MSME Digitalisation in India

Current Status and Challenges

RIS
Research and Information System
for Developing Countries
विकासशील देशों की अनुसंधान एवं सूचना प्रणाली

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Pankaj Vashisht

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Contents

List of Tables and Figures

Tables

Figures

Abbreviations

AI	Artificial Intelligence
ASEAN	Association of South East Asian Nations
CRM	Customer Relation Management
CSIDO	Central Small Industry Development Organization
DCSSI	Development Commission for Small Scale Industry
ERIA	Economic Research Institute for ASEAN and East Asia
ERP	Enterprise Resource Planning
GDP	Gross Domestic Product
IFC	International Finance Corporation
IoT	Internet of Things
ITC	International Trade Center
KPMG	Klynveld Peat Marwick Goerdeler
LDCs	Least Developed Countries
MENAP	Middle East, North Africa, Afghanistan and Pakistan
ML	Machine Learning
MoMSME	Ministry of Micro, Small and Medium Enterprises
MSMEs	Micro, Small and Medium Enterprises
NIC	National Industrial Classification
OECD	Organization for Economic Co-operation and Development
ONDC	Open Network for Digital Commerce
RFID	Radio Frequency Identification
SCM	Supply Chain Management
SSIB	Small-Scale Industries Board
UPI	Unified Payments Interface

Preface

Professor Sachin Kumar Sharma
Director General, RIS

Micro, Small, and Medium Enterprises (MSMEs) are the backbone of India's economy, contributing significantly to job creation, innovation, and economic growth. They represent approximately 30 per cent of the nation's Gross Domestic Product (GDP) and are crucial to the economic fabric of the country. However, despite their importance, many MSMEs face significant challenges in their journey towards digital transformation.

The global economy is undergoing a digital revolution, with technologies such as e-commerce platforms, digital payment systems, artificial intelligence (AI), cloud computing, machine learning, big data, the Internet of Things (IoT), and quantum computing reshaping industries. For MSMEs, the adoption of these digital tools presents both opportunities and challenges. On the one hand, digital technologies can help MSMEs streamline operations, access new markets, and compete on a more level playing field with larger corporations. On the other hand, the rapid pace of digital transformation, coupled with financial and human resource constraints, leaves MSMEs vulnerable to the disruptions brought on by this change.

In light of these challenges and opportunities, this report—"MSME Digitalisation in India: Current Status and Challenges"—aims to provide a comprehensive analysis of the digital adoption journey among Indian MSMEs. With the financial support of the Mastercard Center for Inclusive Growth, this study leverages secondary research and a robust primary survey to shed light on the current state of digitalisation, sectoral and regional disparities, and the gender dimensions of technology adoption.

The findings reveal that while many MSMEs have embraced basic digital tools like digital payment systems, a substantial gap remains when it comes to more advanced technologies such as e-commerce platforms, AI, and cloud computing. Regional variations in digital adoption are significant, with states like Karnataka leading the charge, while others lag behind. The report underscores the clear benefits of digitalisation for MSMEs—enterprises that embrace digital technologies exhibit higher productivity and growth. However, significant barriers, such as a lack of awareness, skill shortages, and financial constraints, continue to hinder widespread digital adoption. To address these challenges, the report proposes targeted policy interventions, including awareness campaigns, digital literacy programs, financial support mechanisms, and enhanced cybersecurity measures.

We extend our sincere thanks to Dr Pankaj Vashisht, Associate Professor at RIS, for his diligent work in preparing this detailed survey-based report. We also acknowledge the financial support of the Mastercard Center for Inclusive Growth. We trust that this report will serve as a vital resource for policymakers, industry stakeholders, and MSMEs themselves, providing valuable insights and recommendations for fostering a more inclusive and digitally empowered MSME sector in India.

Sachin Kumar Sharma

Executive Summary

The global economy is in the midst of a profound economic transformation. Digital innovations such as e-commerce platforms, digital payment systems, artificial intelligence (AI), cloud computing, machine learning, big data, the Internet of Things (IoT), and quantum computing are revolutionizing traditional business models, fundamentally changing the way goods and services are produced and delivered.

The ongoing digital revolution offers unprecedented opportunities for Micro, Small, and Medium Enterprises (MSMEs) to enhance their efficiency, reach new markets, and compete on a more level playing field with larger corporations. However, due to financial and human resource constraints, MSMEs are also highly vulnerable to the disruptions caused by digital transition. There is a legitimate fear that if left to the market alone, MSMEs may lose their competitiveness due to rapid digitalisation, which given the critical role of MSMEs in job creation, could lead to serious societal ramifications.

The importance of MSMEs in the Indian economy cannot be overstated. They account for about 30 per cent of India's Gross Domestic Product (GDP) and form the backbone of the economy, driving job creation and economic growth. However, the level of digitalisation among Indian MSMEs remains poorly understood. *This report aims to fill this knowledge gap by providing a comprehensive analysis of the digitalisation journey of Indian MSMEs, highlighting sectoral, regional, and gender variations in digital adoption and examining the impact of digitalisation on their growth trajectories.*

Based on nuanced secondary research and a comprehensive primary survey of 2882 enterprises across fourteen major states and covering five major sectors; manufacture of food products, manufacture of wearing apparel, manufacture of auto components, retail trade services and food and beverage service, the report's key findings reveal a mixed picture of digital adoption among Indian MSMEs. On the positive side, MSMEs have made considerable progress in adopting basic digital tools and digital payment systems. The integration of these basic technologies has enabled many MSMEs to streamline their operations and improve their financial transactions. However, the use of intermediate digital tools, such as social media for marketing and e-commerce platforms for sales, as well as advanced technologies like ERP (Enterprise Resource Planning), SCM (Supply Chain Management), big data and AI, remains limited.

The study uncovers significant sectoral, regional, and demographic variations in digital adoption. While digital penetration is fairly uniform across different sectors, the retail trade sector shows a slight edge with substantial regional disparities. States like Karnataka are leading in digital adoption, whereas others, such as Odisha and Assam, are significantly lagging. Additionally, demographic factors play a crucial role in digital adoption. Larger enterprises and those led by young and more educated individuals exhibit higher levels of digital adoption. Gender differences also emerge, with male-owned MSMEs being slightly more digitally integrated than their female-owned counterparts.

The impact of digital adoption on MSMEs performance is clear: those that embrace digital technologies experience higher productivity and growth. The report establishes a positive relation between digital adoption and enterprise growth. A 10 per cent increase in digitalisation levels correlates with a 1.6 per cent increase in enterprise growth. Basic digital tools (such as smart phone, laptop, desktop, etc.) and internet connectivity provide the most substantial growth boosts, with subsequent adoption of more sophisticated technologies unlocking additional benefits.

Several barriers impede the digital transformation of MSMEs in India. One of the primary obstacles is the lack of information about the benefits and applications of digital tools. The majority of MSMEs are unaware of how digitalisation can improve their operations, market reach, and profitability. Skill shortages further exacerbate this issue, as many MSMEs lack the necessary expertise to adopt and utilize advanced digital technologies. Financial constraints pose another significant barrier, with the high upfront costs of digital technologies being a considerable obstacle for many MSMEs. Moreover, concerns about cyber security and the reliability of digital systems deter many MSMEs from adopting digital solutions.

To address these challenges, the report recommends several measures. Bridging the knowledge gap is crucial and can be achieved through comprehensive awareness campaigns and workshops aimed at educating MSMEs about the benefits and applications of digital technologies. These initiatives should highlight success stories, offer practical advice, and provide detailed information on available digital tools. Facilitating peer learning and knowledge sharing among MSMEs through forums, discussion groups, and networking events can also be highly beneficial.

Addressing the skill gap is equally important. Expanding the reach of digital training programmes, especially in underserved areas, and coordinating efforts between government and private sector initiatives can significantly enhance digital literacy and technical skills among MSMEs. Making technology affordable is another essential step. Developing standardized digital services and tools suitable for MSMEs, forming partnerships with technology providers to offer discounted or subsidised digital tools, and considering tax incentives and concessional credit lines can help reduce the financial burden of digital adoption.

Finally, building trust in digital technology is crucial. Tailored cybersecurity awareness programmes specifically targeting MSMEs can help alleviate concerns about data security and build trust in digital systems. Providing practical guidance and resources to enhance digital resilience will further encourage MSMEs to embrace digital technologies.

1 Introduction

The world is undergoing a significant economic transition. The phenomenal growth in computing power over the last couple of decades has led to several technological breakthroughs. Innovations such as e-commerce platforms, digital payment systems, artificial intelligence (AI), cloud computing, machine learning, big data, the Internet of Things (IoT), quantum computing etc. have revolutionised the global landscape. These technologies are driving a massive socio-economic restructuring, rapidly transforming traditional business models and creating new opportunities and challenges.

The ongoing digital revolution presents a multitude of opportunities for Micro, Small, and Medium Enterprises (MSMEs), offering a range of advantages that can propel their growth and success in the modern business landscape. Theoretically, digital technology has the potential to enhance efficiency and overcome the constraints that have traditionally hindered MSME growth. The rise of e-commerce platforms, for instance, enables MSMEs to reach a broader customer base both domestically and internationally without significant logistics costs. Online marketplaces provide these enterprises with a platform to showcase their products to a global audience, enabling them to compete with larger corporations on a more level playing field.

Meanwhile, digital payment solutions and financial services have made business transactions more convenient for MSMEs, paving the way for their financial inclusion and better access to institutional finance. Services such as mobile banking, digital wallets, and online lending platforms simplify the process of managing finances, securing loans, and conducting transactions, thereby reducing barriers to growth and expansion. Furthermore, mobile phones, the internet, and software solutions like Customer Relationship Management (CRM) and Supply Chain Management (SCM) systems, along with AI-powered chatbots, offer MSMEs the chance to ensure timely and personalised interactions with customers and suppliers. These technologies facilitate real-time communication, enhance customer service and streamline operations, helping businesses build stronger relationships and improve overall efficiency. Last but not the least, the advent of cloud computing has enabled MSMEs to access scalable and cost-effective IT resources. Cloud services offer flexible storage solutions, robust data security, and the ability to collaborate remotely, which is especially beneficial for small businesses with limited budgets.

However, gains for MSMEs from the ongoing wave of digitalisation are not automatic. In fact, given the prevailing digital divide, financial

constraints, and lack of capacity, MSMEs are often most vulnerable to shocks stemming from digital transition. The available evidence suggests that larger firms have been reaping more benefits from the growing digitalisation, while MSMEs are struggling to keep pace. It has been recognized that if left to the market alone, MSMEs may lose their competitiveness due to the rapid digitalisation which, given their critical role in job creation, could lead to serious societal ramifications. Consequently, facilitating the digitalisation of MSMEs has emerged as a policy priority globally.

Accounting for about 30 per cent of India's Gross Domestic Product (GDP), MSMEs form the backbone of the Indian economy. However, little is known about the digitalisation of MSMEs in India. A few studies have attempted to understand the adoption of digital technologies by Indian MSMEs, but these studies are highly restricted in their scope and coverage. The available studies dealing with MSME digitalisation in India can broadly be divided into two groups, based on their methodological approach. One set of studies relies on secondary data sources, such as Enterprise Surveys and Prowess data, to examine the use of digital technology and its impact on MSME performance (Huria et al., 2022; Jain et al., 2022). Despite providing some useful insight, these studies suffer from serious limitations due to the data set used. Studies based on the Prowess database cannot claim to truly represent MSMEs because Prowess database provides information on firms registered with the Ministry of Corporate Affairs, and therefore, micro and small enterprises are not covered in it. Similarly, studies using enterprise survey data suffer from the limitation of defining digitalisation very narrowly.

Given the limitations of secondary data sets, another set of studies has adopted primary survey-based approaches to examine the digitalisation of MSMEs in India. These studies suggest that the use of digital technology by Indian MSMEs has increased, especially after the COVID pandemic. However, these studies also have a few limitations as they either have relied on a very thin sample size (Arora & Rathi, 2019; Paypal, 2022) or have focused mostly on the adoption of e-commerce (KPMG, 2015; ICRIER, 2022). Since digitalisation is a multifaceted concept that involves the use of various digital tools ranging from basic digital products, internet, and social media to advanced digital solutions such as cloud computing, big data, and AI, a comprehensive study is required to quantify the uptake of different digital technologies and identify the constraints obstructing their adoption. For a federal country like India, where infrastructure, policy regimes, and the business environment vary substantially from state to state, it is also important to identify geographical variations in digital technology uptake. Against this backdrop, this study endeavours to conduct a thorough analysis of the digitalisation journey within India's Micro, Small, and Medium Enterprises (MSMEs). With a primary focus on discerning the evolutionary path of MSME digitalisation within the Indian context, the study also aims to explore the sectoral, regional, and gender variations in digital adoption. Additionally, it seeks to delve into the impact of digitalisation on the growth trajectories of MSMEs while identifying the barriers hindering their digitalisation endeavours.

Drawing from both secondary research and a comprehensive primary survey, the study uncovers a nuanced perspective of digitalisation among Indian MSMEs. It underscores the remarkable progress witnessed in basic digital integration and the adoption of digital payment systems across the country. However, the utilisation of intermediate and advanced digital tools remains at a nascent stage, with larger enterprises led by more educated individuals showing relatively higher levels of digital adoption. Furthermore, the study reveals that MSMEs embracing digital technology are experiencing heightened levels

of productivity and growth. This study argues that the lack of information about digital tools and their benefits, skill shortages, financial constraints, and a general lack of trust in digital technology have been the major barriers to MSME digitalisation and advocates for targeted interventions to support MSMEs in overcoming these barriers.

Rest of the report is structured as follows. Section II provides a comprehensive review of the global literature on MSME digitalisation. The growth and evolution of MSMEs sector in India are discussed in Section III, while Section IV deals with the prevailing ecosystem for MSME Digitalisation in India. Data source and methodology of the study are explained in Section V. Main findings and survey results are discussed in Section VI. Finally, Section VII concludes the report with a recapitulation of the main findings and a few policy recommendations.

2 Review of Literature: Understanding Digitalisation in MSMEs

Digitalisation has emerged as the most talked about concept recently. While the term has a longer history in the context of computing and telecommunications, its use in the broader sense of digital transformation across various industries became more prevalent after the invention of the internet in the late 1990s. However, the term gained real traction only at the dawn of the 21st century when organisations across sectors started integrating advanced digital tools to redefine their business models. Since, the impact of digitalisation is expected to be profound and far-reaching, affecting various aspects of business, society, and individual lives, scholars for the last decade have been trying to understand the opportunities, likely impact and challenges associated with growing digitalisation. Since MSMEs play an important role in employment generation and inclusive development, efforts have been made to examine the implications digital technology has for and on MSMEs across the globe. Specifically, studies have tried to answer three broad questions; what opportunities digital technologies offer MSMEs? What is the status of digital technology adoption among MSMEs? What are the barriers to MSME digitalisation? In this section, we briefly review the existing literature on MMSEs digitalisation around these three questions.

2.1 Definition of Digitalisation

Digitalisation is a multidimensional concept. It involves the use of various digital tools, ranging from computers, mobiles, internet to more advanced digital solutions such as artificial intelligence, cloud computing and big data analysis etc., for business purposes. Therefore, depending upon the level of sophistication, the digitalisation can be categorised as basic level digitalisation, intermediate level digitalisation and advance digitalisation (OECD 2021). At a basic level, digitalisation often refers to the conversion of traditional, paper-based business processes into digital formats, such as replacing paper documentation with digital records or implementing electronic communication systems. However, at intermediate and advance level, digitalisation denotes fundamental business transformation, which not only involves doing things digitally but also leveraging digital technology to create new business models, products, and services. It often involves a cultural shift and a commitment to innovation.

2.2 Opportunities

Digital technology holds great potential for MSMEs. At a very basic level, digital tools/ digital connectivity enables MSMEs to have better and real time communication with customers and suppliers, which has been found to have a positive impact on firms' productivity, profitability and new customer acquisition (Esselaar *et al*., 2007; Donner, 2009). Second, digital connectivity allows MSMEs to overcome the information gap/information asymmetry. Access to market information and government support/policies is critical for efficient business decision making. However, given resource constraints, micro and small firms have suffered heavily due to information gaps. Digital connectivity has allowed MSMEs that have adopted these technologies to overcome information gaps in a very cost-effective manner. The available evidence from selected sectors suggests MSMEs using mobile or internet to access market information have performed better than their peers (Uduji, Okolo-obasi and Asongu, 2019). Similarly, access to information regarding government policy has also been found to have a positive effect on MSMEs performance (X. Li He and Zhang, 2020).

Improved market access has been identified as another benefit associated with digitalisation. Digital technology in the form of e-commerce allows MSMEs to access a wider customer base without investing large resources in marketing and logistics. Firms can indulge in e-commerce through their own website or through intermediaries such as e-commerce platforms. While there is limited evidence to support web presence leading to a higher customer base, the available evidence does suggest that e-commerce intermediaries have indeed emerged as a powerful tool for MSMEs to access more customers (UNCTAN 2017). Access to financial services is another benefit which digital technology offers. Given the fact that a major chunk of MSMEs, especially micro enterprises operate in rural and semi urban areas in an informal setting, they have traditionally remained out of the formal banking sector. However, the advent of digital financial services has enabled the MSMEs to use a greater variety of financial services ranging from accounts, payments to credit and financial management. Notably, the available empirical evidence suggests that digital financial services, especially account/digital transaction contribute to MSMEs productivity immensely (Mastercard Foundation and IFC, 2018; Friederici *et al.*, 2020).

Finally, digital technology has also opened the opportunity for complete digital transformation, which represents a fundamental shift in how businesses leverage technology to drive innovation, improve efficiency, and enhance overall performance. It is not just about adopting specific technologies. It involves a comprehensive rethinking of business strategies, models, and culture to adapt to the digital age. It involves incorporating advanced digital solutions such as cloud computing, artificial intelligence, machine learning, data analytics, Internet of Things (IoT), and automation into business operations. For MSMEs, this transformation can lead to enhanced decision-making capabilities through better data analysis and insights.

2.3 Adoption of Digital Technologies

The benefits of going digital are immense for MSMEs. However, are MSMEs adopting digital technologies? Unfortunately, in the absence of any standardised database, quantifying the level of digitalisation among MSMEs has remained fraught with challenges. Scholar across the globe have tried to examine the status, barriers and impact of digital technologies on MSMEs using a primary survey approach. However, the available studies vary significantly in their methodological approach. A large number of studies have focused on one or two dimensions of digitalisation. There are only a few studies

which have tried to capture MSME digitalisation in all its dimensions. Despite these limitations and variations, the available evidence clearly show that MSMEs not only lag far behind larger firms in adopting of digital technologies, but there also exists huge cross-country and within country variation in the level of MSMEs digitalisation.

The available evidence from high income countries suggests that digital offtake among MSMEs has increased significantly, especially after the COVID-19 pandemic, and most of MSMEs have achieved an intermediate level of digitalisation. Small firms are now almost at par with big firms when it comes to the use of digital tools for business-to-business interaction, business-to-customer interactions and interaction with government. In other words, most of the small and medium firms in high income countries have digitised their process and have been using digital tools for marketing, sales and fulfilling legal formalities (OECD, 2021; PwC, 2022). However, a large gap between small and big firms continues to persist when it comes to advance level of digitalisation (Deloitte, 2020; OECD, 2021; PwC, 2022; Ri & Luong, 2021; Tan Maria & Chian, 2019). The available evidence suggests that only a fraction of small and medium firms have invested in advanced digital solutions such as CRM, SCM and ERP which are critical for the integration of business processes and complete digital transformation. Similarly, the adoption of digital tools for production and logistics (RFID) has remained far low among small and medium firms as compared to their big counterparts.

Studies from developing countries paint a bleaker picture. Despite reporting increasing MSME interest in digital technology, these studies almost unanimously report that a predominant majority of MSMEs in developing countries are far from attaining the intermediate level of digitalisation. For example, Bain (2018) surveyed 2,300 MSMEs across ten ASEAN member states to examine the digital integration of MSMEs in the region. The report showed that only 16 per cent of MSMEs surveyed were truly digitally integrated. Similar findings were reported by ERIA (2018) for the ASEAN region. Though based on a very thin sample, this study reported that 56 per cent of MSMEs in ASEAN region are at basic level of digitalisation with minimal adoption of the digital technology. In other words, 44 per cent of firms surveyed were not using digital technology of any significance. The study further reported that 36 per cent of enterprises interviewed were at intermediate level of digitalisation, while just 10 per cent had achieved an advanced level of digitalisation. Similar finding has been reported for China which has made tremendous economic strides in the recent past (Xi *et al.,* 2020).

Available evidence shows that Africa in general, and Least Developed Countries (LDCs) in particular, perform much worse when it comes to MSME digitalisation. The adoption of digital tools among MSMEs in a large part of Africa and LDCs has remained confined to very basic tools such as the use of mobile telephony (Tob-Ogu, Kumat and Cullen, 2018; Souza, Siqueira and Reinhard, 2017; Wanyoike, Mukulu and Waititu, 2012). Notably, even the use of the internet by MSMEs in these economies has remained in a nascent stage. Mothabi et al. (2020) reported that only 7 per cent of MSMEs in Africa use internet for business purposes. The study further reported that the proportion of MSMEs using internet for business purpose in LDCs of Africa was below 4 per cent.

Apart from the massive across country variation in MSME digitalisation, described above, which seems to be positively associated with the level of economic development, gender gaps in the adoption of digital technologies are also widespread. The level of digitalisation among female-owned enterprises has been found to be significantly lower than the level of digitalisation among male owned enterprises (Deen-Swarray, Moyo and Stork, 2013; ITC,

2017). Using World Bank Enterprise Survey data, ITC (2017) concluded that after contorting for other firm characteristics, such as export status, firm size and firm age, women-managed enterprises were 12 per cent less likely to use email than their male counterparts.

2.4 Binding Constraints

Despite proven benefits, digitalisation among MSMEs has remained low. Literature has identified several interrelated barriers which are hindering MSME's ability to fully leverage technology for business growth. Broadly, five binding constraints have been identified. First is the lack of financial resources and/or unaffordability of digital technologies. It is widely known that MSMEs generally operate with tight budgets, which makes it challenging for them to spare financial resources to invest in digital technologies. The surveys across countries have shown that MSMEs rate unaffordability of digital technologies/lack of financial resources as the biggest constraint to their digitalisation. Cost is an extremely important constraint when it comes to the adoption of more sophisticated digital tools because they not only cost more but also need a minimum scale of operation, which many MSMEs lack.

Lack of efficient and reliable infrastructure has been identified as the second biggest constraint to digitalisation, especially in developing and least developed countries. Availability of efficient and reliable digital infrastructure, especially the internet, along with power supply, is a prerequisite for smooth adoption of digital tools. However, availability of digital infrastructure and reliable power supply has continued to be an issue, especially in rural and remote areas of developing and low-income countries. The global evidence shows that the extent of MSMEs digitalisation is inversely linked with the level of income and population density. Since the digital divide continues to exist between high-income and low-income countries, as well as between rural and urban areas, these evidences clearly show that the unavailability of reliable and efficient digital infrastructure has been one of the prime barriers to digitalisation of MSMEs.

Information gaps, lack of digital skills and limited capacity to identify the most appropriate digital solutions for their business operations have been the third most important barrier to MSMEs digitalisation. MSMEs face a skills gap when it comes to understanding and implementing digital technologies. Most of MSMEs, especially, the micro and small enterprises, operate in an informal setting and are managed by people without formal education in business management. It has been reported that a large chunk of MSMEs owners either do not understand the benefits of digital solutions or do not know how to effectively use them. Moreover, since demand for digital skill has skyrocketed, training employees or hiring skilled personnel has also become a daunting task for small and medium enterprises.

Security and regulatory concerns are other important barriers. Given the lack of capacity, MSMEs face challenges in complying with evolving digital regulations and standards. They also hesitate to embrace digital technologies due to concerns regarding data security and privacy. The fear of cyber threats and the cost of implementing robust security measures have also been reported as a deterrent to digitalisation. Finally, there is also a tendency of resistance to change. It has been found that organisations and individuals resist digitalisation due to a variety of reasons including fear of job loss, lack of understanding, lack of trust, etc.

3 Evolution of MSME Sector in India: A Historical Perspective

MSMEs are considered the backbone of economies globally. They are often a hub of entrepreneurship, resulting in regional innovation and diversification, and foster adaptability, leading to the inclusive development of new products, services and business models. Given the high labour intensity, they also serve as the primary source of livelihood for a large segment of the population, particularly in rural and semi-urban areas. The labor-intensive nature of MSMEs makes them vital for reducing unemployment, which is critical for attaining inclusive and sustainable development. Given these characteristics, MSMEs development has received special attention all over the world. India, too, has attached the highest priority to the development of MSMEs. Since independence, a well-crafted policy, encompassing promotional as well as protective policy measures, has been employed to promote small-scale enterprises.

The origin of small-scale industrial policy in India can be traced back to 1954 when acting upon recommendations from Ford Foundation experts, the Government of India set up several organisations such as Central Small Industry Development Organization (CSIDO), Development Commissioner for Small Scale Industry (DCSSI) and All India Small-Scale Industries Board (SSIB) to build an effective county-wide network of industrial extension services for small scale industries (SSI). These institutions were tasked to provide technical, financial and marketing support to SSI. In subsequent years, other promotional as well as protective measures were also introduced. Essentially, during 1960s, India developed a three-pronged approach to promote small scale industries. First, institutions were put in place to provide market research information and other relevant skills to small scale industries. Second, promotional measures such as credit guarantee schemes and investment subsidies were introduced to improve access to finance and promote investment. Third, protective measures such as reserving certain items for exclusive manufacture in the small-scale sector along with tax concessions were introduced to shield small scale enterprises.

Over the next two decades, these protective as well promotional measures were further strengthened. The number of items reserved

for exclusive manufacture in the small-scale sector was progressively increased, and more promotional measures such as priority sector lending scheme, scheme of interest free loans etc. were introduced. In line with these measures, the small-scale industries witnessed a strong quantitative growth in India. Between 1960 to 1991, the number of units as well as employment in small scale sector witnessed very healthy growth (Table 1).

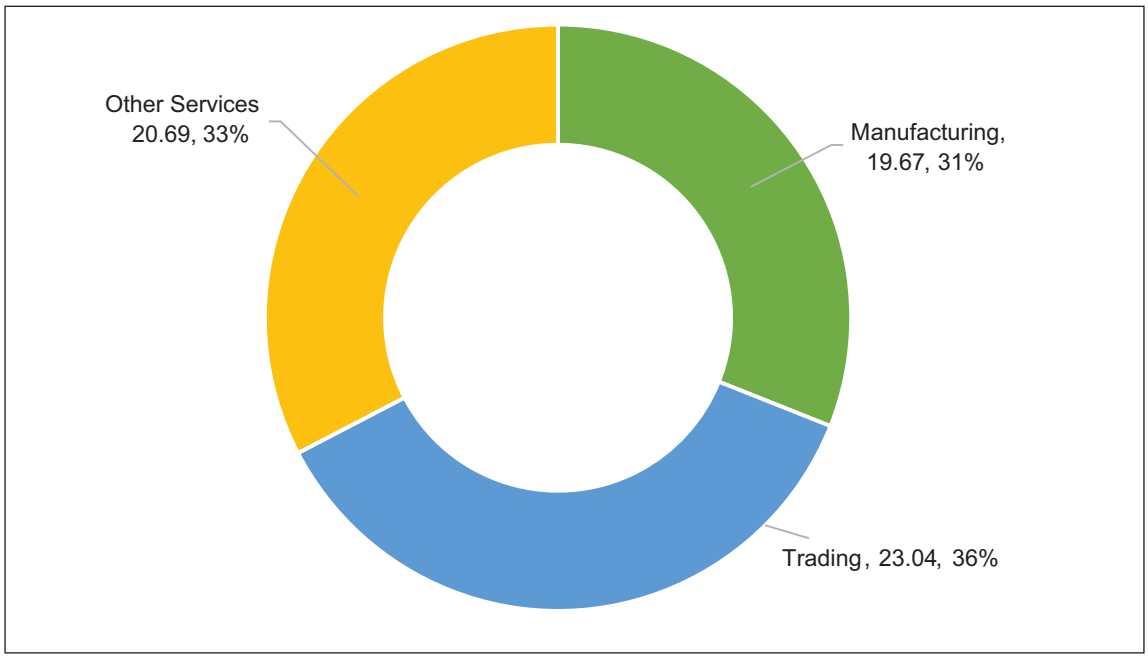
Table 3.1: Evolution of Small-Scale Industries in India

	Units (Million)	Employment (million)
1960-61$	0.03	1.39
1973-74$	0.16	3.97
1980-81$	0.87	7.10
1990-91$	1.95	12.53
2006-07#	36.17	80.52
2015-16*	63.40	110.98

Source: $ data from Development Commissioner for Small Scale Industries, Government of India, # Data from fourth all India Census of SSI, * data from 73rd round of NSS survey.

However, the pre-reform quantitative growth came at the cost of efficiency and innovativeness. Several studies, during the 1980s argued that the prevailing assistance arrangements for small scale industries were wasteful, ineffective and even counterproductive (Kashyap, 1988). In line with the growing criticism and broader shift in economic policies, small scale industry policy witnessed a radical shift in the post-reform period as policy focus shifted from protection to promotion. Starting from the mid-1990s, the protective measures, especially the reservation of items for exclusive manufacture in small scale industries, were gradually phased out, and more promotional measures were introduced to make SSI competitive. In the post-reform period, SSI/ MSME policy focused on (i) credit constraint, (ii) marketing assistance and (iii) technology and quality up-gradation. In line with these measure, MSMEs sector in India has grown significantly (Table 1). As per the latest available data, around 64 million MSMEs are operating in India[1] and around 111 million people are employed in these enterprises, which roughly accounts for a quarter of the Indian labour force.

Figure 3.1: Sectoral Distribution of MSMEs



Source: Compiled from NSS 73rd round.

3.1 Sectoral Distribution of MSMEs

MSMEs in India are engaged in almost all economic activities. At a broader level, 23 million MSMEs (around 36 per cent of total MSMEs) are engaged in trading while around 21 million MSMEs are engaged in other services. The remaining 19.66 million MSMEs are engaged in manufacturing activities. However, at a disaggregate level, MSMEs are highly concentrated in a few selected sectors. An analysis of the distribution of MSMEs at 2-digit level of National Industrial Classification (NIC) suggests that eight sectors namely retail trade (NIC 47), manufacture of wearing appeals (NIC 14), land transport (NIC 49), manufacture of tobacco products (NIC 12), food and beverage services (NIC 56), other personal services (NIC 96), manufacture of textile (NIC 13) and manufacture of food products (NIC 10) accounts for around 71 per cent of operational MSMEs in India.

3.2 Ownership of MSMEs

Despite accounting for half of the population, female participation in economic activities across all developing countries has remained significantly low. India too have been grappling with low female participation in economic activities. Ownership of MSMEs by gender also corroborates this unpleasant fact. As per latest available data, male dominates in the proprietary MSME ownership. Male business owners control 79.6 per cent of MSMEs in India while females control only 20.4 per cent MSMEs. Notably female ownership varies quite substantially across different type of enterprises. Female ownership has remained largely confined to micro enterprises[2] (Table 2). As we move from micro enterprises to small and medium enterprises, proportion of businesses controlled by female declines drastically from 20.44 per cent to 5.6 per cent and further to below 3 per cent (Table 2). There also exists a rural-urban divide in female ownership of MSMEs, as male dominance is more pronounced in urban areas. Rural areas have a comparatively higher share of female-owned enterprises as compared to urban areas (Table 3.2).

Table 3.2: Distribution of MSMEs by Gender of Owner

Sector	Male	Female	All
All	79.63	20.37	100
By Region			
Rural	77.76	22.24	100
Urban	81.58	18.42	100
By Enterprise Type			
Micro	79.56	20.44	100
Small	94.74	5.26	100
Medium	97.33	2.67	100

Source: MSME Annual Report 2022-23

Endnote

1 Apart from these MSMEs, few thousand medium size enterprises are also operating in the organised sector. As per Annual survey of industry data, around 75 thousand medium manufacturing enterprises are operating in the organised sector and around 2.3 million people are employed in these enterprises.

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4 Digital Ecosystem: Infrastructure, Training and Financing for Digital Adoption

Presence of an enabling ecosystem is the key to facilitate MSMEs' transition towards digitalisation. In this section, we delve into a comprehensive analysis of the digital ecosystem for MSMEs in India, focusing on three fundamental pillars: digital infrastructure, training, and financing for digitalisation. Recognising the pivotal role of these pillars in facilitating the digital transformation of MSMEs, our analysis aims to provide insights into the current state and challenges within each domain.

4.1 Digital Infrastructure

Digital infrastructure is the most crucial pillar of the digital ecosystem. Without essential components like mobile towers, base transceiver stations, optical fibre and servers, the digitalisation of an economy is unimaginable. Over the past couple of decades, the Government of India has made commendable efforts to establish robust digital infrastructure. Multiple initiatives such as the Digital India Programme, BharatNet Project, Telecom Development Plan, the launch of 5G services and GatiShakti Sanchar portal have been introduced to ensure seamless nationwide digital connectivity. These dedicated schemes have led to phenomenal growth in the expansion of basic digital infrastructure across the country. For instance, between 2014-15 and 2022-23, the number of mobile towers nearly doubled while the number of base transceiver stations increased by more than four-fold (Table 4.1). Similarly, the length of optical fibre cable laid increased almost four times, from 10.62 lakh kilometres to 39 lakh kilometres. Notably, there has been a more than sixty-fold rise in the number of secure internet servers in India, during this period, from 10,941 in 2014 to 662,000 in 2023. The BharatNet project has played a stellar role in bridging the rural-urban digital divide. Launched in 2011 with the objective of connecting 250,000 village Gram Panchayats with high-speed broadband, the project has successfully connected 210,000 Gram Panchayats so far, with the remaining expected to be connected by 2025.

The massive expansion of infrastructure, coupled with a highly competitive telecom policy, has significantly increased digital penetration in India. The number of mobile

cellular subscriptions has risen from 944 million in 2014 to 1.142 billion in 2023, raising tele-density to 85.23 per cent. Internet penetration has also witnessed remarkable growth over the last one decade, with the number of internet users increasing from approximately 250 million in 2014-15 to over 880 million in 2023-24. Notably, broadband subscriptions have seen vertical growth as well, rising from below 60 million in 2013-14 to over 920 million in 2023-24, a fifteen-fold increase in just nine years. Both public and private companies are playing a key role in providing internet services across the country. There are approximately 1,200 Internet Service Providers (ISPs) in India. This competitive ecosystem has ensured that data tariffs in India have remained among the lowest in the world, at only INR 9.44 per GB. As a result, there has been a more than sixty-fold increase in data usage per mobile subscriber, from 0.27 GB per month in 2014 to 17.11 GB per month in 2023.

The government has also rolled out 5G services to ensure faster internet connectivity. As a result of the aggressive government approach, the number of 5G base transceiver stations has increased to 4.15 lakhs within a short span of time. These stations are already providing high speed internet connectivity to 742 out of total 766 districts in the country. More than 13 crore subscribers have started using 5G services. The rollout of 5G services has insured that average internet speed in India has increased to 70-80 Mbps in 2023.

As part of the infrastructure, the government has also successfully leveraged open-source-based Digital Public Infrastructure (DPI) to enable faster, more efficient, and effective digital transactions across the country. DPI, built on platforms like India Stack, JAM Trinity, UPI and Immediate Payment Service (IMPS), has played a significant role in boosting digital payments in India. The JAM Trinity—encompassing Jan

Table 4.1: Digital Infrastructure and Connectivity in India

Ser. No.	Indicator	2014-15	2022-23
1. Digital Infrastructure			
1.1	Optical fibre laid*	10.62 lakh km	39 lakh km
1.2	Villages connected under BharatNet*	58	2.10 lakh
1.3	Secure Internet servers#	10,941	6,62,298
1.4	Number of Base Transceiver stations*	6.49 lakhs	28.78 lakhs
1.5	Number of Mobile Towers**	4 lakhs	7.4 Lakhs
1.6	Median Speed of Mobile Broadband*	1.30 Mbps	91.81 Mbps
2. Digital Penetration			
2.1	Broadband subscriptions^	5.8 crores	92.4 crores
2.2	Mobile cellular subscriptions^	94. 4 crores	114.2 crores
2.3	Internet users*	25.15 crores	89.58 crores
2.4	Overall Tele-density^	75.38 %	85.23%
3. Affordability			
3.1	Cost of data*	INR 269/GB	INR 9.44/GB

Source: *DoT (2024), **PIB (2022), #World Bank WDI Database, ^TRAI (2014, 2014).

Dhan accounts, Aadhaar and Mobile numbers — has revolutionised Know Your Customer (KYC) procedures and minimized transaction costs. The government has established scalable platforms for UPI-based money transfers and democratized access to vital government data sources like ITR, GSTN and MCA. These digital foundations have paved the way for financial inclusion, streamlined payments, facilitated lending processes and unleashed private sector innovations. India now accounts for 46 per cent of all digital payments worldwide, with UPI transactions comprising 80 per cent of all digital payments in the country. In 2012-13, there were 1.62 billion digital payments, which have now risen to 14.726 billion in 2023-24 (RBI, 2024). The easy and convenient modes of digital payments have registered substantial growth, transforming the digital payment ecosystem by increasing both person-to-person (P2P) and person-to-merchant (P2M) payments. BHIM UPI has emerged as the preferred payment mode for citizens, recording 8.036 billion digital payment transactions valued at INR 12.98 lakh crore in January 2023 (PIB, 2023).

The government's initiative of promoting DPI has created a robust infrastructure that supports MSMEs in their digital transformation journey. Platforms like the Government e-Marketplace (GeM), Open Network for Digital Commerce (ONDC), Trade Receivables Discounting System (TReDS), and e-Sanchit have provided MSMEs with opportunities to access new markets, improve procurement processes, and manage trade receivables more efficiently. GeM has streamlined the procurement process for government departments and agencies, allowing MSMEs to participate more easily in government tenders and contracts. ONDC is facilitating seamless integration with multiple e-commerce platforms, allowing MSMEs to list their products and services across various channels without the need for separate integrations. TReDS has facilitated the financing of trade receivables, providing MSMEs with timely access to working capital. The e-Sanchit platform has simplified the documentation process for exports and imports, reducing the compliance burden on MSMEs.

Needless to say, the infrastructure pillar of the digital ecosystem, led by the government and propelled by the industry (both public and private), has seen exceptional growth and expansion in terms of both coverage and usage in India. Internet speed landscape has improved and with substantial investments in infrastructure along with the introduction of 5G technology, it is expected to improve further in years to come.

4.2 Awareness, Training and Capacity Building

Educating MSMEs about the benefits of digital technologies and strengthening their capacity to adopt digital tools through training is of great importance. Unless MSMEs are made aware and trained, the uptake of digital technologies is expected to remain below par. Although the government has yet to initiate any specific digital awareness program for MSMEs, digital training has received some traction as two government-run institutions, involved in skilling and technology up-gradation, have started offering digital training. The Ministry of Micro, Small and Medium Enterprises (MoMSME) has upgraded the MSME Technology Centres (earlier known as Tool Rooms and Technology Development Centres) to train MSMEs in emerging technologies. These Technology Centres (TCs) are providing training in areas such as digital marketing, e-commerce, digital payments, data analytics and software development to help MSMEs adopt and leverage digital technologies. As of now, 18 Technology Centers (TC) are fully operational and 15 more TCs are being established. Government also approved 'Establishment of New Technology Centres / Extension Centres' scheme, which aims to establish 20 new TCs and 100 extension centres.

The National Small Industries Corporation (NSIC) is also involved in digital capacity building for MSMEs. Although it does not offer standalone digital skills training programs, its comprehensive support ecosystem for MSMEs indirectly contributes to building digital capabilities within the sector. NSIC has been operating as an aggregator and facilitator of ICT-enabled digital services to MSMEs by onboarding various service providers, offering different products/services required for adopting digital ways of managing businesses. Such ICT-enabled digital services include software services (ERP, accounting, other software packages), cloud services [Platform as a Service (PaaS), Software as a Service (SaaS)], Artificial Intelligence solutions, IoT & Machine to Machine (M2M) solutions, B2B and B2C E-Commerce solutions and so on. Currently, there are only two empanelled service providers listed under the NSIC MSME Aggregation Service. These service providers are offering about 10-15 per cent discount on the pricing of the software products and packages.

NSIC through its eight 'Technical Services Centers' (NTSC) located at Okhla (New Delhi), Hyderabad (Telangana), Howrah (West Bengal), Rajkot (Gujarat), Chennai (Tamil Nadu), Rajpura (Punjab), Aligarh (Uttar Pradesh) and Neemka (Haryana), is also providing technology support services to MSMEs in the realm of 'e-Marketing/Digital Services facilitation for MSMEs. NSIC has also launched a B2B portal, 'MSME Global Mart (www.msmemart.com)' which provides an online platform for B2B marketing and connects MSMEs with buyers and suppliers worldwide. The portal aims at significantly reducing/ eliminating the challenge of weak marketing, market access and low visibility of MSMEs in the country.

Apart from government efforts, industry associations, foundations, corporate philanthropy and corporations are also playing important roles in promoting digital awareness and training. In December 2020, CII signed a Memorandum of Understanding (MoU) with the Mastercard Center for Inclusive Growth and the National Institute for Micro, Small & Medium Enterprises (ni-msme), an organization under the Ministry of MSME, to launch the 'Digital Saksham Initiative'. This extensive program aims to enhance the competitiveness of 300,000 MSMEs by imparting digital knowledge and promoting digital adoption (CII, 2020). The collaboration focuses on educating and training micro and small business owners and entrepreneurs to seamlessly integrate into the digital economy.

Open Network for Digital Commerce (ONDC) and Meta have also recently announced a partnership to support small businesses by providing education on building conversational buyer and seller experiences on WhatsApp through Meta's business and technical solution providers. Over the next two years, the Meta Small Business Academy aims to digitally up-skill 500,000 MSMEs, offering a certification program that empowers entrepreneurs and marketers with critical digital marketing skills to grow their presence on Meta apps. The initiative is designed to deliver capacity-building support for MSMEs on the ONDC network (Business Standard, 2023). As a part of Meta's commitment to supporting small businesses, the company will fund the appointment of professionals for one year to support ONDC's onboarding, seller and ecosystem development efforts. These professionals will directly assist small businesses by organising workshops and training sessions and offering hands-on support for digital adoption, including creating business pages and catalogues, marketing campaigns and scaling business operations on WhatsApp and Instagram. Through this collaboration, Meta and ONDC aim to accelerate the adoption of digital tools and strategies, fostering the growth and sustainability of MSMEs in the evolving digital landscape.

Though initiatives to spread digital awareness and training have gained traction, given the large size of the sector, these initiatives need to be scaled up considerably. Fortunately, the government is quite sensitive to this need and, therefore, has been contemplating a special scheme - 'Digital MSME Scheme' - to boost digitalisation of MSMEs. This yet-to-be-launched scheme aims to make MSMEs digitally empowered and motivate them to adopt digital tools, applications and technologies in their production and business processes. The scheme is expected to have provision for awareness campaigns as well as training and support for the adoption of digital tools such as cloud computing, websites and pre-developed Enterprise Resource Planning (ERP) suites to take care of the diverse requirements of the MSMEs, viz. HRM, CRM, Financial Management, Raw Material Management, etc. Once launched, the scheme will be a major boost to spreading digital awareness and capacity building.

4.3 Financial Support

The third crucial pillar in any digital ecosystem lies in financing. Financial support and incentives are essential to motivate MSMEs towards digitalisation. Given that the majority of enterprises in India's MSME sector fall under the Micro category, this becomes particularly critical as these businesses often lack the necessary funds to invest in adopting digital tools and techniques.

Unfortunately, financial support for MSME digitalisation has remained scarce in India. Government is yet to launch any direct and comprehensive support tailored specifically to the digital needs of MSMEs. However, there are a few schemes such as the Credit Linked Capital Subsidy Scheme (CLCSS), the Prime Minister's Employment Generation Programme (PMEGP), Technology Upgradation Fund Scheme (TUFS) and Raising and Accelerating MSME Performance (RAMP) Scheme which indirectly contribute to digitalisation efforts by providing financial assistance for technology upgradation, including the adoption of digital tools and software. The Credit Linked Capital Subsidy Scheme (CLCSS) offers subsidies of up to 15 per cent of the capital expenditure for technology upgradation, including the adoption of digital tools and software. The Technology Upgradation Fund Scheme (TUFS) supports technology modernization in sectors such as textiles and jute, offering financial aid for the adoption of new technology, including digital solutions.

The RAMP Scheme is another such scheme. Launched in June 2022, RAMP, a World Bank-supported Central Sector Scheme, is designed to boost MSMEs competitiveness by facilitating technology adoption, increasing market access and improving credit availability. With a total outlay of INR 6062.45 crores, including INR 3750 crores support from the World Bank, RAMP aims to benefit more than 5.5 lakh MSMEs by 2026-27. PMEGP also has provision for indirectly supporting the digitalisation of MSMEs. Though the scheme mainly provides financial assistance for setting up new ventures, with subsidies ranging from 15 per cent to 35 per cent of the project cost, depending on the location and category of the beneficiary, it also has a provision for second loan for up-gradation of the existing PMEGP/REGP/MUDRA units that can be utilized for adoption of digital tools.

While the schemes mentioned above provide valuable indirect financial support, there is a pressing need for more direct and comprehensive financial assistance tailored specifically to the digital needs of MSMEs. Therefore, the government should prioritize launching 'Digital MSME Scheme'. It could serve as a major avenue for providing fiscal support and incentives to MSMEs for adopting digital tools and solutions.

4.4 Summing up

Based on the analysis in this section, it is evident that the digital ecosystem for MSMEs in India is evolving, with notable progress in infrastructure development and initiatives to enhance awareness and training. However, the aspect of financing remains a challenge with limited direct support tailored specifically to the digital needs of MSMEs. While schemes such as the CLCSS, PMEGP, TUFS, and RAMP Scheme indirectly contribute to digitalisation efforts, there is a clear need for more direct and comprehensive financial assistance. The impending launch of the 'Digital MSME Scheme' holds promise as a potential solution to address this gap, providing fiscal support and incentives for MSMEs to adopt digital tools and solutions. Moving forward, greater collaboration between the government, private sector and industry associations, along with increased engagement of non-governmental organisations, will be essential in ensuring a more balanced and inclusive digital ecosystem that effectively supports the digital transformation of MSMEs in India.

5 Data and Methodology

This study aims to understand the trajectory of digitalisation among Indian MSMEs. It requires data on the use of different digital tools/technologies which, unfortunately, is not readily available. Therefore, this study adopted a primary survey approach to collect the required information and fill this critical research gap. We surveyed 2882 MSMEs to collect the required data, based in fourteen major states namely Andhra Pradesh, Assam, Delhi-NCR, Gujarat, Karnataka, Madhya Pradesh, Odisha, Punjab, Rajasthan, Tamil Nadu, Telangana, Uttar Pradesh and West Bengal, spread across five industry division according to NIC 2008, viz. Manufacture of Food Products, Manufacture of Wearing Apparels, Manufacture of Auto Components, Retail Trade Services and Food and Beverage services. The selection of the industries and the states was based on the natural distribution of MSMEs, with an attempt to capture states and industries that account for the most MSMEs.

A cluster-based approach was adopted to identify MSMEs for survey. Using secondary information, two to three districts with the highest concentration of MSMEs from each of the fourteen states, were selected for the field survey. Local information, available secondary research and Google web scraping were then used to identify multiple clusters/industrial hubs within each shortlisted district. After identifying clusters, the "right-hand rule" was applied to determine the final participants. Starting from a random geographical point within each cluster, a field investigator visited and interviewed all enterprises (from targeted sectors) located on the right-hand side of the starting point. Consistently applying this approach ensured a systematic and unbiased selection process, allowing us to gather diverse perspectives from across the clusters. Certain screening questions such as annual turnover, sector of operation and designation of respondent were asked to ensure the eligibility of targeted respondent. Only the owners or the managing directors of enterprise were interviewed to ensure accurate responses. The interviews were based on a structured questionnaire and each interview lasted for about 45 minutes. The field survey was also supplemented with key informants' interviews and comprehensive stakeholder consultations. Four rounds of stakeholder consultations, each focusing on North, South, West and East of India, were organised.

A detailed sector and size-wise distribution of respondents is given in Table 5.1. Majority of enterprises surveyed are micro enterprises followed by small and medium enterprises. In terms of sectoral distribution, one third of enterprises surveyed are from the Retail Trade services sector, another 17 per cent are from Food and Beverage service sector and remaining 50 per cent of enterprises belong to the

manufacturing sector. Within manufacturing, the largest number of respondents are from the Manufacture of Wearing Apparel sector, followed by Manufacture of Food Products and Manufacture of Auto components sector. In terms of regional distribution, most of the respondents are from Gujarat (12 per cent), followed by Tamil Nadu (10.9 per cent), Maharashtra (10 per cent), Karnataka (10 per cent), Rajasthan (8.1per cent), Uttar Pradesh (7.4 per cent), Odisha (7.3 per cent), Madhya Pradesh (7.1 per cent), Delhi-NCR (6.1 per cent), West Bengal (5.7 per cent), Telangana (4.5 per cent), Punjab (4.1per cent), Andhra Pradesh (3.7 per cent) and Assam (3 per cent) (Table 5.2).

Basic characteristics of the sample are reported in Table 5.3. It provides the distribution of sample as per education level, age and gender of owner/managing director as well as by the age and size of the enterprises. In terms of gender of owner, 2602 enterprises surveyed are headed by male, while remaining enterprises are owned or managed by female. In other words, approximately 10 per cent of enterprises in our sample are headed by female. At disaggregate level, the proportion of female-headed enterprises is two percentage points higher among Micro enterprise as compared to small and medium enterprises. Regarding the educational attainment, approximately 56 of

Table 5.1: Sectoral Distribution of Surveyed Enterprises

Sector	Micro	Small	Medium	Total
Manufacture Food Products	195	189	98	482
Manufacture of Wearing Apparels	207	198	113	518
Manufacture Auto Components	213	146	104	463
Retail Trade Services (except motor vehicles)	431	310	178	919
Food and beverage services	226	173	101	500
Total	1295	1035	605	2882

Source: Author's calculations based on the survey.

Table 5.2: Regional Distribution of Surveyed Enterprises

	State	Micro	Small	Medium	Total
1	Delhi-NCR	61	68	49	178
2	Punjab	50	44	25	119
3	Rajasthan	94	85	54	233
4	Uttar Pradesh	122	64	28	214
5	Maharashtra	112	104	71	287
6	Gujarat	135	122	89	346
7	Madhya Pradesh	81	79	46	206
8	Karnataka	123	99	65	287
9	Tamil Nadu	133	114	68	315
10	Telangana	58	49	23	130
11	Andhra Pradesh	43	42	21	106
12	West Bengal	75	57	32	164
13	Orrisa	150	54	7	211
14	Assam	35	35	16	86
	Total	1272	1016	594	2882

Source: Author's calculations based on the survey.

Table 5.3: Basic Characteristics of Enterprises Surveyed

	Micro	Small	Medium	Total
Owner's Gender				
Male	1,138	926	538	2,602
Female	134	90	56	280
Education of Owner				
Not Formally Educated	4	0	0	4
Educated up to 12th Class	539	339	92	970
Diploma holder	110	79	55	244
Graduate	524	462	318	1304
Postgraduate and above	95	136	129	306
Age of Owner				
Below 30 years	288	185	118	591
Between 30-39 year	568	498	285	1351
Between 40-49 year	282	245	144	671
Above 50 years	134	88	47	269
Year of Incorporation				
Before 1970	9	12	7	28
1970 -1979	16	7	12	35
1980-1989	35	27	9	71
1990-1999	100	102	72	274
2000-2009	233	203	167	603
2010-2019	777	602	295	1674
After 2019	102	63	32	197
Size of Enterprises (Number of Employee)				
Less than 10	1,190	0	0	1,190
10 to 24	82	721	0	803
25 to 50	0	91	0	91
Above 50	0	204	594	798

Source: Author's calculations based on the survey.

enterprises in the sample are owned/managed by individuals with graduate degree and above, another 34 per cent are managed or owned by individual with 12 years of schooling. Around 8 per cent of enterprises are headed by people with vocational diplomas. Notably, only four enterprises surveyed are headed by individuals without any formal education. In terms of age distribution of owner, majority of surveyed MSMEs are owned/managed by young entrepreneurs. Around 47 per cent of enterprises are owned/managed by those in the age cohort of 30 to 39 years, while another 21 per cent of enterprises are owned/managed by individuals below the age of 30 years. Notably, people above the age of 50 years owned/manage just 9 per cent of the enterprises surveyed.

The sample is also quite diverse in terms of the age of enterprises as the year of incorporation ranges from year 1902 to year 2023. However, the majority of surveyed enterprises falls within the mid-range of the age spectrum. The enterprises established between 2010 and 2019 account for 58 per cent of the enterprises surveyed. Enterprises established between 2000 to 2009 account for 21 per cent of the sample.

In other words, 79 per cent of the enterprises surveyed are in the age bracket of four to 23 years. Approximately 14 per cent of enterprise ssurveyed are in the age bracket of above 23 years while around 7 per cent of enterprises have been incorporated after 2019 and therefore can be described as start-ups.

Finally, in terms of the size of enterprises by employment, the sample is dominated by firms employing less than 10 workers. Such enterprises account for 41 per cent of the total sample. The enterprises with a number of workers ranging between 10 to 25 accounts for another 28 per cent of the sample. Around 28 per cent of enterprises surveyed have employee strength above 50 while 3 per cent of the enterprises has employee strength ranging between 25 to 50.

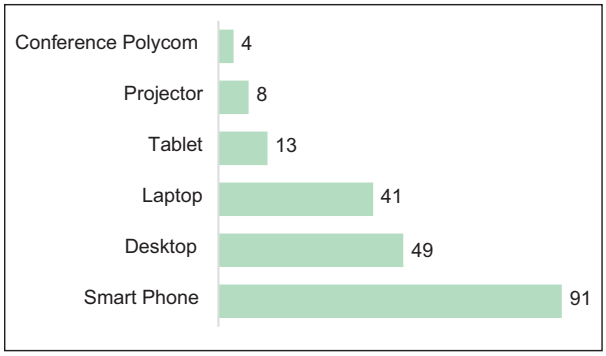
6 Unveiling MSME Digitalisation: Key Insights and Discoveries

Digitalisation is a multi-dimensional concept that encompasses various aspects of integrating digital technology into different business areas. At its core, digitalisation involves the adoption and utilization of digital tools and technologies to improve processes, enhance efficiency and create new business opportunities. The journey of digitalisation begins with the adoption of basic digital products which ensure digital connectivity and serve as the foundation upon which further digital transformation can occur. These basic digital products include things like smartphone, laptop, desktop and internet connectivity. Once these basic tools are adopted, enterprises can then begin to explore more advanced digital technologies and strategies. This may involve using digital marketing, engaging in e-commerce, implementing sophisticated software solutions (CRM, RFID, ERP etc.), leveraging data analytics & artificial intelligence and adopting cloud computing.

6.1 Adoption of Digital Technologies

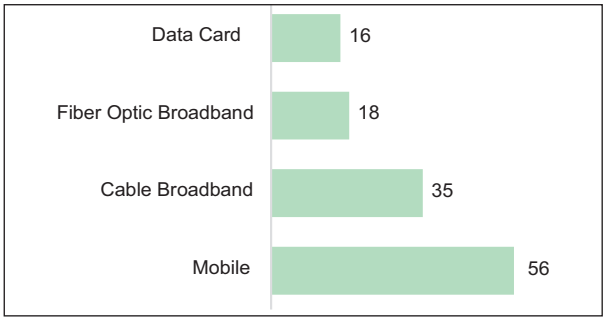
In this study, we explore the adoption of thirteen digital tools/technologies by Indian MSMEs which denotes different levels of digitalisation. The survey results show that a predominating majority of Indian MSMEs have achieved a basic level of digitalisation (Figure 6.1). More than 95 per cent of surveyed MSMEs have been using at least one digital product for business purpose, with smartphone having the highest level of penetration (Figure 6.2). Similarly, more than 94 per cent of surveyed MSMEs are using internet. However, 56 per cent of MSMEs with internet connectivity have been accessing internet through mobile data. The penetration of broadband among MSMEs continues to be low, which did not augur well for the overall digital transformation (Figure 6.3).

Figure 6.1: Adoption of Digital Products



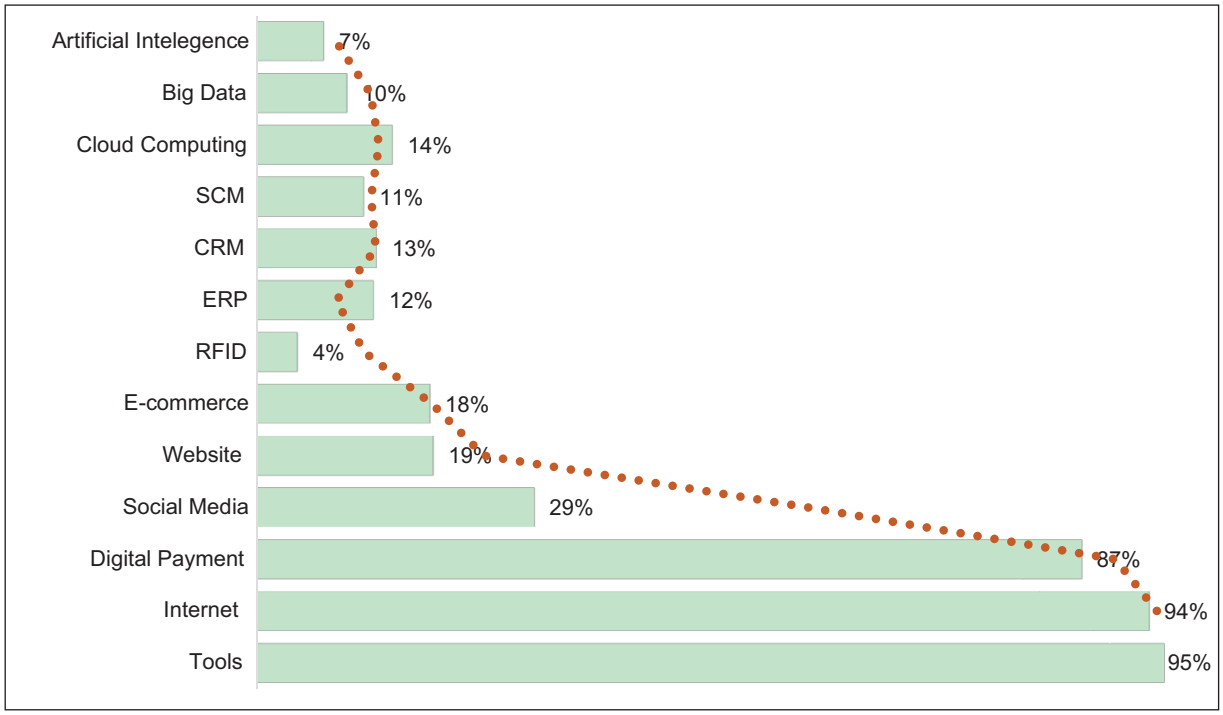
Source: Author's calculations based on the survey.

Figure 6.2: Type of Internet Connection Used



Source: Author's calculations based on the survey.

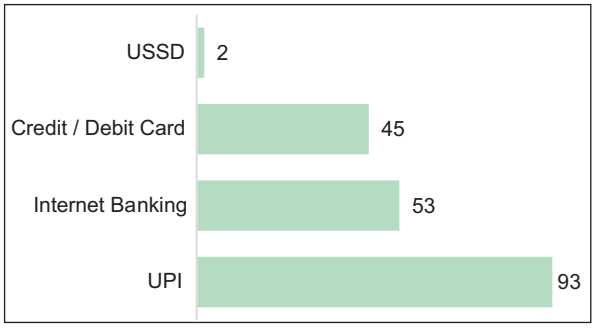
Figure 6.3: Adoption Rate of Selected Digital Technologies



Source: Author's calculations based on the survey.

After digital connectivity, the next step in digitalisation journey involves using digital tools such as digital payment services, web presence and use of social media for digital marketing. Among these, the adoption of digital payments plays a crucial role in the digitalisation journey of Micro, Small, and Medium Enterprises. It is a critical enabler which facilitates efficiency, promotes financial inclusion, enhances transparency and aligns businesses with evolving consumer trends in an increasingly digital economy. Owing to proactive government policies and fintech innovations, India, over the past few years, has experienced a revolution in digital payments. This also reflects in our survey results. Our finding suggests that 87 per cent of MSMEs in India have been using digital mode to receive and make payments. As expected, Unified Payment Interface (UPI) has been the most preferred mode for digital payment transactions (Figure 6.4). In comparison to UPI, the use of internet banking and credit/debit card etc. has remained relatively low. Apparently, the demonetisation of high value currency notes in 2016 seems to have triggered the adoption of digital payments in a big way. Our finding suggests that less than 15 per cent of MSMEs surveyed were using digital mode for receiving and making payment till 2015. However, after the demonetization, the proportion of MSMEs using digital payment services increased vertically to 87 per cent.

Figure 6.4: Preferred Mode of Digital Payment



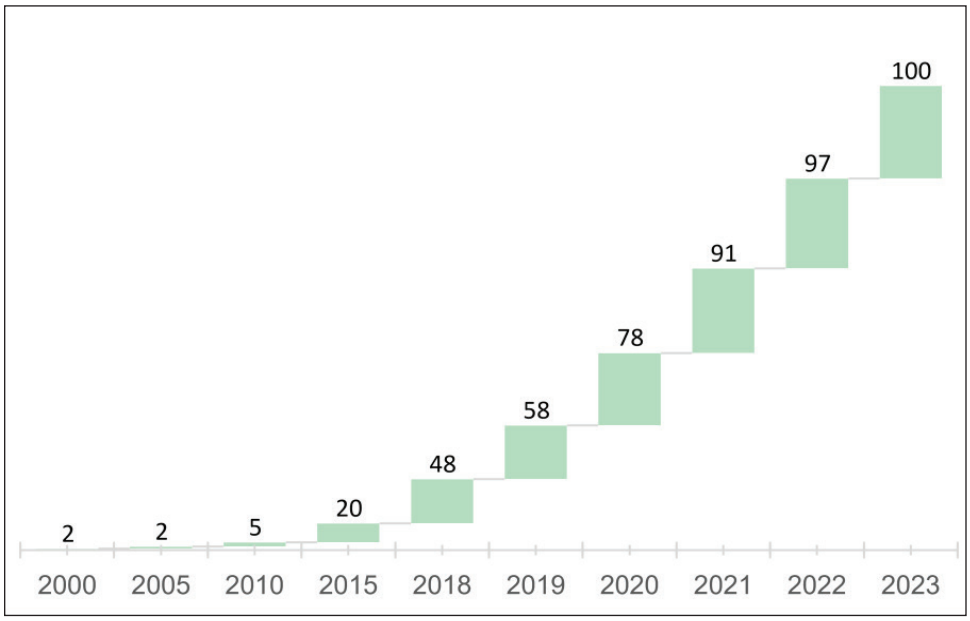
Source: Author's calculations based on the survey.

In a rapidly digitalising economy, establishing web presence and leveraging social media effectively for marketing has become essential for firms to effectively compete and survive. By embracing these digital tools, firms can enhance their visibility, credibility, customer engagement and ultimately their business success. Our survey suggests that despite being digitally connected, a predominating majority of MSMEs in India is yet to embrace social media. Only 29 per cent of surveyed MSMEs have reported that they are using social media for marketing their products and services (Figure 6.1). It implies that a whopping 71 per cent of MSMEs are yet to harness the benefits of social media marketing. The picture is even more precarious when we look at the web presence as merely 19 per cent of MSMEs have reported to have a website or web page.

The adoption of e-commerce is another crucial step towards digitalisation which is recognized as a game-changer for MSMEs. There are several channels, including improved market access, cost-effective marketing, enhanced visibility, customer engagement opportunities, data-driven insights, operational efficiency and integration into global supply chains, through which MSMEs can potentially gain by adopting e-commerce. However, despite these benefits, the adoption of e-commerce by MSMEs in developing countries has remained low and India is not an exception. Our findings suggest that merely 18 per cent of MSMEs were actively engaged in e-commerce at the time of survey. Notably, 52 per cent of MSMEs that were engaged in e-commerce, started selling online only after 2019 which underlines the fact that the COVID pandemic has been a significant catalyst for the adoption of e-commerce (Figure 6.5).

Software solutions like ERP (Enterprise Resource Planning), SCM (Supply Chain Management), RFID (Radio Frequency Identification) and CRM (Customer Relationship Management) are other important dimensions of digitalisation. These software solutions play significant roles in optimising business operations, enhancing supply chain efficiency,

Figure 6.5: Time Line of E-Commerce Adoption



Source: Author's calculations based on the survey.

improving decision-making and fostering better customer relationships. By investing in these solutions, businesses can increase competitiveness and agility. Unfortunately, Indian MSMEs perform poorly when it comes to the integration of these software into business processes. Our survey suggests that only 13 per cent of MSMEs in India have been using CRM software, just 12 per cent are using ERP software and merely 11 per cent are using SCM software. Notably, the adoption of RFID remains extremely low at 4 per cent.

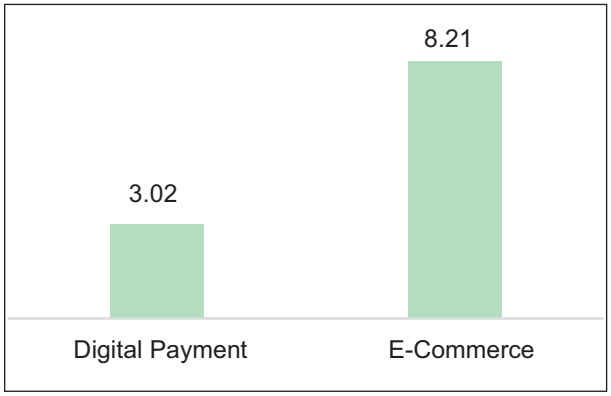
Cloud computing, big data analysis and artificial intelligence are other important digital tools that are essential for driving complete digital transformation in businesses. While cloud computing provides firms with the infrastructure, platforms and software they need to innovate, collaborate and scale their operations, the big data analysis and artificial intelligence enable better decision making, automation and personalisation of goods and services to meet the specific preferences of individual customers. The adoption of these digital technologies characterises the advanced level of digital transformation. Our survey shows that the diffusion of these technologies in India has remained very low. Only 14 per cent of MSMEs have been using cloud computing services, while the use of big data analysis has been restricted to just 10 per cent of surveyed enterprises. In the case of artificial intelligence, the diffusion rate is even lower as merely 7 per cent of surveyed MSMEs have reported using artificial intelligence.

In a nutshell, though Indian MSMEs are showing more inclination towards digital technologies, the adoption has remained restricted to very basic and selected intermediate level of digital tools/technologies. The use of digital tools, internet and digital payment is nearing universalization. However, Indian MSMEs still have a long way to achieve digital transformation.

6.2 Sustaining Digital Adoption Continues to Be a Challenge

Adoption of digital technology is one thing but sticking to technology and digital tools once adopted is equally important. Some evidence shows that due to several reasons, MSMEs often struggle to persist with digital technologies. We incorporated this aspect in our field survey. The findings suggest that by and large MSMEs stick to digital technologies once adopted, except in the case of digital payment and e-commerce. In the case of digital payment, we found that around 3 per cent of surveyed enterprises discontinued using digital payment services after experimenting with it (Figure 6.6). Frequent transaction failure has been identified as the single most important reason for abandoning digital payment methods. Approximately, 60 per cent of MSMEs which abandoned digital payment methods, pointed out that transaction failure due to technical problems was frustrating and inconvenient, which forced them to abandon digital payment methods (Figure 6.7). Concerns about data breaches and fraud have been the second most important factor in discontinuing digital payment methods. Notably, 26 per cent of MSMEs also identified increased cost as a factor responsible for abandoning digital payment methods.

Figure 6.6: Attrition Rate of Digital Technologies



Source: Author's calculations based on the survey.

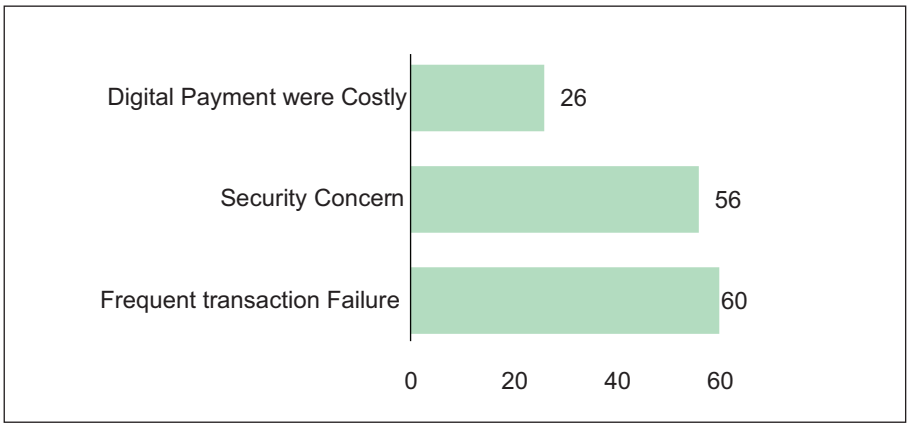
The incidence of MSMEs abandoning technology is much higher in the case of e-commerce. Our survey suggests that more than 8 per cent of surveyed enterprises discontinued using e-commerce after experimenting with online selling (Figure 6.7). Notably, the number of enterprises that abandoned e-commerce is almost equal to 45 per cent enterprises which were actively engaged in e-commerce at the time of survey. More than one third of enterprises which abandoned e-commerce identified the e-commerce platform fee as the reason for discontinuing online selling (Figure 6.8). Around a quarter of enterprises pointed out that they abandoned e-commerce as it was not providing enough additional business. More than 17 per cent of enterprises identified the free return policy as the reason for opting out while 12.3 enterprises indicated a lack of manpower as one of the reasons. Apart from these, higher cost, delay in payment settlement and logistic issues were listed as other important reasons for abandoning e-commerce.

6.3 Digital Penetration: The Sectoral Dimension

Digital penetration can vary significantly across different sectors due to their unique characteristics, business models and customer behaviors. In order to understand the sectoral dimension of digitalisation, we calculated a digital penetration index / digitalisation score for each enterprise. Since we have thirteen technology indicators, the digital score / digital penetration index ranges from 0 to 13. After we calculated the digital penetration index for each enterprise, we estimated the average digital penetration index for each of the five sectors covered in the study. The results, reported in figure 6.9, show that the average digital penetration does vary across sectors, but the variation is not very high. Among the five sectors, retail trade sector has the highest level of digital penetration, while the manufacture of auto component sector has the lowest level of digital penetration. The remaining three sectors, namely manufacture of food products, manufacture of wearing apparel and food and beverage services sector have almost identical levels of digital penetration.

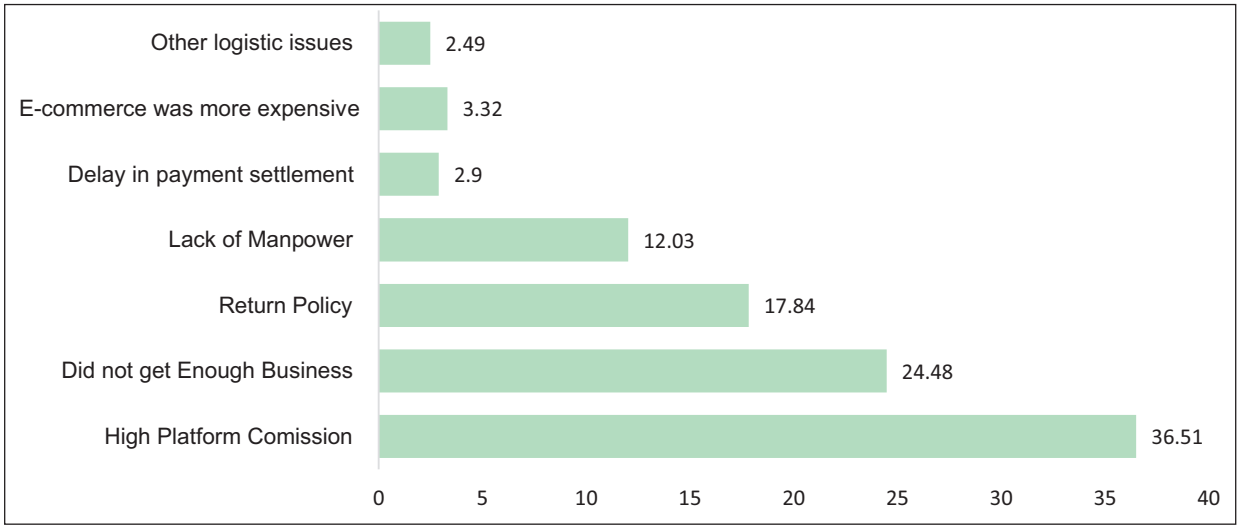
In order to get a deeper insight in the sectoral variation, we estimated the adoption rate of different technologies at a sectoral level. The results, reported in Table 6.1, show that there is no sectoral variation when we look at the adoption of basic digital connectivity and

Figure 6.7: Reasons for Abandoning Digital Payment



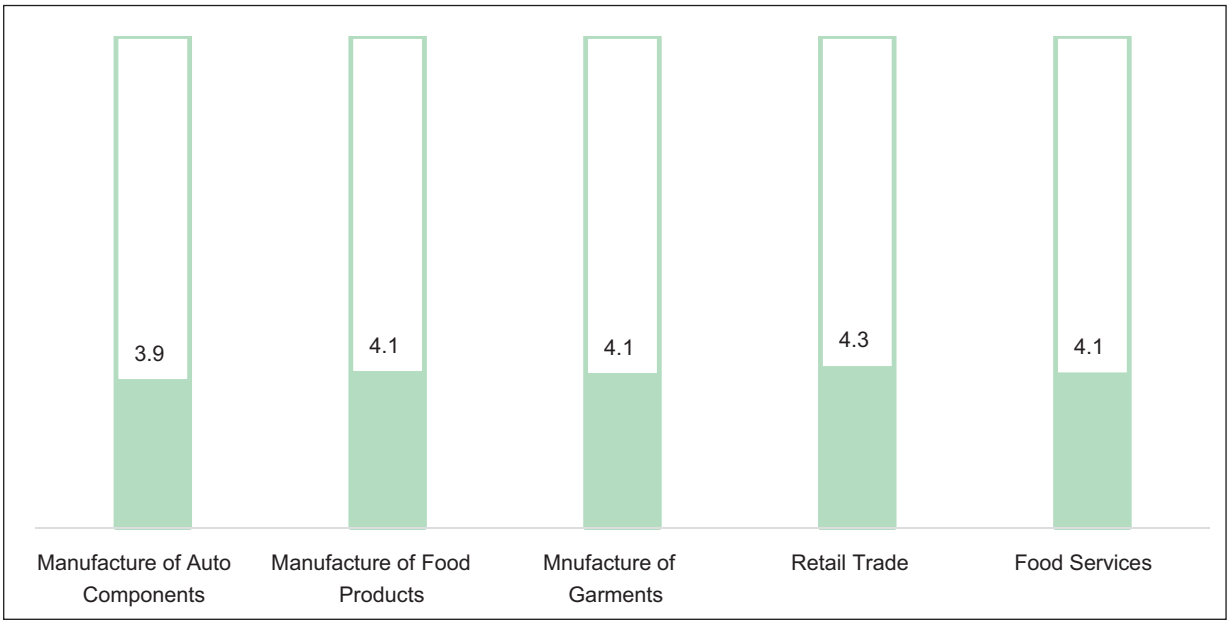
Source: Author's calculations based on the survey.

Figure 6.8: Reason for Abandoning E-Commerce, (Multiple Response Allowed)



Source: Author's calculations based on the survey.

Figure 6.9: Sectoral Variation in Digital Penetration



Source: Author's calculations based on the survey.

digital payment. However, as we move up on the digitalisation ladder, sectoral variations start emerging. On average, the two services sectors have a higher adoption rate of digital marketing and web presence. Especially, MSMEs involved in food and beverage services seem to be much ahead in harnessing social media for digital marketing. The sectoral variation is highest in the case of e-commerce adoption, with food and beverage services sectors leading. Approximately, 29 per cent of MSMEs involved in food and beverage services sector have been using e-commerce which is almost 10 percentage points higher than the Manufacture of food products sectors, having the second highest rate of e-commerce adoption. Nonetheless, despite being a leader in the adoption of e-commerce and harnessing social media, the food and beverage services sector performs below average in the case of

Table 6.1: Digital Technologies Adoption Rate by Sector

Product	Auto Components	Food Products	Wearing Apparels	Retail Trade	Food Services	Coefficient of Variation
Tools	94.2%	97.2%	94.4%	95.4%	95.9%	0.01
Internet	92.4%	95.8%	94.2%	94.3%	92.0%	0.01
Digital Payment	85.3%	85.3%	85.7%	88.2%	87.7%	0.01
Social Media	25.1%	29.4%	29.5%	28.7%	33.3%	0.09
Website	15.8%	19.1%	15.4%	20.4%	20.3%	0.12
E-Commerce	13.4%	19.3%	17.8%	14.4%	29.0%	0.30
RFID	3.9%	3.8%	5.4%	4.7%	3.5%	0.16
ERP	9.5%	12.9%	11.0%	15.4%	10.1%	0.18
CRM	11.4%	13.3%	12.5%	14.3%	10.1%	0.12
SCM	10.6%	11.9%	11.4%	13.1%	8.0%	0.16
Cloud	14.7%	13.3%	15.3%	16.8%	9.4%	0.18
Big Data	9.7%	7.0%	9.5%	12.1%	7.2%	0.20
AI	6.7%	5.8%	6.8%	9.9%	3.9%	0.29

Source: Author's calculations based on the survey.

integrating software solutions and adoption of advanced digital tools such as cloud computing, big data and AI. For the adoption of these technologies and software solutions, the retail trade service sector emerges as the leader although with a thin margin as compared to manufacture of food products and manufacture of wearing apparels sector.

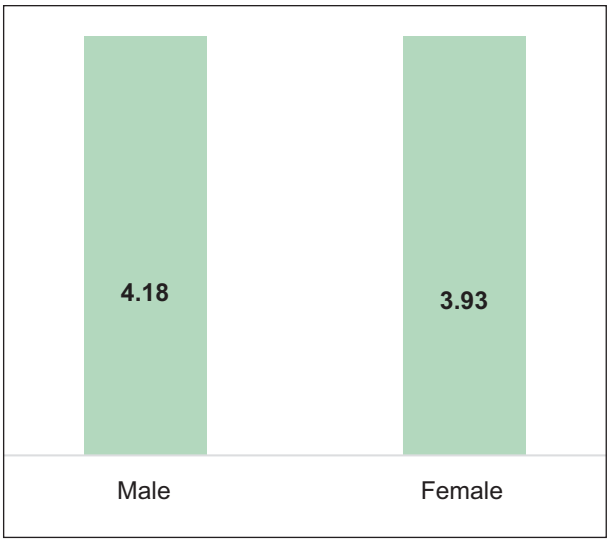
6.4 Gender Dimension of Digitalisation

The gender implications of the ongoing digital revolution have been one of the most talked about issues of recent times. Given the prevailing socio-cultural norms, gender bias, digital skill gap and lack of access to financial resources, it is often argued that women-led businesses are not benefitting from digital transformation at the same rate as their male counterparts. In fact, several studies have indeed reported that female-headed enterprises have lower levels of access to and usage of digital technologies compared to male entrepreneurs even in developed countries. In a comprehensive report, the European Commission found that female-led enterprises in the European Union (EU) tend to have lower levels of digitalisation with fewer female entrepreneurs utilizing digital tools for business activities such as marketing, e-commerce and online transactions (OECD, 2019). In order to understand the gender dimensions of MSME digitalisation, we estimated the penetration of digital technology by gender of owner or managing director of the surveyed enterprises. Overall, female-headed enterprises do have lower levels of digital penetration as compared to their male counterparts. However, the gap is not very high (Figure 6.10).

In order to get a disaggregated picture, we estimated the offtake of different digital technologies by male- and female-headed

enterprises separately. The results, reported in figure 6.11 show that female headed enterprises are at par with male headed enterprises in the adoption of basic digital tools, such as the use of digital products, internet connectivity, use of digital payments as well as harnessing the social media for digital marketing. However, the gender gap starts showing up when we move up on the technological ladder, with a notable exception of RFID technology. On average, female enterprises lag by 3 to 6 percentage points in the adoption of intermediate and advanced digital technologies in comparison to male headed enterprises. The gender gap is the largest in the case of ERP software adoption as only 8 per cent of female headed enterprises have been using ERP software while the corresponding figure for male headed enterprises stands at 14 per cent.

Figure 6.10: Digital Penetration by Gender of Enterprise Owner



Source: Author's calculations based on the survey.

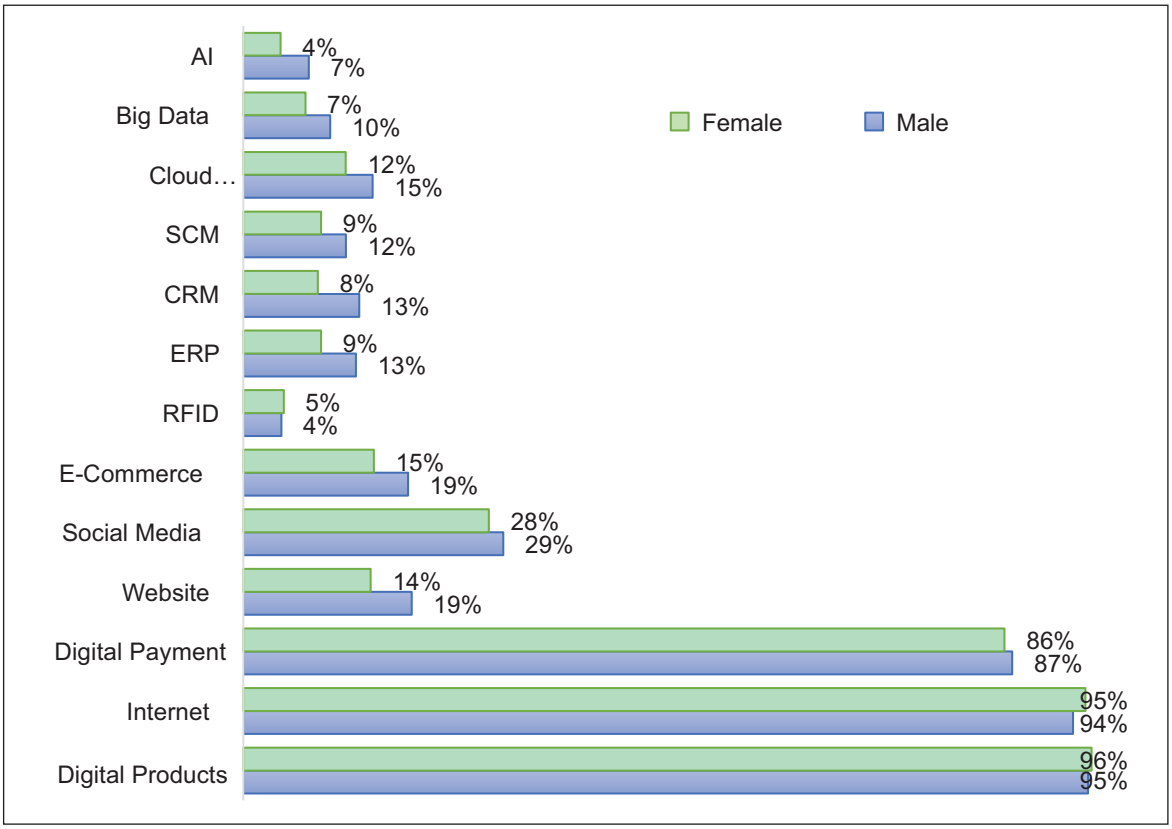
Female-headed enterprises also lag significantly behind their male counterparts when it comes to having a web presence and adopting CRM software. For both these digital technologies, adoption rate among female headed enterprises is approximately 5 percentage points lower than the male-headed enterprises. The adoption of e-commerce is another digital tool where the adoption rate among female-headed enterprises is approximately 20 per cent lower than the male headed enterprises. As per our survey, only 15 per cent of female-headed enterprises have been engaged in e-commerce. In comparison to this, more than 19 per cent of male headed enterprises are selling their goods and services online. The female headed enterprises also lag by around 4 percentage points in the adoption of ERP software. For remaining digital technologies namely, SCM software, cloud computing, big data and AI, the gap in adoption rate stands at 3 percentage points.

6.5 Regional Variation in Digitalisation

India is a federal country with considerable variation in level of development. Some states like Maharashtra, Karnataka and Gujarat are economically advanced with high GDP per capita, while states like, West Bengal, Uttar Pradesh, Madhya Pradesh and Odisha lag in economic indicators. Similarly, the availability of skilled manpower as well as entrepreneurial culture also varies substantially across states. Given these variations, there are reasons to believe that the offtake of digital technologies by MSMEs may vary across regions. Our survey covers 14 different Indian states representing north, south, east and west of India. In order to understand the regional dimension of MSME digitalisation, we estimated the average digital penetration among MSMEs by state they are operating from. The results reported in Figure 6.12 shows that the level of digitalisation does vary across states, with the eastern part of India falling behind.

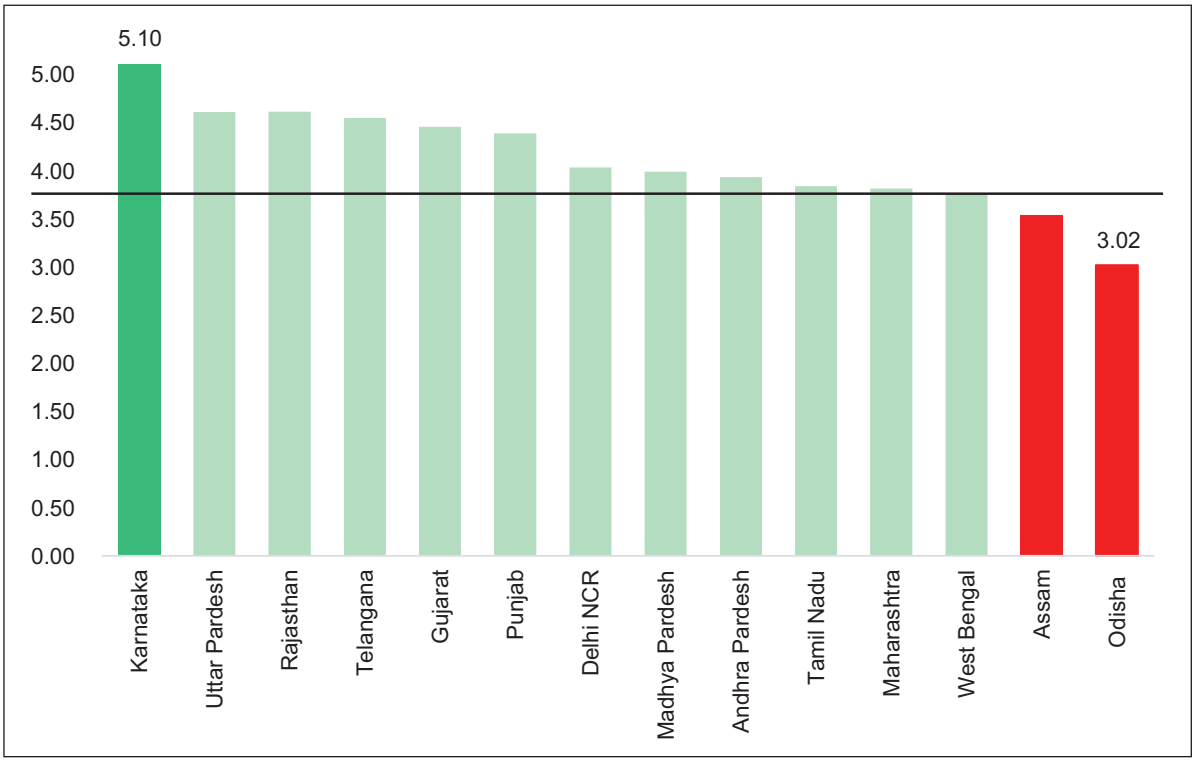
At a state level, the digital penetration score varies from 3 to 5.1. However, if we use standard deviation to divide 14 states in three groups, we can see that digital penetration in twelve states, namely Delhi-NCR, Punjab, Rajasthan, Gujarat, Telangana, Uttar Pradesh, Maharashtra, Madhya Pradesh, Tamil Nadu

Figure 6.11: Digital Technologies Adoption Rate by Gender of Enterprise Owner



Source: Author's calculations based on the survey.

Figure 6.12: Regional Variation in Digital Penetration



Source: Author's calculations based on the survey.

Andhra Pradesh and West Bengal, hovers around national average. In other words, the level of digitalisation in these states is not significantly different from the national average as the difference from the national average is less than one standard deviation point. Our analysis suggest that Karnataka stands out with a digital penetration rate of 5.10, which is higher than the national average by one standard deviation point. This indicates that Karnataka is leading in digital adoption compared to other states. In contrast, Odisha and Assam show digital penetration rates of 3.02 and 3.53, respectively. These values are lower than the national average by one standard deviation point. This suggests that Odisha and Assam lag behind the national trend in digital adoption, indicating that these two states need special attention to drive MSME digitalisation.

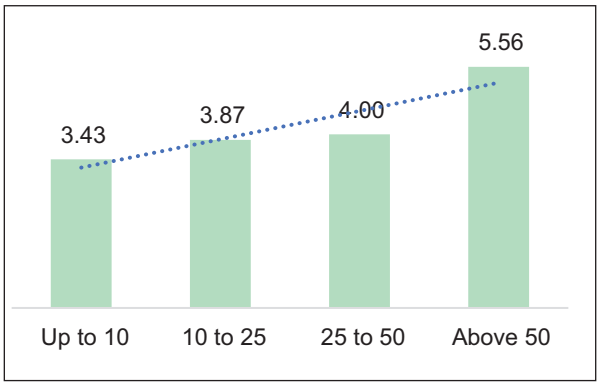
6.6 Characteristics of Enterprises Going Digital

Section 6.1 clearly shows that the level of digital penetration among surveyed MSMEs varies substantially. There is a small proportion of MSMEs which have achieved very high digital penetration while others are still languishing at a very low level. So, what does explain this variation? Literature suggests that size of the enterprise, education level of the size of owner and age of the owner are some of the crucial factors that may influence a firm's ability to go digital. In order to understand the factors driving digitalisation, in this section we examine the characteristics of enterprises, which are adopting different digital technologies. Specifically, we explore if the adoption of digital technologies is linked with enterprise size, age and education level of owner/managing director of enterprise.

Size of an enterprise is perhaps the most important determinant of digitalisation. Since larger firms often have more financial resources, technical expertise and organisational capabilities to invest in digital technologies and infrastructure compared to smaller firms, it is anticipated that bigger enterprises will be more likely to adopt cutting-edge technologies as compared to smaller enterprises. In order to examine the variation in digital adoption by enterprise size, we categorise the surveyed firms in four subgroups based on the number of people employed and calculated the average level of digital penetration for each group. The results are reported in Figure 6.13. It is evident from the figure that the average digital penetration is indeed positively linked with the size of enterprise. The digital penetration increases as we move from smaller enterprises to bigger enterprises quite substantially.

At a disaggregate level, though the bigger enterprises have a higher adoption rate for all digital technologies, the variation between small and big enterprises is extremely high in the case of advance digital technologies. In case of basic digital connectivity and digital payment services, the adoption rate is somewhat comparable across four groups of enterprises by size (Table 6.2). The variation in the adoption rate of e-commerce and digital marketing is also on the lower side. However, the variation in adoption rate increases sharply when we look at the technologies which require a higher level of investment. The adoption rate of SCM software, big data, AI and a

Figure 6.13: Digital Penetration by Size of Enterprise



Source: Author's calculations based on the survey.

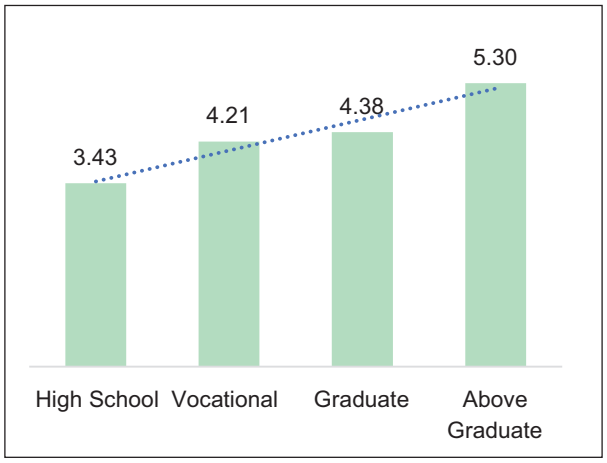
Table 6.2: Digital Technologies Adoption Rate by Enterprise Size

S. No	Tool	Up to 10	10 to 25	25 to 50	Above 50	Coefficient of Variation
1	Digital Products	92.15	96.11	96.81	99.51	0.03
2	Internet	89.83	94.53	94.68	99.01	0.03
3	Digital Payment	84.88	88.08	76.60	89.37	0.06
4	Website	7.44	13.75	20.21	39.93	0.60
5	Social Media	20.41	27.01	32.98	44.13	0.28
6	E-Commerce	11.16	16.30	15.96	31.03	0.40
7	RFID	1.82	3.89	3.19	8.65	0.59
8	ERP	6.28	7.18	9.57	26.95	0.67
9	CRM	5.70	8.39	15.96	26.95	0.58
10	SCM	4.79	8.03	12.77	24.23	0.59
11	Cloud Computing	6.94	11.31	13.83	28.43	0.53
12	Big Data	4.21	4.50	9.57	22.62	0.73
13	AI	3.31	4.14	3.19	16.19	0.82

website is more than five times higher among enterprises employing more than 50 workers as compared to enterprises employing less than 10 employees. Similarly, variation in adoption rate of RFID, ERP, CRM and cloud computing is 4 times higher in the case of bigger enterprises as compared to enterprises with less than 10 workers.

The education level of the owner is another important factor that could influence the ability of an enterprise to adopt digital solutions. Owners with higher levels of education generally have better analytical and strategic decision-making skills which enables them to assess the benefits and risks of technology up-gradation. Therefore, enterprises headed by individuals with higher education levels are expected to embrace digitalisation and effectively leverage digital tools. Our survey data corroborates this theoretical understanding. We estimated the average digital penetration among surveyed enterprises as per the educational attainment of their owner/managing director. Results show that digital penetration is indeed positively associated with educational attainment of owner/manager. There is almost 2 percentage point difference in the average level of digital penetration between enterprises headed by individuals with a secondary level of education and enterprises headed by individuals with a post graduate degree (Figure 6.14).

Figure 6.14: Digital Penetration by Educational Attainment of Owner



Source: Author's calculations based on the survey.

An analysis of variation in the adoption rate for different digital technologies by educational attainment of owner/manager shows that the education level of the owner perhaps does not matter much at the basic level of digitalisation, including adoption of digital payments and harnessing social media (Table 6.3). However, for the adoption of intermediate and advanced digital technologies, the educational attainment of managing director/owner seems to be extremely important. Our results suggest that the adoption rate of intermediate technologies and advance technologies such as various software solutions, use of big data and AI increases almost vertically when we move from enterprises headed by individuals with basic schooling to enterprises headed by individuals with higher level of educational attainment. Notably, in case of AI, the most advance digital tool, the adoption rate among enterprises headed by individuals with post graduate degrees is more than nine times higher than the enterprises headed by individuals with basic schooling.

Age of owner is another firm characteristic that may influence the digital offtake among enterprises. The theoretical understanding suggests that younger owners/managing directors, particularly those belonging to the digital-native generation, may be more comfortable with technology and receptive to digitalisation as compared to older owners. They are also expected to have a higher risk appetite and more willingness to experiment with new technologies and business models for driving innovation and digital transformation within their enterprises. Our survey does suggest that digital penetration among Indian MSMEs is inversely linked with the age of owner/managing director (Figure 6.15). If we look at the average digital penetration, with an average digital penetration score of 4.43, MSMEs headed by individuals below 30 years of age top the list. The average digital penetration score declines to 4.19 for enterprises headed by individuals between the age bracket of 30 to 93 and further to 4.18 for enterprises headed by individuals in the age bracket of

Table 6.3: Digital Technologies Adoption Rate by Educational Attainment of Owner

S. No.	Digital Tools	High School	Vocational	Graduate	Above Graduate	Coefficient of Variation
1	Digital Products	92.05	96.03	96.93	98.36%	0.02
2	Internet	89.70	94.44	96.03	96.17	0.03
3	Digital Payment	83.57	82.54	90.72	83.06	0.04
4	Website	9.04	14.29	23.43	29.23	0.41
5	Social Media	23.53	30.16	32.34	31.97	0.12
6	E-Commerce	11.71	14.68	20.36	30.33	0.37
7	RFID	2.67	4.76	3.89	10.11	0.53
8	ERP	4.38	11.11	15.34	23.50	0.51
9	CRM	5.12	13.10	14.22	26.78	0.52
10	SCM	4.39	12.30	11.90	27.05	0.59
11	Cloud Computing	7.24	17.86	15.12	27.87	0.43
12	Big Data	4.30	11.11	9.21	23.77	0.59
13	AI	2.36	9.92	6.06	21.58	0.72

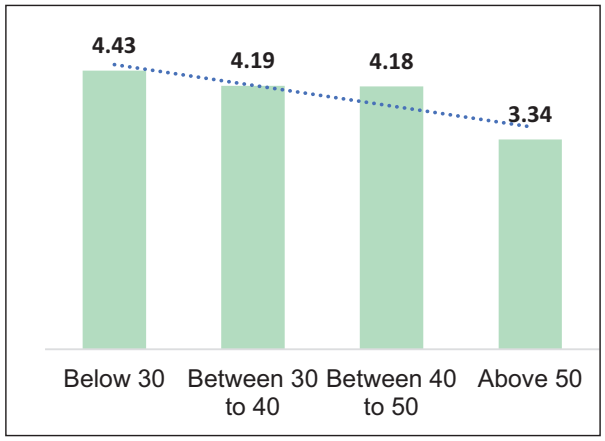
Source: Author's calculations based on the survey.

40 to 50. The most significant decline occurs when we look at the enterprises headed by individuals above 50 years of age. However, it should be noted that the generation gap in digital penetration is less stark as compared to educational and size gap mentioned above.

At a disaggregate level, the generation gap in the adoption of digital technologies is highest for RFID and AI (Table 6.4). As per our analysis, the adoption rate of RFID among enterprises headed by individuals below 30 years of age is more than six times higher as compared to enterprises headed by individuals above 50 years of age. Similarly, the adoption rate of AI among enterprises headed by younger individuals is five times more than the enterprises headed by older individuals. Apart from these two technologies, the age gap is also on the higher side in the case of big data and SCM software, while for remaining digital tools, the variation in adoption rate, though present, is not very high.

In a nutshell, our survey finding suggests that on average, relatively bigger enterprises headed by educated and young individuals are driving the MSMEs digitalisation race in India.

Figure 6.15: Digital Penetration by Age of Owner



Source: Author's calculations based on the survey.

6.7 Impact of Digitalisation on Enterprise Performance

Digitalisation is perceived to be a game changer for MSMEs. Theoretically, digitalisation is expected to boost the growth of MSMEs by driving efficiency, reducing costs, expanding

Table 6.4: Digital Technologies Adoption Rate by Age of Owner

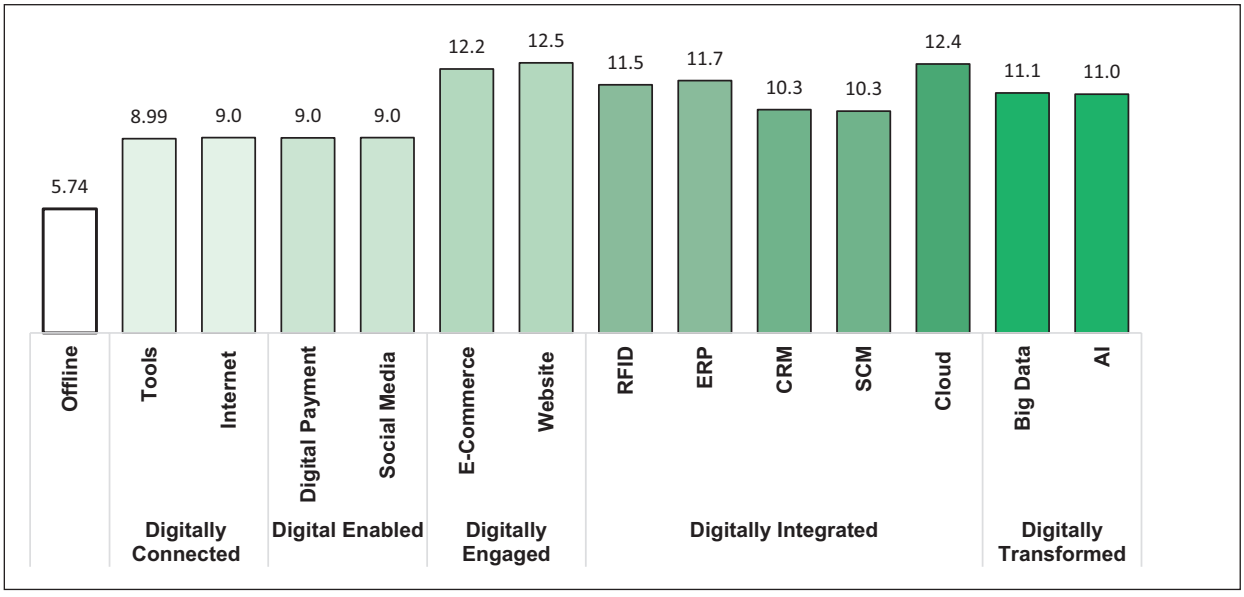
S. No.	Tool	Below 30	Between 30 to 40	Between 40 to 50	Above 50	Coefficient of Variation
1	Digital Products	95.27	96.83	95.40	89.35	0.031
2	Internet	93.92	95.95	92.95	85.91	0.041
3	Digital Payment	88.01	86.15	87.77	84.54	0.016
4	Website	21.28	17.47	19.71	15.46	0.119
5	Social Media	37.50	29.70	24.03	22.34	0.209
6	E-Commerce	20.10	19.16	18.42	9.62	0.250
7	RFID	4.56	4.79	4.75	0.69	0.471
8	ERP	13.85	12.16	12.52	9.62	0.127
9	CRM	16.55	11.42	13.81	7.56	0.268
10	SCM	13.68	11.20	12.37	4.47	0.341
11	Cloud Computing	15.37	12.90	16.98	12.37	0.130
12	Big Data	12.67	8.55	11.37	3.44	0.393
13	AI	8.78	6.85	8.35	1.72	0.437

Source: Author's calculations based on the survey.

market reach, enhancing customer engagement and enabling data-driven decision-making. Are Indian MSMEs investing in digital technologies reaping these benefits? Our survey as well as stakeholder consultation suggests so. We asked respondents how the adoption of different digital technologies has impacted their business. A predominating majority of MSMEs, using different digital technologies, reported that the adoption of digital technologies has enabled them to achieve higher growth through improved communication, higher geographical reach, reduction in transaction time and cost, improved efficiency and better decision making.

Though MSMEs using digital tools acknowledged the positive impact of digitalisation on their business, it is important to understand whether enterprises using digital technologies have actually achieved higher level of efficiency and productivity. In order to objectively understand the relation between digitalisation and level of productivity, we examined the variation in average labour productivity (turnover per employee) of surveyed enterprises as per their level of digitalisation. The results reported in Figure 6.16 show that labour productivity is indeed positively associated with the level of digitalisation. The average productivity among enterprises not using any digital tools is lowest, which increases by almost 50 per cent when we move with offline enterprises to enterprises which are digitally connected (using digital products and internet). The average level of labour productivity remained almost unchanged once we moved to the next level of digitalisation that is from digitally connected to digitally enabled enterprises. Another major increase in labour productivity occurs when the level of digitalisation increases from digitally enabled to digitally engaged enterprises. In other words, enterprises which are digitally engaged with customers either through e-commerce or their own website seem to have 35 to 40 per cent higher level of labour productivity. Notably, our survey data suggests that the shift from an intermediate level of digitalisation to advance level of digitalisation—which involves using advance software, big data and AI—does seem to increase the productivity further, at least at an aggregate level.

Figure 6.16: Average Labour Productivity of Enterprises by Level of Digitalisation



Source: Author's calculations based on the survey.

A positive association between productivity and digitalisation is quite evident from the figure above. In order to understand whether digitalisation induced higher productivity also translates in to higher growth, we examined the relation between level of digitalisation and the turnover growth of an enterprise using a multilinear regression model, specified below:

$$Y_i = \alpha + \beta_1 X_i + B_z Z_i + U_i \quad (1)$$

Where:

Y_i is the dependent variable representing the average growth in turnover of enterprise i during previous two financial years, α is intercept term, X_i is digitalisation variable, Z_i is a vector of control variables, such as size of enterprise, age of enterprise, state dummy, industry dummy and U_i is random disturbance term.

We started our regression analysis with a straightforward approach of analysing the impact of each digital technology on the percentage change in turnover of enterprise individually. Despite limitations, analyzing the impact of individual digital technology in isolation serves as a good starting point. It provides valuable insight on how different digital tools are related to enterprise growth without the influence of other indicators. The results, reported in Tables 6.5 and 6.6 show two important points. One, it is clear that after controlling for size of enterprise, age of enterprise, unobserved state heterogeneity as well as sector specific effect, all digital technologies are positively associated with enterprise growth. However, in case of four specific technologies, namely RFID software, ERP software, big data analysis and AI, the coefficients, despite being positive are statistically insignificant. Since the optimum utilisation of these complex technologies involves long implementation time and substantial organizational changes, the insignificant relation between growth of enterprise and adoption of these technologies is perhaps not very surprising. In fact, several papers have reported similar results for other countries too (Aghion et al 2017, Comunale M and Manera A. 2024).

Second, the results show that the impact of different digital technologies on growth varies quite substantially. Specifically, the first step toward digitalisation—opting for digital products and internet connectivity—seems to be producing the biggest benefit in terms of higher growth. Our results suggest that enterprises using these basic digital tools outperform enterprises which are not using these digital tools by roughly 1.5 to 2 parentage points in growth. Apart from these two basic technologies, use of social media, e-commerce, SCM software and CRM software are other digital tools/technologies which produce relatively higher growth benefits. In case of remaining technologies (digital payment, website and cloud computing), the incremental gain, though significant, is comparatively low.

Lack of training has been identified as one of the biggest constraints to digitalisation. Our stakeholder consultation suggests that training from NGO, fintech firms and other entrepreneurial support organisations has been critical for adoption of digital tools by MSMEs, especially in the case of micro enterprises. To understand whether training received also influences growth, we included an interaction term between adoption of digital payment and training received for digital payment. The results, reported in column 4 of Table 11 show that the interaction term is insignificant, which implies that the growth of enterprises, which have received training is not significantly different from enterprises, which are using digital payment but have not received any training. We get similar results for e-commerce (see column 7). These results suggest that though a helping hand from NGOs and fintech firms in the form of training may be critical for the adoption of certain digital tools especially for micro enterprise, it is not translating into additional growth benefits over and above the base effect of that particular technology.

Table 6.5: Impact of Digital Technologies on Enterprise Growth

	Dependent Variable: Change Percentage Change in Turnover						
	1	2	3	4	5	6	7
Basic Tools	1.87*						
	(.2801)						
Internet		1.55*					
		(.2587)					
Digital Payment			.380*	.380**			
			(.1766)	(.1862)			
Digital Payment * Training				.002			
				(.1554)			
Social Media					.977*		
					(.1432)		
E-Commerce						.746*	.980*
						(.1705)	(.1483)
E-commerce * Training							-.017
							(.2248)
Enterprise Size	0.487*	0.483*	.525*	.525*	.460*	.486*	.461*
	(.0514)	(.0517)	(.0513)	(.0517)	(.0514)	(.0520)	(.0519)
Enterprise Age	-.004	-0.003	-.005	-.005	-.005	-.006	-.0055
	(.0058)	(.0057)	(.0057)	(.0057)	(.0056)	(.0056)	(.0056)
Constant	2.75*	3.07*	4.08*	4.08*	4.58*	4.36*	4.58*
	(.3874)	(.3743)	(.3421)	(.3481)	(.2978)	(.2973)	(.3046)
State Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R Square	0.1463	0.1451	0.1351	0.1351	0.1487	0.1403	0.1487
Observation	2,882	2,882	2,882	2,882	2,882	2,882	2,882

Source: Author's calculations based on the survey.

Note: Robust Standard Error in the brackets, *, ***, **** significant at 1, 5 and 10 per cent respectively

Having analysed the impact of different digital technologies on growth in isolation, we move to examine the combined effect of different technologies on growth. However, given the fact that we have 13 different technologies, some of which are also highly correlated with each other, performing regression analysis to study the combined effect of different technologies is fraught with challenges. The inclusion of all 13 indicators of technologies in regression equation not only makes the model complex but also leads to multicollinearity, which adversely affects the results. Two approaches have been advocated to deal with such situations. First,

Table 6.6: Impact of Digital Technologies on Enterprises Growth

	Dependent Variable: Percentage Change in Turnover							
	8	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Website	.306***							
	(.1745)							
RFID		.310						
		(.2932)						
ERP			.242					
			(.2116)					
CRM				.527*				
				(.2008)				
SCM					.616*			
					(.2115)			
Cloud Computing						.377**		
						(.1858)		
Big Data							.051	
							(.2152)	
AI								.099
								(.2399)
Enterprise Size	.500*	.527*	.517*	.498*	.496*	.509*	.530*	.529*
	(.0537)	(.0517)	(.0524)	(.0527)	(.0524)	(.0521)	(.0527)	(.0516)
Enterprise Age	-.006	-.005	-.006	-.006	-.006	-.006	-.006	-.006
	(.0056)	(.0057)	(.0057)	(.0057)	(.0057)	(.0057)	(.0057)	(.0057)
Constant	4.50*	4.44*	4.45*	4.47*	4.46*	4.45*	4.43*	4.43*
	(.2989)	(.2967)	(.2980)	(.3009)	(.3020)	(.2997)	(.2968)	(.2963)
State Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R Square	0.1349	0.1342	0.1343	0.1362	0.1368	0.1352	0.1339	0.1339
Observation	2,882	2,882	2,882	2,882	2,882	2,882	2,882	2,882

Source: Author's calculations based on the survey.

Note: Robust Standard Error in the brackets, *, ***, **** significant at 1, 5 and 10 per cent respectively

we can perform cluster analysis to group the 13 digital technology indicators into different clusters and then an regression equation can be estimated by including one representative indicator from each cluster. Alternatively, a composite index of digitalisation/penetration can be computed by combining all 13 indicators and it can be used in regression equation to study the combined impact of digitalisation on growth. We experimented with both these approaches and results are reported in Table 6.7.

Results reported in column 1 of Table are based on cluster analysis. Since basic digital tools and internet connectivity are highly corelated and form one cluster, we include internet connectivity in our regression. Indicators pertaining to software solutions namely ERP, CRM, SCM and cloud computing are also highly correlated and form another cluster together. Therefore, we included one representative indicator from these clusters in our regression equation. Similarly, big data and AI are also strongly correlated. Therefore, we excluded big data from the equation. In short, we estimated equation 1 with 8 digital technologies as explanatory variables.

The results show that inclusion of multiple indicators of digital technology improve the explanatory power of model. The individual coefficients show that the relation between growth and RFID as well as AI continues to be insignificant as was the case when their impact on growth was examined in isolation. This may be due to several reasons. First and foremost, firms that have adopted AI and RFID may be in the early stages of implementation, which often involves testing and assessing feasibility. Generally, the full benefits of technology are not realized in the initial stage, delaying the measurable impact on growth. Additionally, firms may lack the necessary skills and expertise to effectively leverage these technologies, which can hinder their ability to capitalize on potential growth opportunities. Among other technologies, the basic digital connectivity, harnessing social media, engaging in e-commerce and adoption of software solutions such as SCM exhibit strong positive impact on growth, even after including all indicators of technology. However, the same is not the case with digital payment as well as website/web presence. Both these digital technologies show strong positive impact on growth in isolation, but when other technologies are included in regression, their coefficient turnout to be insignificant.

Finally, we estimated equation 1 with a composite index of all 13 digital technologies as explanatory variables. The results, reported in column 3, show that after controlling for enterprise size, enterprise age, state-specific effect and sector-specific effect, the digital penetration is strongly associated with enterprise growth. A statistically significant positive coefficient of 0.164 suggests that after holding other factors constant, one per cent increase in digital penetration is associated with a 0.164 per cent increase in sales growth. The magnitude of coefficient is broadly in line with other studies which have also shown that a 10 per cent increase in digital penetration is associated with 1 to 2 per cent increase in sales growth.

To sum up there is strong evidence that adoption of digital technology is positively linked with enterprise performance. Our results suggest that while the first step towards digitalisation provides a major boost to growth, subsequent adoption of higher technologies further accelerates this growth trajectory by unlocking additional benefits and capabilities.

6.8 Constraints to Digitalisation

Identifying the reasons behind the low adoption of digital technologies is crucial for addressing barriers to digitalisation. We asked respondents to list the reasons for not adopting digital technologies. As per our survey findings, the following are major constraints to MSME digitalisation in India.

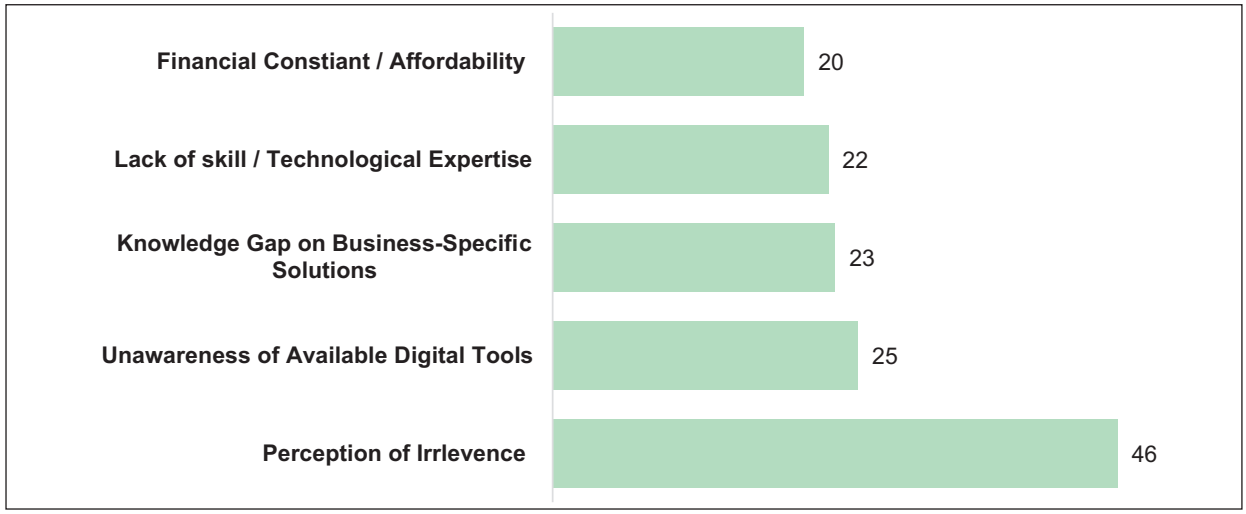
Table 6.7: Digitalisation and Enterprise Performance - Regression Results

	Dependent Variable: Percentage Change in Turnover		
	1	**2**	**3**
Digitalisation Index			0.164*
			(0.030)
Internet	1.48*	1.45*	
	(.2753)	(.2757)	
Digital Payments	-.233	-. 172	
	(.1894)	(.1964)	
Digital Payment * Training		-.114	
		(.1584)	
Social Media	0.819*	.842*	
	(.1547)	(.1568)	
E-Commerce	.386**	.547**	
	(.1935)	(.2452)	
E-commerce * Training		-.405	
		(.3006)	
Website	-.224	-.221	
	(1949)	(.1951)	
RFID	.045	.079	
	(3070)	(.3092)	
SCM	0.545**	.538**	
	(.2534)	(.2530)	
AI	-.448	-.452	
	(.2534)	(.2855)	
Enterprise Size	0.441*	0.441*	0.419*
	(.0550)	(.0558)	(.0552)
Enterprise Age	-.003	-.003	-.005
	(.0057)	(.0057)	(0.0056)
Constant	3.41*	3.54*	4.08*
	(.3962)	(.4086)	(.3048)
State Dummy	Yes	Yes	Yes
Sector Dummy	Yes	Yes	Yes
R Square	0.1612	0.1620	0.1639
Observation	2,882	2,882	2,882

Source: Author's calculations based on the survey.

Note: Robust Standard Error in the brackets, *, ***, **** significant at 1, 5 and 10 per cent respectively

Figure 6.16: Constraints to Digitalisation - (Multiple Response allowed)



Source: Author's calculations based on the survey.

1. Lack of Awareness and Understanding: The lack of awareness and understanding about the benefits of digital technologies is the biggest constraint to MSMEs digitalisation. The lack of awareness is manifesting in following three different forms;

i. **Perception of Irrelevance**. Approximately, 46 per cent of our respondents, not using digital technologies, believe that their businesses do not need digital technologies. This perception is stemming from a misunderstanding of how digital tools can enhance their operations, streamline processes, and open new avenues for growth.

ii. **Unawareness of Available Digital Tools**: Approximately a quarter of our respondents have not been exposed to or have not heard about the various digital tools available. This lack of exposure means they are completely unaware of the existence of digital solutions like CRM, ERP, SCM, RFID, cloud computing, big data and AI, which could greatly benefit their businesses.

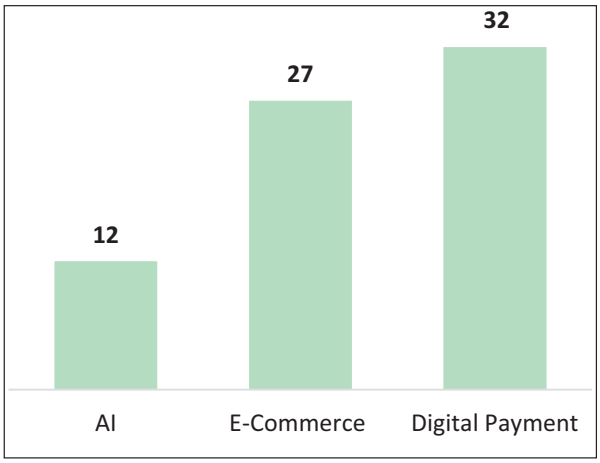
iii. **Knowledge Gap on Business-Specific Solutions:** Even when MSMEs owners are aware of broad technologies, a sizeable proportion of them have no idea how these technologies can be tailored to their specific business needs. According to our survey, almost a quarter of our respondents are facing this issue. They have heard about various digital tools but have no idea how these technologies can be applied to optimise their supply chain, enhance customer engagement or personalize marketing strategies. This knowledge gap is preventing them from seeing the practical benefits and implementation strategies relevant to their business context.

2. Skill Gap/Lack of Technological Expertise: Lack of skill/technical expertise to implement and manage digital technologies effectively has been widely identified as an important constraint to MSMEs digitalisation across the globe. India is also not an exception in this regard. Approximately, 22 per cent of our respondents pointed out that they do not have the required skill or technical expertise to adopt intermediate and advanced digital technologies.

3. Financial Constraint: Affordability is another major barrier to MSME digitalisation. Since MSMEs have low profit margins and also grapple with credit constraints, it is not surprising that one in every five-respondents not using digital technologies pointed out that they do not have financial resources to invest in the digital technologies.

4. Security Concerns: Apart from the major constraints mentioned above, security concerns are another important barrier which is hampering the adoption of certain specific digital technologies. As per our survey, lack of faith / security concerns has been an important barrier to the adoption of e-commerce, AI and digital payments. Approximately, 27 per cent of enterprises which are currently not selling their products/services online identified lack of faith/security concerns as one of the reasons for not integrating with e-commerce platforms, while the corresponding figure for digital payment is 32 per cent. Similarly, 12 per cent of firms not using AI identified lack of faith as reason for not investing in AI (Figure 6.17).

Figure 6.17: Security Concern - Technology Specific Constraint



Source: Author's calculations based on the survey.

7 Conclusion and Way Forward

In the face of ongoing digital transition, Indian MSMEs stand at a critical crossroad. As the business landscape undergoes rapid digitalisation, MSMEs are faced with both unprecedented opportunities and significant challenges. While digital technologies are offering a multitude of opportunities for MSMEs to enhance their competitiveness, reach new markets, improve efficiency and innovate, given the prevailing financial and human resource constraints, they are also extremely vulnerable to shocks emanating from the ongoing digital transition. There are legitimate concerns that MSMEs may face significant disadvantages if they fail to effectively utilise digital technologies in the age of digital transition. In this context, this report examined the adoption of digital technology by Indian MSMEs, its impact on their growth and the barriers to digitalisation.

Based on a comprehensive primary survey, this study found that Indian MSMEs thrust with digitalisation, so far, has been a mixed bag, characterised by both notable successes and persistent challenges. On the positive side, Indian MSMEs have made significant strides in basic digital integration and the adoption of digital payment systems. However, the utilisation of intermediate and advanced digital tools has remained in its nascent stage. In the case of intermediate digital technologies, less than a third of Indian MSMEs have been harnessing social media for digital marketing while less than 20 per cent of MSMEs are engaged in e-commerce. The use of advance digital tools such as software solutions (ERP, SCM, RFID, CRM), cloud computing, big data and AI has remained even more restricted with adoption rates ranging from 4 per cent for RFID software to 14 per cent for cloud computing. This delineation highlights the two-tiered nature of digital adoption among Indian MSMEs—while basic digital practices are becoming more widespread, there is huge room for growth in more sophisticated technological integration.

The analysis of digital technology adoption by MSMEs across various dimensions, sector, state, size, gender and educational attainment of owners, reveals insightful patterns. At a sectoral level, despite some notable variation in the adoption rate of individual digital technologies, the overall digital penetration is somewhat comparable across all sectors, with retail trade sector doing marginally better. In contrast, the regional divide in digital penetration is quite visible with two eastern states namely Odisha and Assam falling significantly behind the national average, while Karnataka performs

significantly better. Digital penetration among the remaining eleven states covered in the study hovers around the national average. Gender analysis indicates that male-owned MSMEs are slightly ahead in digital adoption compared to female-owned businesses, which may reflect underlying structural and socio-economic barriers that women entrepreneurs face. Size-wise, larger MSMEs exhibit a higher propensity to adopt intermediate and advanced technologies compared to their smaller counterparts, which underlines the importance of resources and capacity for investment in digital transformation. Finally, the educational attainment of the owners/ managing director seems to be an important determinant of digitalisation. Enterprises headed by individuals with higher level of education are way ahead in embracing digital technologies as compared to enterprises headed by less educated individuals.

We found that MSMEs adopting digital technology are reaping rich dividends, experiencing higher productivity and consequently, translating this productivity difference into higher growth. Our econometric analysis shows that after controlling for enterprise size, enterprise age, unobserved state heterogeneity and sector-specific effect, all digital technologies except RFID software, ERP software, big data analysis and AI share a positive and significant relation with enterprise growth. First step towards digitalisation, that is the adoption of digital tools and internet connectivity, produces the biggest boost to growth and subsequent adoption of more sophisticated digital technologies further accelerates the growth trajectory by unlocking additional benefits and capabilities. As per our analysis, a 10 per cent increase in the level of digitalisation leads to 1.6 per cent increase in enterprise growth.

Several constraints are impeding the digital transformation of MSME in India. Our research identifies four major barriers: lack of information, skill shortage, financial constraints and lack of trust in digital technology. The lack of information about digital tools and their benefits is the biggest barrier. Almost three fourth of MSMEs owners currently not using digital technologies are unaware of how digitalisation can improve their operations, market reach and profitability. They either feel that digital technology is irrelevant or have little information about the business specific solutions of various available digital technologies. The shortage of skilled personnel further exacerbates this issue. According to the survey, a quarter of MSMEs have not been able to adopt intermediate and advanced digital technologies as they do not have the required skill or human resources to operate these technologies. Unaffordability is another important barrier. The adoption of digital technologies requires some upfront investment. However, since most of the MSMEs, especially micro and small enterprises, operate with tight budgets, sparing financial resources to invest in digital technologies continues to be a major challenge for Indian MSMEs. Finally, there is a pervasive lack of trust in digital technology. Concerns about data security, privacy and the reliability of digital systems are deterring many MSMEs from embracing certain digital solutions.

A multi-faceted approach involving government intervention, private sector participation and public awareness campaigns is required to overcome the barriers to MSMEs digitalisation. The following policy measures can be considered to facilitate the digitalisation of MSMEs in India.

Bridge the Knowledge Gap: Bridging the knowledge gap and spreading information about the importance of digitalisation is critical for promoting MSME digitalisation. Given the prevailing lack of information about the importance of digital technologies among MSMEs, massive awareness campaigns are required to educate the owners of MSMEs. The

awareness campaign (events and workshops) needs to highlight success stories, provide information on available digital tools and offer practical advice on starting the digital transformation journey. Additionally, efforts should be made to facilitate peer learning and knowledge sharing among MSMEs by creating forums, discussion groups and networking events where entrepreneurs can share their experiences and best practices related to digital technology adoption.

Address the Skill Gap: Skill shortage is a well-known fact in India. Industry in general and MSMEs in particular have been grappling with a lack of required human resource. Recognising this, MoMSME has been making efforts to address the skill shortage though its flagship schemes such as 'MSME Champions Scheme' and 'Entrepreneurship and Skill Development Progarmme Scheme'. Both these schemes have provision for skill development programs aimed at enhancing digital literacy and technical skills pertaining to digital marketing, e-commerce, cybersecurity, and data analytics.

The MSME Technology Centres, formerly known as Tool Rooms, are also offering technical training programs that include modules on digital technologies and their application in manufacturing and other sectors. Additionally, several corporate philanthropies and foundations, such as the Mastercard Center for Inclusive Growth, Meta and NASSCOM Foundation, have also been working with industrial associations and NGOs to impart basic digital skills among MSMEs. However, despite these efforts, skill shortage continues to be a major constraint, which given the enormous size of MSME sector is not very surprising. Therefore, reach and coverage of digital training programs, especially in underserved areas needs to be increased. Since several private foundations are involved in skilling, efforts should be made to synergize these initiatives to achieve scale and maximize impact. A central body, with participation from both government and private players, can be created to oversee and coordinate government and private skilling programs. It can ensure that efforts are not duplicated and resources are allocated efficiently. Apart from this, efforts should be made to develop a centralised database to track all skilling initiatives, their progress and outcomes. It can help to identify gaps, overlaps and opportunities for collaboration.

Making Technology Affordable: Given the fact that most of the MSMEs do not have the resources to pay the fixed costs required for the adoption of advance digital technologies, efforts to make digital tools affordable are critical to boost digitalisation. The fundamental way to reduce the cost of digital technology is to develop standardised digital services and tools suitable for the massive MSME sector. Ministry of MSME has started making efforts in this direction through NSIC which has been operating as an aggregator and facilitator for providing ICT-enabled digital services to MSMEs at transparent and affordable prices by onboarding digital service providers. However, with an extremely low number of empaneled digital service providers, this endeavor has remained in initial stages. Therefore, the government should explore more partnerships with technology providers, including software vendors, cloud service providers and digital marketing agencies, to offer MSMEs discounted or subsidized access to digital tools and services. Additionally, tax incentives along with special concessional credit lines or cheap loans for adoption of digital technologies should be considered to make technology adoption more affordable.

Building Trust in Digital Technology: Lack of faith and security concerns continues to be a major constraint to adoption of e-commerce, digital payment systems and AI. Given the fact that ransomware attacks on Indian enterprises have witnessed a steep increase, these concerns are not unfounded. Over the years, The Indian government has implemented several

measures to combat ransomware and enhance cybersecurity. It includes enacting legislation such as IT Act, 2000, the National Cyber Security Policy, 2013, Personal Data Protection Bill and establishing Indian Computer Emergency Response Team (CERT-In) to enhance security of India's cyber infrastructure. Additionally, it has also established Cyber Swachhta Kendra to promote cybersecurity awareness and preparedness among users and organisations. However, despite these concerted efforts, the pervasive lack of trust in digital technologies and persistent cybersecurity concerns continue to pose formidable challenges to MSME digitalisation. Therefore, government should consider launching tailored cybersecurity awareness programmes specifically targeting MSMEs to build trust in technology. These awareness programmes should offer practical guidance and resources to enhance MSMEs digital resilience.

In conclusion, the digital transformation of MSMEs holds immense potential for economic growth and development. It is imperative to continue supporting MSMEs in their digital endeavors to ensure they remain competitive and resilient in the digital age.

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Research and Information System for Developing Countries

विकासशील देशों की अनुसंधान एवं सूचना प्रणाली

RIS specialises in issues related to international economic development, trade, investment and technology. It is envisioned as a forum for fostering effective policy dialogue and capacity-building among developing countries on global and regional economic issues. The focus of the work programme of RIS is to promote South-South Cooperation and collaborate with developing countries in multilateral negotiations in various forums. Through its following centres/forums, RIS promotes policy dialogue and coherence on regional and international economic issues.

The word "DAKSHIN" (दक्षिण) is of Sanskrit origin, meaning "South." The Hon'ble Prime Minister of India, Shri Narendra Modi, inaugurated DAKSHIN – Global South Centre of Excellence in November 2023. The initiative was inspired by the deliberations of Global South leaders during the Voice of the Global South Summits. DAKSHIN stands for Development and Knowledge Sharing Initiative. Hosted at the RIS, DAKSHIN has established linkages with leading think tanks and universities across the Global South and is building a dynamic network of scholars working on Global South issues.

AIC at RIS has been working to strengthen India's strategic partnership with ASEAN in its realisation of the ASEAN Community. AIC at RIS undertakes research, policy advocacy and regular networking activities with relevant organisations and think-tanks in India and ASEAN countries, with the aim of providing policy inputs, up-to-date information, data resources and sustained interaction, for strengthening ASEAN-India partnership.

CMEC has been established at RIS under the aegis of the Ministry of Ports, Shipping and Waterways (MoPS&W), Government of India. CMEC is a collaboration between RIS and Indian Ports Association (IPA). It has been mandated to act as an advisory/technological arm of MoPSW to provide the analytical support on policies and their implementation.

FITM is a joint initiative by the Ministry of Ayush and RIS. It has been established with the objective of undertaking policy research on economy, intellectual property rights (IPRs) trade, sustainability and international cooperation in traditional medicines. FITM provides analytical support to the Ministry of Ayush on policy and strategy responses on emerging national and global developments.

BEF aims to serve as a dedicated platform for fostering dialogue on promoting the concept in the Indian Ocean and other regions. The forum focuses on conducting studies on the potential, prospects and challenges of blue economy; providing regular inputs to practitioners in the government and the private sectors; and promoting advocacy for its smooth adoption in national economic policies.

FIDC, has been engaged in exploring nuances of India's development cooperation programme, keeping in view the wider perspective of South-South Cooperation in the backdrop of international development cooperation scenario. It is a tripartite initiative of the Development Partnership Administration (DPA) of the Ministry of External Affairs, Government of India, academia and civil society organisations.

FISD aims to harness the full potential and synergy between science and technology, diplomacy, foreign policy and development cooperation in order to meet India's development and security needs. It is also engaged in strengthening India's engagement with the international system and on key global issues involving science and technology.

As part of its work programme, RIS has been deeply involved in strengthening economic integration in the South Asia region. In this context, the role of the South Asia Centre for Policy Studies (SACEPS) is very important. SACEPS is a network organisation engaged in addressing regional issues of common concerns in South Asia.

Knowledge generated endogenously among the Southern partners can help in consolidation of stronger common issues at different global policy fora. The purpose of NeST is to provide a global platform for Southern Think-Tanks for collaboratively generating, systematising, consolidating and sharing knowledge on South South Cooperation approaches for international development.

DST-Satellite Centre for Policy Research on STI Diplomacy at RIS aims to advance policy research at the intersection of science, technology, innovation (STI) and diplomacy, in alignment with India's developmental priorities and foreign policy objectives.

— Policy research to shape the international development agenda —

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