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Role of Digital Technologies in India's Microfinance Sector to promote Innovation, Efficiency and Inclusivity

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Abstract

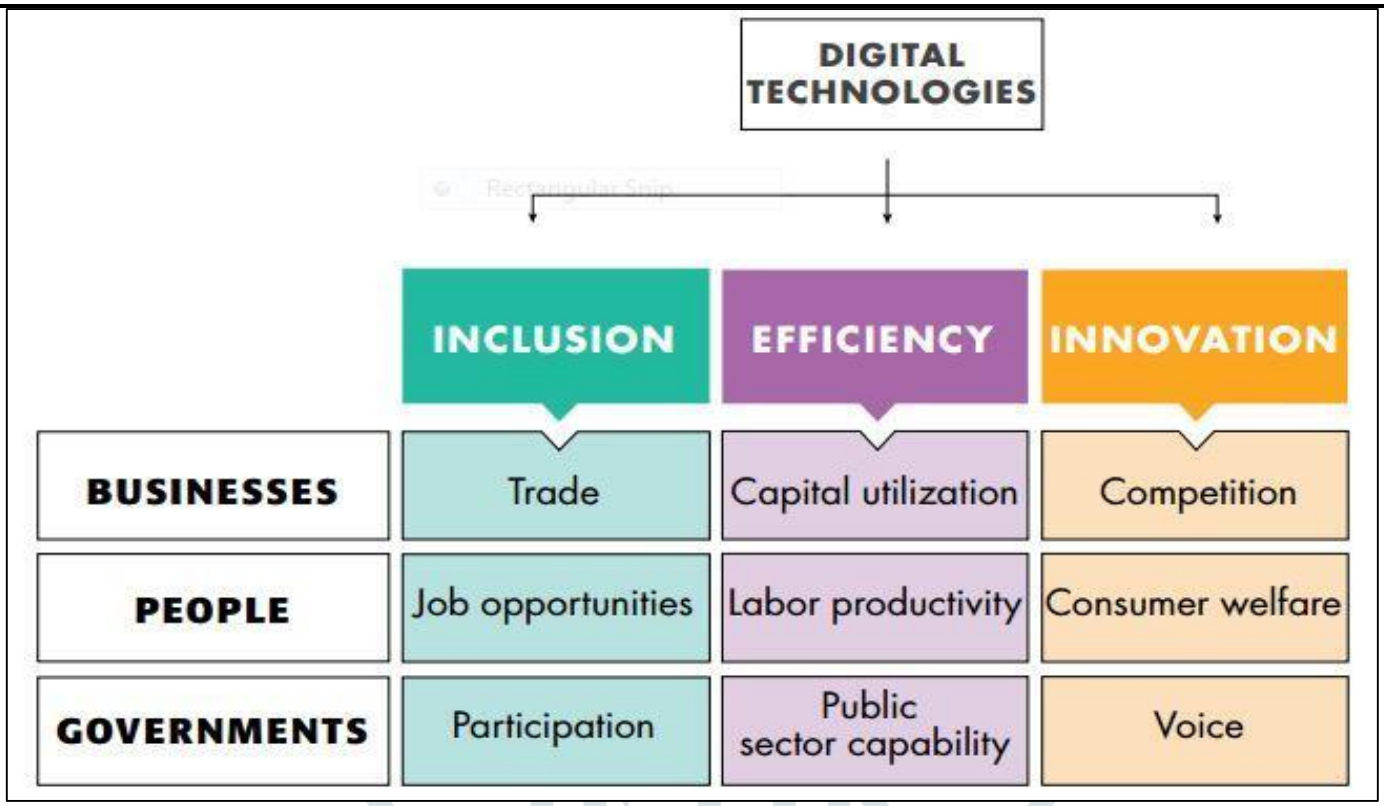
Digital technologies are swiftly permeating various aspects of human existence, and the microfinance sector is no exception to this trend. The continuous advancements in digital technology are playing a significant role in transforming the operational models, governance structures, risk landscape, industry networks, and prevailing practices within the microfinance domain. Emphasising the importance of innovation and seamless integration of digital technology, these factors hold the potential to drive development by fostering innovation, enhancing operational efficiency, and facilitating greater inclusivity. This study deals into the historical significance of these mechanisms—innovation, inclusion, and efficiency—in the realm of microfinance and examines how the advent of digital technology innovations presents yet another avenue for microfinance institutions to foster development. By drawing upon examples from the Indian microfinance industry, we explore the transformative impact of digital technology changes on the microfinance landscape.

Keywords: Digital innovation, Digital technologies, Microfinance, Innovation

JEL Classification code : G21, G23, G28 and G29

1. Introduction

The microfinance sector has a rich and dynamic history. Originating from endeavours aimed at addressing poverty and promoting women's empowerment, microfinance has now become a significant element within the banking systems of developing nations. These financial institutions, known as microfinance institutions (MFIs), have gained prominence by employing innovative approaches to achieve objectives that were once deemed unfeasible by traditional banks.Instead of requiring collateral, MFIs provided small loans to individuals from low-income groups, primarily engaged in income-generating activities in the informal economy (Jayadev, 2016). For a long time, there was scepticism about the ability of the free market to offer effective and efficient financial services to the poor. However, pioneers like Bangladesh's Grameen Bank demonstrated that a concept of 'social business' was viable (Cull, et al., 2009). Their success was founded on groundbreaking lending techniques, such as the joint liability approach, which minimised the risk of defaults and ensured repayment. As a result, these organisations were able to profitably extend financial services, particularly credit, to the impoverished on a large scale. In contrast, conventional banking systems repeatedly struggled in this regard due to insufficient information about borrowers' creditworthiness, high transaction costs, and the lack of collateral. The microfinance institutions accomplished what was once considered impossible - they succeeded in 'banking the unbankable.microfinance has been widely recognized as a crucial tool for reducing poverty and fostering financial development. Its primary strength lies in its potential to enhance financial access, which has been emphasised in development literature as a means to reduce inequality, stimulate economic growth, and alleviate poverty (Demirgüç-Kunt, et al., 2007). While microfinance is commonly regarded as an anti-poverty strategy, it is also seen as an essential component of a developing country's broader financial development approach Barr (2005) outlines several ways in which microfinance contributes to overall financial development. Apart from lifting people out of poverty and creating livelihoods, microfinance initiatives can deepen markets, thereby advancing financial development. Additionally, they can serve as a development tool in regions with weak formal institutions or inadequate legal and policy environments. Furthermore, microfinance activities accelerate the growth of the banking sector and facilitate the maturation of financial markets, particularly in developing nations. Lastly, they play a role in promoting domestic financial reforms by introducing competition and encouraging financial liberalisation.The global microfinance sector is currently experiencing a transformative phase, largely due to the integration of digital technologies. These technological advancements are driving fundamental changes in the sector's characteristics and organisation. This paper aims to explore how digital technology innovations can enhance the microfinance sector's role in development, particularly in the context of India. The examination of existing literature in the next section adopts the World Bank's framework (2016), which identifies innovation, inclusion, and efficiency as key mechanisms through which the developmental process unfolds.



Source:World Development Report 2016

The subsequent sections argue that these three mechanisms have been integral to microfinance operations in the past and that digital technology innovations present yet another opportunity for microfinance institutions to promote development through these mechanisms. integration of digital technologies in the Indian microfinance sector was gaining momentum and making significant strides in various areas:

❖ **Efficiency and Streamlining:** Digital technologies were being used to automate and streamline various processes within microfinance institutions (MFIs). This included digitising customer onboarding, loan applications, and disbursement processes, which reduced paperwork, minimised manual errors, and accelerated the speed of transactions. This increased efficiency allowed MFIs to serve a larger number of clients.

❖ **Improved Data Management:** Digitalization enabled better data collection, storage, and analysis. MFIs could leverage data analytics to gain insights into customer behaviour, repayment patterns, and credit risk, helping them make more informed lending decisions and tailor financial products to suit specific customer needs.

❖ **Financial Inclusion:** The integration of digital technologies in the microfinance sector played a pivotal role in extending financial services to unbanked and underbanked populations in rural and remote areas. By offering mobile-based banking solutions and digital wallets, individuals who were previously excluded from the formal financial system gained access to a range of financial services.

❖ **Access to Credit:** Digital technologies facilitated a faster and more convenient credit assessment process. MFIs could use alternative data sources, such as mobile phone usage patterns and transaction histories, to assess creditworthiness, making it easier for individuals with limited credit histories to access loans.

❖ **Mobile Banking and Payments:** Digital technologies allowed MFIs to offer mobile banking services, enabling customers to perform transactions, check balances, and make loan repayments through their mobile devices. This convenience encouraged financial discipline and improved repayment rates.

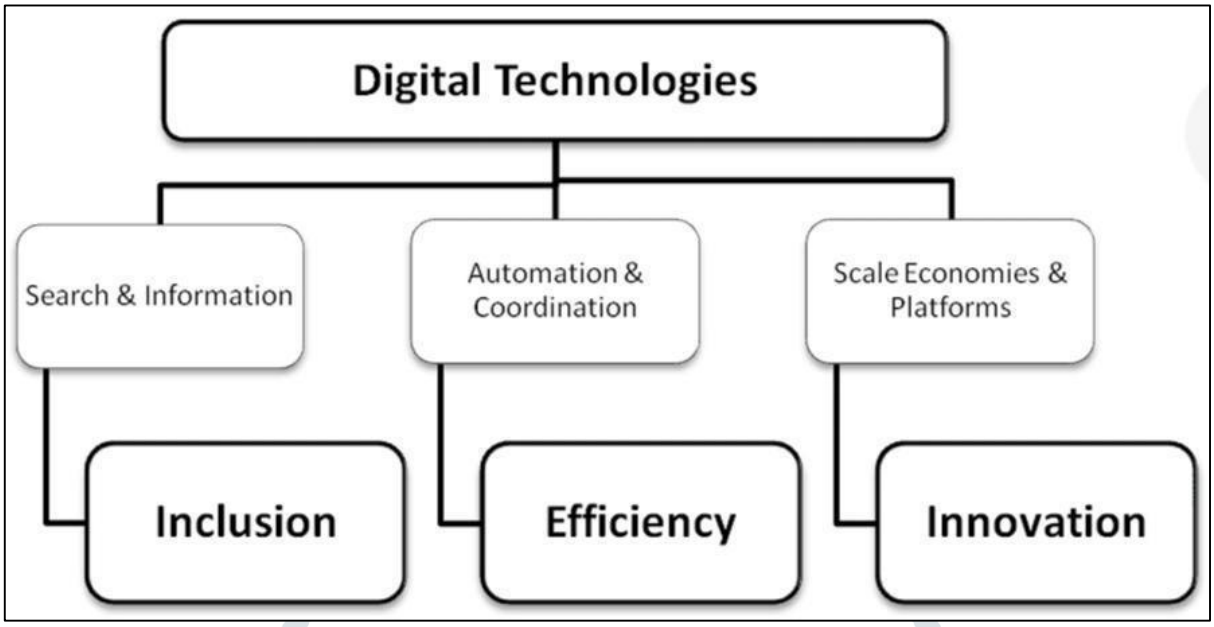
❖ **Partnerships with Fintech Companies:** Many traditional microfinance institutions collaborated with fintech companies to enhance their digital capabilities. Fintech firms brought innovative solutions, such as digital lending platforms and payment gateways, which complemented the services offered by MFIs.

❖ **Risk Mitigation:** Digital platforms also helped MFIs mitigate risks associated with cash-based transactions. By transitioning to digital payments, they reduced the security risks involved in handling cash and improved overall transparency in financial operations. It is important to note that the landscape of the microfinance sector is continually evolving, and advancements in digital technologies may have continued to shape the sector since my last update. To obtain the most current information, I recommend referring to recent reports, studies, or news articles on the topic.

2. The digital revolution – digital technologies and pathways to development

Digital technologies are swiftly permeating every aspect of human life, introducing novel ways of engagement, broadening opportunities, and enhancing efficiency for individuals, businesses, and governments. The microfinance industry worldwide is also quick to adapt to these technological advancements within the financial sector. While the digitization of back-end operations has been an ongoing process for some time in the microfinance industry, there is now a growing adoption of technology in other aspects of their operations. Additionally, there is an increasing trend of collaboration between microfinance institutions and fintech companies to fully embrace technological advancements.Examples of this technology integration can be observed, such as the migration of BC Finance in Myanmar to a private blockchain, which was facilitated by Japanese technology firms Infoteria and Tech Bureau. Moreover, microfinance institutions in the Philippines are utilising an open Cloud-based Computing Systems (CBS) platform with the help of open Application Program Interfaces (APIs). In India, the National Payments Corporation has digitised MFI transactions using its Aadhar Payment Bridge System (ABPS) (PwC, 2017). These instances demonstrate the growing trend of microfinance institutions embracing technology to improve their operations and services.Enhanced connectivity and technological advancements offer a wide array of developmental advantages, known as digital dividends (World Bank, 2016), which have the potential to stimulate growth, create more opportunities, and enhance service delivery. As depicted in Figure 1, digital technologies promote development through three key aspects: inclusion, innovation, and efficiency. As digital technologies continue to expand, they contribute to increased inclusion by reducing information asymmetries. This leads to improved information sharing among different parties, enabling more transactions at lower costs and with reduced risk. Consequently, existing activities become more cost-effective and efficient.Furthermore, the growth of information and communication technology fosters efficiency improvements by reducing the need for certain production factors and enhancing the productivity of others, which cannot be replaced. This results in streamlined processes and improved productivity.

Figure 1: Development mechanisms of digital technology



Source: Adopted from World Bank (2016)

Moreover, digital technology serves as a catalyst for innovation by facilitating economies of scale and substantially reducing marginal costs. This growth in technology creates an environment conducive to fostering innovative solutions and initiatives.In summary, the expansion of digital technologies leads to a host of developmental benefits, including increased inclusion, efficiency, and innovation, thus propelling growth and enhancing various aspects of societal progress.

3. Current status in India in 2023

During FY2023, India's technology industry is projected to achieve a total revenue of over $245 billion, indicating an 8.4% year-on-year growth. This would be an increase of $19 billion compared to the previous year. Export revenue is expected to reach $194 billion, with an anticipated growth of 9.4% in reported currency terms and 11.4% in constant currency terms. The domestic technology sector is predicted to reach $51 billion, showing a year-on-year growth of 4.9%.In terms of rupees, the domestic tech revenues are estimated to experience a substantial 13% year-on-year growth, driven by continuous investments from enterprises and the government. The industry remains a significant job creator, with an addition of nearly 300,000 employees, bringing the total employee base to around 5.4 million, showcasing a 5.7% year-on-year growth. This further reinforces India's position as a global leader in providing digital talent.

4. Innovation

It is crucial to examine the evolving dynamics of the microfinance industry, particularly concerning innovation, especially in developing nations. Microfinance has always been a breeding ground for entrepreneurial endeavours and has thrived on innovative practices. Morduch (1999) highlights that the very essence of microfinance's potential lies in its innovative nature, encompassing novel management structures, pioneering

contracts, and innovative mindsets.Mersland and Strom (2012) categorise five key areas of innovation within microfinance. These areas include the targeting of impoverished customers, with a focus on women, the introduction of new lending technologies, the implementation of fresh organisational solutions, and the exploration of innovative sources of funding. These innovative approaches have played a fundamental role in shaping the microfinance sector and its ability to cater to the needs of underserved populations.The aforementioned changes brought about significant innovations to the existing banking sector and led to the creation of an entirely new product market (Mersland and Strom, 2012). Microfinance emerged as a solution to the classical problems of information asymmetry faced by traditional banks.Before the rise of microfinance, the poor were either served by money lenders or state-owned banks, but both options were far from being efficient in achieving a socially balanced equilibrium. State-run banks heavily relied on subsidies to cater to this customer segment, resulting in low penetration and repayment rates. The absence of collateral was a major barrier that excluded a large portion of the poor population from accessing financial services. The government's programs incurred significant costs as they collected minimal savings, provided limited credit, and experienced high default rates (Morduch, 1999). On the other hand, moneylender loans were more easily accessible, but they were exploitative and had detrimental effects on society, leading to negative externalities. The advent of microfinance addressed these issues by providing a more equitable and sustainable financial solution for the underserved and poor populations. In contrast, microfinance loans were specifically directed towards high-risk borrowers, particularly women. The implementation of group lending methodology eliminated the need for collateral and effectively addressed challenges related to borrower screening, repayment, and auditing. These loans were relatively small and intended for income-generating activities. Microfinance institutions (MFIs) also employed dynamic incentives, regular repayment schedules, and collateral substitutes to encourage high repayment rates (Morduch, 1999).

Additionally, the deliberate targeting of women was another innovative approach, diverging from the traditional male-focused banking practices. This women-centric approach offered numerous advantages. From a societal perspective, it promoted gender equality, contributed to poverty reduction, and generated positive externalities for both society and the economy. From a business standpoint, it reduced moral hazard issues, enhanced dynamic incentives (Morduch, 1999), and led to improved repayment rates (Mersland and Strom, 2012).

The microfinance industry has experienced significant transformations in the past two decades. Microfinance institutions are no longer exclusive entities, as commercial banks have become more involved in this sector. This increased participation of commercial financial institutions has resulted in the marginalisation of the poverty-alleviation practitioners who originally pioneered modern microfinance (Kent and Dakin, 2013). Furthermore, there has been a growing convergence in financial sector regulations affecting the microfinance industry. As commercial microfinance institutions adapted their business models to meet these regulatory challenges, the original developmental vision has somewhat receded. The industry's distinctive selling point is now being questioned, and there is mounting pressure on the sector to innovate in response to these changes.The microfinance sector is currently undergoing what can be described as a 'technological transition' (Geels, 2002). This transition encompasses not only technological changes but also shifts in user practices,

regulations, industrial networks, infrastructure, and symbolic significance (Geels, 2002). While the fundamental concept of providing small, non-collateralized loans remains intact, the sector is now integrating digital technology into its mainstream financial services, although the nature of these changes differs from the broader financial services sector. Unlike the financial services industry, where innovations occur in both product and process, the microfinance sector primarily experiences process innovations (Tidd et al., 2005).These process innovations focus on improving the production or delivery methods. These changes represent an ongoing cumulative technological advancement (Nelson and Winter, 1982), characterised by continuous evolution where new innovations build upon previous ones in a progressive manner. In essence, the microfinance sector is continuously evolving through a series of technological advancements rather than a singular event of technical breakthrough.

5. microfinance sector needs to prioritise innovation in India

Despite being comparable in size to the credit industry, the Indian microfinance sector faces obstacles stemming from technological limitations and regulatory constraints imposed by the RBI. As of March 31, 2023, the microfinance sector had served around 66 million borrowers with outstanding loans totaling INR 3,48,339 crore across all states, a scale akin to the credit card industry in the country. However, while the credit card industry had embraced numerous product innovations, customer-centric approaches, and technology linkages over time, the microfinance sector remained largely unchanged. Surprisingly, the microfinance sector has demonstrated its ability to adapt, promptly responding to macroeconomic shocks like demonetisation and the COVID-19 pandemic. During such times, microfinance institutions (MFIs) implemented strategies like debt rescheduling, restructuring, and payment deferrals to support their customers. Research has shown that financial product innovations can benefit both MFIs and their customers. For instance, a study conducted by Warwick in collaboration with Sonata Finance tested a flexible repayment loan option that accommodated business seasonality. Customers could opt for a repayment "holiday" of up to three consecutive months, during which repayments were paused or reduced, and future instalments were adjusted accordingly. This flexible loan option not only improved outcomes for borrowers, including business performance, but also increased early loan repayment rates by 31%, contrary to the previous belief that flexibility could negatively impact repayment rates. Despite the potential benefits, there are significant constraints hindering the adoption of financial innovations in the microfinance sector:

- **Technological Constraints:** High default rates among MFI customers pose risks for the institutions' financial health. While technology advancements in screening, record-keeping, communication, and cashless repayment offer opportunities to mitigate these risks, smaller MFIs find it expensive to develop and integrate such tools due to their limited customer base. Moreover, adopting these technologies might weaken the in-person relationships between bankers and lenders, which could lead to free-riding behaviours
- **Regulatory Barriers:** While the RBI introduced less stringent lending requirements for MFIs, insufficient collateral from customers prevents the extension of certain financial products like larger ticket-size loans and mortgage loans. Addressing the regulation on collateral requirements for low-income borrowers could unlock these opportunities.

❖ **Customer Demand:** There is an increasing demand among micro and small entrepreneurs for flexible loan contracts to meet their business needs. Commercial banks and FinTech companies are providing alternative options, such as payment apps and peer-to-peer lending, challenging the traditional MFI loan model. To retain clients, MFIs must make adequate marketing efforts and explain complex products to a diverse customer base. Incorporating technological and financial innovations within their operations will be a significant challenge for the microfinance sector. The scalability of existing innovations remains uncertain due to limited incentives resulting from regulations, technology constraints, and market competition. However, the success of pandemic-driven schemes and innovative products should encourage MFIs to experiment and explore new avenues for growth and development.

6. Efficiency

The primary obstacle to achieving efficiency in any market is the presence of high transaction costs and inefficient utilisation of production factors. As previously mentioned, the financial sector had struggled to reach a significant portion of the population, resulting in costly transactions, distorted pricing, and exclusion of potential participants. Microfinance, however, successfully addressed these issues by reducing transaction costs and optimising resource utilisation. These efficiency improvements were not confined solely to the financial sector; they extended to consumers and the overall economy. By making credit more accessible, microfinance created greater economic opportunities and reduced hardships, contributing to overall development. The increased availability of credit translated into more avenues for growth and progress, ultimately benefiting society at large. As commercialization and heightened competition have taken hold, the once efficient operations that characterised microfinance activities have come under threat. In certain countries, the imposition of rate caps and other factors led to a decline in profit margins. The case of India, which will be discussed later in this paper, serves as an example of how inefficient operations, even among a few players, can trigger a crisis in the entire microfinance sector. Kent and Dakin (2013) also point out that the behavioural norms in microfinance have become less distinguishable from mainstream commercial banking practices worldwide. Microfinance institutions are now required to adhere to standards similar to those in the banking industry while continuing to serve their traditional markets. One significant challenge faced by microfinance institutions is the higher cost of funds compared to their banking competitors. This further complicates their situation and necessitates substantial improvements in efficiency across all aspects of their operations. To thrive in this competitive landscape, microfinance institutions must streamline their processes and enhance overall efficiency in order to continue delivering services effectively.Technology has the potential to greatly benefit the microfinance industry by enhancing efficiency, particularly in terms of reducing transaction costs and increasing the productivity of existing resources. Research has indicated that microfinance institutions (MFIs) dealing with small transactions for dispersed populations tend to have operating costs ranging from 12% to 15%, while traditional banks maintain costs below 5% (Moro Visconti and Quirci, 2014). Among MFIs, operating expenses are the most significant cost component.

Based on a study by Kneiding and Ignacio (2009), which analysed a sample of 1,003 MFIs across 84 countries, three primary factors influence the operating expense ratio (OER) and thus efficiency. Firstly, higher loan

numbers can lead to economies of scale. Secondly, larger average loan sizes may improve the cost structure. And finally, possessing more knowledge about customers can streamline processes, leading to increased efficiency. In light of these findings, integrating technology into microfinance operations has the potential to drive substantial improvements and optimise resource utilisation.Based on a recent study conducted by strategic consulting and market research firm Report Ocean, the microfinance market in India is projected to grow at a Compound Annual Growth Rate (CAGR) of 11.3% until 2028. The market's flourishing state is attributed to several factors, including the rising number of microenterprises, government backing for microfinance initiatives, and reduced interest rates. This positive outlook indicates that the microfinance sector is poised for rapid expansion in the upcoming years. One of the key drivers of this growth is the significant role played by microenterprises in fostering economic development, thereby creating a favourable environment for market expansion. Moreover, the growth of small and medium enterprises (SMEs) and the empowerment of lower-income groups, especially women in rural areas, who contribute to managing household and social livelihoods, further support the market's upward trajectory. Additionally, government initiatives aimed at promoting fair competition and enhancing the national payment system have also contributed to bolstering the market's potential for growth.Despite these positive indicators, certain limitations hinder the market's expansion. Microfinance institutions face challenges due to their shorter repayment terms and high interest rates, which can act as constraints on the overall growth of the microfinance market in India.

7. Inclusion

The microfinance sector played a pioneering role in promoting financial inclusion by extending financial services to previously unbanked individuals. Its rapid growth occurred worldwide, particularly in underserved rural areas and among women, which were considered groundbreaking initiatives for pro-poor banking at that time (Mersland and Strom, 2012). Recognizing the significance of women's involvement in financial services, microfinance operations highlighted the associated social benefits. Due to their participatory approach, these operations effectively complemented the formal banking system, drawing more people into the realm of formal financial services. Microfinance organisations boasted extensive networks and implemented unique strategies to reduce costs and risks, thereby assisting banks in expanding their presence and reach. Their efforts contributed to the deepening of financial services accessibility and further fostered financial inclusion. As competition intensified within the microfinance sector, the social aspect of its operations began to diminish. Microfinance institutions increasingly targeted clients who were easier to reach, resulting in new additions to their customer base being primarily from the better-off segment among the poor, urban areas, or businesses with rapid turnover, like retail (Kent and Dakin, 2013). Chasmer (2009) refers to this shift towards wealthier clients as 'mission drift'. While commercialization and growing competition are commonly cited as reasons for this shift, it could also have been driven by the need to comply with stringent regulatory requirements, such as maintaining capital adequacy ratios (Chasmer, 2009). It is at this critical point that digital technologies become crucial, as they offer a means to connect with marginalised individuals and embrace a more comprehensive and inclusive business model. The integration of digital technologies allows microfinance institutions to extend their services to underserved populations and align with their original social mission, counteracting the effects

of mission drift caused by commercialization and competition. The proliferation of digital technology will enhance inclusion in both existing and emerging markets. According to the World Bank (2016), this improvement stems from the fact that certain transactions did not previously exist due to lack of knowledge or information imbalances between parties. Digital technologies effectively address these issues by providing access to information and facilitating searches. The primary challenges in these cases were related more to trust and transparency than cost, and technological innovations significantly ease monitoring and information sharing. Access to user-specific data empowers firms to implement newer risk mitigation strategies and offer more personalised services. An excellent example of this is the increased use of credit bureau data in the Indian market, where microfinance institutions actively engage with credit bureaus and contribute to their databases. Integration with the credit bureau system benefits consumers as well, as it simplifies future interactions with mainstream financial entities.Moreover, technological advances enable a broader perspective of financial inclusion, moving beyond mere provision of financial services to the unbanked. True financial inclusion encompasses ensuring the continuous and efficient utilisation of these services, which depends on both demand and supply factors (Demirgüç-Kunt, et al., 2007). Technology-driven innovations hold immense potential to address the needs of the underbanked, who may be voluntarily or involuntarily excluded from the formal financial system. These innovations differ from others in that they can be swiftly adopted and are primarily pioneered by newer and smaller players. Microfinance institutions can readily collaborate with these emerging players to introduce fresh operational models and innovative service delivery methods.

8. The Indian Microfinance Industry

The origin of India's microfinance industry can be traced back to community development programs and the rise of self-help groups (SHGs). While these initiatives laid the foundation for microfinance activities, the major boost came with NABARD's SHG-bank linkage program (SHG-BLP), wherein NGOs were encouraged to promote and nurture SHGs. These groups would then deposit their savings with existing banks, operating within the existing legal framework (Karmakar, 2008). Microfinance institutions have now become a vital part of India's banking sector. These institutions emerged around the same time as SHG-BLP and have continuously evolved.Inspired by the success of Bangladesh's Grameen Bank, there was a surge of activity in the microfinance sector, with numerous organisations engaging in financial intermediation for social development (NABARD, 2016). Many of these entities started as not-for-profit organisations but later transformed into for-profit entities and non-banking financial companies (NBFCs). With a favourable policy environment and substantial capital inflows, the sector experienced rapid growth, particularly in the latter half of the 2000s. Despite facing intermittent crises, the sector has continued to grow and now encompasses a significant number of NBFCs, commercial banks, as well as not-for-profit trusts, societies, and NGOs.The majority of the microfinance sector is dominated by NBFC-MFIs, accounting for 79% of the total loan portfolio. About 82% of the portfolio belongs to MFIs with a portfolio size exceeding Rs.500 crore (Sa-Dhan, 2017). It is evident that the sector is largely controlled by large for-profit commercial entities, while the presence of others is comparatively limited.As previously mentioned, as the microfinance industry expanded and evolved in India, it encountered similar challenges to those faced in other countries regarding its role in development. The most

significant crisis emerged in Andhra Pradesh in 2010 (Priyadarshee and Ghalib, 2011; Jariwala and Mehta, 2015), with reports of coercive loan recoveries and borrower suicides. Andhra Pradesh held a leading position in terms of loan portfolio, with a total outstanding loan amount of approximately Rs. 5,210.8 crore. In that year, 56% of the total client outreach of MFIs was in the southern region, and Andhra Pradesh alone accounted for almost 42% of the total client outreach within the region. Though there are varying opinions about the exact causes of the crisis, there is a general consensus that it originated from some MFIs disregarding fair-lending practices in their pursuit of building portfolios (Kaur and Dey, 2013). This led to overindebtedness and distress in many areas. The situation culminated in the enactment of the Andhra Pradesh Microfinance Institutions (Regulation of Moneylending) Act, 2010. Faced with stringent regulations and an unfavourable environment, MFI activities in the state collapsed, causing a severe impact on the sector. Defaults and operating costs soared, rendering the MFI activity unviable and unprofitable. Consequently, the asset quality of MFI players was affected, and write-offs increased from 0.6% in FY09 to approximately 9% in FY11 (Jariwala and Mehta, 2015). Banks' reluctance to lend to microfinance companies worsened the situation (Kaur and Dey, 2013), leading to the implementation of corporate debt restructuring (CDR) bailout packages for major MFI players operating in Andhra Pradesh (Jariwala and Mehta, 2015). The crisis had repercussions beyond Andhra Pradesh, with costs per borrower for MFIs outside the state increasing by 60%. This nationwide impact prompted several regulatory reforms and improvements in the operational practices of microfinance companies in India as a response to the crisis of 2010. After adopting the recommendations of the Malegam Committee, the Reserve Bank of India (RBI) introduced comprehensive guidelines for the microfinance industry and established a new non-banking category known as NBFC-MFIs (Non-Banking Financial Company - Microfinance Institutions). This categorization has significantly transformed the industry's dynamics. Despite its growth, there are lingering concerns about the nature of this growth and its impact on financial inclusion.

A rapid analysis reveals a significant imbalance within the industry, with a heavy concentration of resources in large NBFC-MFIs, while others lag behind. According to Sa-Dhan (2017), during 2016-17, the total debt funds received by the sector amounted to nearly Rs. 26,236 crores, excluding Small Finance Banks (SFBs). Out of this total, 95% was directed towards NBFC-MFIs. In terms of size, the majority of these funds (84%) were allocated to large MFIs with a portfolio size exceeding Rs. 500 crores. Additionally, the industry is grappling with an increasing cost of funds. For instance, in 2015-16, the cost of funds for various microfinance institutions in India ranged from 11% to 15%, with a median of 13.3% across all segments (Sa-Dhan, 2016 b). Data from the microfinance institutions network (MFIN), the industry body of NBFC-MFIs, consistently indicates that large NBFC-MFIs benefit from significantly lower average costs of funds when compared to mid-sized or small institutions (MFIN, various years). This further contributes to the uneven distribution of resources within the sector. Regarding financial inclusion, the microfinance industry experienced a temporary slowdown in client outreach, particularly in 2012 and 2013. However, it has been steadily growing since then. Notably, a significant aspect of this growth is the industry's shift away from being perceived solely as a rural phenomenon. There has been a remarkable rise in the share of urban clients. The proportion of rural clientele, which was previously 69%, declined to 33% by 2015. This observation raises concerns about the potential occurrence of the mission drift, as discussed earlier (Chasmer, 2009).

9. Digital technologies and microfinance

At this critical point, the significance of advancements in digital technology becomes apparent, as microfinance companies are swiftly embracing digital solutions in line with prevailing trends in the financial sector. Integrating technology with microfinance operations has been a major policy agenda since the late 2000s. Prior to this, the focus of institutional support programs for MFIs primarily centred around demand-side issues and enhancing human resources capacity. To understand how technology gradually permeated the microfinance sector, a thorough analysis of past reports such as Status of Microfinance, Bharat Microfinance, and Inclusive finance reports was conducted. It was observed that technological innovations consistently emerged as a theme in capacity-building programs starting from 2003-04. The objective was to adopt innovative solutions that would facilitate outreach and sustainability. During this period, several pilot projects aimed to promote technological integration, such as Computer Munshi, e-Grama, and branch automation. While e-Grama focused on establishing village information centres, the other two projects aimed to improve the bookkeeping and efficiency of field workers.Technology was viewed as an instrument to enhance efficiency, particularly in back-end operations. The alluring incentive of efficiency gains drove widespread adoption of Management Information Systems (MIS), Automatic Teller Machines (ATMs), Interactive Voice Response (IVR) systems, and other technological tools. Furthermore, specialised software for loan management, accounting, human resources management, and monitoring were introduced during this period. Examples of such software include Delfix Nano, Bijli, Ganaseva, and Efimo, which were adopted by various MFIs (Srinivas and Mahal, 2017).The stated strategy is evident in official policy papers. In the Rangarajan Committee Report (2008) concerning financial inclusion, the emphasis on utilising technology-based approaches was primarily to lower transaction expenses. The Committee acknowledged the substantial and diverse operational costs associated with small credits, which depended on the institutions' operating models and cost structures. As a result of the Committee's suggestions, the establishment of the Financial Inclusion Technology Fund (FITF) aimed to boost investments in Information and Communication Technology (ICT).The adoption of technology by many Microfinance Institutions (MFIs) received significant momentum through their partnerships with commercial banks, known as banking correspondents (BCs). This technology-based approach aimed to enhance access to formal financial services for people living in remote areas (Sa-Dhan, 2017). BC activities have been integrated into the Indian financial services industry since 2006. Under this model, banks are permitted to outsource financial services through business correspondents and business facilitators. MFIs, which had well-established rural networks, quickly became preferred partners, leading to the development of "partnership models" (Nair and Tankha, 2014). A notable example of this approach was the collaboration between ICICI Bank and Cashpor, with FINO serving as the technology provider (Nair and Tankha, 2014). This model, largely promoted by private banks, flourished until the Andhra Pradesh crisis. Subsequently, the corporate BCs (primarily technology service providers) took the lead, but the sustainability of the BC business became a challenge. However, with the rise of NBFC-MFIs, partnership models were revived, offering more opportunities and a greater role for MFIs. Currently, the BC portfolio constitutes a significant portion of MFIs' total portfolio, accounting for 21%, and 69% of the managed portfolio (Sa-Dhan, 2018a). The BC model played

a pivotal role in encouraging MFIs to switch to digital solutions, as the partnership proved to be a profitable business domain with promising returns, especially for smaller MFIs. As banks had already embraced technology in their operations, the BC partnerships provided the incentive, motivation, and much-needed familiarity for MFIs to transition to newer technologies. Various technology additions such as General Packet Radio Service (GPRS)-enabled mobile-based online applications, portable printing devices synchronised with mobile handsets, real-time data transfer to servers, and biometric smart cards gained popularity due to the BC role of MFIs and their engagement with banks (SaDhan, 2016). On one hand, the BC model expedited the adoption of technology-led models in microfinance institutions, and on the other hand, it familiarised the clientele, particularly the rural population, with digital financial services. However, a significant shift in the approach to technology adoption within the MFI sector occurred only when mobile-based technology achieved widespread implementation at various operational levels. The increased penetration of mobile technology, internet, and mobile banking played a crucial role in this process, highlighting that technology was the primary catalyst for advancing financial inclusion. During this phase, the focus shifted towards understanding the impact of technology on inclusion. It also marked a period of recovery for the MFI industry, as institutions actively sought alternative operational models to enhance their outreach. Consequently, front-end activities underwent digitization through real-time data entry, geo-tagging, the use of financial literacy videos to educate clients, and other advancements.

An early example of adopting mobile technology was demonstrated by Sonata Finance Pvt. Ltd. (Sa-Dhan, 2015), which became one of the pioneers in using mobile technology for loan approvals and disbursals. The widespread adoption of mobile technology brought numerous benefits to the company, including real-time transaction tracking, generation of real-time reports, digitization of physical records, and improved transparency and process efficiencies (SaDhan, 2015).Currently, a rapid series of innovations is causing significant changes within the industry. For instance, MFIs of all sizes are increasingly adopting cash-lite models for disbursements and repayments, despite concerns about the initial high costs. These changes are partly driven by continuous innovations in the financial services sector, but there are other equally important factors contributing to this trend. The State plays a crucial role, as there is an ongoing policy push for digitization throughout the country. The Indian Government has been actively promoting digital transformation through initiatives like Digital India, Digidhan mission, Jan Dhan, and JAM trinity. The development of a neutral and open payment ecosystem in the country has proven to be highly beneficial for the MFI sector. The increased adoption of Immediate Payment Services (IMPS), Unified Payment Interface (UPI), and National Unified USSD Platform (NUUP) enables MFIs to offer multiple products and leverage the advantages of digital finance. A clear example of the transition to digital finance is the rising proportion of cashless disbursements compared to total loan disbursements. According to Sa-Dhan (2018 b), during Q4 of the financial year 2017-18, 45% of the total disbursed amount was through cashless means. This cashless mode is gaining significant traction, and there have been reports of institutions completely shifting to a cashless mode for loan disbursals and other digital initiatives such as E-KYC (Sa-Dhan, 2017). Technological integration is also making headway in the bank-linked SHG sector, which has historically lagged behind MFI institutions in this aspect. An example of this is the noteworthy EShakti7 program by NABARD, which aims

to promote digitization among self-help groups. This program addresses issues related to the quality of book-keeping, multiple memberships of SHG members, credit history of members, etc. By leveraging technology, this initiative facilitates access to affordable credit by eliminating information asymmetries that have hindered SHGs from becoming a part of the larger banking system. MFIs have now started forming partnerships with fintech companies. According to a report by PwC (2017), there are numerous instances of collaboration between MFIs and fintech companies in India. These collaborations encompass various aspects, including customer onboarding, credit assessment, loan disbursal, and collections.For instance, Janalakshmi Financial Services (an MFI) has joined forces with the Entrepreneurial Finance Lab (EFL), a psychometric credit assessment company, to access credit assessment services. Additionally, Oxigen Services and Sonata Finance Limited (an MFI) have formed a partnership to offer mobile financial services and education to the latter's clients. Another example is the collaboration between Ujjivan (an MFI, now a Small Finance Bank) and Artoo, a technological company, to streamline customer onboarding processes (PwC, 2017). These collaborations have not only been innovative but have also contributed to operational efficiency and the achievement of financial inclusion objectives.An important characteristic of these innovative partnerships is that they not only enhance existing products but also provide access to a wide range of new financial services for previously excluded individuals. This has led to the growth of credit plus activities in India, such as micro-insurance and micro-pension programs (Sa-Dhan, 2017). As of 2017, MFIs had enrolled 14.68 lakh clients for health products and approximately 51.1 lakh clients for non-health products (Sa-Dhan, 2017).

As mentioned earlier, the swift integration of digital technology is driving process innovation within the industry, resulting in a reduced but not completely displaced role for field workers. The increasing prevalence of cashless operations and digital payments will mitigate the risks associated with cash-based transactions, leading to improved operational efficiency and cost savings. Service provision and risk management will no longer solely rely on physical outreach, as valuable insights can be derived from the digital data generated during operations.According to MFIN (2017), organisations adopting 'cash-lite' models have reported benefits such as reduced turnaround time, decreased risk of errors and fraud in disbursements and repayments, and streamlined reconciliation tasks due to data shared by technology service providers. Moreover, there has been a significant shift in institutions' engagement strategies as advancements in financial literacy tools have enhanced customer interactions.The technological change is not limited to digital field applications for customer onboarding or lead management activities (PwC, 2016) but extends to automation and increased reliance on analytics. Ongoing integrations of credit bureau data, E-KYC, Aadhar-enabled payments, adoption of self-service options, and e-payments are other components driving the sector's ongoing transition.The widespread adoption of enabling architectures like Aadhar and E-KYC is expected to yield substantial cost savings. While the microfinance industry is labour-intensive, with 60% of the total staff engaged in field operations in India, the increased utilisation of technology channels such as ATMs, POS machines, and mobile banking holds the potential to enhance operational efficiency. As technology continues to evolve, the industry is poised for further advancements and transformations in its operations.

10. Challenges

The microfinance sector is facing an issue concerning the diminishing "human touch" element in its operations, which had long set it apart from mainstream banking. As the sector embraces digitalization, there is a concern that the unique participatory and bottom-up nature of microfinance, which involves providing small, uncollateralized credit to low-income individuals for income-generating activities in the informal economy, might be eroded.Traditionally, microfinance institutions (MFIs) had distinct approaches to their operations, with variations in governance structures, delivery channels, accountability frameworks, and product offerings, despite adhering to a limited number of operational models. Their success hinged on their understanding of their clients and the specific geographical areas they served. The performance of microcredit organisations was not only influenced by macroeconomic and formal institutional factors but also by social beliefs, especially trust and cooperation norms (Berggren and Burzynska, 2014).Networks and trust played a critical role in microfinance operations, influencing outcomes at various levels of interaction. The web of networks built on trust and peer pressure was vital for the efficiency of these institutions. Field agents and loan officers were integral to this ecosystem as they established and maintained essential client interfaces, ensuring the survival of the institutions (Siwale and Ritchie, 2012). These field workers acted as facilitators, extending microfinancial services by overcoming clients' reluctance to participate and helping reduce the risk of delinquency while ensuring high-quality services (Siwale and Ritchie, 2012) (Fisher and Sriram 2002).The growing adoption of digital technologies poses a significant threat to the core principles of the microfinance industry. It remains to be seen how the sector will navigate and adapt to these changes while preserving its unique characteristics and effectiveness.The microfinance sector is confronting a rise in competition from technology-driven fintech companies and universal banks due to the growing convergence of markets. Fintech lenders like Capital Float, NeoGrowth Credit Limited, and Indifi Technologies Pvt Ltd. are entering the scene, catering to underserved and unserved markets (PwC, 2017). Moreover, the collaboration between commercial banks and fintech startups is further heightening the competitive landscape. These partnerships enable banks to address previous challenges of cost and informational asymmetry, allowing them to target clients who were previously overlooked. Although the direct competition may not be intense currently, the rapid advancements in digital innovations are erasing traditional boundaries both within and outside the microfinance market.

11. Conclusion

The global microfinance sector stands on the brink of a significant transformation, driven by the integration of digital technologies. This transformation has the potential to deeply impact the sector's core characteristics and organisational processes. While the adoption of technology holds the promise of fostering development through innovation, efficiency, and inclusivity, the road ahead may not be without challenges. The extent of the benefits remains uncertain, and it is clear that technological advancements alone cannot guarantee substantial progress. Equally crucial are factors such as competition dynamics and the obstacles faced.

One potential challenge lies in the emergence of a digital divide (Word Bank, 2016), where larger firms are better positioned to swiftly and effectively integrate technology, leaving smaller entities at a disadvantage. Additionally, unequal access and barriers to productive utilisation hinder the realisation of efficiency gains

promised by these technologies. These issues become more prominent when technologies rely on network effects, which thrive when a large number of people utilise them. The existing skills and logistical infrastructure play a pivotal role in addressing these concerns.It is essential to recognize that reaping developmental benefits from this technological transformation is not automatic and is contingent upon various factors, including the specific business climate, regulatory framework, and the skill level of the labour force in each country.

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