purposive non-random sampling strategy, which entails ‘selecting information-rich cases for study, to permit inquiry into and understanding of phenomena yielding insights’ (Patton, 2002). The sample size determination was guided by the criterion of information redundancy, that is, sampling can be terminated when no new information is elicited. The ‘principle of saturation’ was applied to determine the

sample size of 16 key informants, as adding more participants did not result in obtaining additional information and no new codes could be generated.

5.4 Data Analysis

The interview transcripts were analysed using atlas.ti software. A total of 143 codes and 12 code groups emerged from the data. Codes that seemed to have similarities were grouped into thematic patterns. The emerging themes were documented and maintained as a permanent record of our analysis progress. These steps were repeated until no new themes emerged. For undertaking the thematic analysis, we followed the steps developed by Braun and Clarke (2006). We decided on following a deductive approach for undertaking the thematic analysis. Once the themes were generated, they were carefully reviewed and compared with the data set. Lastly, the themes were properly and succinctly named and defined.

5.5 Results

The thematic analysis identified and validated four major themes that incorporated all the data recorded from the interviews:

Theme 1: Evolution of the Indian Fintech Landscape: Is India perfectly placed to Reap 'Fintech' for Financial Inclusion

The first dominant theme that emerged from the data was on India being ready in terms of the infrastructure, regulation and funding to fully reap the benefits of the Fintech for Financial Inclusion. The main argument is that Indian Fintech landscape has evolved dramatically in terms of structured development of the market, regulatory framework and investment opportunities, laying solid foundations for new and innovative business models to emerge providing bundled financial products and services with greater flexibility and affordability.

Market Evolution

The CEOs believed India has seen significant diversification and niche product development through technology. The market has evolved in different layers where each of the layers emerged independently and the synergy between the different layers provided the ground for new business models to innovate by plugging in components from each of the different layers of the industry. The three layers of the market have emerged as: burgeoning public digital infrastructure, private digital infrastructure and the consumer facing entities. India has a burgeoning Public Digital Infrastructure which

provides linkages, networks and pathways to connect people and communities with data, products and services and helps start-ups to innovate quickly by reducing their time to build up services. This layer consists of a variety of components such as the Adhaar, UPI, Direct Benefit Transfer, E-signature, and E-KYC, Digital locker, Account aggregators and India Stack initiative. These components provide a ubiquitous platform for the customers, new businesses, and government to build up digital footprints. They help in lowering the cost of transactions, easy identification and on boarding of new business and customers. As quoted by one of the CEOs:

'If you look at India, we have a very burgeoning digital public infrastructure in that layer, I put India stack which includes adhaar, UPI, digital lockers, and now the account aggregators who have just come about last year, and the Data Protection Policy which will go like sometime next year'.

The second layer comprises of the private technology providers. These companies are transforming the technology and financial services industry by acting as an enabler to Fintech startups and banks , offering financial products directly to the end customers. The final layer consist of the consumer facing entities offering the financial products and services directly to the customers through a digital platform. ranging from insurance, payments, deposits, lending , investment management and crypto-currency based activities. The growth of the retail payment segment further adds to emergence of the consumer facing entities.

Currenty, the Fintech market in India is witnessing the growth of new business models which are plugging in components from all the three layers and providing innovative and bundled financial products and services at lower cost and with greater ease of onboarding and identification. As rightly quoted by a senior policy manager at AFI,

'Fintech in Asia particularly is driven by the digital platforms, these are very big players already in the market and they have been offering some kind of services through digital platforms and in order to extend these digital services, they added payments rail to it and then they add additional financial services rail PAYTM in India is a very good example. There almost every player who has a E money wallet now to facilitate transactions in the platform, on top of credit product or insurance product, so on so forth, actually'.

Regulatory Evolution

In last five to six years the Government initiatives such as demonetisation, PMJDY, licensing (NBFC-P2P), biometric identification database and promoting non-cash transfer, all contributed towards bringing about a phenomenal change in the Indian Fintech landscape. A CEO of a Fintech firm recognised the role of RBI in bringing about structured regulations for the Fintech sector, *'RBI has played a very important role, because while they structured regulations, they also eased out regulations, they understood certain issues.* Moreover, the CEOs also laid emphasis on the licensing policy of RBI as an important step towards promoting the Fintech sector in India. As commented *'The kinds of licencing is ready for the kind of vertical and specialist licencing that RBI has given out in the last eight to 10 years. That has really ha been really helpful for the Fintech innovation'*. The comments reflect Government's and the regulatory body's multifarious policy moves and initiatives to boost the overall digital ecosystem, further placing India to fully realise potential of the Fintech Sector.

Investment Surge

Investments in the Fintech Industry stood at \$5.7 billion during 2014-18, with maximum share allocated to the payments domain followed by the lending business. An angel investor quoted, *'Fintech Industry is getting fueled by investments, so, now and in future investments are only set to increase. So, very positive'*.

The theme establishes that India has indeed laid stable ground for the Fintech Start-ups to employ innovative business models by pulgging in components from the three layers of the market , providing bundled financial services tailored to the specific needs of the customers. The Fintech landscape in India has evolved in terms of infrastructure, regulation and investments providing numerous opportunitis for the proliferation of new busniness models in India.

Theme 2: Potential of the Indian Fintech Start-ups for Financial Inclusion: A granular approach to whether the Fintech Start-ups in India can eradicate the pain points of financial inclusion while creating value propositions for the underserved

The theme highlights how the Fintech start-ups are successfully employing innovative business models, providing flexible products and removing the pain points of the financial services offered to the underserved.

Table 15 Reasons for non-usage of financial services in India

CEOs and Co-Founders	Consultants	Investors	Head Strategists
Lack of financial literacy and awareness	Distance from bank	Skewed financial services	High customer acquisition cost
Lack of trust	Skewed financial services		High underwriting cost
Lack of enough income			
Problem of user adoption			

Source: From the primary survey

The qualitative analysis presented in table 15 revealed that the CEOs and the founders were of the opinion that the demand side challenges such lack of financial literacy and awareness, lack of trust, lack of enough income and a preference for cash transactions are some of the important reasons for non-usage of financial services. One interesting reason highlighted by the CEOs was the problem of User adoption which points to the behavioural intent of a user to use technology. A lack of willingness to use technology especially for making financial transaction is a major roadblock to full penetration of the financial services. The key informants expressed that although the people in India have access to smartphone and internet, they are still do not intend to use the same for availing financial services. They attach a risk towards using technology for making financial transactions. According to one of the partners at microsave consulting,

‘What really happens in a kind of Indian population is that a lot of them have access to phone and internet. And if you see, are they using digital application? answer is yes. What is that they're using? So they have been using typically it for media. So they don't create any content rather they only consume the content. The problem comes at the moment they think that can we use the same application or a new application for doing financial transition. Suddenly they see a risk because what happens it is a faceless situation and in case of a glitch whom they should reach out. So trust is something which is a combination of so many other stuff. They require someone next to them who can solve their digital problems’.

The same is true for the rural customers as well for being reluctant to using any mobile banking app despite having an access to a mobile phone. The CEO of Gramcover

commented, *'Reaching to the ultimate customer is a big challenge. Because we do find people in the rural areas especially reluctant to using any mobile banking app for that matter, they they will have access to a smartphone, but they will not use it for availing any kind of, you know, banking services for that matter. So, like, how can Fintech firms change their perspective, how can they make them believe that this is something which is really useful and can actually save their time and be beneficial to them still remains to be a challenge'*.

This reflects the conundrum which India is facing in terms of usage of financial services, where despite having the required infrastructure and investment, facilitating access to financial services there are roadblocks to the actual usage of the financial products which hinders the full penetration of financial inclusion in India. However, these roadblocks provide immense opportunities for the Fintech Start-ups to step in and fill in the gaps existing in the financial inclusion ecosystem.

Upon interactions with the CEOs and founders of some Fintech Start-ups in India working specifically towards accelerating financial inclusion, it was found that the Fintech Start-ups are employing innovative business models which actually caters to the Indian low-income segment and are successfully delivering financial products and services such as credit, insurance, savings, payments and de-risking tailored to the needs of the customers. These Start-ups are manoeuvring through the roadblocks turning all the obstacles into opportunities. The success stories of the Start-ups present some key lessons to be learned in accelerating financial inclusion in India.

Bridge to Capital: Building the Trust

Bridge to Capital is a Fintech Start-up based on B2C supply's chain finance model providing flow-based credit to the medium and small businesses located in both small towns and big cities. The firm has built a UI, which is designed for small merchants based on a transactional ledger technology application on the principles of flow based lending, and providing working capital to small businesses, which is directed them to improve the turnover of their business. Bridge to capital has successfully overcome the challenge of underwriting the small merchants who lack the necessary documentary evidence and providing them small term loans. Bridge to Capital has successfully gained the trust of small merchants since they were unfamiliar with the online technology and were resistant

to adopt the digital means of transacting by employing field representatives to assist the small merchants clearing all their doubts.

The success story of Bridge to capital is a great example of how can we create value proposition for the low-income segment by overcoming the challenges of lack of trust and user adoption. The firm's ability to generate a robust underwriting mechanism for small merchants has immense potential to overcome the challenge of lack of enough underwriting data of the small businesses, facilitating more use of credit products.

GramCover: An Assisted Model for Rural India

GramCover is a composite insurance broking firm focused on insurance product design and tech enabled distribution for rural India. The firm adopts a unique technology led distribution & servicing model well suited for rural set up to minimize the inefficiencies and transaction costs involved in the process.

The success story of Gram Cover provides an understanding of the challenges specific to rural areas where most people still rely on the cash-based transactions. Gram cover has built the entire premium collection around cash. The farmers are provided insurance products through a village level entrepreneur who explains the benefits to the farmer, uses a technology platform on behalf of the farmers to buy the insurance product. The farmers can reach out to him for any doubt or query at all time. The assisted model of providing insurance in the rural area creates immense opportunity for a deeper penetration of the financial product. The CEO of Gramcover quoted,

'We thought about key to build a digital marketplace for insurance, and go for a different kind of model, instead of do-it-yourself kind of model we went for an assisted kind of a model because in rural areas as we cannot expect a farmer to come and buy the insurance policy on its own. There should be a person who will be selling the insurance to farmer, explain him all the benefits, and even the farmer can reach out to that person. We built the entire system, premium collection system around cash only. We have built this model keeping the customer in mind. So that's why we are doing better than any other financial products in the market'.

Credible India: De-risking Agriculture

Credible India is Fintech Start-up which enables risk management of the Agri business. It provides farm-level insights such as crop health monitoring and production estimation. It uses remote sensing and AI to deliver these insights.

The start-up can overcome the problem of market information asymmetry for the farmers. Through a robust price forecasting model delivered using a combination of analogue channels, relevant market information is provided to the farmer which can help them choose the right market and timing for selling their products. The CEO of Credible commented, *‘Credible India creates products, which are data driven and address risk management aspect of finance, especially in the agriculture creating tools, which make it easier for financial institutions to provide loans to rural population, especially who are busy with agriculture’*.

Entitled Solutions: Ensuring Financial wellness of Blue-Collared Workers

The most important reason for the non-usage of financial services in India is the lack of financial literacy amongst the underserved segment of the population, where most of them remain unaware of the benefits of the products and hence does not give impetus to the financial products and services. Entitled solutions is a Fintech Start-up which provides financial wellbeing services for the blue collared workers, which includes access to credit and non-credit services like insurance and savings along with financial literacy and wellbeing services of workers. Entitled partners with employers to provide access to emergency funds, rewards, discounts on healthcare and daily essentials, saving programs and counselling for its employees. Based on the data as provided by the employers of the Company, on the kind of wages that they've been drawing or any performance information that's available, the start-up builds a credit profile of the worker. The credit profile of the worker becomes the basis for the customer to access the innovative solutions employed by the. The key lesson learned from the success story of Entitled Solutions is the efforts towards creating financial literacy along with the provision of financial services can result in greater usage and adoption, paving its way towards enhanced financial inclusion.

An understanding of the working of these Fintech start-ups compels us to follow an approach to move beyond the mere access and provision of financial services to ensuring financial wellness and awareness of the underserved. The success stories of these start-ups provide some valuable lessons for financial inclusion to be meaningful. To tap into the underserved and excluded segment it is imperative to gain their trust besides providing the services. These people need to be made aware of the usefulness and the convenience of the tech enabled solutions available to them. An ‘assisted model’ with an element of

human touch can go a long way to making financial services more inclusive and the Fintech Start-ups in India indeed has immense potential to execute the same.

Theme 3: Collaboration and partnership: Market Strategy for the Fintech Start-ups to remain Sustainable

The third prominent theme that emerged for the data was the market strategy that needs to be followed by the all stakeholders of the Fintech ecosystem for the Fintech start-ups to sustain in the long run. Fintech ecosystem consists of a diverse set of stakeholders, from financial institutions, MNOs, Infrastructure providers, consumers to investors, regulators and consultants. While the Fintech start-ups would explore and create innovative business models, the other stakeholders would be required to support them through necessary funding, regulatory guidelines and consulting. Fintech encompasses a plethora of digital financial services, so it is imperative for all the stakeholders to work in harmony forming strategic alliances for a sound and enabling financial ecosystem. The key informants alluded to the recurring theme of following a collaborative market strategy which will be mutually beneficial for the all the stakeholders of the ecosystem. Collaboration helps Fintech start-ups to scale-up and capture more diversified market segment. A partner at Microsave consulting commented, *'It will be difficult for Fintech to scale, because they'll be they will be constrained by their own capital, hence there is a need to have a collaboration'* Similarly, the MD at Microsave consulting quoted,

'As they(Fintech Start-ups) try to get deeper into the distribution chain get to rural India get to more diversified market segments, that is when they will realise that they will not be able to do it n their own. And then they will need, they will be the tie ups and so on'

One of the CEOs quoted,

'Fintech has no choice but to work with other stakeholders. I think it is very important for banks, the non bank and the regulated entities to work very closely with the unregulated entity to see that whether where they can find a midway path to work on it'

The key informants have brought to surface some crucial obstacles of following a collaborative market strategy. These are cultural differences, misaligned incentives and apprehensive partners. The problem of cultural difference and misaligned incentives arise when the Fintech Start-ups partner with the incumbent banks and financial institutions. The Fintech start-ups move at a faster pace in terms of their decision-making process, whether it is product innovation, or product launch, or acquiring customers, or setting up

a business in new geographies, as compared to the traditional financial institutions. Traditional institutions have a slower decision-making mechanism requires multiple levels of approval. The cultural differences defeat the very purpose of collaboration creating frictions between the two players. While collaborating with the regulatory bodies and bigger market players, the Fintech start-ups often face the problem of lack of trust as these stakeholders are circumspect of the performance of the Fintech start-ups given its scale and size.

Hence, for a successful partnerships and collaborative it is required to accommodate the inherent cultural differences and align the incentives for both the partners. To reap the benefits of a successful partnership, both the partners must jointly establish a common ground on which the partnership is established. Alignment in time horizon, patience and a transparent decision-making process are some ways to mutually acknowledge the differences and reach a common ground. The regulatory bodies and bigger market players should be more accommodative towards the Fintech start-ups helping them scale up and reach larger market segment. A collaborative market strategy is indispensable for a sound financial ecosystem where each stakeholder collectively works towards achieving greater financial inclusion and delivering efficient financial products and services for the benefit of the end customer.

Theme 4: A Verdict on the Current Regulatory Stance: Is the regulatory response in tandem with the technological disruption?

The fourth theme that emerged was the regulatory stance in India on the Fintech Start-ups and the technological disruption in the financial industry. There was a general agreement among all the key informants that the regulatory bodies in India have a positive regulatory stance towards the Fintech Industry, they are accommodative and give the Fintech firms an opportunity to innovate. The policy response of the regulatory bodies in India consists of a decent mix of both structured and permissive regulations. As quoted by one of the CEOs, *'Regulatory bodies are opening up; they are giving us a chance to experiment with more and more models.'* The MD at Microsave consulting expressed about the permissive stance of the regulatory bodies in India as, *'I think regulation has been permissive. It has tried to adjust accommodate encourage start-ups and Fintech'*.

However, CEOs /founders and the investor believed despite maintaining a positive regulatory stance, the regulatory responses are not in tandem with the pace of innovation

that is happening in the Fintech Industry, which also creates regulatory hurdles for a lot of Fintech Start-ups. This was pointed out by one of the angel investors as,

‘The innovation is happening at the scale of 10X but the policy changes and collaboration which are forced collaboration and the openness of bank and RBI and SEBI and payment systems and all of that that is happening at 1X. So, the regulator needs to be fast enough if they want to catch on to the opportunities.’

The disruptive forces brought about by the Fintech Start-ups are all dynamic, constant and complex which require a proactive policy response. However, the current regulatory stance in India lacks the agility required to respond to the technological disruptions brought about by the Fintech start-ups. The regulators in India are still wrapping their heads around the technology-based regulations required in the current times. The regulators often find themselves in a dilemma of having a balanced mix of mitigation of the risks while providing a ground for technological disruptions to happen. An important argument that stems from this theme is that the regulatory design around the Fintech sector needs to be more proactive, dynamic and responsive. There is need for a greater willingness on the part of the regulators to engage in policy and regulatory experiments in which different regulatory regimes are adopted and results are compared.

5.6 Discussion

Fintech disrupts the financial services sector by a) transforming financial service providers (making financial services more decentralised), b) disrupting the financial service providers (through emergence of new start-ups) and c) by promoting financial inclusion. The regulatory responses adopted by various countries to the Fintech disruptions can be categorised as ‘reactive’ and ‘proactive’ (Vermeulen 2017). Moreover, the degree to which regulators will respond to Fintech activities may be a function of whether current regulatory framework covers the relevant emerging risks. A report by Financial Stability Board (2017) stocktakes the regulatory approaches to Fintech adopted by various jurisdictions. Regulatory changes ranged from introducing a new draft law in Mexico, and eight new sets of rules on open banking in China, limited number of amendments in EU, Korea, and Russia to a more specific regulatory framework in Hong Kong, Indonesia and India followed by the introduction of various regulatory sandboxes, accelerators, and innovation hubs.

India's regulatory response has been forthcoming and accommodating in terms of experimenting and trying out new innovations. The regulators in India are promoting product and service innovations through dedicated sandboxes for each sector as payments, insurance, KYC, debt etc. However, the regulatory sandboxes in India are still in a nascent stage. There is enough ground and support from the regulatory bodies in India for the Fintech start-ups to innovate and experiment. However, the regulators in India often have to address some key challenges posed by the Fintech as- consumer protection, keeping pace with the technological innovation, low user adoption and financial stability.

In this concluding section we draw on the findings of the literature and the discussions with the key informants of the sector, and suggest some regulatory and policy recommendations to create an ecosystem for inclusive Fintech sector.

Due to the cost-saving ability of technology, Fintech can increase social benefits and generate positive externalities. The regulators, Fintech firms, and the incumbent banks & financial services firms must work together to reap these positive externalities. This 10-point agenda is the essence of the roadmap for benefitting from the positive externalities. India at this stage must embrace the Fintech revolution openly and calibrate its regulatory and financial systems to channelize the Fintech sector in such a way that it contributes to resolving the problems of conventional finance and facilitates poverty reduction through financial inclusion.

6. CHAPTER VI: Policy Framework and Recommendations towards greater Digital Financial Inclusion

This chapter of the thesis presents policy recommendations based on the interactions with the stakeholders of the financial inclusion ecosystem. The previous chapters of the thesis helped us identify the challenges from the point of view of various stakeholders. The thesis captured both the demand and supply side challenges of digital financial services with respect to its provision and usage among the low-income segment customers in India. The supply side analysis captures the status of implementation of digitalization of financial services in India as well the perception of the providers of the financial services in India. On the other hand, the demand side analysis was a quantitative study based on the Technology Acceptance Model that considered the behavior and perception of the low-income customers towards usage of digital financial services.

The stakeholders in the thesis can be broadly categorized as providers of the technology and financial services as well as the customers. However, we can further identify the stakeholders as following:

1. Microfinance Institutions (NBFC-MFIs, NGO-MFIs and Small Finance Banks)
2. Scheduled Commercial Banks (Public and Private Sector),
3. Regional Rural Bank
4. Cooperative Bank
5. Fintechs
6. Low-Income customers

Each stakeholder had their expectations from the regulatory bodies in India that would ensure overcoming the challenges and moving towards greater penetration and usage of digital financial services in India. This chapter, chalks-out policy recommendations based on the overall stake-holder challenges of digital financial inclusion.

6.1 Action Points for the Microfinance Institutions in India:

1. **Emphasis on enhancing financial and digital literacy among the clients of the Microfinance Institutions-** Findings of the survey on the cliental adoption accentuate the need to work on the financial and digital literacy of the clients. For the successful diffusion of Digital financial services in India, financial and digital

literacy can prove to be a boon. It is the need of the hour that the low-income and financial excluded segment must be enabled to use digital platforms through training and handholding. Financial Institutions and the Government must join hands to foster continuous dissemination of knowledge and awareness both for the clients and the field officers. Digital literacy programs must aim at developing necessary skills and understanding of the digital platforms. Such programs must be widespread in both rural and urban areas as well as across all income and age groups. This would ensure greater inclusion and narrowing of the digital divide.

2. **Investing in a robust and a cost-effective digital infrastructure-** Lack of affordable digital infrastructure is one of the dominant challenges to realise the full potential of Digital financial services. This would mean lack of access to network connections, to devices and to software applications. There is a need to carefully invest in a cost-effective digital infrastructure that would ensure access and affordability especially for the poorest. Cost-effective digital infrastructure would also enable the financial institutions to leverage technology to compete and innovate. The regulatory bodies and the government will be required to a) give the private sector a boost by easing out regulations, b) provide a stable and predictable policy environment, c) ensure regulatory best practices, and d) focus on stimulating the demand for digital solutions.
3. **A hybrid model-** To ensure greater financial inclusion the human touch and digital innovation must work simultaneously. The findings of the study indicate a strong case for a ‘human touch’ model given the heterogeneity in terms of the clients and the areas of operations of the Microfinance Institutions. Establishing cliental relationship can help eradicate the pain points of leveraging technology, thus making the illiterate and semi-literate clients more comfortable with the hybrid model than the complete digital model.
4. **Hyper-localisation of Applications-** Success of Digital Financial services rests substantially on the rural India’s shift from cash to digital mode of transaction. In rural India, the mass adoption of digital financial services platforms and mobile applications can be driven by hyper-localisation. Hyper-localisation is designing the digital platform for different segment of the society that would appeal the local users. This would mean using their own language, incorporating cultural nuances, and adjusting keywords into their own search items.

- 5. Architecting a comprehensive privacy and data security framework-** As the society progress towards greater usage of digital financial services using digital platforms, more citizens are likely to be prone to data misuse without any right to protect their information and data. It is imperative that the Government must architect a comprehensive privacy and data security framework with clear definitions of the rights and its violations, legal framework and resources and immediate areas of intervention by the government, and accountability.

Table 16 Action points for MFIs

Major Challenge	Action Point
Digital and financial literacy	<ul style="list-style-type: none"> • Promotion of Digital literacy programs must aim at developing necessary skills and understanding of the digital platforms • Hyper Localisation of Applications • Blending the human and technical capabilities
High acquisition cost	<ul style="list-style-type: none"> • Cost efficient digital infrastructure

6.2 Action points for the Bankers in India:

- 1. A greater focus on the demand-pull Financial Inclusion-** Demand pull financial inclusion would take into consideration the demand side challenges of financial inclusion which majorly revolve around the lack of enough income amongst the low-income clients. Digitalisation of financial services would contribute more towards financial inclusion if the Government and the regulatory bodies along with developing the necessary digital infrastructure should also frame macroeconomic policy in way that would take the income down to the low-income segment, reduce income inequality and generate additional income.

“Financial Inclusion has mainly followed a supply-push model”

- Chief Manager and Economist,
(State Bank of India)

- 2. Digital Innovation should be based on a revenue-generating model-** For the banks to adopt and promote digital banking, it is pivotal to ensure that the digital

innovations are based on a revenue generating model. Regulators should ensure that all the stakeholders are generating enough revenue to cover the capital and operational expenditure of selling a digital product. Concomitantly, the banks must be adept in adopting multiple business models simultaneously. Banks are required to shift their perspective from a traditional linear banking models and focus on business models with the agenda of product innovation, embedded distribution, purpose, and sustainability. This will ensure banks raise their revenue and take up more digital innovations.

- 3. Emphasis on the Ethical aspect of Technology-** Ethical Artificial Intelligence is artificial intelligence that adheres to well-defined ethical guidelines regarding fundamental values, including individual rights, privacy, non-discrimination and non-manipulation. Ethical AI places fundamental importance on ethical considerations in determining legitimate and illegitimate uses of AI. Laws and regulations are generally insufficient to ensure the ethical use of AI. It is incumbent on individuals and organisations who use AI as well as those who develop and provide AI tools and technology to practice ethical AI.

An approach to ensure ethical AI requires addressing three key areas:

- a) **Policy:** This includes developing the appropriate framework for driving standardisation and establishing regulations. Ethical AI policies also need to address how to deal with legal issues when something goes wrong.
- b) **Education:** Executives, data scientists, front-line employees and consumers all are required to be educated about the policies, key considerations and potential negative impacts of unethical AI and fake data.
- c) **Technology:** AI systems should be designed in a way to automatically detect fake data and unethical behaviour.

Table 17 Action points for the Bankers

Major Challenge	Action Point
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<p>Difficulty to sell products to the low-middle income segment</p>	<ul style="list-style-type: none"> • Incentivizing bankers through Merchant Discount Rate (MDR) on online transactions • Helping banks build a Revenue generating model while catering to the low-middle income cohort • Adoption of a demand-pull model for financial inclusion
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6.3 Action points for the Fintech sector in India

1) **Fostering training and awareness among the Customers is a prerequisite**

The key informants stress upon lack of awareness and digital literacy among underserved and low-income customers as a major impediment to actual usage and adoption of digital financial services in India. Consequently, there is a need to focus on fostering digital training and awareness amongst the excluded, making them aware about the benefits of ease and convenience that digital financial services can provide. Fintech and the Government can join hands in undertaking training and awareness campaigns designed specifically for the low income and underserved section of the society, helping them familiarize with the products and services. Moreover, promoting ease of use in the design of the digital platform, offering an interactive user interface in local languages can further support the efforts towards spreading awareness and training.

2) **Incentivize the behavioural change among the Customers to move away from cash-based transaction**

The customers especially in the rural parts of India are often, resisting adopting the digital means of transacting and relying majorly on the cash-based transaction. For such customers the impediment is their behavioural intent of using the digital financial services. A behavioural shift is required amongst such customers to adopt the digital way of transacting. There is a need to incentivize this behavioural shift which would require a greater intervention from the policymakers and the Fintech firms. Enabling interoperability, waiving off transaction fee and provision of complementary value-added services to the customers can help incentivize the customers to shift from the cash based to digital based transactions.

3) **A human-touch business model to build up the Trust**

A human-touch or an assisted business model can go a long way in gaining the trust of the customers. Fintech start-ups must innovate and experiment around such a business model and engage with the local people and institutions in delivering their products and services. Moreover, ensuring safety of transactions and designing proper redressal mechanism can also help in overcoming the problem of 'lack of trust' amongst underserved and low-income customers.

4) A combination of Vertical and Horizontal conditioning of the founders of the Fintech Start-ups is necessary

It is crucial for the founders of the Fintech start-ups to realise that to take a product to a mass scale they are supposed to be conditioned to grow their enterprise not just vertically but also horizontally. A horizontal integration business strategy will help the start-up expand in size, diversify product offerings, reduce competition and expand into new markets. Moreover, the investment decisions of the investors with regards to a Fintech start-up in India, is majorly driven by the products that the firm offers and also the execution strategy followed by the founders. The investors look for start-ups which are spearheaded by founders that have good execution skills acquired through years of experience.

5) Easy On-boarding of small and medium enterprises

Regulators should find a way to bring in video KYC norms for small and medium business accounts just as we have the norms in place for all the retail accounts. This will allow a lot of start-ups and new businesses to become a part of the formal economy right from the beginning and not wait for getting physically on-board with the banks. One time KYC norms and One tap licensing can also speed up and simplify the on boarding of many start-ups in India.

6) Including Fintech Experts within the regulatory regime

The regulatory bodies in India can have experts from the Fintech Industry to suggest policy reforms and interventions while designing the regulatory framework around the Fintech Industry. A Fintech expert can provide industry insights and perspectives taking into consideration the expectations of the all the stakeholders of the Fintech ecosystem. This can allow the regulators to strike a balance between innovation, stability, and regulations.

7) Need for an Open and Collaborative Approach- by the financial sector regulators and the Government

The Government can come up with a national digital transformation strategy for Fintech in India. Many countries such as Egypt have an actual digital transformation strategy for Fintech. At a government level, such a strategy set forth a vision for incorporating Fintech into a broader financial services and financial inclusion framework.

8) Policy intervention based on engagement and learning

Following the example of UK, the regulators in India can set up a Fintech office with the main aim of not to come up with newer regulations but to engage with the industry. Teams can be assigned to engage with the stakeholders, Fintech companies, regulated entities and technology players through various workshops and conferences. This will allow the regulators to learn from the market which they can pass it on to their regulatory and supervisory teams internally. Based on such learning the regulators can decide on the softer and harder policy intervention to be followed.

9) Regulations on operational resilience

Regulations around cyber security, business continuity and third-party providers must be more coherent and transparent. Moreover, there is need for a Strong data privacy law in India.

10) Multiple alternate data sets and sharing of API for a greater reach

A mandate with respect to the access of multiple alternate data sets to provide by the Fintech firms can help the Fintech to provide better solutions and different products to a wider segment of the population. A fixed mandate on large financial institutions to share API with the tech companies can also be put in place.

11) Providing a level playing field for the start-ups

The regulators should provide a level playing field for the market participants to prevent the abuse of market dominance, where a non- banking firm can compete with a bank for a non- banking payment service.

Table 18 Action Plan for the Fintech

Major Challenge	Action point
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Competition from the incumbent bankers	<ul style="list-style-type: none"> • Establishing a facilitating body for bringing together Fintech and bankers • Ease of onboarding for the start-ups through promotion of video KYC and one tap licensing • Level playing field for the Fintech start-ups
Regulatory Hurdles	<ul style="list-style-type: none"> • Providing a platform through workshops and conferences for the stakeholders to engage and learn • Including Fintech experts within the regulatory regime. • Stringent cyber security laws and third-party data protection

6.4 Low-income customers

1. **A greater focus on an age inclusive digital financial inclusion-** The analysis clearly indicates that age can be barrier to digitalisation as for older users of digital financial services a positive attitude to use may not ensure a positive behavioural intent to actually use digital financial services. There are a few possible reasons for this. Firstly, older people generally prefer the traditional method of banking by physically visiting the bank themselves, as they value human interaction and social contact (Jayachandran, 2019). Secondly, they also tend to worry about privacy, fraud, and theft, making trust and security a major concern (Malaquias and Hwang, 2016). Thirdly, older people have high resistance to change and adopting new technology (Andalib and Hashim, 2018). And lastly, they face usability issues, such as navigation and design problems, interface issues, learning difficulties and lack of confidence (Thomas et al, 2023). Therefore, creating channels and products for the older people remains to be a challenge for digital financial inclusion. Technology aimed at the older people should simplify processes and make it easier to carry out banking operations. The interface should be designed to educate and answer user questions easily. The digital interface should also have virtual training on how to use digital financial services along with some information on the potential risks of digital transactions. The digital

technologies must harness the inclusive technologies that can customize the digital products as per the diverse needs of the older people.

2. **A gender sensitive digital financial inclusion-** The findings suggests that gender is an influential factor which can alter the perception and attitude to use digital financial services. The perception and attitudes vary significantly on the basis of gender. For women especially, a positive perception on the ease of use of digital financial services can positively impact the attitude to use digital financial services. Therefore, the digital financial ecosystem requires gender-based regulatory enablers for greater access and usage of digital financial services among the women clients. Some gender based enabling policy suggestions are as follows:
 - a) **A shift towards non-bank e money-** Given the success stories of the mobile money accounts in countries like Indonesia and Ghana which have stark gender gap in terms of the digital adoption, issuance of non-bank e money can be promising for the women clients. Having a mobile account instead of a bank account can provide an ease of access to their finance leading to greater usage.
 - b) **Having a greater number of women as third-party agents-** Third party agents can facilitate customer's access and usage of digital financial services. However, the regulatory bodies must promote the business case for women agents. More number of women in the agent network can help attract more female clients as they are more comfortable in expressing their issues and concerns to a woman agent as compared to a male agent. This can also help in solving the challenges of societal norms and safety concerns which hinders a woman's access to technology.
 - c) **Making women a recipient of the Government's welfare transfer schemes-** A regulatory push from the Government for the digital transfer of welfare payments only in the bank accounts of women can be highly beneficial. Such welfare transfer framework can provide women with independent access to her predictable streams of income, ensuring financial autonomy¹³

¹³ <https://www.findevgateway.org/paper/2019/06/enhancing-womens-economic-empowerment-through-digital-cash-transfers>

- d) Customised digital solutions for women clients-** For designing digital products for woman clients, more sex-disaggregated data must be employed by the service and technology providers to understand the preferences and barriers faced by them. The products must be customised as per the needs of woman clients. Concomitantly, the Government must invest in educational and awareness raising programmes focusing on behavioural outcomes.
- e) Developing value proposition for women-** The regulators and providers must also concentrate on developing value proposition for women clients to make use of the digital products. For creating value proposition, new products must be developed or the existing products must be revamped with features like use of local languages, biometric and voice-based solutions to address issues related to low level of financial and numeracy literacy. The new products should be easy to use so that the women clients can navigate easily on the interface.
3. **Emphasis on enhancing financial and digital literacy-** For the successful diffusion of Digital financial services in India, financial and digital literacy can prove to be a boon. As revealed in the analysis, there is a direct and significant relationship between education and behavioural intent to using digital financial services. It is the need of the hour that the low-income and financial excluded segment must be enabled to use digital platforms through training and handholding. Financial Institutions and the Government must join hands to foster continuous dissemination of knowledge and awareness both for the clients and the field officers. Digital literacy programs must aim at developing necessary skills and understanding of the digital platforms. Such programs must be widespread in both rural and urban areas as well as across all income and age groups. This would ensure greater inclusion and narrowing of the digital divide.
4. **A need to recognise the demand side gaps-** The TAM analysis in the study was an effective methodology to understand the demand side gaps in the usage of digital financial services in India. A major roadblock in the adoption of digital financial services among the low-income households in India is the perception of an individual. A positive perception can go long way in bridging the gap between intention and actual usage of digital financial services. However, since the onus of the actual usage rests on the subjective factors such as perception, attitude and

behavioural intent all influenced by demographic and socio-economic variables, a one-size-fit approach to digital financial inclusion may further widen the digital divide. There is a need to have a feature of personalisation and customisation in the digital financial services with greater demographic appeal providing customised solution that addresses the unique needs and profiles of the low-income segment.

5. **Fortifying the Trust-** The findings of the study suggests that if a low-income consumer perceives digital financial services trustworthy, it would directly impact the behavioural intention towards actual usage. Hence, fortification of the customer's trust must be a key consideration in the effective provision of digital financial services especially for the low-income segment. Providers of financial services especially the Microfinance Institutions and the SHGs rooted in the rural parts of India should hold awareness drives for the low-income customers with respect to the risks involved in undertaking digital transactions. The awareness drives should emphasise on the following points:

- a) Setting up of robust password with multifactor authentication
- b) Being vigilant on receiving unsolicited SMS/Calls
- c) Being careful while replying to phishing emails or while providing consent the third-party authentication
- d) Making the low-income customers aware of the frauds and misuse of the data. Educating them to not share personal details or OTPs to unknown/fraudulent calls.

Moreover, there is need for strong authentication setting standards for a universal authentication framework and client-to-authenticator protocol. Trust in digital financial services is also affected by the reliability and availability of connectivity. It has been found that network downtime and transaction failure can erode the trust of the consumers in Digital financial services. Therefore, investment in a robust digital infrastructure can be effective in safeguarding customer's trust.

6. **Accessible grievance redressal mechanism:** The current grievance redressal systems for financial services is a two-layered grievance redressal system consisting of the internal forums of the financial institutions as well as the external sector specific ombudsmen and redressal forums. However, the annual report of

RBI (2019) revealed that the uptake in the current grievance redressal system is very low with lesser complaints especially from the rural areas. There is lack of awareness and usage of the current channels of complaints among the low-income marginalized segment of the society. Moreover, the current channels of complaint registration are not inclusive and accessible.

For ensuring the trust of the general public in digital transaction, an expeditious and accessible grievance redressal mechanism with prompt reconciliation of transactions is indispensable. For making the channels of complaints more accessible, a voice-enabled interface can be introduced for launching complaints in place of a written communication channel. Moreover, the grievance redressal systems must be designed to be more age and gender inclusive.

Table 19 Action points for the Users

Major Challenges	Action points
Lack of digital and financial literacy	<ul style="list-style-type: none"> • Handholding from the providers as well as the regulatory bodies to provide “need based training” through rolling out of Digital skill programs. • Awareness drives pushed through the Microfinance institutions • Personal finance training workshops
Age based digital divide	<ul style="list-style-type: none"> • Promotion of “Senior Digital Literacy Program” through digital media intervention which is easy to operate and specifically designed for the older aged cohort
Gender based digital divide	<ul style="list-style-type: none"> • Keeping women at the forefront • Provision of non-bank e-money transfer setting especially for women • Making women the recipient of the benefit transfer schemes • Working on Sex-Aggregated data to understand women preferences
Lack of Trust	<ul style="list-style-type: none"> • Expeditious grievance redressal systems for prompt reconciliation of the complaints • Having local support in pushing the awareness drive for customer’ data privacy against online theft.

6.5 Conclusion

The thesis has unveiled some interesting facet about the digital financial inclusion in India. As an attempt to fill in the gaps in the existing literature, the thesis presents a comprehensive stakeholder wise analysis of digital financial inclusion in India, along with a compendium of policy recommendations which can have a far-reaching effect on the usage of digital financial services in India. A key highlight of the thesis is that as the challenges of digital financial inclusion both from the demand and supply side are structural and deep rooted in India. While the supply side challenges are structurally peculiar, the demand side challenges get intensified based on age and gender. The novelty of the study is a granular approach to bring out the demand-side gaps in digital financial inclusion solely from the perspective of the low-middle-income segment in India, which remains to be pertinent gap in the existing literature. To tap into the strengths of the low-middle-income clients we need to offer digital solutions that are more personalized rather than adopting a one-size-fit-all policy. The regulatory enablers must be developed based on the diverse set of challenges faced by different stakeholders. This research also has limitations, which shed light on directions for future research. Firstly, the study is constrained by the sample size which can be further enlarged. Secondly, TAM could also be expanded further by incorporating relevant construct variables. To further enhance greater veracity of the findings, the researchers encourage further exploration of more mediators and moderators for the model. Thirdly, as the impact of income was not significant because of the homogenous income group of the respondents, a similar study can be undertaken with a more heterogenous group of respondents to bring out the impact of income on the usage of digital financial services. Lastly, intersectionality of the socio-demographic factors and its impact on the digital financial inclusion can be further explored, which should reveal some more interesting facets.

Annexures

Table 20 Interview Schedule with the bankers

Focus Area	Questions and Probes
1.Promising Digital Innovation	<ul style="list-style-type: none"> • What according to you is the most promising and game changing digital innovation in the banking services that is going to benefit and help the low-income clientele the most? • Has the digital financial services adoption and usage among the low-income clientele increased in the last five years?
2. Benefits of DFS for LMI	<ul style="list-style-type: none"> • How do think the digitalization strategy will benefit the financially excluded and the underserved section of the society? • What are the perceived benefits?
3. Challenges faced when catering to LMI	<ul style="list-style-type: none"> • For the successful adoption of a digitalization strategy, what are the challenges faced by the banking institutions in India? • What are some of the impediments in the use of digital financial services by the low-income clientele?
4. Regulatory Stance	<ul style="list-style-type: none"> • As a banker, what are your expectations from the regulatory bodies in India with regards to better usage and penetration of digital financial for low-income clientele? • What are your recommendations for greater usage of digital financial services in India?

Table 21 Interview Schedule with the Fintech firms and regulators

Focus Area	Questions and Probes
1.Evolution of the Indian Fintech Landscape	<ul style="list-style-type: none"> • How has the FinTech landscape in India changed over the last five years?
2.Potential of the Fintech for Financial inclusion	<ul style="list-style-type: none"> • How has you Fintech firm contributed towards Financial Inclusion? • Describe about your Fintech firm along with area of operation and products offered • Please mention about the innovative financial solutions • What are the challenges faced in catering to the LMI
3. Ideal Market Strategy to sustain	<ul style="list-style-type: none"> • How important is it for a FinTech firm to collaborate with other stakeholders? • Have you been facing any challenge when working with other stakeholders?
4. Regulatory Stance	<ul style="list-style-type: none"> • Can you comment on the prevailing regulatory stance? • Are there any loopholes? • Any specific suggestions for the regulatory bodies in India?

Table 22 Stakeholder-wise Policy implications based on the findings

Stakeholder wise Policy Roadmap				
Users				
Challenges	Lack of Digital and financial literacy	Age based digital divide	Gender based digital divide	Lack of Trust
Solution	1. Handholding from the providers as well as the regulatory bodies to provide “need based training” 2. Personal finance training workshops	Promotion of “Senior Digital Literacy Program” through digital media intervention which is easy to operate and specifically designed for the older aged cohort	1. Making women a recipient of the Government’s welfare transfer schemes 2. Customised digital solutions for women clients	1. Expeditious grievance redressal systems 2. Having local support in pushing the awareness
Providers (Bankers)				
Challenges	Unappealing LMI Segment		Lack of enough income	
Solution	1. Digital Innovation should be based on a revenue-generating model 2. Incentivizing bankers through Merchant Discount Rate (MDR) on online transactions		1. Demand Pull Financial Inclusion	
Providers (MFIs)				
Challenges	High acquisition cost of digital infrastructure		Lack of cliental digital literacy	
Solution	Carefully invest in a cost-effective digital infrastructure		1. Hyper Localisation of Applications 2. Promotion of Digital literacy programs	
Fintech				
Challenges	Competition from the incumbents		Regulatory Hurdles	
Solutions	1. Establishing a facilitating body for bringing together Fintech and bankers 2. Ease of onboarding for the start-ups through promotion of video KYC and one tap licensing		1. Providing a platform through workshops and conferences for the stakeholders to engage and learn 2. Including Fintech experts within the regulatory regime. 3. Stringent cyber security laws and third-party data protection	

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