CHAPTER 1

Introduction to Financial Inclusion and FinTech

1.1 Introduction to Financial Inclusion

Financial inclusion enables all sections of society to have access to basic financial services i.e., savings, remittances, borrowings and insurance (Arun & Kamath, 2015). The relevance of financial inclusion has grown since the early 2000s and has become a priority for development for global and national policymakers. The concept of financial inclusion dates back to 2003 when the Secretary General of the UN Kofi Annan considered financial inclusion to be a prerequisite for inclusive development and emphasized creating an inclusive financial sector for the purpose of providing the poor access to financial services like savings, insurance and credit (United Nations, 2006) and according to United Nations, it has a direct correlation with poverty (United Nations, 2015; United Nations, Economic and Social Commission for Asia and the Pacific, 2020). An inclusive financial system aids in strengthening competence and prosperity by furnishing the route for prudent and safe access to coherent financial services (Das, 2015). An inclusive financial system emphasises the requirements of the poorest social strata, in particular, having access to formal finance can be especially beneficial for the poor, who may use it to assist in stabilise household spending, increase investments in their children's education, or start new ventures (Rumbogo et al., 2021). Improved account usage makes government payments to individuals more efficient and transparent. Thus, to achieve equitable growth and long-term sustainable development, financial inclusion is crucial. Expanding access to financial services is a policy goal for achieving sustainable development, and the 2030 Agenda for Sustainable Development identifies financial inclusion as a key development concern by referencing it in multiple objectives and targets. Financial inclusion aids in mobilising and channeling domestic savings and broadening credit availability for MSMEs and households. Financial Inclusion begins with payments, which assists as a doorway to auxiliary financial services including credit, insurance and savings. Maximizing the development function of remittances necessitates their facilitation, speed, safety, and low cost, all of which can be enhanced through access to financial services (United Nations Conference on Trade and Development, 2021). As such, a significant goal of SDG is to

decrease remittance transaction costs to below 3 percent. When comparing inclusive growth to other factors, such as availability and awareness of financial services, it is clear that the usage of financial services has a quantitative and visible effect. In particular, in sub-Saharan Africa, enhanced use of financial products and services increased inclusive growth (Sarpong & Nketiah-Amponsah, 2022). Studies have also found that increased account usage in African countries like Malawi and Kenya led to an increase in farmer savings that resulted in enhanced agricultural output and domestic expenditures (Demirguc-Kunt et al., 2017).

In the 2009 Pittsburg Summit, the G20 committed to enhancing the access of the poor to financial services and focused on launching a Financial Inclusion Experts Group by working with the Consultative Group to Assist the Poor (CGAP), the International Finance Corporation (IFC) and other international organisations. Studies have highlighted the potential of financial inclusion in achieving the Sustainable Development Goals namely Goal 1 (No poverty), Goal 2 (Zero hunger), Goal 3 (Good health and well-being), Goal 4 (Gender equality), Goal 8 (Decent work and economic growth), Goal 9 (Industry, innovation and infrastructure) and Goal 10 (Reduced inequalities) (Kuada, 2017; UNCDF, 2022). Therefore, financial inclusion in its broadest sense includes offering an extensive variety of services for attaining a holistic set of services for the progress of the country (Das and Bhuyan, 2016). In this milieu, the 11th Five Year Plan (2007-2012) of India sets down sustainable and inclusive growth as the prime purpose to promote the socio-economic development of the country. The Government of India, the Reserve Bank of India (RBI), and the policymakers have made financial inclusion a top priority for development and several initiatives in this avenue have been undertaken and noteworthy progress has been achieved. According to the Reserve Bank of India "financial inclusion is the process of ensuring access to appropriate financial products and services needed by all sections of the society in general and vulnerable groups such as weaker sections and low income groups in particular, at an affordable cost in a fair and transparent manner by regulated mainstream institutional players" (Chakrabarty, 2013). In the last few decades, considerable endeavours have been made including the nationalization of scheduled commercial banks, the establishment of regional rural banks, extending credit to the priority sectors, increased village coverage of commercial banks, deployment of business correspondents, the opening of no frill accounts, Kisan Credit Cards (KCC), the introduction of an Indian domestic debit card called Rupay card in 2012 by National

Payments Corporation of India (NPCI) and Jan Dhan accounts to extend the outreach of financial inclusion in the country. However, despite the success of the initiatives, the gaps in financial access and data on unbanked and under-banked population exhibit a grim picture. Globally there are 1.7 billion unbanked adults out of which 190 million are in India i.e., the second highest after China (Demirguc-Kunt et al., 2018). Despite the fact that account ownership in India has increased from 33 percent in the 2011 Global Findex Report to 79 percent in the 2018 report but cost and distance are highlighted as significant obstacles to opening an account at a financial institution (Demirguc-Kunt et al., 2018). Access to financial services and ensuring optimum utilization of the resources possessed by the last-mile population is a major challenge. The cost of using formal financial services is an important factor that hinders poor people such as labours, daily wage earners, etc. to use formal financial services. The key challenges are geographical access costs, inappropriate products and financial illiteracy (Schuetz & Venkatesh, 2019). However, account ownership is not the only measure of financial inclusion, a significant portion of the population lacks access in terms of insurance and access to credit. This sheds light on the necessity of focusing more on removing the demand-side barriers as opposed to enhancing the physical availability of banks for the purpose of accelerating effective financial inclusion in India (Kumar, Pal & Pal, 2018). Thus, financial inclusion is more likely to improve through technological innovation.

1.2 Introduction to FinTech

The brick-and-mortar investments are uneconomical for the banks, thus, there is the potential for financial technology (FinTech), particularly in the mobile space to gauge the impact of technology-driven inclusion, it has cost-advantages thereby making it increasingly popular. The interconnectedness between technology and finance is not new. Financial Technology, popularly known as FinTech has been around in different phases and has been assisting each other for decades. The most recognised FinTech innovation, which marks the evolution of modern-day FinTech is the introduction of the world's first ATM in the year 1967 (also termed FinTech 1.0). Furthermore, the structural shift of financial institutions towards digitising their operations and engrossing in information technology from the 60s to the mid-2000s earmarked a period of revolution in the manner of financial service provision. The earliest mention of the word FinTech was in a scholarly article published in the year 1972, which states, "FinTech is an acronym which stands for

financial technology, combining bank expertise with modern management science techniques and the computer" (Bettinger, 1972, pp. 62). Furthermore, the upswing in the internet led to the introduction of online banking in the year 1990. This period is characterised as FinTech 2.0, which lasted until the 2008 Global Financial Crisis (Aion Digital, 2020; Arner, Barberis & Buckley, 2016). The 2008 crisis acted as a critical point and is considered a catalyst in the growth of the period of FinTech 3.0 (Arner, Barberis & Buckley, 2016). The shift in the mindset of consumers and job losses of financial professionals led to the creation of the new category of players along the side of existing ones i.e., traditional financial institutions to provide interoperable, affordable and sustainable financial services applying technology. In conjunction, the rise in smartphone penetration, which facilitated internet access to millions has also aided in shaping the face of FinTech.

Some of the definitions of FinTech are given below in Table 1.1

FinTech definition
"Financial technology or FinTech refers to the use of technology to deliver financial solutions. The term FinTech is not confined to specific sectors (e.g. financing) or business models (e.g. peer-to-peer (P2P) lending), but instead covers the entire scope of services and products traditionally provided by the financial services industry" (Arner, Barberis & Buckley, 2015).
McKinsey & Company defined FinTech Players "as start-ups and other companies that use technology to conduct the fundamental functions provided by financial services, impacting how consumers store, save, borrow, invest, move, pay, and protect money" (McKinsey & Company, 2016).
Financial Stability Board of the Bank for International Settlements defined "FinTech as technology-enabled innovation in financial services that could result in new business models, applications, processes or products with an associated material effect on the provision of financial services" (Financial Stability Board, 2019).

As per the definitions given above, it can be stated that FinTech includes incumbents, telecom operators, start-up companies and so on that aims in the designing and provision of technology-based financial services through inventive business models.

Mobile money accounts have been a prime driver of technology-based financial inclusion, over the last decade, 1.2 billion adults formerly unbanked have procured access to financial services and much of the progress can be attributed to the innovative role of mobile financial service (Appaya, 2021). As per Statista (2021), the global penetration of smartphones in the year 2020 is estimated to be over 78 percent. In India as of 2020, there are 84 mobile subscribers per 100 population (World Bank, 2020). In addition, there has been a 4.29 percent increase (829.30 million) in internet subscribers in the year 2021 when juxtaposed with the figures of 2020 i.e., 795.18 million (Telecom Regulatory Authority of India [TRAI], 2020-2021a). This exhibits the enormous potential of digital financial services in enhancing access and facilitating the efficient delivery of financial services. Additionally, FinTech has come a long way in supporting businesses and households in executing financial transactions during the crisis and aftermath (Asian Development Bank Institute [ADBI], 2022). The acceleration in the pace of digital adoption amidst the COVID-19 pandemic has given the needed boost to expedite the initiatives of digital financial inclusion and has given the impression that technological advancements together with a sound policy are crucial in the provision of innovative and interoperable financial services that are affordable to the consumers and sustainable for the providers. Furthermore, the increase in transaction limits on digital transactions in countries like Kenya, Ghana, and Myanmar, the use of FinTech innovation to deliver Government transfers in India, Peru, Uganda, and Namibia, responding to the liquidity needs of SMEs by the FinTech lenders amidst the pandemic reinvigorated the opportunities for digital financial inclusion. In India, both RBI and Government are taking the digital route to reach the unbanked and underbanked. The National Payments Corporation of India (NPCI) launched by RBI and Indian Bank Association in the year 2008 is an umbrella organisation for retail payments and settlements enabling digital payments. The important enablers of financial inclusion in India are commonly known as the JAM triumvirate i.e. Jan Dhan Yojana, Aadhaar and Mobile phones (PwC, 2017). Furthermore, IndiaStack is an ambitious project of creating a unified software platform and is the largest open Application Programming Interface (API) in the world. The launch of the financial inclusion lab under the Centre for Innovation Incubation & Entrepreneurship (CIIE)

supports the lower and mid-income sections with technological solutions that would provide a much-needed boost to digital financial services (MicroSave & CIIE, 2018). The creation of a special FinTech Committee supported by India Stack along with the Start-up India initiative has funded more than 182 start-ups, which shows the Indian Government's push for Indian FinTech start-ups. (MEDICI, 2019). The covid-19 pandemic has altered how payments are made. According to Global Findex Database, in India, during the pandemic about 80 million adults performed their first-ever digital financial transaction and 51 percent of unbanked adults in the country have a mobile phone (Demirguc-Kunt, Klapper, Singer & Ansar, 2021). According to TRAI (2019a), as data access is a crucial input in attaining cent percent financial inclusion, thus, with the advent of digital innovation, the FinTechs are dedicated to harnessing its potential to advance financial inclusion. Globally, 2/3rd of the unbanked adults have access to mobile phones (Demirguc-Kunt et al., 2018) and the theoretical underpinning for the connection between financial inclusion and FinTech is that greater digital finance aid in ameliorating access to financial services, government transfers for the last-mile population. With over 3/4th (80.9 percent) of the employed individuals working in the informal sector in India (International Labour Organisation, 2018), dependency on the cash mode of transactions and the digital divide poses challenges in attaining digital financial inclusion (Draboo, 2020). However, FinTech is also exposed to certain risks in the areas of consumer protection, data privacy, operational resilience and financial stability. Thus, promoting innovation together with balancing risks has become the prime focus of the regulators.

1.3 Leveraging Financial Inclusion through FinTech: A Theoretical Framework

An inclusive financial system is an essential precondition for economic growth that enables even the last-mile population to participate in the formal financial system, absorb financial shocks and entitle the users to meet the majority of their financial needs (Bank for International Settlements, 2020). This requires comprehending the customers' demand, fortifying the concepts and strategies together with evaluating the viability and technological necessities (International Finance Corporation, 2017). The fixed costs incurred by the financial institutions such as cost per transaction, IT systems, branch network, etc. made the outreach of financial services to clients with small and few transactions very costly (Beck, 2020). As a result, a large number of bank accounts remained dormant thereby posing constraints to the sustainable use of bank accounts. The

potential cost of financial inclusion both from the supply and demand side outweighs the benefits thereby requiring a more diversified financial system (Hannig & Jansen, 2010). Thus, there is a need for modified financial products and services that will lead to the upliftment of the poor and the development of the underprivileged sections (Mehrotra, Puhazhendhi, Nair & Sahoo, 2009). With respect to making deeper inroads into rural areas and providing tailor-made solutions to enhancing access, the collaboration between FinTech firms and incumbents would aid in diminishing the cost required to address the needs of the last mile population (Deloitte, 2017; International Finance Corporation, 2017). The innovative technology-based solutions have assisted in the ubiquitous delivery of financial services in a cost-effective and efficient manner. M-Pesa reaches about 84 percent of the Kenyan population that lives below $2/day with more than 16.6 million active users (Andrei-Dragos, 2019; Costa & Ehrback, 2015). Domestic remittances form an indispensable section to ameliorate financial inclusion in India (Pricewaterhouse Coopers [PwC], 2022). Studies suggest that the extensive utilisation of remittances is for household consumption (Parida & Madheswaran, 2011; Reja and Das, 2020). The Census 2011 data estimated a total of 454 million internal migrants in the country (Ministry of Housing & Urban Poverty Alleviation, 2017). However, the unprecedented Covid-19 pandemic highlighted the conditions engulfing migrant workers. The worst hit were the vulnerable circular migrants, which constitute about 75 percent of the informal economy who are more inclined to macroeconomic shocks affecting their livelihoods (Garg & Agarwal, 2021). A major source of migrants are unbanked or their accounts remain dormant (Nigam, 2022). The small size of transactions accounting for a higher percentage of transaction cost makes it costly for the last mile population, thus, the remitters in turn adopt less secure informal channels for remitting funds to their families (Cecchetti & Schoenholtz, 2018; Kosse & Vermeulen, 2014; Nigam, 2022). In this regard, innovative zero cost-based FinTech solutions such as Unified Payment Interface (UPI) launched by NPCI would aid in ameliorating formal means of remitting funds by the informal sector, which is an important policy initiative of G20 (RBI, 2018). Furthermore, the geographical spread and interoperability of financial infrastructure could be assisted by technology-based solutions (Bank for International Settlements, 2020). Technology has the potential to blur the line between in-person payment and remote payment. Point of Sale (POS) terminals along with bank branches and ATMs are examples of in-person payments, besides, Quick Response (QR) code-based transactions are the access point for remote payments. Contactless innovations such as QR codes are an inexpensive substitute for

conventional POS terminals. Asia-Pacific region leading the real-time payments with India exhibiting a 70 percent increase in payments (25.6 billion) in 2020 (McKinsey & Company, 2021) shows the pathway to extend outreach and reach the underserved and under-digital population of the country with innovative inclusion models.

Access, usage and quality are prime dimensions of financial inclusion and quality aids in gauging the association of customers with the financial service providers together with ensuring the availability of choices to the customers (Hanning & Jansen, 2010). Thus, the conception of technology-based innovation is not only to incorporate the formerly excluded individuals into the formal financial system but also to ameliorate sustainable and widespread usage of banking services. The unserved segments are particularly constrained by information asymmetries and inadequacy of documentation/track record/collateral that encumber the lending process (Hannig & Jansen, 2010). The utilisation of big data analytics by FinTechs in extending credit lines, insurance to blue-collar workers, improving agent networks could further financial inclusion initiatives (Bank for International Settlements, 2020; PwC, 2022). In India, the difficulty in verifying identity by financial institutions is set to resolve by the underlying infrastructure of Aadhaar in opening deposit accounts, which has brought down the cost of opening deposit accounts by 90 percent (Gupta & Xia, 2018). In order to speed-track financial inclusion, the concoction of Jan Dhan-Aadhaar- Mobile has given a much-needed boost to digital financial inclusion. After the launch of the Jan Dhan Yojana 446.3 million beneficiaries have been banked so far (Department of Financial Services, 2022). Furthermore, the execution of the Aadhaar Enabled Payment System through Business Correspondents and the Aadhaar Payment Bridge System for crediting Government transfers to Aadhaar linked bank accounts has helped in reducing the inequalities of access and fast delivery of Government subsidies. Besides, account-to-account interoperability offered by innovative FinTech services such as the Unified Payment Interface (UPI) aided in the real-time transfer of funds between the sender and receiver by using a Virtual Payment Address (VPA) or mobile number. Aadhaar along with an agent network has emerged as an infrastructure that aids in the supplementation of accessibility to promote digital financial inclusion. In recent years, to get a better of the geographical barriers digital financial service providers have come up with a varied type of agent networks including small shops, ultra-small branches, Common Services Centres (CSCs), counter for bill payment (Kim, Zoo, Lee & Kang, 2018; Sanz & De Lima, 2013). Thus, mobility i.e., access to

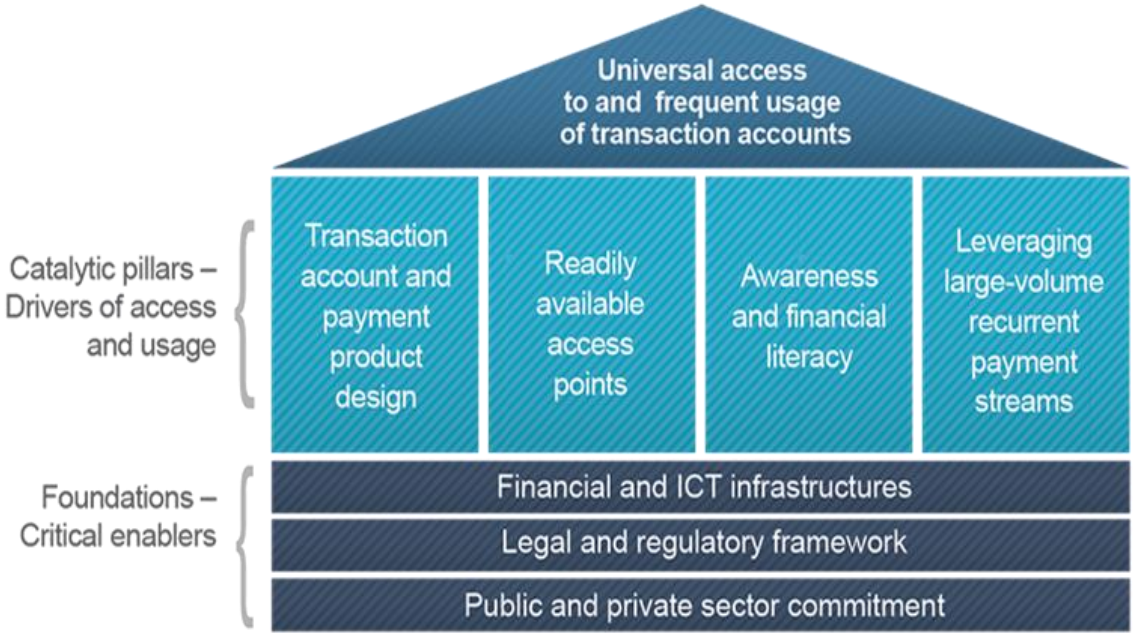
financial services irrespective of geographical location, user convenience and flexibility i.e., accomplishing financial transactions on varied types of applications enhances information access points and scalability (Kim, Zoo, Lee & Kang, 2018).

The uprise of FinTech start-ups facilitating retail payments, lending and insurance, partnerships between incumbents and FinTech companies, and the launch of cutting-edge technology-based financial services by the incumbents signify the changes in financial inclusion and financial service provision as compared to a decade ago. Moreover, the acceptance infrastructure and connectivity issues require further boost even in the rural areas as lack of proper acceptance infrastructure can undermine financial inclusion. FinTech is also considered as a double-edged sword (RBI Bulletin, 2020). Besides, the enormous potential of FinTech, it can sometimes enlarge cyber-security risks thereby causing harm, particularly to digitally illiterate customers due to the credulity of low-income individuals (Hannig & Jansen, 2010; RBI Bulletin, 2020). In this view, a survey under the Bank for International Settlement encapsulates the regulators' role in requiring a sound regulatory regime with respect to fast-paced innovation in FinTech (Ehrentraud et al., 2020). As FinTech is not the panacea for all the problems, the Government, regulators and policy-makers have to derive the right balance between data security and privacy, financial innovation and financial stability, competition and efficiency by taking charge of the issues in a proactive manner.

1.4 Policy Perspectives of FinTech and Financial Inclusion

With the growing consensus that FinTech-related developments have the potential to address the gaps in financial inclusion, organisations globally are coming up with a core set of indicators and guiding principles for the effective promotion of digital financial inclusion while managing the risks, with innovations that swiftly deepen access to finance along with strengthening the quality and affordability of banking services. The Maya Declaration initiated in the Global Policy Forum, 2011 is a comprehensive initiative towards realising sustainability in financial inclusion. The Maya Declaration constituted several accords to attain specified goals on various facets of financial inclusion. Among them, the Sochi Accord launched in the course of the Alliance for Financial Inclusion, Global Policy Forum, 2018 focuses on policy interventions on FinTech for financial inclusion by balancing innovation with surveillance (Alliance for Financial Inclusion [AFI], 2022). The action plan brings forth the necessity to enhance the usability of

financial services by leveraging technology with a prime focus on shrinking the gender gap and financing needs of SMEs together with maintaining soundness and financial stability (AFI, 2022). The Global Partnership for Financial Inclusion (GPFI) was formed at the G20 Seoul Summit in 2010 to proceed with the execution of action plans for financial inclusion (GPFI, 2022). In view of the G20's commitment to leverage technological innovations to further digital financial inclusion, the forum in 2016 has come up with High Level Principles for Digital Financial Inclusion, to propel sound policy and initial efforts to drive inclusion through digital technologies. "Digital Financial Inclusion is broadly referred to the use of digital financial services to advance financial inclusion. It involves the deployment of digital means to reach financially excluded and underserved populations with a range of formal financial services suited to their needs, delivered responsibly at a cost affordable to customers and sustainable for providers"(GPFI & G20, 2016). The principles put forward by G20 emphasizes promoting digital financial inclusion while balancing innovation and risks, commensurable legal and regulatory framework, consumer protection, expansion of digital infrastructure and tracking digital financial inclusion progress among others. On the other hand, The Payment Aspects for Financial Inclusion (PAFI) report published jointly by the World Bank Group and Committee on Payments and Market Infrastructures (CPMI) in 2016, provides a framework for the global and country-level measures to improve access to and usage of transaction accounts and recognizes FinTech as the driver of new applications, business models, products and processes. The PAFI framework anticipates at the minimum one transaction account for businesses and individuals to perform the majority of their transaction requirements, to securely store value and to set out an avenue to diverse financial services (Bank for International Settlements & World Bank Group, 2020). To achieve the strategic objectives, the report has outlined a structure i.e., seven guiding principles called the 'PAFI house' (Figure 1.1), which consists of foundations comprising of information technology infrastructure, regulatory framework and commitment from private and public sectors as critical enablers while the pillars include the accelerators of usage and access, which would further the comprehensive and persistent usage of the transaction account.



Source: Committee on Payments and Market Infrastructures-World Bank (2016)

Figure 1.1: PAFI[1] house based on seven guiding principles

In addition, to the above policy initiatives, The Bali FinTech Agenda serves as a blueprint for utilising the convenience offered by FinTech. The Agenda initiated supervisory and regulatory priorities with 12 policy elements including enabling digital technologies to spur the provisioning of financial services, observing developments to grasp an understanding of the emerging financial system, streamlining the legal groundwork, building up vigorous financial and data infrastructure to nourish the opportunities offered by FinTech, international co-operation among others with a focus on stability, financial resilience and protecting the integrity of the financial system (International Monetary Fund, 2018).

In India, in an effort to augment financial inclusion by unlocking the potential of technology and increasing the usage and penetration of digital finance, the Reserve Bank of India and the Government have devised various committees namely Committee on

[1] The Payment Aspect for Financial Inclusion Task Force of CPMI and the World Bank Group created the PAFI framework to facilitate the access and utilisation of financial services by underserved groups. This includes Foundation, i.e., the regulatory and legal framework, Information and Communication Technology, financial infrastructure, and stakeholders' committment, all of which serve as essential enablers for payment service provision. In addition, the catalytic pillars, which include the design of payment products, awareness, the availability of access points, and a high volume of recurring payments, would serve in increasing transaction account access and usage.

Medium Term Path for Financial Inclusion, Working Group on FinTech and Digital Banking, Committee on Deepening Digital Payments among others. The Nandan Nilekani Committee on Digital Payments highlighted that even though the supply side offers a variety of payment-related services but the costly structures including interchange/swipe fees hinder widespread adoption (RBI, High Level Committee on Deepening of Digital Payments, 2019a). Issuance to acceptance being the crucial element in intensifying acceptance, the Committee suggests the transition to a low value-high volume and low-cost transaction encompassing technology. The Committee also recommends a robust cash-in/cash-out structure and assessment of the payment system by the Board for Regulation and Supervision of Payment and Settlement Systems (BPSS) to assure the well functioning of the mechanisms (RBI, High Level Committee on Deepening of Digital Payments, 2019a). In addition, the RBI to realise the vision and goal of attaining sustainable financial inclusion released the National Strategy for Financial Inclusion (2019-2024) drafted by the apex bank in consultation with the Government and financial sector regulators. Given the critical gaps such as deficient infrastructure, inadequate connectivity particularly in rural areas and North Eastern region of the country and socio-cultural impediments. The policymakers have identified six strategic pillars comprising universal access to financial services, delivering essential financial services, approach to livelihood and skill training, financial literacy, ensuring redressal of grievances with consumer protection and facilitating constructive co-ordination (RBI, 2019b) with technology serving as an under-structure for building an inclusive and flexible financial system. Furthermore, the Payments Vision 2025 embarks on the aim of intensifying outreach, digital deepening with customer-centric approaches and shrinking cyber vulnerabilities. Fabricated from the G20s focus on dealing with the obstacles of access, cost, speed and transparency (RBI, 2022a), the payment strategy ought to enhance inclusion, unification, innovation and internalisation with a vigorous framework to ensure consumer protection.

In addition, the insurance penetration in India in terms of life insurance and non-life insurance is 3.20 percent and 1 percent respectively, which is lower than the other Asia-Pacific countries including Malaysia, Japan, Taiwan, Singapore, South Korea and Thailand (IRDAI, 2021) thereby emanating an essential sub-segment for FinTechs to boost technology-driven insurance by automating underwriting, ameliorating application process and well-organised filing of claims. In this regard, to surge the insurance

penetration in the country, Insurance Regulatory and Development Authority (IRDAI) has focused on a regulatory sandbox-based[2] approach to expedite innovation together with keeping up the policyholder's interest and regulatory requirements (IRDAI, 2021). Moreover, a notable percentage of MSMEs and agricultural households depend on informal sources of finance (Department of Economic Affairs, Ministry of Finance, 2019). The Report of the Steering Committee on FinTech Related Issues focuses on the role of FinTech and Non-banking Financial Corporations (NBFCs) to work with cooperatives, MFIs and Farmer Producer Organisations to enhance rural presence in extending credit facilities to the unserved agricultural households and marginal farmers. Furthermore, MSMEs and small businesses have meagre documentation to serve as credit history, which challenges formal financial institutions in lending. The Committee recommends technology-based solutions for credit scoring, disbursement and risk management, which would assist in building cash flow-based lending method for complying with the demand for working capital requirement of small businesses (Department of Economic Affairs, Ministry of Finance, 2019; Ministry of Finance, Press Information Bureau, 2019). As only 15 percent of households with marginal land holding receive finance from formal sources, the merging of TReDS[3] with the Goods and Services Tax Network (GSTN) would aid in forming the backbone for cash flow-based lending by banks and NBFCs (Department of Economic Affairs, Ministry of Finance, 2019). The Committee also proposes the digitisation of land records, which is important data for bank credit in the agricultural sector.

The aforementioned policies intend to emphasise the need to increase the usability of financial services by leveraging technology, with a primary emphasis on closing the gender gap, meeting the financing needs of small and medium-sized enterprises (SMEs), and maintaining soundness and financial stability, a comparable legal and regulatory framework, consumer protection, expansion of digital infrastructure, and monitoring the progress of digital financial inclusion, among others. Thus, focusing on stability, financial

[2] Regulatory sandbox involves experimentation/testing of new products and services in a controlled regulatory setting. Regulatory sandbox provides an avenue for a smaller scale testing of digital innovations prior to extensive launch of the product or service (RBI, 2019c).

[3] Trade Receivable Discounting System (TReDS), a digital platform was set up to aid in the financing of MSMEs trade receivables from corporates and also Government departments and Public Sector Undertakings (PSUs). The platform enables transparency, resulting in faster payments including the processing of transactions without liability to the MSMEs (RBI, 2020a).

resilience, and protecting the integrity of the financial system, the policies aim to promote FinTech and financial inclusion by increasing access to and use of transaction accounts.

2. Review of Literature

Plethora of studies on financial inclusion has been conducted in both the international and national arena. In order to further understand the scenario of financial inclusion and FinTech, numerous studies were reviewed to better comprehend the current state of affairs in the sector. In order to establish a conceptual framework addressing all parts of the study objectives, the literature review has been broken down into the following sections (i) Sustainable Financial Inclusion- Theoretical Framework (ii) Use of Technology in Achieving Financial Inclusion (iii) Researches on FinTech and Financial Inclusion (iv) Determining the Adoption of Technology (v) FinTech for Inclusive Growth in North East India

2.1 Sustainable Financial Inclusion- Theoretical Framework

The United Nations Brundtland Report (1987) provides the most widely acknowledged definition of sustainability as "sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs". Becker (2012) in his book stated that sustainability is a mere buzzword that is used by everyone with a different meaning in different contexts. According to him, it is challenging to determine the exact connotation and particular explanation of the term. He said that starting with a philosophical perspective, there are three crucial characteristics i.e., Continuance[4], Orientation[5] and Relationship[6] that are recognised to determine the key meaning of the term sustainability and the critical issues relating to it.

[4] Continuance- The term sustainability precisely means the potential to keep up, keep going, ability to perpetuate. In other words, it refers to the potential of a process, entity or system to persist in its process or activity (Becker, 2012).

[5] Orientation- The utilisation and comprehension of the expression 'sustainability' exhibits an intrinsic normative and evaluative meaning, more specifically it is broadly regarded as a norm. Thus, "sustainability is regarded as being something positive, something for which we should strive, pg. 11", such as the UNs International Agreement Agenda 21 states that sustainable development is a key aspect internationally (Becker, 2012).

[6] Relationship- Sustainability not only refers to orientation but also the existence of relationship. While referring to the Brundtland Report, there are two foundational relationships between persons i.e. the association among divergent groups and individuals of the present generation and also the relation among

The objective of sustainable financial inclusion is to provide the vulnerable groups with financial support derived on the basis of equality, assisting them in contracting poverty thereby eliminating social inequality and attaining stability in economic growth. True financial inclusion necessitates continuing pursuit of benefitting the consumers and providers altogether and this is termed sustainable financial inclusion (Boston Consulting Group, 2017). "Sustainable financial inclusion has to address demand i.e., what consumers want, supply i.e., what financial institutions provide, and the environment i.e., how the public sector and other private sector companies play a facilitative role". (Boston Consulting Group, 2017). About 70 percent of South African adults have bank accounts but greater than 1/4th of the adults withdraw the wages received immediately after the amount has been deposited to their accounts. According to Global Findex Database, 2018, 20 percent of accountholders at the global level have inactive accounts. In addition, according to the Global Findex data of 2021, India has the highest number of unbanked population with around 35 percent inactive accounts (Demirguc-Kunt et al., 2021). This implies that there is an inactive operation of accounts, which hampers the achievement of financial goals and attaining the benefit of varied financial services (Boston Consulting Group, 2017). As because financial inclusion is regarded as a crucial part of the social inclusion driver, in the same way, social inclusion is a vital accelerator for sustainable development (Voice, 2017). Many researchers Adalessossi and Kaya (2015), Allen et al. (2012), Sarma (2008), etc. focused on measuring financial inclusion, namely measuring the financial inclusion index. However, this is only the initial step in measuring financial inclusion, the next step is to accomplish the effective growth and sustainability of financial inclusion.. The financial eco-system has to be congenial for continued financial inclusion and sustainability in terms of financial inclusion means that there should be deliverables of financial inclusion to reduce poverty. This view has also been supported by BCG (2017) and according to them the operating model of banks, other financial institutions and insurers, infrastructure, regulatory environment and connectivity can promote sustainable financial inclusion. Innovations such as agent and correspondent banking, branchless banking, digital payments and flexibility in the repayment of the loan can all promote sustainable financial inclusion. Also, measures to improve competition, overall quality of

the present and future generations. Furthermore, there also exist another type of relationship i.e. between the individuals and nature (Becker, 2012).

credit information and offering incentives to save can increase financial inclusion. As sustainability and financial inclusion are different sides of the same coin (Zetzsche, Buckley & Arner, 2019), thus, financial inclusion is considered to be a crucial facilitator of the UN SDGs aimed at the provisioning of savings, remittances, insurance and credit in promoting equitable growth with FinTech being the catalyst in the goal of attaining sustainable financial inclusion (Buckley et al., 2019). Innovations in technology assist in making significant inroads into financial services with better access to secure transaction account and by such means stimulate frequent usage. According to Bank for International Settlement [BIS], (2020), FinTech can come up with revamped lay out of transaction accounts, varied remittance services, which can enhance the ubiquitous delivery of financial services, contribute to enhanced user experience and increased usability, which is the principal aim of attaining sustainability in financial inclusion.

2.2 Use of Technology in Achieving Financial Inclusion

Financial inclusion has a broader standpoint, which not only depends on access but also on the degree of customers' involvement with the financial offerings. A considerable build-out in banking is the acquisition of Core Banking Solutions (CBS), which aided in the networking of bank branches, however, advancements in technology look forward to the provisioning of efficient services together with effective information management. According to Gupta (2011), the prime ground for slow-paced financial inclusion includes the lack of banking products mapped out to comply with the demand of the low-income population, which requires technology-based solutions with economies of scale to reach the unserved. As per Census 2011 data, India has over 168 million rural households and 80 million urban households (Office of the Registrar General & Census Commissioner, Ministry of Home Affairs, Government of India, 2011). The well-ordered mobilisation of household savings would assist in administering the credit needs and thereby corroborate sustainable development. Bansal (2014) stated that information technology can accumulate, transfer and transfigure the data generated and co-operate with other financial service providers to develop viable choices for the last-mile population. As technology has emerged as a bestower in easing account ownership, lessening social inequalities and furthering inclusive growth, thus, it can be utilised to furnish localised financial services, which would meet the overall community's demand (Asongu, Biekpe & Cassimon, 2021; Tay, Tai & Tan, 2022).

The use of technology particularly mobile phones is a salient tool to enhance digital inclusion. The success of M-Pesa in Kenya in facilitating financial inclusion is an example of how technology coupled with a network of agents helped in designing a payment service designed specifically for the unbanked (Hughes & Lonie, 2007). The platform leveraged the opportunity and revolutionized the way financial services are accessed in Kenya and is now providing diverse value-added services like M-Shwari to meet the further needs of the population. M-Shwari using M-Pesa's foundation aided in bringing millions of last-mile Kenyan population under the banking ecosystem with access to deposits and credit. M-Shwari is considered to be the pioneer in tapping the digital information of unbanked customers for the determination of credit scores (Cook & McKay, 2015). Natile (2020) stated M-Pesa as a social entrepreneurship and a logic of entrepreneurial potential and highlights that M-Pesa's social enterprise advocates an approach to digital financial inclusion that relies on the development of financialised fee-based opportunities to give the unbanked the resources they need to use these services.

Morawczynski & Pickens (2009) in their study interviewed 350 respondents and conducted 21 focus group interviews on customers' usage of M-Pesa. The study found that since rural recipients started using M-Pesa, their income has increased by up to 30 percent. The reason for such an increase includes the non-requirement to pay for transportation to urban centres, where the majority of money transfer services were located. Smaller, more frequent transfers and regular M-Pesa deposits were made by users, which resulted in a change in remittance and savings patterns. However, the study also found that urban users struggled with failed transactions and rural users face cash float shortages. The agents have to frequently visit banks to maintain their cash float to execute withdrawals. Since most banks are in cities, these travels are expensive and time-consuming for rural agents. As a result, some agents reduce costs by not replenishing their cash reserves. This limits M-Pesa's efficiency and forces some clients to withdraw from cities. Hove & Dubus (2019) found that socio-demographic characteristics influence the positive effects of M-Pesa such as the ability to receive remittances more frequently and promptly and ultimately the chance to save in a more formal setting. Furthermore, lack of education, lack of knowledge of mobile phone fundamentals, the rural-urban digital divide and the gender gap significantly influence the likelihood of using mobile money.

bKash, a mobile money platform in Bangladesh is acting like a bank for those who do not have a bank account, the main aim of bkash is to boost financial inclusivity and curtail the conventional practice of keeping cash under the bed. The model adopted by bKash, on the one hand, keeps up with regulatory integrity and on the other provides requisite convenience to mobile operators. Based on the feature phone, most of the customers of bKash perform small-value transactions however, the extensive transaction volume recompenses the small-ticket transactions (GSMA Mobile and Development Intelligence, 2012). Uddin (2018) highlights the importance of mobile financial services in helping people gain access to banking services. The study found that the services offered by bKash have aided in widening the bank's reach and improving the average daily transaction among customers. Resmi et al. (2017) in their study found that users' willingness to utilise bKash mobile banking services in Bangladesh is influenced by their satisfaction with the services' efficiency, customer support, security, convenience of use and performance. The study also revealed that even though bKash intends to narrow the gap in the use of formal banking services but lack of preparedness among the staff to handle the services by tech-illiterate person prevent the customers to acquire the necessary services when needed. Zilani (2018) highlighted that bKash needs to modernise and improve several aspects, such as the competence of its customer care agents, the safety of its transactions and pin-setting problems. In this context, according to Khan et al. (2020), the aspect of bKash's service quality that will have the greatest influence on the opinions of the customers is its dependability. As a result, the provider should give more thought to bolstering the trustworthiness and efficiency of mobile financial services among their clientele.

In China, the digital payment market is dominated by giants called Alipay and Tenpay. Mobile commerce in China has seen rapid growth. It has shifted the market from cash to mobile and digital payments system based. Mobile money adoption in China has picked up a steady pace with approximately 50 percent of internet users in rural areas adopting digital payments (Community Group to Assist the Poor [CGAP], 2017). The linking of users' wallets to in-app platforms aids in providing access to a host of insurance and credit services. The gifting of money in red envelopes, which is a Chinese tradition during the new year when done in a digitised manner by WeChat Pay suggests that socializing payments is an important step in invigorating trust and gaining knowledge about technology-based financial services in a community-based setting. This is the ground for which WeChat Pay is mostly preferred in rural areas of China as compared to Alipay

(CGAP, 2017). Chen & Yuan (2021) in their study highlighted the banking services framework, perspectives from policy support digital financial development and cross-country assessment to provide a balanced view of China's financial inclusion progress. The study found that the Chinese government's efforts in the areas of regulation and monetary policy have contributed significantly to the growth of financial inclusion in the country. Secondly, China's progress toward financial inclusion has been ahead of the global average, particularly in digital financial inclusion. It is vital to mention that the advancements in digital financial inclusion have greatly boosted the efficacy of financial services, while the remaining hurdles and likely threats to digital financial services are noticeable.

2.3 Researches on FinTech and Financial Inclusion

Studies have provided a theoretical grasp and foundation to comprehend the swift development in technological innovations and financial inclusion. According to Varga (2017), the prime drivers of FinTech include the information technology, internet and mobile phone infrastructure that aided in rapid growth by minimising service costs, new and open model of cooperation contributing to fruitful business opportunities in the provisioning of financial services and business models, where users of financial services are positioned at the centre. This aids in offering seamless and customer-centric services, which has the ability to enhance scalability and tailored services in the areas of insurance, savings and finance for working capital. MSMEs that were outside the reach of the unbanked and the underbanked sections are now able to benefit from such facilities, however, an important question, which must be addressed is how will it be able to achieve widespread social impact (Patwardhan, 2018). In addition, Jagtiani & Lemiux (2017) in their study found that FinTech lenders have penetrated into such sections and areas of society that lacked formal branches and credit supply to fill credit gaps. The assistance comes with risks where partnership plays a facilitative role, however, more regulatory approaches need to be taken to alleviate borrowers' risks and ensure protection.

Badruddin (2017) studied the merits and challenges of digital finance on Self Help Groups (SHGs), business correspondent models and micro-finance institutions. The study mentioned that digitised SHGs would assist in the appraisal of credit from formal institutions and the robust Management Information System (MIS) of the communities included could offer appropriate initiatives for socio-economic empowerment. The

technology could also benefit the MFIs to digitise their business procedures and assist in agent services for the suppliers of digital finance. Besides, the challenges in this regard include wide-reaching capacity-building programmes for SHGs, a lower level of knowledge concerning value-proposition and suitable technology, which requires efforts from the regulators to further the suppliers with the tech-led ecosystem and catering to the users' needs to include them.

Andrianaivo & Kpodar (2012) in their study nexus between mobile phones, financial inclusion and development gauged the influence of mobile financial services in an economic upswing with data from 44 African countries. The study substantiated that the dissemination of mobile phones holds the potential in lessening that gap in financial infrastructure and access among the African population. However, interplay with finance and technology requires policy initiatives for minimising the challenges. The provision of financial services via mobile technology offers a modification in the model of financial service provision and aids in vanquishing the diseconomies of scale (Beck, Maimbo, Faye & Triki, 2011). Consistent with this, a study by Mbiti & Weil (2011) found that the embracing of technology-based financial services like M-Pesa enhances the frequency of remittances, reduces the practice of savings in informal sources like Rotating Saving Credit Association (ROSCA) and results in the growth of the banked population. The authors further stated that technology-based financial services aid in complementing the banks, which further enhances the demand for formal financial services.

Gautam et al. (2022) studied whether the availability of two important services i.e., ATMs and Kisan Credit Cards (KCCs) influence literacy in rural India. The study covered 29 states and 2 union territories with data collected from the RBI website for three fiscal years (2017-2020) and found that the number, amount of KCCs and the number of ATMs have a positive effect on literacy, which adds credence to the idea that the availability of FinTech-based solutions motivates the individuals to use the services thereby directing enhanced adoption. Similarly, Fanta & Makina (2019) used cross-sectional data from 168 countries from World Bank data on World Development Indicators and found that ATMs and mobile technologies influence financial access and usability, which is a crucial element for inclusive growth.

According to Schuetz & Venkatesh (2019), financial inclusion in India is constrained by the issues of geographical access, cost, financial illiteracy and ill-suited banking products.

The study highlights the role of blockchain-based solutions in enhancing financial inclusion in India. Blockchain technologies being a distributed ledger technology, immutable and allowing for automated transaction execution would aid in solving the first three challenges of inclusion (Lacity, 2018 as cited by Schuetz & Venkatesh, 2019). Blockchain being immutable, automated and distributed ledger reduces the need for intermediaries (Lacity, 2018). The study also mentioned that to stretch out the potential of blockchain-based solutions, technology adoption in rural areas needs to be studied, as research on technology adoption behaviour is still nascent. Furthermore, the factors leading to the abandonment of technology after its adoption would add up crucial knowledge regarding technology adoption.

Arner, Barberis & Buckley (2016) studied the evolution of FinTech and stated that the Global Financial Crisis of 2008 displays a watershed moment and brought about the broadening of FinTech as we are witnessing today. The crisis impacted human capital and public perception together with providing an avenue for financial professionals in developing financial solutions using technology, leading to the re-shaping of the structures and models of the incumbents and initiated a new paradigm termed FinTech.

Soriano (2017) studied the effect of digital finance on financial inclusion from the viewpoint of FinTechs operating to serve the unserved. Collecting data from 63 financial technology start-ups operating in India, South-East Asia and Africa, the study found that earlier experience in financial services, customer-centric approaches, partnership with incumbents and e-commerce positively affect financial inclusion and performance. Furthermore, in addition to the above, scalability and earlier start-up experience are also crucial factors for the implementation of initiatives successfully.

Siddique & Siddique (2020) performed a study on the influence of telecommunication on financial inclusion. The study conducted on six villages of West Bengal and Gujarat, India found that irrespective of the states' growth level, the usability of telecommunications has a positive influence on the knowledge, capability and usability of financial services. Furthermore, the study mentioned the need for holistic and inclusive policies, which would together promote telecom and financial inclusion infrastructure for an inclusive India.

Raj & Upadhyay (2020) highlighted the opportunities rendered by FinTech in India in terms of designing appropriate financial products, digital onboarding for improved

financial inclusion, removing inequalities and gender gap, leading the way for small businesses into the digital fold, however, together with the opportunities there are various challenges and risks, which requires adequate supervisory and regulatory frameworks to protect the interest of both the suppliers and consumers. The author also brought to light that FinTech in India has much influence in the urban areas, therefore efforts are required to cater to FinTech's presence in semi-urban and rural areas comprehensively.

Research has shown that countries having a greater level of financial inclusion experience higher growth rates in GDP thereby lowering inequalities (Beck, Levine & Loayza, 2000; Clarke, Xu & Zou, 2006). In a report by McKinsey & Company, Manyika et al., (2016) stated that technology-based financial services could aid in boosting GDP by $3.7 trillion in the emerging economies by 2025, where digital payments would result in 2/3rd growth by enhancing the productivity of Government and businesses and the rest 1/3rd growth would come from inclusive welfare of individuals and MSMEs. Ravi (2019) stated that even though the Government has executed various initiatives and plan of action addressing particularly women and the rural population, besides, the availability of financial services continue to be narrow across various sections including slow-paced growth in North-East and Eastern regions of India. This requires the policymakers to embrace FinTech solutions to broaden access apart from mere account ownership to include insurance, credit and pension.

The use of FinTech is vital for remittances and investment for the growth of new businesses for enhancing livelihood opportunities. Goswami, Sharma & Chouhan (2022) found a positive relationship between the rural population and the use of FinTech services for financial inclusion. Furthermore, the study suggested that technology-based financial services be perceived as user-friendly and comprehensible, which would promote an environment of FinTech usage among individuals. Consistent with this, a study by Gupta & Agrawal (2021) revealed a multitude of factors that affects the financial landscape. The embracing of FinTech has picked up speed amidst the unprecedented Covid-19 pandemic, which designates enhanced financial inclusion leveraging technology. The study further mentioned that incumbents and FinTechs have their own core competencies and the conception of a collaborative outlook of functioning would surge the benefits for both the FinTechs and incumbents.

Buteau, Rao & Valenti (2021) stated that India is one of the largest domestic remittance markets with millions of migrants and furthermore, the Central Bank's directive for digital Know You Customer (KYC) for better access amidst the pandemic highlights data privacy rules as a pre-requisite to ensure the protection of the last lime population. In addition, Kandpal & Mehrotra (2019) stated that the policymakers and Government in India have highlighted an entrepreneurial climate for financial technology, however, it is a pre-requisite to complement the momentum of innovations to make certain transparent and stable growth. As new technologies come into play, appropriate privacy and security issues are a necessity to make implementation successful and gain customer confidence even though the innovations are more uncomplicated and more economical than the conventional methods. Ravikumar T (2019) in the study relating to the uprise of FinTech in promoting digital financial inclusion stated that the ease and indiscriminative approach of FinTech has fuelled growth in terms of essential financial services together with being the foremost enabler for digital financial inclusion.

Mukherjee, Mallik & Thakur (2019) in their study measured financial inclusion in 20 states of India using five years of data from 2008-2012 and called attention to the importance of better infrastructure and customisation of inclusion models as per the needs and demand of the customers. The study further highlights the need for the mobilisation of resources by financial institutions with information technology to establish a platform for the development of the last mile and rural population towards inclusive and sustainable growth. Evolution in technology, globalisation and reforms in the regulatory architecture has invigorated an era of digital innovations (Agarwal, 2016). Furthermore, launched under the chairmanship of Dr. Nachiket Mor, payment banks are considered to be niche entities that are equipped with avenues for digital accessibility for extensive inclusivity of disadvantaged households and small businesses. According to Agarwal (2016), Singh & Bhadouria (2019), payment banks would aid in lifting vulnerable individuals in achieving growth through their broader reach and distinctive business model. However, it is requisite to address the challenges for deriving the advantages under this unique concept. As of March, 2020, only six out of the 11 payment banks have continued their operations, also, payment banks like India Post Payment Bank (IPPB) have not yet been able to break even. According to Pramani & Iyer (2022), as the payment banks' operating guidelines barred them from lending and are able to accept deposits up to Rs. 2,00,000, this necessitates their business model to be volume-centric with greater embracement and usage. Sikdar &

Kumar (2017) also suggested the application of a viable, innovative and cost-effective business model to thrive in the long run ensuring the fulfilment of the financial inclusion objective.

Brown & Slagter van Tryon (2010) referred to financial literacy as a crucial element of the 21st century for the expanding use of technology, which has the potential to reduce the gap between lower levels of finance management and usage of internet (Shen, Hueng & Hu, 2019). Financial literacy includes the comprehension of having informed decisions in selecting financial services. Hasan, Le & Hoque (2021) conducted a study with 852 respondents from Bangladesh and dealt with information relating to respondents' use of banking services, MFIs and financial technology. The study found that financial literacy has a positive influence on financial access, however, individuals in rural areas have a limited understanding of various banking services, which is also the reason for their limited usage of other services. Furthermore, inappropriate models and low responses from people make training programmes insignificant. The study further mentioned the need for promoting literacy for enhanced inclusive finance, with advertising not being enough source for the promotion of a broad range of financial services.

Technology-based solutions offer innovations in Government to Person payments, however, it needs to be designed in a proper manner, which includes profound thought for easy functionality bridging the gap between digital-to-real and suitably designed account procedures. Zetsche, Buckley & Arner (2019) in their study highlighted the role of FinTech in achieving SDGs. The authors stated that FinTech and financial inclusion are the means of attaining the UN's SDGs. FinTech could assist in the maintenance and development of infrastructure, shrinking inequalities with better savings opportunities, substantial involvement between communities and balancing cash flows through savings, lending, etc. This requires economies to embrace FinTech-based strategies for digital transformation with regard to financial inclusion. However, the authors suggested that the real likelihood to promote FinTech for financial inclusion by furthering SDGs is the regulatory sandbox, which would provide an opportunity for learning to both the regulators and FinTechs. Furthermore, Buckley et al., (2019) discussed the gap in establishing financial inclusion as a broader goal in FinTech promotion to attain the UN's SDGs simultaneously enhancing growth and balancing risks. The authors were of the view that FinTech, financial inclusion and sustainability requires increasing the assigning of existing

financial sources, the extension of resources and the utilisation of technology and finance for the accomplishment of SDGs, which would be possible through the application of appropriate regulatory approach through regtech to develop a superior regulatory and financial system.

Asongu & Nwachukwu (2016) stated that sustainable and inclusive growth are interlinked with suitable regulatory approaches. According to Guild (2017), digital financial innovations can transform the provision of financial services in an inclusive and egalitarian manner. After determining the FinTech growth in India, China and Kenya, the study recommended the receptive regulatory path instead of an interventionist one for promoting financial inclusion through FinTech. In this view, a study by Jaluka, Aggrawal & Gupta (2017) underpins a regulatory sandbox-based approach for better risk management by regulators and policymakers. The absence of appropriate regulation could affect financial stability and risk assessment procedure. A study by Batunanggar (2019) focused on the necessity of promoting balanced and responsible innovation. The study mentioned that as the foremost constraint is to maintain innovation with the integrity of the intermediaries and protection of customers there is a need for balanced regulation with holistic and agile strategy, promotion of supervision, compliance, sandbox and responsible innovations with a better assessment of risks. When policies complement one another, it empowers the services to prosper (Guild, 2017).

2.4 Determining the Adoption of Technology

The process of technology usage involves three phases, first is the phase of assessment, which involves gaining interest and concern about the technology. The second phase involves action, which relates to the acquisition and execution of the technology. The third is the phase of acceptance, which is associated with decisions pertaining to whether to use a particular technology or discontinue its usage (Kollmann, 2004 as cited by Kiwanuka, 2015). The OECD Financial Literacy Report states that users of technology-based financial services have better knowledge about finance and their perspectives compared to non-users (Deloitte, 2022). This makes understanding of factors influencing technology adoption a pre-requisite. Studies establishing relationships between technology adoption and human behaviour have been conducted using several technology acceptance models. Some of the established technology acceptance models are- Task-Technology Fit (Bandy, 1973), the Theory of Reasoned Action (TRA) (Ajzen, 1975), the Theory of Planned

Behavior (TPB) (Ajzen, 1985, 1991), the Technology Acceptance Model (TAM) (Davis, 1989), Theory of Diffusion of Innovations (DIT) (Rogers, 1995), Decomposed Theory of Planned Behaviour, (Todd, 1995), Technology Acceptance Model 1 (Davis, Bagozzi & Warshaw, 1989), Technology Acceptance Model 2 (TAM2) (Davis, 2000), Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, 2003) and Technology Acceptance Model 3 (TAM3) (Bala, 2008).

Based on the Theory of Reasoned Action (developed by Fishbein & Ajzen, 1975), Davis, Bagozzi & Warshaw (1989) developed the Technology Acceptance Model (TAM) which deals with the acceptability of technology among people. The aim of this model is to predict how well an information system will be accepted by users and figure out what changes need to be made to make it acceptable. It is based on two factors i.e., Perceived Ease of Use (PEOU) and Perceived Usefulness (PU), which are considered the main variables that influence the adoption of technology. The model says that perceived usefulness and perceived ease of use influence the attitude towards using a product, the attitude determines the behaviour, which in turn influences the actual acceptance. Traditional TAM postulates that there is a significant positive association between user attitudes towards a technology and their adoption intentions; this is mostly supported by studies in the bank field. (Hu et al., 2019; Marakarkandy, 2013 and Urban, Amyx & Lorenzon, 2009).

According to Kim, Mirusmonov & Lee (2010), the practical attributes of TAM makes it a widely used concept for studying technology acceptance behaviour among individuals. TAM model was further developed as TAM 2 by exhibiting the social influence/subjective norm having a direct effect on adoption decisions during mandatory use cases (Venkatesh & Davis, 2000). Furthermore, TAM 3 developed by Venkatesh & Bala (2008) aimed at providing technology adoption interventions to aid managerial decision-making during the pre and post-implementation stages of complex, voluntary and inter-organisational systems. Notwithstanding the substantial use of TAM, many researchers have suggested the incorporation of additional constructs to the model in order to enhance the model's predictive ability and supplement the usability and ease of use variables (Cheema et al., 2013). Researchers in the course of time have combined different technology acceptance models into one to arrive at their desired results. Akturan & Tezcan (2012) used Technology Acceptance Model to study the adoption intention in mobile banking where

they examined the factors such as perceived risk, time risk, security risk, privacy risk and performance. Sharma & Govindaluri (2014) used the variables of computer self-efficacy, social influence, quality of internet connection and awareness to study the use of internet banking in urban India. Accordingly, Singh & Sarma (2022) used TAM to study the adoption of FinTech payment services among millennials and Generation X amidst the pandemic. The authors added to the model additional variables like the risk and severity of Covid-19 and individual mobility. Since the study only considered two generational cohorts, the authors suggested the inclusion of the area of residence and cultural profile of individuals to study adoption behaviour. In this context, Boamah, Murshid & Mozumder (2021) in their study addressed the necessity to prevent the one-size-fits-all intervention. Furthermore, the study stressed on understanding the individual and socio-cultural factors relevant to digital financial capabilities.

Al nawayseh (2020) used the UTAUT model by adding the constructs of the valence framework including trust, social impact and perceived benefits i.e., the users' perception regarding the serviceability and positive outcome of using the service. The study found that among the constructs used perceived benefits, trust and social antecedents substantially affect an individual's intent for using FinTech services. Matar & Alkhawaldeh (2022) stated that there exists a gap in technology adoption studies particularly in developing countries with regard to safety issues and hence, extended the TAM by adding four new constructs including influence from reference groups, bank's trustworthiness, awareness and security issues. The study found that perceived awareness, ease of use and usefulness has a significant association with technology adoption whereas, the relationship between awareness, security concerns and technology was not significant. Umrani & Ghadially (2008) in their study found that the technological antecedent i.e., perceived usefulness and social antecedent i.e., social influence/network externalities are crucial determinants of technology adoption in India. The authors were of the view that studies relating to technology adoption in India require integration of social context and normative approach. As social influence is compulsory to be of greater importance during compulsory setting of technology adoption. Thus, incorporating the construct of network externalities in determining technology adoption behaviour amidst the pandemic becomes vital.

2.5 FinTech for Inclusive Growth in North East India

While discussing the state-wise performance in the CRISIL Inclusix Index, 2018 the states except for Sikkim and Tripura of North Eastern India feature in the bottom 10. The main reason is that there is low branch penetration, deposit ratio and credit deposit ratio in the region. However, there is an increase in mobile phone and internet penetration in the region. The total number of internet subscribers pre-covid-19 i.e., as of March, 2019 in Assam was 11.53 million and in other North East states was 6.7 million. Besides, there has been an increase in the number of internet subscribers post-covid i.e., 15.98 million in Assam and 9.01 million in other North East states as of March, 2022 (TRAI, 2019b; TRAI, 2022) and because of the physiology of North East India, mobile technology is the best way to connect business.

Maity & Sahu (2022) studied the financial inclusion standing in the North Eastern state of Assam concerning geographical, demographic, credit and deposit penetration. Covering a twelve years period from 2008 – 2019, the study found that the difference exists in terms of financial inclusion status in Assam and India. Furthermore, Assam is found to have a lower level of financial inclusivity when juxtaposed with country-level data. The reasons are varied including cultural, financial and geographical factors. As the aspects of inclusivity are experiencing a continuous switch by infusing new approaches. This requires re-structuring the current plan of action with technology-based financial service provision. In addition, according to Beck, Demirguc-Kunt & Levine (2007) enhanced demographic and geographic penetration ensures better service by narrowing the distance between the users and service providers. Strengthening the focus on distance issues would aid in achieving improved inclusivity (Ghosh, 2020). Kumar and Debnath (2018) examined the reasons why the people of certain areas of the country are reluctant to use technology-based financial services. They analysed the usage behaviour of the consumers especially in the North Eastern region and concluded that advancements in technology in North East, which is a hilly area can help in providing more inclusion to the unbanked population. The authors mentioned that mobile phone compatibility with security features during payment and fundamental technological know-how affects technology usage. However, discontinuing usage and lack of communication from officials after performing a few transactions reduces digital payment growth in the region.

A study by Das & Das (2020) on the adoption of FinTech services in Assam found that the elder generation perceives FinTech services to be complicated, which results in a lack of trust. Furthermore, there is gender inequality in FinTech usage in the state. The study also suggested the need for better payment infrastructure with collaboration between banks, FinTech firms, MFIs and NGOs to enhance literacy through education camps with volunteers in the local areas for setting up financial and digital literacy kiosks in vulnerable languages. According to a report by the Ministry of Electronics and Information Technology, Government of India & Better Than Cash Alliance (2022) about 80 percent of 1.5 million merchants in the North East region of India lack the infrastructure pertaining to acceptance of digital payments particularly in the rural and semi-urban areas. The report also highlighted that 13 percent of merchants in the region are women and gender inequality is an impediment to digital payment acceptance. Other difficulties include intricate processes, language barriers and a low volume of Aadhaar accounts. As the onset of the pandemic has raised the need for digital payments together with undertaking remedial action for working capital loans and remittances, thus, boosting digital acceptance by merchants is of crucial focus of the Digital North East Policy, 2022.

2.6 Brief Profile of Assam

Assam, situated in the extreme far east of India is geographically isolated from the rest of India, covering an area of 78438 square kilometres. The Siliguri corridor in the Indian state of West Bengal is also known as the Chicken's Neck and serves as a geo-economic spine connecting the North Eastern states to the rest of the country. However, the economic isolation has been lessening over the past few decades owing to the Indian government's 'Act East' policy and investments in infrastructure. Assam, the gateway to the North Eastern region of India holds majority of financial flow in the region. Besides the countries of Bhutan and Bangladesh, Assam shares a border with seven other states namely Meghalaya, Manipur, Nagaland, Tripura, Mizoram and West Bengal. The state is home to a diverse group of people from many different backgrounds and cultures. Assam has a total population of 31.17 million people, 26.78 million of whom live in rural areas and 4.39 million in urban areas, according to the Census of India, 2011 (Directorate of Economics and Statistics, Government of Assam, 2011). The state's rural population percentage is greater than the average for India (69 percent) (Transformation and Development Department, Directorate of Economics and Statistics, Government of Assam 2022).

According to the 2011 Census, the literacy rate of the state is 73.18 percent, with female literacy at 67.27 percent and male literacy at 78.81 percent (Directorate of Economics and Statistics, Government of Assam, 2011).

The agricultural sector is the economic backbone of Assam. To date, agriculture is responsible for the direct or indirect support of over 75 percent of the state's economy and the employment of over 53 percent of the entire workforce (Panchayat and Rural Development, Government of Assam, 2023). In 2020-21, the agriculture and allied sector is expected to contribute 22.32 percent of Gross State Domestic Product of Assam at current prices (Transformation and Development Department, Directorate of Economics and Statistics, Government of Assam 2022). Two of the most prominent plantation crops in the state are rice and tea. Furthermore, the handloom industry is deeply rooted in the state's history and culture. The handloom industry in Assam is second only to agriculture in terms of job creation, and despite the widespread adoption of cutting-edge machinery and equipment in the textile industry, it continues to play a crucial role in the state's economy (Panchayat and Rural Development, Government of Assam, 2023). Assam's economy has lagged behind despite having huge potential due to its underutilised manpower and natural resources. The agricultural industries have not advanced much despite promising future growth. Assam receives a comparatively small amount of private investment and suffers from uneven industrial and economic development as a result of its strategic location, which places it in the far northeast of India, surrounded by foreign countries other than a narrow passage that connects it to the rest of India. According to the National Sample Survey (NSS) 73rd Round (2015-2016) the states of Uttar Pradesh (8.999 million units), West Bengal (8.868 million units), Tamil Nadu (4.948 million units), and Maharashtra (4.778 million units) have the highest concentration of Small and Medium scale industries in India, accounting for 14.19 percent, 14 percent, 7.8 percent and 7.53 percent of the country's total SME population (RBI, 2022b). However, Assam only accounts for 1.9 percent (1.214 million) of India's total number of Small and Medium scale industries. Furthermore, according to the State-wise Ease of Doing Business, 2019 rating published by the Ministry of Commerce and Industry, Government of India, Assam ranks 20th among the 29 states in the country (RBI, 2022b).

It is important to note that only 2 percent of India's scheduled commercial banks are located in the state of Assam, which is an important dearth when discussing the state's

banking profile. Assam has fewer scheduled commercial bank branches (3043) than many other states, including Uttar Pradesh (18073), Maharashtra (13590), Tamil Nadu (12094), Karnataka (10780), West Bengal (9616), Gujarat (8599), and Rajasthan (7969) (RBI, 2022b). However, as of March, 2021, the average population served by a single bank branch in Assam is 12,307, whereas, in all of India, the figure is 9,074 (Transformation and Development Department, Directorate of Economics and Statistics, Government of Assam, 2022).This marks a difficulty in access to formal financial services in the state. In addition, as of December 2022, the total number of ATMs in the state is 4071, nevertheless, the distribution of ATMs around the state is uneven comprising of 40 percent ATMs (1630) in urban areas, 44.3 percent in semi-urban areas (1802) and only 15.7 percent in rural areas (639) (State Level Banker's Committee, Assam, 2023). Kamrup Metro district, a major financial hub in Assam, has the highest concentration of automated teller machines, at 883. This contrasts with relatively economically backward districts in Assam including West Karbi Anglong (5 ATMs), Majuli (11 ATMs), Chirang (14 ATMs), Dima Hasao (21 ATMs), and Baksa (27 ATMs) (State Level Banker's Committee, 2023). Furthermore, as of December, 2022, a total of 333 Common Service Providers (CSPs), who directly connect with the bank customers for providing banking assistance and resolving disputes in the last mile areas are inactive (State Level Banker's Committee, Assam, 2023). While discussing the progress under the Pradhan Mantri Jan Dhan Yojana (PMJDY) an Indian government initiative aimed at expanding financial inclusion, the total number of accounts opened under the scheme in Assam as of December, 2022 is 2160.7 million out of which the number of zero balance accounts is 209.33 million. Furthermore, the number of RuPay cards (debit cards) issued and activated under the scheme amounts to 1132.49 million and 715.16 million respectively (State Level Banker's Committee, Assam, 2023). The reason for low number of RuPay card activation may be attributed to the limited ATM network. Since financial inclusion is a prerequisite for sustainable and inclusive growth, access to payment, credit, borrowing, and insurance is crucial for allowing previously excluded groups to participate in the economy and boost the growth prospects of the state.

On the positive aspect, Assam, like the rest of the country, has experienced an increase in the use of FinTech-based services, which could render routine banking operations less cumbersome. As of December, 2022 there have been 161.29 million BHIM UPI accounts, 337.7 million BHIM Aadhaar accounts, and 24.98 million debit/credit cards in Assam

(State Level Banker's Committee, Assam, 2023). As a result, this shows the increased potential of FinTech-based services in uplifting the banking scenario among the last-mile population of the state. However, merchants in the region make up only 2 percent of the country's total, and the percentage of merchants outside of Guwahati (largest city in Assam) and other large capital cities of the region who accept digital transactions is even smaller (Ministry of Electronics & Information Technology, Government of India & Better Than Cash Alliance Report, 2022). As of December, 2022, the total number of Bharat QR account is a little more than 168 thousand, which affects the upliftment of digital transactions in the state (State Level Banker's Committee, Assam, 2023). While connectivity issues have been addressed in major cities, they remain a significant problem in semi-urban and rural areas. This is especially important considering the poor connectivity issues, which necessitate a proper acceptance infrastructure, better application flow, regulatory policies and complaints resolution process. Additionally, in the context of the isolated geography of Assam, FinTech is of critical importance in bridging the financial inclusion gap of the state and supplying a comprehensive set of banking services that boost economic viability. Thus, the study focuses on the issues and challenges with regard to FinTech and financial inclusion in the state of Assam.

3. Research Gap

The research gap identified from the above literature are firstly, though, many researches have been done in the perspective of measuring the status of financial inclusion focusing on the share of adults who have opened a transaction account, there is a scope for research that could have been better by intensifying the factors that affect the regular usage of bank accounts. Thus, there is a dearth of research focusing on the perspective of sustainable financial inclusion, determinants affecting sustainability and banking system predicaments in fostering financial inclusion. Secondly, there are lack of studies focusing on the role of FinTech with regard to financial inclusion. However, enormous the potential of FinTech, its realisation will remain a distant dream unless the social factors in adopting such services are studied properly. The number of studies considering the social and cultural factors in the adoption of FinTech services and how it can impact the different dimensions of financial inclusion together with the factors affecting its acceptance or denial is rare. Thus, an attractive opportunity for research emerges. Thirdly, there is a lack of research done in relation to FinTech and financial inclusion with reference to the North Eastern region.