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Centre for Digital Inclusion and Social Impact (CeDISI) Trust

MSME TechTrack

From Early to Medium: Charting the Course of MSME Technology Adoption

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Acknowledgment

At CeDISI, we firmly believe that the best way to understand the impact of any initiative is to listen directly to those it is meant to serve. Our approach has been to elevate the voices of India's micro, small, and medium enterprises (MSMEs), especially the early and nano segments. The learnings from our field-level interactions during the Digital MSME Yatra 2024 formed the cornerstone of this report and continue to shape our ongoing work.

We sincerely thank all the early, nano MSME owners, employees, and support ecosystems who welcomed us into their businesses and lives, sharing candid insights, challenges, and aspirations. This report would not have been possible without your generosity, patience, and openness.

We are equally thankful to the government and non-government organisations whose pioneering work and research have laid the foundation for this effort. The numerous scheme documents, reports, and sectoral studies mentioned in this report helped us build upon their work.

We would like to extend our special thanks to the industry experts and stakeholders who generously offered their time, perspectives, and encouragement. Your expertise helped us navigate complexity and stay grounded in reality.

We also appreciate the efforts of public and private institutions, ecosystem partners, digital platforms, and civil society actors in promoting digital inclusion among micro, small, and medium-sized enterprises (MSMEs) across India. This report benefited from ai tools for research, drafting and review; however, the team reviewed and edited all outputs for accuracy and context.

This report was made possible by the tireless efforts of our team, whose commitment to rigorous research is evident in the report.

This report is a reflection for MSMEs, researchers, students, enablers, policymakers, service providers and practitioners. We are grateful to each of you for being part of this journey.

Author:
Piyush Singh
Founder and Chairperson, Centre for Digital Inclusion and Social Impact (CeDISI) Trust.

Co-Author:
Dr. Nisha Mary Thomas
Assistant Professor of Finance. PhD, IIT Delhi
Specialising in Digital Lending & Alternate Finance.
ORCID: 0000-0002-2427-6146

Research Associate:
Ms. Bhavya
M.A. Political Science, DU, UGC NET qualified.

Sectoral Experts:

Ms. Kalaiarsi Periasamy
Fractional AI and Automation Consultant

Mr. Sharat Chandra
Blockchain and Emerging Technology Consultant. Founder, EmpowerEdge Ventures.

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Note from the Founder & Chairperson

Piyush Singh

Founder and Chairperson,
Centre for Digital Inclusion and
Social Impact (CeDISI) Trust

With immense pride and responsibility, I present the first edition of our annual "**MSME TechTrack**" report by the Centre for Digital Inclusion and Social Impact (CeDISI) Trust. This report compiles the literature review, the ground insights from Digital MSME Yatra and the team's deep and diverse work experience in the domain. It delves into the current landscape of MSMEs' digital adoption, focusing on the micro-segment, which constitutes most of our MSMEs.

As we rush towards technological advancement, the digitalisation of Early, Nano, Micro, Small, and Medium Enterprises (MSMEs) is not merely an option but a critical imperative for India's sustained economic growth and global competitiveness. MSMEs form the backbone of our nation's economy, contributing significantly to GDP, employment generation, defence, and exports. This report examines the hurdles and explores various government and private sector initiatives aimed at building a digitally inclusive ecosystem for Indian MSMEs.

Our journey in establishing the Centre for Digital Inclusion and Social Impact (CeDISI) is driven by our deep belief in the power of digital technologies to create a more equitable and prosperous society. We envision CeDISI's role as dedicated to bridging the digital divide by empowering early, nano, and micro enterprises across industries, genders, ages, and social strata, and facilitating their digital transformation journey. From building awareness and literacy to enabling adoption, sustainable growth, and scaling, we strive to understand their needs and challenges and develop interventions through consultation to help them learn, adopt, and leverage digital tools to enhance their efficiency and revenue.

Our annual flagship MSME connect initiative, the **Digital MSME Yatra**, enables us to interact directly with MSMEs across diverse sectors and regions, understand their pain points, and gather firsthand insights into digitalisation. Beyond the team's deep diverse experience the learnings from the 2024 Yatra have been invaluable in shaping the perspectives presented in this report and have reinforced our understanding of the nuanced support required by these enterprises, especially the need to recognise the diversity within the 'Micro' sector itself by proposing further sub-categorisation into 'Early' and 'Nano' enterprises. Our focus on nano and micro enterprises is intentional; these businesses often lack the visibility, voice, and support systems that larger firms enjoy. This report aims to bridge that knowledge gap and spark meaningful dialogue and action through that tone and intention.

We will ensure our efforts remain grounded in the evolving realities of the MSME landscape. We aim to take the Digital MSME Yatra, our digital tools, entrepreneurship promotion, and capacity-building efforts pan India through partner organisations and collaboration.

This report is a testament to our commitment to this cause. It will serve as a valuable resource for policymakers, industry stakeholders, researchers, and MSMEs, providing a compilation of work already done by other organisations, actionable insights, and fostering a collaborative approach towards building a digitally empowered MSME ecosystem in India. The findings and recommendations presented herein will catalyse meaningful dialogue and drive concerted efforts to unlock the immense potential of our MSMEs.

Let this report serve as a catalyst for policymakers, ecosystem enablers, private sector players, and development practitioners to act together, decisively, and inclusively.

For suggestions, queries or collaboration, please write to us at piyush@cedisi.org or contact@cedisi.org

Warm regards,

Piyush Singh

Founder and Chairperson, Centre for Digital Inclusion and Social Impact (CeDISI) Trust

List of Acronyms

1. A-ESDP - Advanced Entrepreneurship-cum-Skill Development Programme
2. A-MDP - Advanced Management Development Programme
3. AI - Artificial Intelligence
4. AICTE - All India Council for Technical Education
5. API - Application Programming Interface
6. ARPU - Average Revenue Per User
7. ASSOCHAM - Associated Chambers of Commerce and Industry of India
8. ATIs - Administrative Training Institutes
9. B2B - Business to Business
10. B2C - Business to Consumer
11. BBPS - Bharat Bill Payment System
12. BHIM - Bharat Interface for Money
13. BNPL - Buy Now, Pay Later
14. CAGR - Compound Annual Growth Rate
15. CDO - Community Development Organisations
16. CeDISI - Centre for Digital Inclusion and Social Impact
17. CFC - Common Facilities Centres
18. CGTMSE - Credit Guarantee Fund Trust for Micro and Small Enterprises
19. CII - Confederation of Indian Industry
20. CRISIL - Credit Rating Information Services of India Limited
21. CRM - Customer Relationship Management
22. CSO - Civil Society Organisations
23. CSIR - Council of Scientific and Industrial Research
24. DFS - Department of Financial Services
25. DMI - Digital Maturity Index
26. DPIIT - Department for Promotion of Industry and Internal Trade
27. DTFC - Digital Transformation Facilitation Centre
28. E-NACH - Electronic National Automated Clearing House
29. e-NAM - National Agriculture Market
30. EAP - Entrepreneurship Awareness Programme
31. EN-MSME - Early, Nano, Micro, Small, and Medium Enterprises
32. ERP - Enterprise Resource Planning
33. E-SDP - Entrepreneurship-cum-Skill Development Programme
34. ESDP - Entrepreneurship Skill Development Programme
35. FICCI - Federation of Indian Chambers of Commerce and Industry
36. FOMO - Fear of Missing Out
37. FTH - Frontier Tech Hub (as part of NITI FTH)
38. GDP - Gross Domestic Product
39. GeM - Government e-Marketplace
40. GST - Goods and Services Tax
41. GVA - Gross Value Added
42. IAM - Identity and Access Management
43. IAMAI - Internet and Mobile Association of India
44. IaaS - Infrastructure as a Service
45. IBEF - India Brand Equity Foundation
46. ICAR - Indian Council for Agricultural Research
47. ICRIER - Indian Council for Research on International Economic Relations
48. ICT - Information and Communication Technology
49. IFC - International Finance Corporation
50. IIMs - Indian Institutes of Management
51. IITs - Indian Institutes of Technology
52. INR - Indian Rupee
53. IoT - Internet of Things
54. IPR - Intellectual Property Rights
55. IT-ITES - Information Technology and Information Technology Enabled Services
56. IVR - Interactive Voice Response
57. JLG - Joint Liability Group
58. KPMG - Klynveld Peat Marwick Goerdeler
59. KVIC - Khadi and Village Industries Commission
60. LEAN - Lean Management (under MSME Competitive scheme)
61. M2M - Machine to Machine
62. ME - Microenterprises

List of Acronyms

63. MeitY - Ministry of Electronics and Information Technology
64. MFI - Microfinance Institution
65. MGIRI - Mahatma Gandhi Institute for Rural Industrialisation
66. MoMSME - Ministry of Micro, Small and Medium Enterprises
67. MSME - Micro, Small and Medium Enterprises
68. MSE - Micro and Small Enterprises
69. MSE-CDP - Micro & Small Enterprises - Cluster Development Programme
70. MSEFC - Micro and Small Enterprises Facilitation Council
71. MSMED - Micro, Small and Medium Enterprises Development
72. NASSCOM - National Association of Software and Service Companies
73. NBFC - Non-Banking Financial Company
74. NBFC-MFI - Non-Banking Financial Company - Microfinance Institution
75. NCS - National Career Service
76. NeGD - National e-Governance Division
77. NGO - Non-Governmental Organisation
78. NIMSME - National Institute for Micro, Small and Medium Enterprises
79. NITs - National Institutes of Technology
80. NITI - National Institution for Transforming India
81. NSDL - National Securities Depository Limited
82. NSIC - National Small Industries Corporation
83. O/o DC (MSME) - Office of the Development Commissioner (MSME)
84. OEM - Original Equipment Manufacturer
85. ONDC - Open Network for Digital Commerce
86. OTP - One Time Password
87. OTT - Over The Top (media platforms)
88. P2P - Peer to Peer
89. PaaS - Platform as a Service
90. PAN - Permanent Account Number
91. PMKVY - Pradhan Mantri Kaushal Vikas Yojana
92. PM SVANidhi - Pradhan Mantri Street Vendor's AtmaNirbhar Nidhi
93. PMS - Procurement and Marketing Support Scheme
94. POS - Point of Sale
95. PSB - Public Sector Bank
96. PSUs - Public Sector Units
97. PWC - PricewaterhouseCoopers
98. RAMP - Raising and Accelerating MSME Performance
99. RBI - Reserve Bank of India
100. SaaS - Software as a Service
101. SEO - Search Engine Optimisation
102. SFURTI - Scheme of Fund for Regeneration of Traditional Industries
103. SHG - Self-Help Group
104. SIDBI - Small Industries Development Bank of India
105. SIEM - Security Information and Event Management
106. SNP - Seller Network Participant
107. SOP - Standard Operating Procedures
108. SPV - Special Purpose Vehicle
109. STP - Straight Through Process
110. T-ReDS - The Trade Receivables Discounting System
111. TEAM - Trade Enablement & Marketing
112. TUS - Technology Upgradation Scheme
113. UAP - Udyam Assist Platform
114. UPI - Unified Payments Interface
115. VI - Vodafone Idea
116. VSM - Value Stream Mapping
117. WSHG - Women Self-Help Groups
118. ZED - Zero Defect Zero Effect
119. 5S - Sort, Set in Order, Shine, Standardise, Sustain

Table of Contents

Table of Contents

1. Executive Summary

India's Micro, Small, and Medium Enterprises (MSMEs) form the economic backbone of the nation, contributing over 30% to the GDP and employing more than 20 crore people, which is vital to achieving our **Viksit Bharat 2047** goal and towards self-reliance in the dynamic geopolitical situation. Yet, as the world rapidly moves into the digital age, the MSME sector remains unevenly equipped to ride this transformation, particularly for its micro, nano, and early-stage enterprises. The **MSME TechTrack** report, developed by the Centre for Digital Inclusion and Social Impact (CeDISI) Trust, offers a ground-up perspective rooted in secondary research and insights from its annual flagship MSME Connect initiative, **Digital MSME Yatra**.

A core insight and a proposed advocacy point of the report is the **urgent need to recognise the diversity within the 'Micro' category**, which currently makes up more than 98% of registered MSMEs in India. We propose a critical shift, **further segmenting Micro enterprises into "Early" and "Nano"** to reflect their distinct aspirations, capabilities, and digital needs. Enterprises with ₹5 lakh annual turnover or below cannot and should not be clubbed with those having ₹5 crore yearly turnover (now increased to ₹10 Crore, further increasing the disparity) under the same policy and intervention lens, as the both categories don't think, work, seek support, have challenges, etc of the same type. A one-size-fits-all approach in Micro limits the support and attention that Early and Nano entrepreneurs need.

Significant barriers persist despite the availability of affordable smartphones, rising internet penetration, and a vibrant ecosystem of fintech, e-commerce, AI, and cloud-based tools. These include limited digital literacy, poor awareness of government schemes, access to finance, unclear return on investment (ROI) from digital investments, gendered digital divides, cybersecurity threats, and an overload of tools that confuse rather than enable.

Still, the potential is undeniable. MSMEs that embrace digital tools report increased sales, access to new markets, operational efficiencies, and stronger customer engagement. Government initiatives, such as Udyam Registration, ONDC, RAMP, and PM SVANidhi, have created an enabling infrastructure, but adoption requires more parties to come together.

This report is both a mirror and a roadmap. It reflects the state of MSME digitalisation and sets forth **12 strategic recommendations** to build an inclusive, future-ready EN-MSME ecosystem:

1. Enhanced focus on Micro enterprises by introducing two new sub-categories under the Micro category, *Early* and *Nano*, for better targeting of policies and support.

2. Raising awareness of government schemes through hyperlocal campaigns, tools and simplified communication in regional languages.

3. Promoting digital literacy and training through NGOs, MFIs, SHGs, BCs, especially for first-time entrepreneurs and informal businesses.

4. Encouraging targeted investments in digital infrastructure and tech enablement for MSMEs in underserved regions.

5. Leveraging FinTech innovations to unlock formal finance for businesses with limited documentation and thin credit files.

6. Fostering a better understanding of regulatory compliance through digital tools that simplify GST, Udyam registration, and tax filings.

7. Extending support to medium enterprises is often neglected between micro-focused schemes and extensive industry policies.

8. Engaging local governments and panchayats to co-create digital MSME support hubs and facilitate outreach.

9. Supporting gradual and sustainable digital adoption, avoiding technology fatigue, and ensuring long-term behavioural change.

10. Taking a gender-intentional approach by addressing access gaps for women-led businesses and promoting digital skilling for women entrepreneurs.

11. Role of educational institutions to train their students and future entrepreneurs on the functioning of MSMEs, digital transformation tools and strategies.

12. Not only access but also building and improving MSMEs' capacity to absorb and effectively utilise credit through digitalisation and skill development is as crucial as improving credit access to ensure sustainable growth and financial resilience.

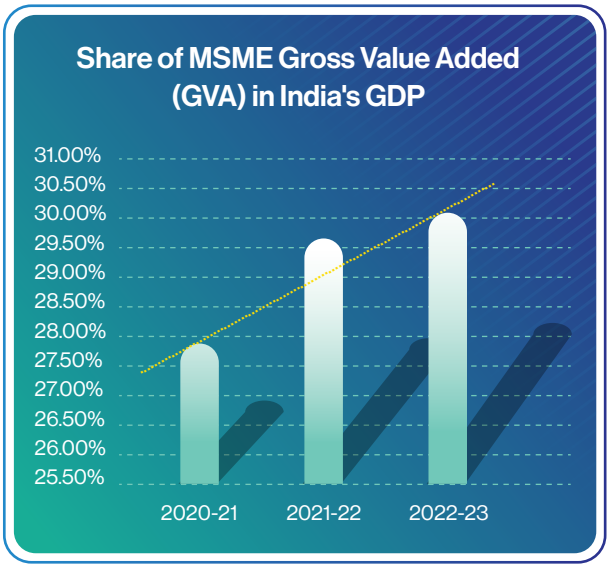
In closing, the report urges all stakeholders, government bodies, private sector players, civil society, academia, and MSMEs to **co-create a digitally inclusive ecosystem for MSMEs.** The future of India's economy lies not in digitalisation alone, but in **democratising digital success** across the smallest of enterprises.

2. Introduction

2.1 Importance of MSME Digitalisation in the Indian Economy

Nano, Micro, Small, and Medium Enterprises (MSMEs) are the backbone of the Indian economy. They are crucial in enhancing industrial output, creating employment opportunities, and bolstering exports. India has nearly 63 million MSMEs [1], MSMEs had created 20.51 crore jobs by 2024 [2], while contributing 30% of India's GDP [3], and about 45.73% of the total exports [4].

The recent past has witnessed the rapid adoption of digital technologies by the MSME sector in India, especially in the wake of disruptions such as the COVID-19 pandemic [5]. Various factors are driving this digital transformation, including increasing internet access and the use of smartphones, growing access to affordable digital tools, the mounting influence of e-commerce [6] and online transaction platforms [7], and government initiatives for digitalisation, such as Digital India, Udyam Registration, and many more. The digital transformation enables the MSME sector to enjoy the benefits of organisational efficiency, performance optimisation, better risk management and improved client acquisition. MSMEs must adopt digital transformation strategies to fully realise their potential.



Source- Press Information Bureau. Budget 2025-2026- Fuelling MSME Expansion [4].

Source: Press Information Bureau. Budget 2025-2026- Fuelling MSME Expansion [4].

2.2 About the Report

This report outlines the current state of digital adoption among micro and small enterprises (MSMEs) in India, with a focus on microenterprises. It explores ongoing government and private sector initiatives to promote the digitalisation of these businesses, evaluates their applicability, and highlights the key challenges MSMEs face in adopting digital tools and platforms. The study is based on secondary research, learnings from the Digital MSME Yatra 2024, and the team's experience in the domain, involving a thorough review and analysis of government publications, industry reports, and academic literature. Sources were selected based on their reliability, relevance, and recency, with particular attention given to the most recent and pertinent insights and trends wherever available. The company, brand, tools, schemes, initiatives, or platform mentioned in this report must not be considered exhaustive or promotional, and we advise you to do your research; many other tools and institutions are working in the domain that you can find suitable and valuable.

The report focuses only on the business-related dimensions of MSME digitalisation, excluding the personal digital adoption, preferences, and practices of MSME owners and workers. Lastly, given the vast diversity of MSMEs across different regions and industries, the findings may not represent all types of enterprises across various areas and demographics. This requires further thematic study, which we aim to cover in our upcoming reports.

3. Definition and Classification of MSMEs

3.1 Current Classification (2020 and Revised 2025 Guidelines)

The classification of Micro, Small, and Medium Enterprises (MSMEs) is primarily based on their investment in plant and machinery (for manufacturing units) or equipment (for service enterprises), along with their annual turnover. To streamline and strengthen the MSME (Micro, Small, and Medium Enterprises) sector, the Government of India introduced a combined definition for manufacturing and service enterprises, which were previously separate. According to the 2020 guidelines, a micro-enterprise was defined as one with an investment not exceeding ₹1 crore and turnover not exceeding ₹5 crore.

A Small Enterprise was one with investment up to ₹10 crore and turnover up to ₹50 crore, while a Medium Enterprise had investment up to ₹50 crore and turnover not exceeding ₹250 crore. We still do not have a clearly stated definition of Nano enterprises [8].

According to the revised guidelines, applicable from 1st April, 2025, Micro Enterprises have an investment up to ₹2.5 crore and turnover up to ₹10 crore; Small Enterprises have an investment up to ₹25 crore and turnover up to ₹100 crore; while Medium Enterprises have an investment limit of up to ₹125 crore and turnover up to ₹500 crore [9].

Revision Year	2020		2025	
Enterprise category	Investment Upto (₹ Crore)	Turnover Up to (₹ Crore)	Investment Up to (₹ Crore)	Turnover Up to (₹ Crore)
Micro	1	5	2.5	10
Medium	10	50	25	100
Small	50	250	125	500

3.2 Proposed New Subcategories: Early and Nano Enterprises

Microenterprises comprise the majority of MSMEs and are a source of employment and GDP in the Indian economy. However, most of these enterprises operate in the informal sector and face many difficulties in accessing credit, market linkages, and digital tools that could increase their business scale. Therefore, there must be extra emphasis on this segment.

Digital MSME Yatra, 2024, conducted by the Centre for Digital Inclusion and Social Impact (CeDISI) Trust, aimed at delving into the challenges and requirements that MSMEs face when adopting digital solutions for enhancing business growth and operational efficiency. Its findings show a need to recognise the diversity within the 'Micro' sector.

The MSME category in India defines the "Micro" category as enterprises with an investment in plant and machinery or equipment of up to ₹2.5 crore and a turnover limit of under ₹10 crore, previously ₹1 crore and ₹5 crore, respectively.

However, during our interactions, it became clear that someone with a ₹5 lakh turnover doesn't think, behave, seek support, subsidies, and operate in the same manner as those with a ₹5 Crore (now ₹10 Crore) turnover. Their aspirations, needs, and operational efficiencies differ significantly. Clubbing them into a single category by applying a one-size-fits-all approach is a disservice to the nano enterprise. It does not give enough focus and policy-level support.

Therefore, beyond the existing MSME definition, based on Investment and Turnover, we propose that the Micro be further subdivided into **Early and Nano** categories.

Proposed category	Investment (INR)	Turnover (INR)
Early	Up to ₹5 Lakhs	Up to ₹25 Lakhs
Nano	Up to ₹50 Lakhs	Up to ₹2.5 Crores

Since Early and Nano have not been officially recognised, they rarely appear in advocacy papers, groups, and market sizing reports. Following recognition, we can see more support and innovative financial and non-financial products developed by service providers, including micro-investments, as well as an increased share of targeted benefits being availed of by micro-entrepreneurs; currently, these may be missing due to a lack of clear demarcation and categorisation.

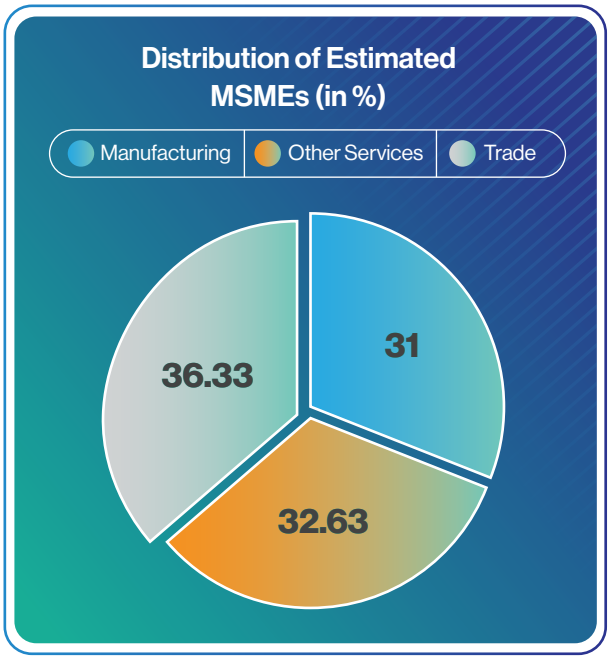
4. Current Landscape of Digital Adoption Among MSMEs

4.1 State of Digitalisation: Key Statistics and Trends

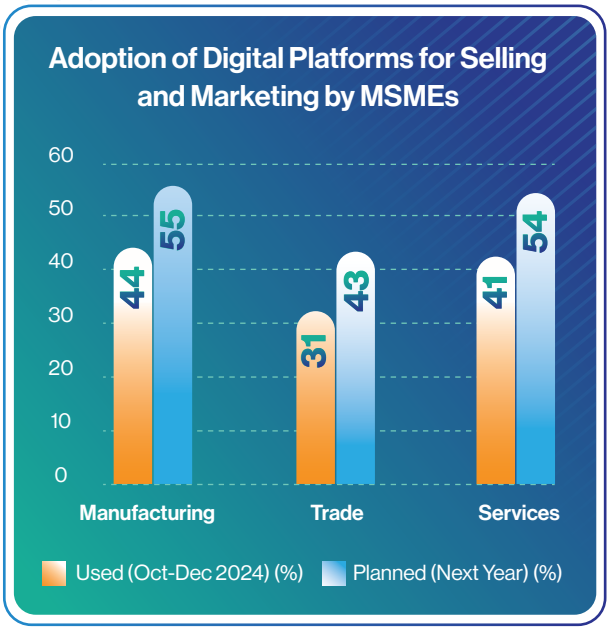
According to Udyam Portal and Udyam Assist Portal (UAP), MSME registration is 6,27,78,450 for micro; 4,72,294 for small and 35,195 for medium enterprises [10]. These figures demonstrate that microenterprises comprise the overwhelming majority of India's MSME sector, underscoring the need for targeted policies and schemes that address their specific challenges and needs. Many small microenterprises face challenges in accessing credit, establishing market linkages, and utilising digital tools. MSME Digital Index 2024 survey released by PayNearby shows that over 65% of MSMEs today integrate some form of digital technology in their day-to-day operations, reflecting a significant shift towards digitalisation [11]. However, the variation in digitalisation in MSMEs based on sizes is evident too based on the score in Digital Maturity Index (DMI) by MSME Growth Insights Study Vol 2.0 2024 by Vi Business, with less than ₹10 Crore turnover at 55, while for those with turnover between ₹50-₹100 Crore is at 58, and MSMEs with turnover above ₹100 Crore at 68 [12]. It highlights the correlation between business size and digital maturity, underscoring the need for enhanced support and targeted strategies to help smaller micro and small enterprises (MSMEs) adopt digital technologies.

4.2 Sector-Specific Digital Adoption

MSMEs in India have a diverse landscape, encompassing sectors such as manufacturing, trading, and services, as well as more informal enterprises. According to the 73rd round of National Sample survey, which the National sample survey office conducted under the Ministry of statistics and programme implementation during the 2015-16 period, there were about 633.8 lakhs unincorporated non agriculture MSME in the country engaged in various other economic activities (196.65 lakh in the field of Manufacturing, 0.03 lakh in the Non-captive Electricity Generation and Transmission sector, 230.35 lakh in Trade and finally 206.85 lakh in Other Services) excluding those MSMEs registered under section a) 2m (i), 2m (ii) of the factories act, 1948, (b) Companies Act, 1956 and (c) construction activities falling under Section F of National Industrial Classification (NIC) 2008 [1].



The way MSMEs embrace digital tools varies across different industries in terms of extent and manner, depending on their unique needs and capabilities. According to the MSME Outlook survey by SIDBI, more businesses are turning to digital platforms for sales and marketing. In manufacturing, 44% of MSMEs utilised digital methods between October and December 2024, a figure expected to rise to 55% over the next year. A similar trend is happening in the trading sector, where 31% of businesses had gone digital during the same period, with 43% planning to join them in the coming year. The services sector is also keeping pace; 41% of the platforms are already digital, and 54% intend to adopt them within a year, reflecting a steady increase in digitisation across the board [13].



The MSME Growth Insights Study Vol 2.0 2024 by Vi Business shows that digitalisation among MSMEs isn't the same across all sectors. Their Digital Maturity Index (DMI), based on three factors — digital customers, digital business, and digital workspace, highlights these differences. Sectors like IT-ITES, Financial Services, and Transportation are leading the way, with DMI scores of 63.3, 62.3, and 61.4, all showing an increase in their DMI score in 2024 from 2023. Meanwhile, industries such as logistics, Telecom (especially those involved in telecom and networking products), and Professional Services are still lagging, being the least digitally mature sectors [12].

4.3 Focus on Microenterprises

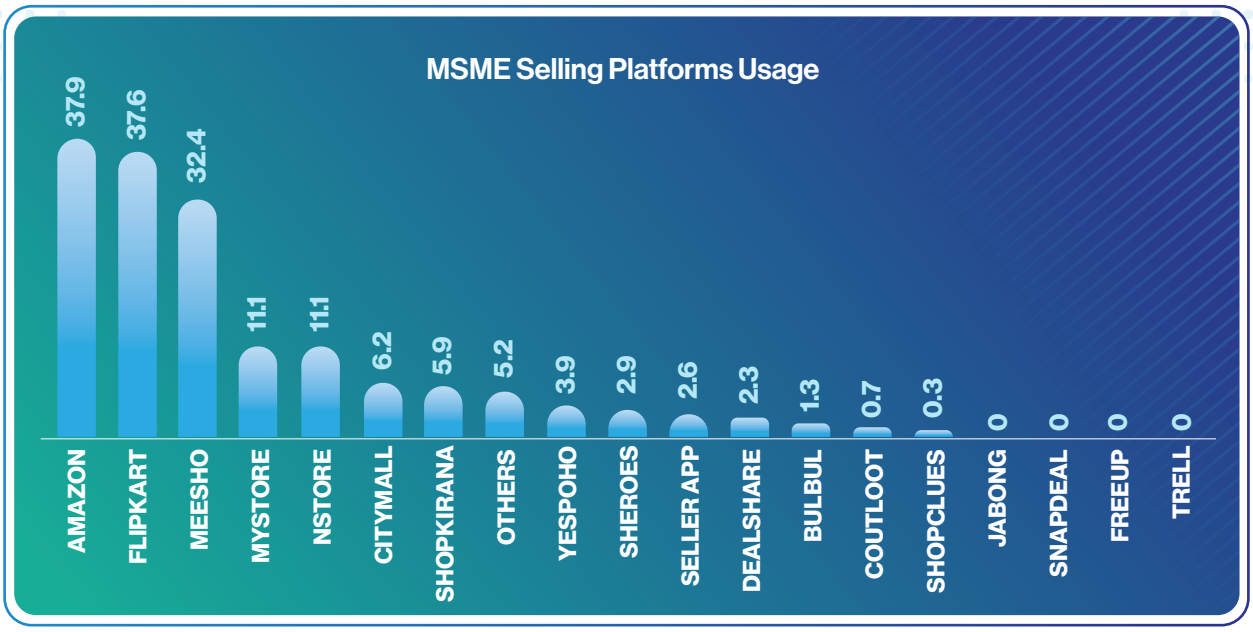
According to the MSME Annual Survey 2023-2024, microenterprises account for more than 99% of MSMES, with small and medium-sized enterprises accounting for 0.52% and 0.01%, respectively [1]. Each sector is further highly heterogeneous due to differences in the type of industry, ownership structure, mode of operation, and area of operation, as well as an enterprise's stage of development.

According to research conducted by MicroSave Consulting in collaboration with Busara, only 38% of microenterprises have successfully integrated their businesses with digital platforms. It reflects the digital divide in the entrepreneurial sector. Most companies operate in the informal sector, providing a significant source of employment and contributing to GDP. However, many face difficulties in accessing credit, market linkages, and digital tools that could help increase the scalability of their businesses. 38% of microenterprises integrated with digital platforms reported better business outcomes because digitalisation increased their income and expanded their customer reach. However, this growth often comes with higher expenses, such as platform fees and logistics costs. Despite these added expenses, the overall business confidence among digital platform users has increased, with many microenterprises feeling more resilient and optimistic about the future [14].

Another report by MicroSave Consulting defined a microenterprise as a small business with fewer than two employees operating in retail trade and social selling. According to the study, India is home to 9 million microentrepreneurs who have learned about digital platforms through their research. Peer influence and social media usage rank second and third, respectively, as the sources of platform awareness. 49.1% of 'unplatformed' microenterprises and 41.2% of microenterprises that are 'platformed' rely on friends and family for awareness about various digital platforms. They are the second-most common source of information. A substantial number of microenterprises (MEs), including those already using digital platforms and those considering engagement with the platforms, emphasised the importance of learning about the platforms before joining. These enterprises also expressed a need for assistance navigating the onboarding process and understanding the commission structures of the platforms, highlighting the importance of detailed guidance on the platforms and onboarding support [15].

37.9% of the interviewed MEs are registered on Amazon, with many microenterprises being registered on multiple platforms. The popular and more prominent platforms, such as Amazon and Flipkart, are the most commonly adopted by MEs.

Social selling platforms, notably Meesho, also enjoy significant popularity. Specifically, 59.8% of respondents operate on a single platform, 18.6% on two or three platforms, and only 0.03% engage with more than three platforms [15].



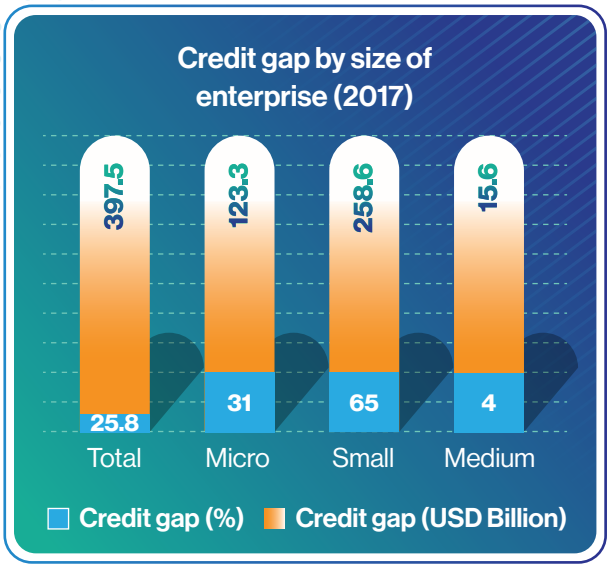
Source: MicroSave Consulting. Impact of digital platforms on microenterprises: India country findings [15].

Microenterprises face a wide range of challenges in their digitalisation journey. A significant 87.5% of MEs are concerned about high commission fees imposed by digital platforms. Additionally, some find difficulties with unfavourable return policies and complex navigation on the platforms. The onboarding process is further complicated by mandatory inventory requirements and strict payment structures [15].

Another report titled 'Country Strategy for Green Inclusive Micro Enterprises Financing - India', September 2021, reveals that while making a significant contribution to the economy, MEs are weak in terms of stability and competitiveness because of various challenges they confront including limited access to markets and restricted access to capital, which can further affect their ability to invest in market development, in modern and digital tools and machines and in raising working capital. A similar study by the Reserve Bank of India on the micro, small, and medium enterprise sector in 2019 identified that MEs face insurmountable barriers to accessing credit and risk capital.

MEs mainly operate in industries driven by orders, such as repair and maintenance, retail trade, textiles, and restaurants, among others, with a significant demand for working capital. However, because they primarily transact in cash and therefore lack recorded financials, it becomes difficult for MEs to have their creditworthiness assessed by financial institutions. MEs also have minimal access to movable and immovable collateral, making collateral-based financing through financial institutions out of option for them. Moreover, having limited training in resource planning and a lack of awareness about the potential financing avenues make them even more vulnerable [16].

According to a report by IFC, titled Financing India's MSMEs, estimation of Debt Requirement of MSMEs in India, 2018, the finance gap in micro, small and medium enterprise segments, that financial institutions can address, is around 123.3 billion USD, 258.6 billion and 15.6 billion USD, respectively, based on primary research of WBG-Intellecap Analysis [17].

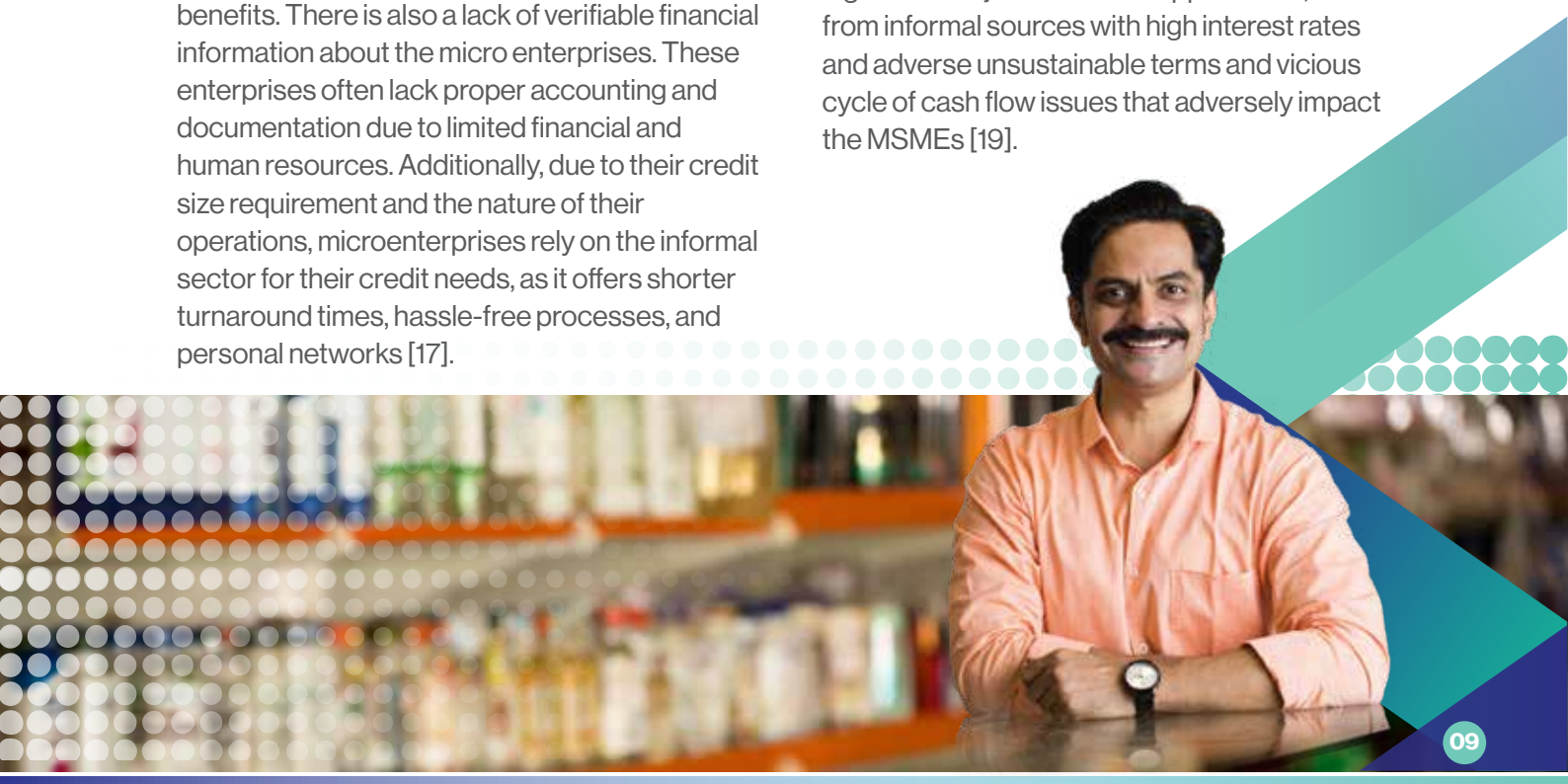


The micro-enterprise sector accounts for 31 per cent of the total addressable credit gap in the MSME sector. Furthermore, the gap-to-demand ratio in this segment stands at 68%. The credit gap in this segment has resulted from various challenges that microenterprises have faced. First, most microenterprises cater to the services sector and do not own immovable assets to serve as collateral to secure finance. Furthermore, while the government has introduced multiple services, projects, and schemes tailored to the needs of microenterprises, the lack of awareness among entrepreneurs about these initiatives is a significant obstacle to availing themselves of the benefits. There is also a lack of verifiable financial information about the micro enterprises. These enterprises often lack proper accounting and documentation due to limited financial and human resources. Additionally, due to their credit size requirement and the nature of their operations, microenterprises rely on the informal sector for their credit needs, as it offers shorter turnaround times, hassle-free processes, and personal networks [17].

The Government of India has addressed the challenge of using balance sheet-based credit assessment in its 2024-25 budget, which states that banks will use alternative credit assessment, especially Public Sector Banks (PSBs). PSBs are advised to develop a new credit assessment model based on the scoring of digital footprints of MSMEs.

The digital footprints in the model can include name and PAN authentication using NSDL, API fetch of GST data, mobile and email verification using OTP, and bank statement analysis using account aggregator, among others. This model will benefit MSMEs by reducing paperwork and branch visits, allowing for the submission of applications through online mode, and implementing an end-to-end straight-through process (STP), as well as eliminating the need for physical collateral securities for loans covered under CGTMSE, among other benefits. It will also cover MSMEs without a formal accounting system [18].

While this initiative has been appreciated by industry practitioners and experts, and is a welcome move, however, as per The Economic Times, the industry has been expecting something more from the Government like tackling the problems in MSME sector like the high rate of rejection of loan applications, credit from informal sources with high interest rates and adverse unsustainable terms and vicious cycle of cash flow issues that adversely impact the MSMEs [19].

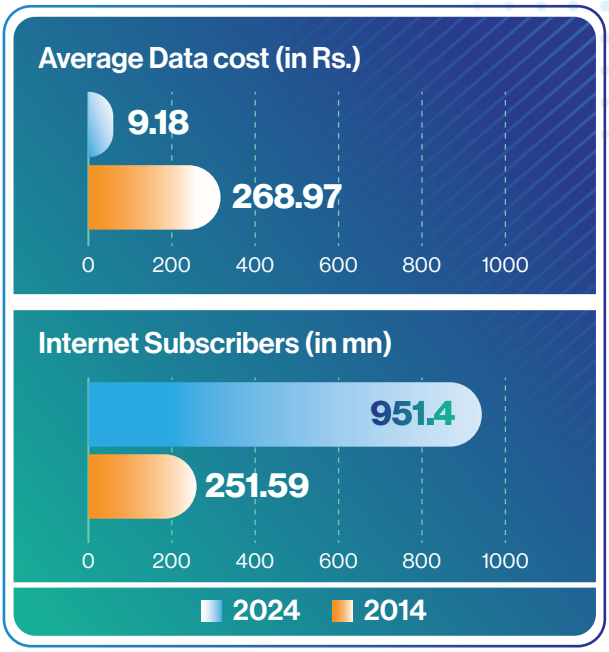


5. Factors driving digitalisation in MSMEs

In recent years, the digital revolution has become fully established, with MSMEs adopting digital tools and platforms to tap into new markets, remain highly competitive, and enhance their adaptability. This is a result of several factors, including global opportunities, customer aspirations, affordability, regulatory facilitation, and technological innovation.

5.1 Affordable Technology and Connectivity

One of the most significant factors has been the increased affordability of access to digital platforms, as evidenced by the rapid increase in internet and smartphone users resulting from the reduction in smartphone and data prices. According to the IAMAI and Kantar report, "Internet in India, 2024," the Number of Internet users in India has increased steadily over the past few years, rising from 41% in 2019 to 58% in 2024, with 574 million and 886 million users, respectively. India is also projected to have over 900 million internet users by 2025, with a significant portion of these users coming from rural areas. India is also the market with the cheapest smartphones and data plans among G20 countries. For Indian telecom operators, the average revenue per user (ARPU) ranges from Rs. 140 to Rs. 200, compared to the global range of Rs. 600 to Rs. 850 [20]. The MSME Growth Insights Study Vol. 2.0 2024, by Vi Business, based on the data of the International Telecommunication Union, also reveals an increase in internet services, with a 110% compound annual growth rate (CAGR) in fixed broadband and a 40% CAGR in mobile broadband internet, from 2018 to 2022 [12]. The average cost of data per GB declined by 96.58%, decreasing from ₹268.97 to ₹9.18 from March 2014 to March 2024. This steep decline in data prices led to a sharp increase in average data consumption, rising from 0.26 GB to 20.27 GB per user. Moreover, internet subscribers also increased from 251.59 million to 954.40 million [21]. It indicates that accessibility to digital services, information, and e-commerce is being enhanced due to the nationwide penetration of digital connectivity.



Affordable smartphones and cheaper data have allowed small businesses to utilise digital platforms and break the monopoly of large corporations over their use. This includes, for instance, using UPI for transactions, YouTube and Instagram for marketing, and WhatsApp Business for customer communication, as well as the rise of influencer marketing and freelance digital content creators driving the digital creative economy. It is now very common to see micro-enterprises, such as artisans, street food sellers, or vegetable vendors, leveraging tools like food blogging, vlogging, influencer marketing, and other non-traditional digital modes to expand their digital presence and business. Earlier, they were more focused on traditional pamphlets, newspapers and SMS marketing. SEO, creative and performance marketing, website, and mobile apps have become standard.

The conventional “Prachaar Nahin to Vyapaar Nahin” (No Promotion, No Business) is now overloaded with a higher share of digital tools and ways, including the automated Artificial Intelligence-based promotions. This affordability and accessibility are significant factors in levelling the playing field and democratising digital access, allowing nano and MSMEs to participate in the digital economy.

5.2 Changing Customer Aspirations

Increasing digital awareness and access to diverse global content among Indian entrepreneurs and customers is also key in driving the digitalisation of MSMEs. The exposure of the Indian audience to international platforms, including Netflix, Instagram, YouTube, and e-commerce platforms such as Flipkart and Amazon, has been a consequence of the internet's penetration and the availability of affordable data, along with the widespread adoption of smartphones. According to the Ormax OTT Audience Report 2024, the digital video market experienced a 13.8% increase from 2023, with 547.3 million users projected for 2024. Moreover, it is fascinating that smartphones were the preferred device for online video consumption for around 90% of the audience [22] . Considering the e-commerce market in India, as per Globe Newswire, based on the "E-commerce market in India 2024-2029" report, it was valued at INR 8.42 trillion in 2023. It is expected to reach a value of INR 53.42 trillion by the end of 2029, expanding at a compound annual growth rate (CAGR) of ~39.37% from 2024 to 2029 [22].

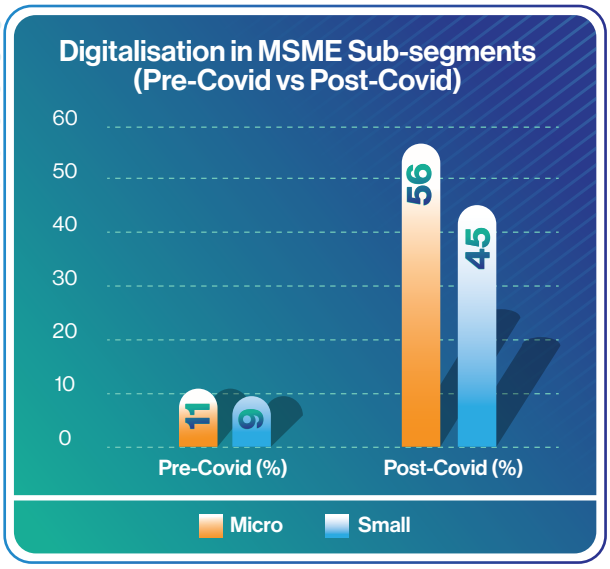
Access to global content, products, services, and trends has drastically changed consumer behaviour and increased customer aspirations. Customers now expect higher-quality, convenient, personalised, and more digital interactions and experiences, irrespective of the size or location of the business. The demand is for speedy deliveries, diverse payment options, easy returns, timely customer assistance, and interactive digital experiences. This shift in consumer aspiration has pressured MSMEs to upgrade themselves to meet the enhanced expectations of the globally aware and digitally literate audience and stay relevant.

According to a report by MicroSave Consulting, 82% of customers expressed comfort with online shopping. Key reasons include anytime availability (62%), wide product selection (43%), and better discounts (38%).

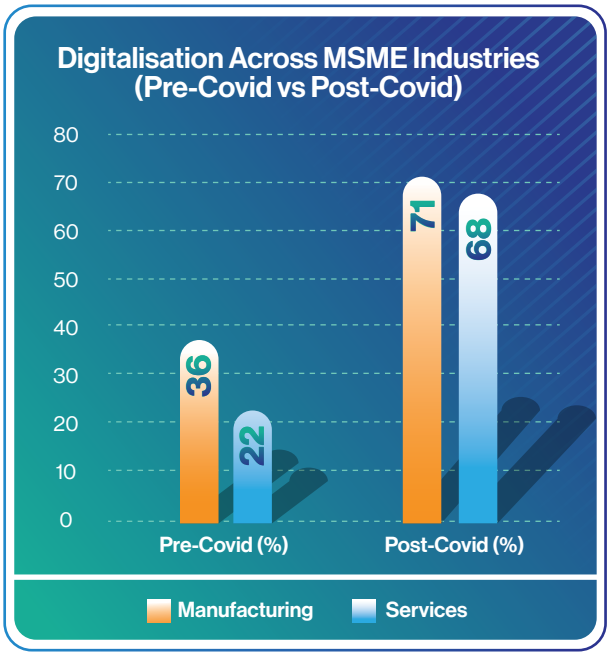
These experienced shoppers often buy in bulk to maximise savings and prefer established marketplaces that offer product variety, brand comparisons, and personalised recommendations through algorithm-driven engines based on their search and purchase history [23].

5.3 Impact of COVID-19 on Digital Adoption

COVID-19 emerged as a catalyst for digitalising MSMEs in India and enhancing their customer approval. This pandemic pushed MSMEs to adapt rapidly to the contactless ecosystem by disrupting the traditional business models. MSMEs were compelled to adopt digital modes for operations, communication, and sales due to recurring lockdowns, supply chain disruptions, and reduced foot traffic to physical stores. Utilising digital payment systems, social media marketing, and e-commerce platforms has become necessary to ensure business continuity and maintain customer engagement. According to a report by ICRIER (2025), about 71% of enterprises joined e-commerce platforms during or after 2020 [24].



Source: ASSOCHAM and CSIRIL. MSMEs back to the grind [5].



Source: ASSOCHAM and CSIRIL. MSMEs back to the grind [5].

5.4 Potential to Access International Markets

The potential to access international markets has also been a key incentive for MSMEs to adopt digital solutions. Small businesses in India can reach customers outside India by utilising platforms like Amazon Global Selling and Alibaba. These platforms offer a range of tools and services designed to simplify logistics, payments, and compliance management. This 'plug and play' model of exports has removed several entry barriers for accessing overseas opportunities.

Moreover, small Indian brands can create narrative with global appeals and reach niche global audiences through digital marketing, social media, SEO, and influencer-driven promotion. Handcrafted decor, regional foods, and ayurvedic wellness products are capturing the attention of overseas audiences. This enhanced reach at the international level has helped MSMEs expand their revenue sources and reduce dependence on regional market fluctuations. The NITI Aayog's report underscores the transformative potential of e-commerce platforms in enabling Indian MSMEs to access international markets [25]. These platforms offer tools for targeted marketing, reaching specific customer segments, and providing integrated logistics and fulfilment services through which MSMEs, even with low-volume production, can economically reach customers.

5.5 Competitive Pressures and Reduced Margins

Digital marketplaces are opening new customer bases, leading to a more competitive environment, which reduces profit margins. For example, the volume-driven, slim-margin operating models of platforms like Amazon and Nykaa, as well as other brands, encourage sellers to engage in price-driven market competition and offer discounts to boost their market presence.

This shift modified business models in MSMEs. MSMEs must eliminate unnecessary costs, enhance the effectiveness of their operations, and utilise digital services and tools effectively. For example, automated logistics and inventory systems help reduce workforce and wastage. Digital marketing offers more targeted and cost-effective market penetration. Many MSMEs are now adopting direct-to-consumer (D2C) models to control branding, pricing, and customer data, eliminate intermediaries, and improve profitability. According to the FICCI Report on SMEs in India, approximately 35 per cent of respondents reported a reduction in annual operational costs by 11-20 per cent due to digitalisation.

Another 30 per cent of respondents indicated that their operational yearly costs had decreased by more than 20 per cent [26].

5.6 Need for Transparency and Regulatory Compliance

Digitalisation brings better transparency to business operations. Digitalised operations, such as digital invoices, cloud-based ERP systems, and transaction tracking, provide MSMEs with a clearer view of their operational efficiency and financial health. There are multiple benefits to this transparency; it prevents incidents of fraud and revenue leakage. It simplifies tax compliance, especially in the current GST regime. It is helpful in building credibility among various stakeholders, including lenders, customers, and suppliers. More importantly, business requires transparency, especially considering today's regulatory environment.

MSMEs are being encouraged to formalise through digital means as the government mandates digital payments, implements limits on cash-based transactions, introduces e-invoicing, and requires formal registration, such as Udyam.

Monitoring accountability is also made better using digital tools. More informed decision-making is now possible, as owners can track the performance of employees, customer feedback, sales trends, and vendor relationships in real-time. Customer service is improved, and a solid foundation for scale is made possible through agility-enhanced data-backed management of this kind. Nano and MSMEs can quickly complete regulatory filings by syncing directly with the internal database and required documentation, which is made possible by digitalisation.

6. Digital Tools and Technologies

MSMEs must adopt digital technology and tools strategically to survive, scale, improve, and grow in a digital era. Given the vast diversity among MSMEs in terms of sector, size, location, and stage of growth, there is no one-size-fits-all digital solution. Therefore, MSMES needs to assess its specific operational needs, customer base, and growth goals before selecting technologies.

This section provides an overview of the core digital technologies and related digital tools, highlighting the benefits that MSMEs can derive from their applications. These technologies, ranging from digital media and Cloud computing to IoTs, AI, and many more, benefit MSMEs in key functional areas, including finance and compliance, marketing and outreach, customer service, workforce management, operations, and logistics.

6.1 Accounting and Inventory Management Tools

Accounting tools enable MSMEs to manage financial transactions efficiently, ensure regulatory compliance, and gain real-time insights into their economic status. These tools automate invoicing, expense tracking, and financial reporting. Vyapar, for instance, offers features for GST billing, payment management, and invoicing. Zoho Books allows users to manage invoicing, financial reporting, and tracking. MSMEs can reduce manual errors and save time by utilising accounting software, thereby obtaining more accurate financial records and making better-informed decisions.

Inventory Management Systems (IMS) offer MSMEs a streamlined approach to managing stock levels, reducing operational costs, and enhancing overall efficiency. These tools help automate stock tracking, order processing, and supply chain management. Zoho Inventory, for instance, allows barcode scanning and end-to-end order tracking. Marg ERP provides warehouse management and real-time inventory tracking.

Tranzact integrates inventory with production and procurement processes, offering reports and GST e-invoicing. Integrating Internet of Things (IoT) technology into inventory management enhances the operations of micro, small, and medium-sized enterprises (MSMEs). IoT devices provide real-time data on inventory levels, location, and condition, facilitating precise tracking and timely replenishment.

6.2 Artificial Intelligence (AI) Applications

AI enables MSMEs to streamline operations and boost productivity by automating routine tasks, including designing initiatives, providing customer support through chatbots, and optimising supply chain operations with data analytics. Further, MSMEs can receive valuable market insights to make informed decisions. For instance, ChatGPT offers assistance for content creation and customer support. QuickBooks can automate financial tasks such as invoice management and bookkeeping. Aksum provides supply chain solutions, enables real-time demand forecasting and connects businesses with suppliers, thus assisting in the optimisation of inventory management.

6.3 Augmented Reality (AR)/ Virtual Reality (VR) for MSMEs

AR and VR, immersive technologies that blend digital and physical worlds, can be used by MSMEs to create interactive, engaging, and realistic experiences. While AR enhances how we interact with our environment by overlaying digital elements onto the real world using smart glasses, smartphones or tablets, VR makes users feel present in a digital space by creating a wholly simulated 3D environment that users can interact with through headsets and controllers.

MSMEs can use these technologies for product demonstrations, employee training and enhancing customer experiences.

For instance, customers try clothes, accessories, or cosmetics in retail through AR. In real estate, clients can explore properties remotely using VR headsets. For MSMEs in manufacturing or skilled trades, VR-based training reduces cost and risk by allowing workers to learn in simulated environments. AR can overlay a digital version of equipment in the engineering sector for live monitoring and design improvements. Various AR/VR tools are available that MSMEs can leverage. ZapWorks, for instance, is a drag-and-drop AR creation platform ideal for retail and branding. Vuforia can be utilised in manufacturing to provide visual instructions and facilitate equipment diagnostics.

6.4 Blockchain for MSMEs

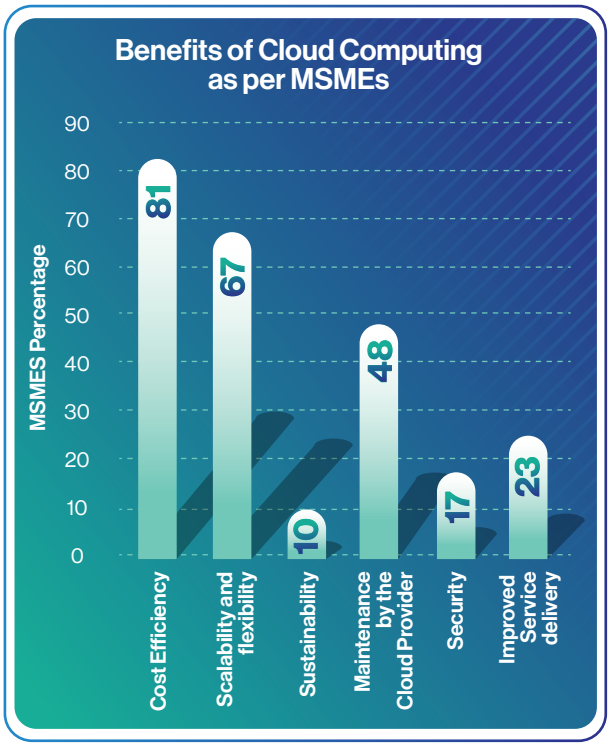
Blockchain, a decentralised and distributed digital ledger technology, can be leveraged by MSMEs to record transactions, ensuring transparency, security, and efficiency in their operations. The technology makes it nearly impossible to alter records, ensuring participant security and trust. MSMEs can use it for secure supply chain tracking, smart contracts, and data sharing. For instance, supply chain-based MSMEs can utilise blockchain to track goods in real-time. It can also be used for cross-border payments and contracts via smart contracts, eliminating intermediaries and ensuring faster settlements.

MSMEs can benefit from blockchain through ready-made Blockchain-as-a-Service (BaaS) platforms, including IBM Blockchain, Microsoft Azure Blockchain, Ethereum, etc. MSMEs can also partner with Blockchain service providers. Some companies that provide setup and training include Tech Mahindra, Infosys, and Wipro, among others. A blockchain platform can also be integrated with MSMEs' ERP or accounting software.

6.5 Cloud Computing

Cloud computing is a transformative digital technology that offers Micro, Small, and Medium Enterprises (MSMEs) in India an affordable, scalable, and flexible way to manage their operations and expand their businesses.

Instead of investing heavily in physical infrastructure, such as servers and data centres, MSMEs can utilise cloud services to access computing power, storage, and software over the internet. This reduces upfront costs, allows quick scaling based on business needs, and enhances collaboration among remote teams. MSMEs can benefit from NSIC's digital service facilitation. Under this, MSMEs can access cloud services at affordable prices with special offers and discounts, without facing market challenges or dealing with intermediaries.

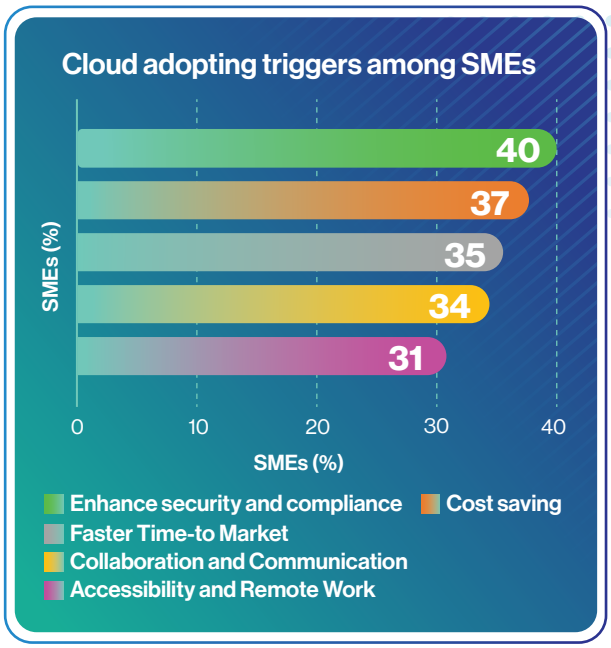


IJCRT. A study of cloud computing in MSMEs [27].

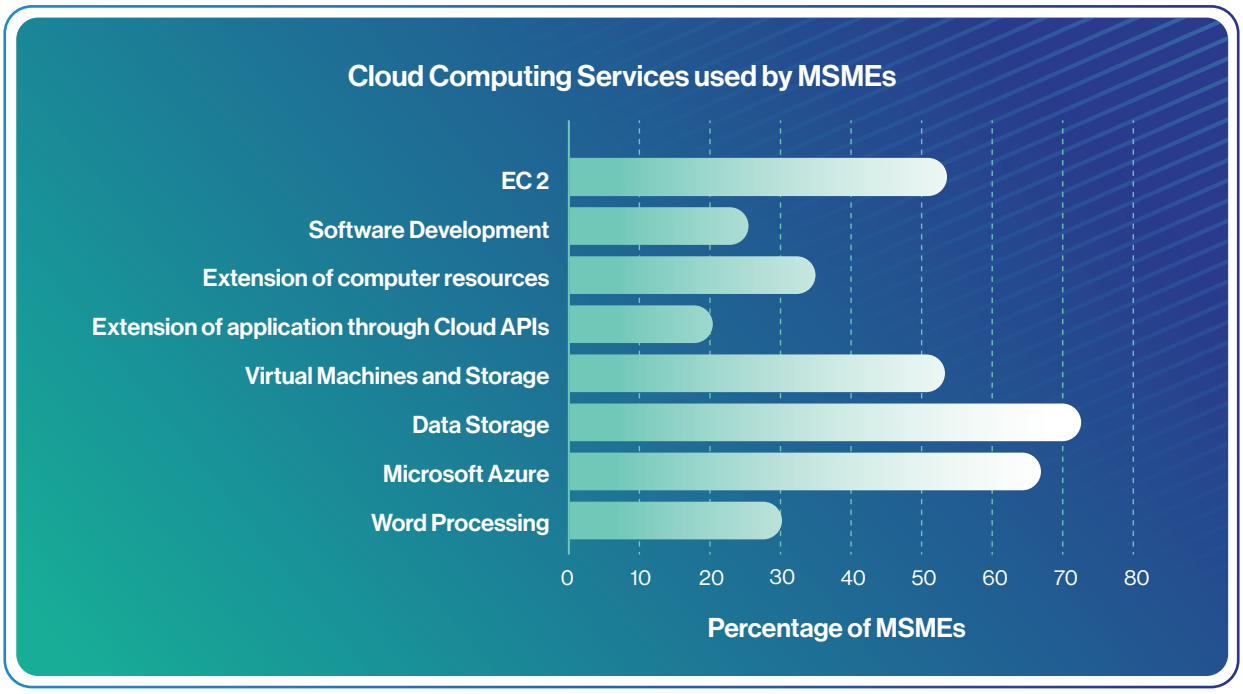
Several tools and platforms are available for MSMEs to effectively leverage cloud computing. In cloud storage and collaboration, platforms like Google Drive and Dropbox enable MSMEs to securely store, share, and access business documents from anywhere. Google Drive is widely used for file sharing and cloud storage, while Dropbox is used for version control, easy syncing, and other purposes [28].

Cloud-based team communication and collaboration tools are crucial for maintaining team connectivity and boosting productivity, especially with the growing adoption of remote and hybrid work models.

Popular cloud computing solutions, such as Slack, enable project-based discussions by organising communication into channels and integrating seamlessly with other cloud tools, like Google Drive and Trello. Microsoft Teams, another cloud-powered platform, combines chat, video meetings, and file collaboration in a unified interface. Tools like Flock, Google Workspace, and others also fall under Software as a Service (SaaS), offering real-time access and data synchronisation via the internet. These cloud-enabled tools help MSMEs maintain transparency, reduce delays, and foster a collaborative and agile work environment, eliminating the need for complex physical infrastructure.



Tata Tele Business Services and CyberMedia Research. Adapt Scale Thrive – SMEs and the Cloud Imperative [29].



IJCRT. A study of cloud computing in MSMEs [27].

6.6 Content Creation Tools

Content creation tools offer significant opportunities without requiring high-end professional expertise and equipment. Based on the Case studies on Digital branding and patent (2022-2023), NI-MSME, Canva has been an essential tool utilised to create content for digital marketing [30].

Canva is an intuitive online graphic design platform that enables individuals and businesses to create a diverse range of visual content. It provides pre-sized templates for various platforms, including Instagram posts and stories, Facebook ads and covers, YouTube Thumbnails, LinkedIn banners, posters, flyers, and Business Cards, among others.

It also allows team members to view and edit designs, as well as add comments and feedback. Another example can be InShot, a mobile app for editing video and photo content.

MSMEs can use YouTube to reach a global audience. It can be used for product demonstrations by showcasing how their products and services work, through unboxing videos, storytelling with customer testimonials, educational content, expert insights via webinars, live streaming, and sharing industry insights, as well as social media integration and advertising. There are 2.1 billion YouTube users worldwide [31]. In January 2024, India had the largest YouTube audience, with nearly 491 million users, followed by the United States, which had 253 million users on the popular video platform [32]. In 2024, YouTube's advertising revenue accounted for approximately 13.66 per cent of Google's total revenue [33]. These figures reveal the potential of YouTube for MSMEs.

6.7 Customer Relationship Management (CRM) Systems

CRM tools help MSMEs manage and engage with current and potential customers, as well as streamline their operations.

Zoho CRM, for instance, offers features such as sales automation, multichannel communication, and AI-powered analytics, providing a comprehensive solution for customer engagement.

A survey conducted by Zoho reveals that 81% of respondents want to increase their cloud spending budget in 2025, with key technology areas for businesses in 2024 including CRM, financial services, and business intelligence. Among the surveyed MSMEs that plan their IT spending (98%), 77% have allocated up to 50% of their 2024 budget towards cloud solutions, while 23% of businesses have allocated more than 50%. 87% of the respondents have either used a CRM solution before or currently use one, out of which 97% said they have seen an improvement in their customer operations post using a CRM. Additionally, 90% of MSMEs currently not using a CRM solution said they will adopt one by 2026 [34].

6.8 Cybersecurity Solutions

Adopting digital tools brings challenges, particularly in cybersecurity, where robust defences are needed to protect operational and informational systems. The growth in cybercrimes and increasing cyber threats, including phishing, ransomware, malware, and denial-of-service attacks, makes it evident that the need for cybersecurity is more prominent than ever. It is further essential for vulnerable businesses, such as micro, small, and medium-sized enterprises (MSMEs), which often have weak system protection and low awareness. As many companies now operate from home without a comprehensive security framework in place, the need for cybersecurity is further heightened.

For example, Honeywell has developed advanced cybersecurity solutions to safeguard industrial control systems, ensuring uninterrupted operations for its clients in critical sectors such as oil and gas [35]. Cybersecurity tools fall into various categories, including Antivirus and Anti-malware, Firewalls, Encryption Tools, Network Security tools, Identity and Access Management (IAM), and Security Information and Event Management (SIEM).

6.9 Digital Media Platforms

MSMEs can utilise various digital media platforms, such as Instagram, Facebook, LinkedIn, WhatsApp, their website, and mobile app, to grow, engage with customers, and streamline operations. These tools enable MSMEs to reach broader audiences at very low cost and gain brand recognition by enabling targeted advertising, customer engagement, and visual storytelling.

- **Instagram** enables MSMEs to gain brand recognition through consistent posting, visuals, and storytelling. The platform's major user base comprises young people, the potential audience for the enterprises. Instagram offers to switch to a business profile, unlocking tools like insights and a platform for running ads.

There are options for sharing visually appealing content, such as Reels and Stories, as well as enabling Instagram Shopping features, all of which are effective ways to increase engagement and drive sales. Instagram's analytics tools help businesses monitor content performance and refine their approach. Moreover, features like hashtags and location tags enhance discoverability, while the opportunity for collaboration with influencers can also increase reach. Instagram enables MSMEs to sell products directly through features like Instagram Shopping, allowing customers to browse and purchase items within the app.

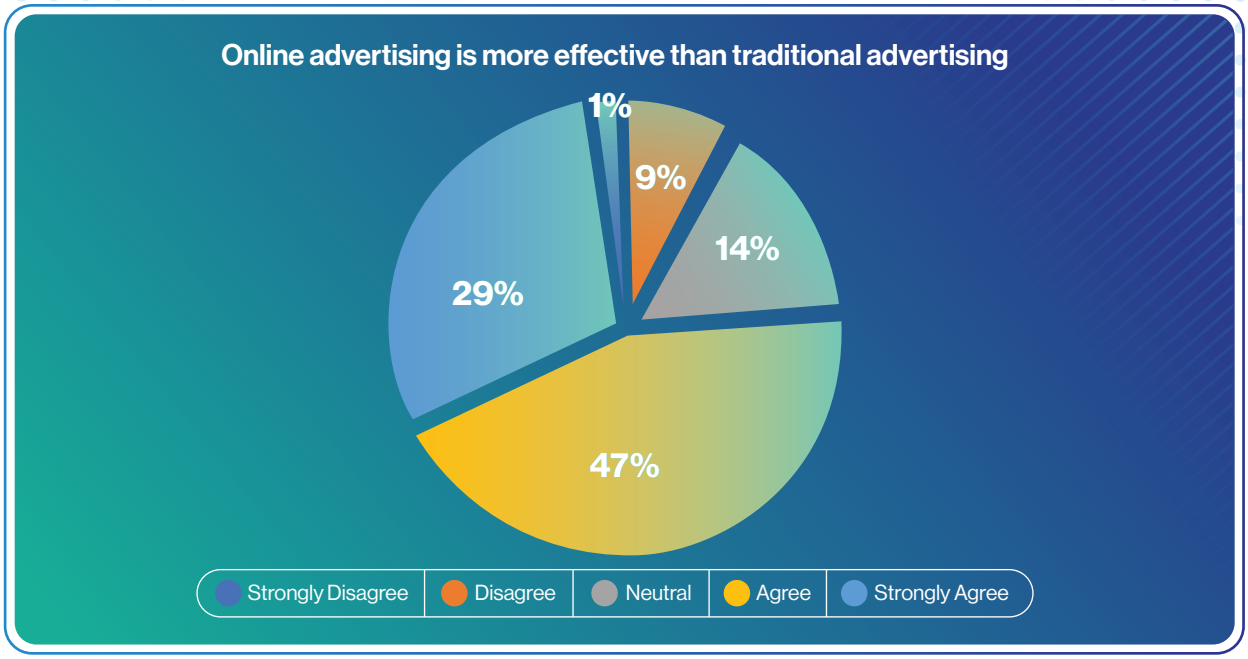
- **Facebook** allows MSMEs to create a business page to showcase products, interact with customers, and run targeted ads. A report by the World Trade Organisation titled, "Examining MSMEs and Digital Readiness Through Meta Survey Data" reveals that worldwide, micro and small business Facebook users consider advertising their top reason for using digital platforms. In contrast, medium and large businesses prioritise communication. Tools like Messenger and targeted advertising also enable direct customer engagement and broader audience reach.

- **LinkedIn** is a powerful tool for MSMEs to network professionally and connect with potential clients, partners, and industry professionals. MSMEs can create a company page and showcase their products and services. Furthermore, engagement with industry-specific discussions and groups enables the sharing of insights and connection with potential partners and clients. Additionally, targeted advertising tools can be utilised for enhancing brand awareness and generating effective leads.

- **WhatsApp Business** enables MSMEs to communicate directly with customers, offering a more personal and immediate connection. Businesses can market their products through broadcast messages, catalogues showcasing their products with images, descriptions, and prices, as well as status updates, reaching customers in a personalised way. It enables real-time sales communication, order confirmations, and follow-ups, allowing customers to browse through them and make direct inquiries, thereby building trust and enhancing the customer experience. WhatsApp Pay enables seamless transactions within the chat, allowing customers to complete purchases without needing to leave the conversation.

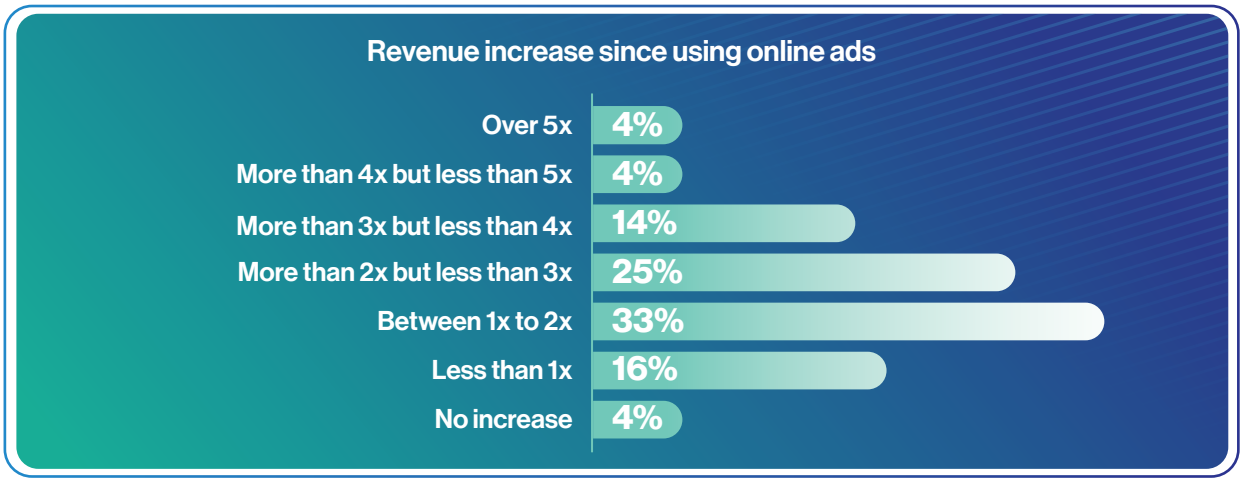
A survey conducted by DAI, Ipsos, and Meta from June to August 2021 found that 21 percent of surveyed online MSMEs reported that they used Facebook apps, including Facebook, WhatsApp, and Instagram, to communicate with suppliers in the past 30 days, while only six percent reported using other digital tools to do the same in the same timeframe [36]. With a usage rate of 97%, WhatsApp and WhatsApp Business were collectively the most widely used messaging apps among Indian micro, small, and medium-sized enterprises (MSMEs) [11]. In the Digital MSME Yatra 2024, organised by CeDISI, WhatsApp emerged as the most trusted and widely used internal ERP for cross-department collaboration and a CRM tool for entrepreneurs, who value its simplicity, group visibility, and control over access.

Furthermore, with the number of Indian users on Instagram, Facebook, and LinkedIn being 229.55 million, 366.85 million, and 150 million, respectively, these platforms have become attractive for MSMEs to build their presence [37]. A report by Primus Partners titled 'Leveraging Online Ads for India - Unpacking the Impact of Online Ads on MSMEs and Startups' reveals that MSMEs and startups believe online advertising was more effective than traditional advertising for their business [38].



Source: Primus Partners. Leveraging Online Ads for India: Unpacking the Impact of Online Ads on MSMEs and Startups - A Multistakeholder Perspective [38].

The report also revealed that revenue increased since using online ads was as follows.



- **Own Website:** Furthermore, an MSME's website serves as a digital storefront, showcasing their services, products, and commitments 24/7 to their audience. The website enhances search engine visibility (SEO) and fosters trust by providing basic information, including services, contact details, location, company history, and more. This information generates leads through newsletter sign-ups or downloadable content. It can also increase sales through e-commerce functionality.

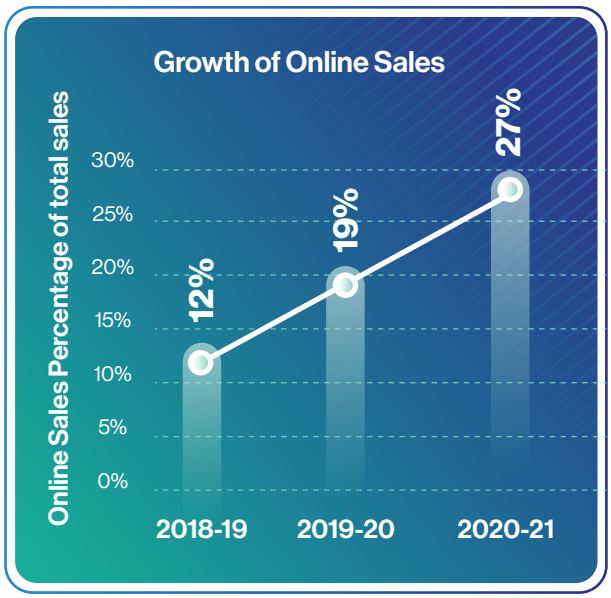
- **Mobile apps** of MSMEs can offer personalised user experiences and send push notifications to promote offers and updates. Certain parts of the app can function even without an internet connection. SMEs have also been leveraging e-commerce platforms and online marketplaces to reach a more extensive customer base and expand their market presence. These platforms allow SMEs to showcase and sell their products nationally and globally. Regarding online markets and sales platforms, 71 per cent of participating enterprises had their online channels or sales platforms (such as a website to display or sell products) [26].

6.10 E-commerce Platforms

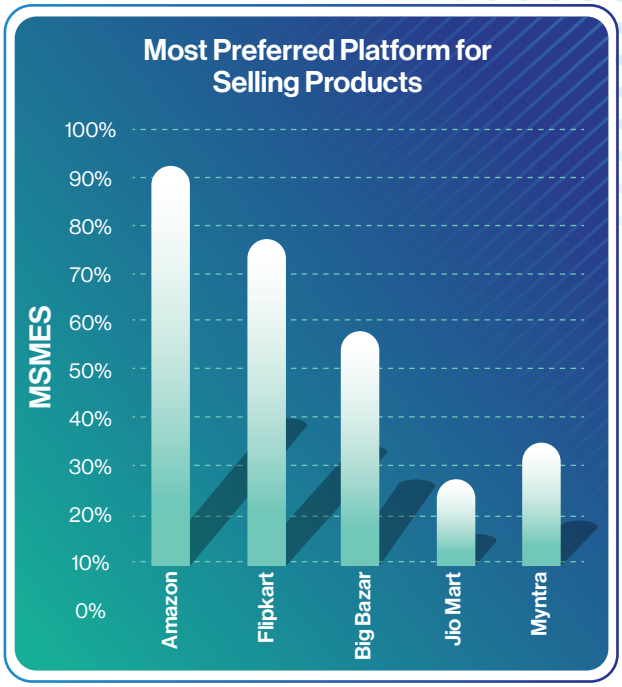
E-commerce platforms enable MSMEs to tap into a global online marketplace by assisting in building digital storefronts, managing products, processing orders, collecting payments, facilitating customer communication, and synchronising inventory. These platforms allow entrepreneurs to digitise their businesses without employing complex software. They offer digital catalogue creation, order tracking, and WhatsApp integration. Some widely used E-commerce platforms include WooCommerce, Shopify, Instamojo, Razorpay, Amazon, and Flipkart, among others.

The government-backed Open Network for Digital Commerce (ONDC) is a platform that enables sellers to list products on a unified national network, connecting them with buyers, delivery partners, and payment services.

A report by ICRIER reveals that in 2020-21, online sales accounted for 27 per cent of total sales, compared to 19 per cent in 2019-20 and barely 12 per cent in 2018-19. It also revealed that Amazon is the most preferred platform, followed by Flipkart, Big Bazar, Jio Mart, and Myntra [39].



Source: ICRIER. MSMEs go digital: Leveraging technology to sustain during the Covid-19 crisis [39].



Source: ICRIER. MSMEs go digital: Leveraging technology to sustain during the Covid-19 crisis [39].

According to the same survey by ICRIER, several hurdles exist that prevent MSMEs from onboarding e-commerce platforms. Since enterprises integrated on e-commerce platforms must register for GST compulsorily, they cannot avail themselves of the advantages under GST since e-commerce marketplaces do not enjoy the GST threshold exemption. While digital infrastructure is gradually expanding in the country, there remains reluctance, largely due to the low level of awareness and skill gaps.

6.11 Enterprise Resource Planning (ERP) Software

ERP tools integrate various business processes, including inventory, finance, and human resources. TallyPrime can be used in accounting, inventory management and GST compliance. SAP Business One provides a model for integrating sales, finance and inventory. ZohoERP offers modules for sales, finance, inventory, HR, and more, enabling MSMEs to automate processes and gain real-time insights. ERPNext includes modules for accounting, inventory, manufacturing, sales, and HR, with built-in compliance for GST. Odoo ERP is a modular, open-source business management software that integrates various business functions, such as sales, inventory, accounting, and human resources, into a single platform.

This allows businesses to start with essential modules and expand as needed. By consolidating information from various departments into a unified database, centralising data management, automating routine tasks such as financial reporting, and providing insights into resource utilisation, ERP systems enable MSMEs to enhance data accuracy, improve decision-making processes, and streamline operations.

According to the FICCI Report on SMEs, 2023, accounting software (such as Tally/ Vyapar/ Busy, etc.) and business applications like ERP and CRM were reported to be SMEs' most-used digital tools. Notably, about 37% of the surveyed enterprises also used cloud-based business applications, including IaaS, PaaS, and SaaS. Most firms have experienced improved productivity and reduced operational costs due to incorporating digital technology into their business functions. Approximately 35% of those surveyed reported a 11–20% decrease in their yearly operational expenses due to digitalisation [26].

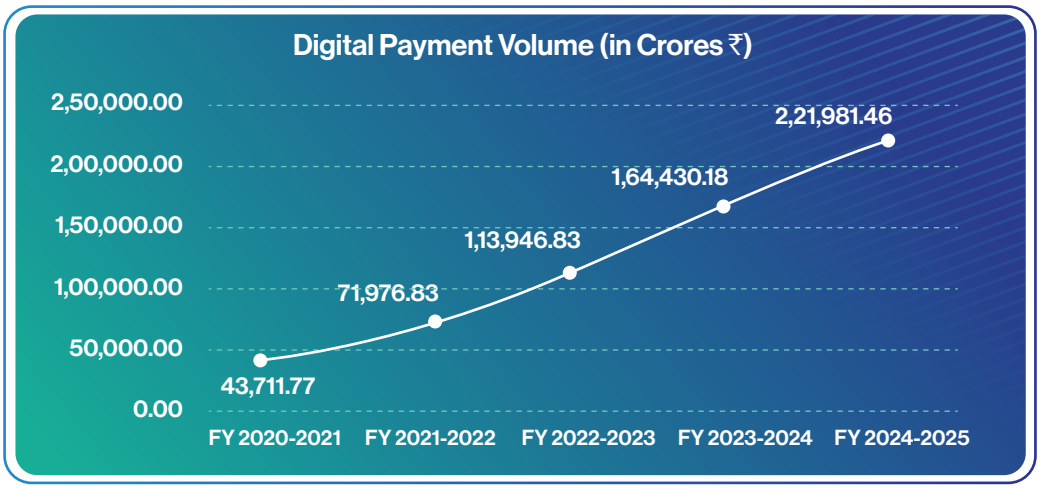
6.12 Financial Technologies

Fintech tools are addressing challenges such as delayed payments and a lack of formal credit history by offering digital-first solutions that are faster, more affordable, and tailored to the needs of micro, small, and medium enterprises (MSMEs). This includes innovations in payments, lending, insurance, wealth management, and regulatory technology (RegTech). For MSMEs, these tools can lower barriers to formal finance, improve cash flow, and streamline operations.

a. Payments

Digital payment systems are one of the critical ways that MSMEs can incorporate into their digitalisation journey. While allowing purchases and transferring money electronically through UPI, online payment gateways, and card machines, they make transactions secure, fast, and convenient. They enable MSMEs to grow by facilitating cashless transactions, increasing money flow, expanding customer reach, enhancing transparency, and reducing dependency on handling cash. MSMEs can utilise digital payment systems, including UPI, payment gateways, card machines, and BHIM Aadhar Pay for transactions.

UPI can be integrated into business operations by using apps like Google Pay, PhonePe, and Paytm, which require only a UPI ID or a QR code for seamless transactions. BHIM Aadhar Pay, a digital payment platform, was launched by the Government of India in 2017, enabling merchants to receive digital payments from customers over the counter through Aadhaar Biometric Authentication [40]. The merchant requires an Android mobile or any supported device with the BHIM Aadhaar Pay app and a certified biometric scanner attached to a mobile phone/Kiosk/Tablet on a USB Port or Micro-ATM/POS, mPOS, and both customer and merchant are required to have their Aadhaar linked to their bank account [41]. MSMEs can utilise payment gateways such as Razorpay, Cashfree, PayU, Paytm, and others to process online business payments.

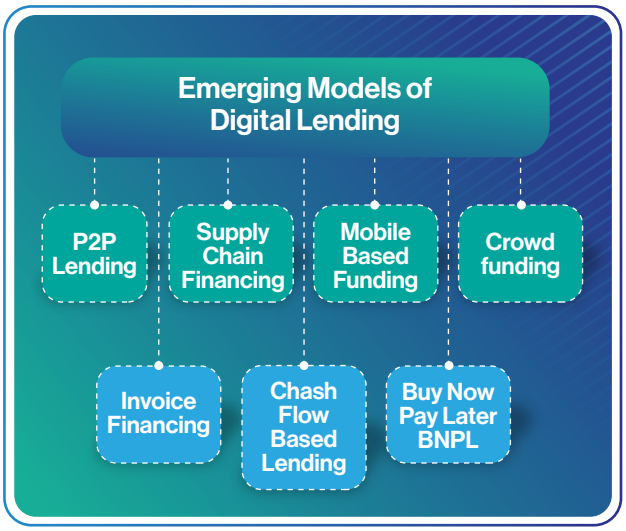


Another tool for digital payments is card machines that accept debit and credit card payments. Early, Nano, and Micro enterprises can also use Paytm and PhonePe sound boxes, which enable instant audio payment confirmations and improve transaction transparency.

According to RBI Payment System indicators, the volume and value of digital payments have been steadily rising, as visible in the graph [42].

b. Digital Lending

Over the past few years, various digital lending platforms have stepped in to finance MSMEs, and the Reserve Bank of India is closely monitoring the space as digital lending has become quite dynamic due to its complex nature and interplay of multiple organisations and models. The Digital Lending Guidelines (DLG) clearly define participants, outline 'Do's and Don'ts,' and introduce innovative initiatives like the Unified Lending Interface (ULI) and ONDC, shaping a potential $515 billion (by ET-BFSI estimation) digital lending ecosystem.



Source: ASSOCHAM and PwC India. FinTech for the underserved: Future of FinTech and payments to drive financial inclusiveness [43].

- **Peer-to-peer** lending platforms assist MSMEs in linking with individual lenders through an online medium to fulfil their credit needs. This allows micro businesses to access funds more quickly. P2P platforms support MSMEs in efficiently raising working capital. They also help improve cash flow and facilitate growth without relying on complex collateral-based systems, making funding more accessible and inclusive. Reserve Bank of India (RBI) regulates the P2P lending platforms through its NBFC-P2P guidelines.
- **Supply chain financing** helps MSMEs receive payment for their services early on their invoices from financial institutions. It is based on their buyer's creditworthiness. Supply chain financing enables small businesses to meet their short-term financial needs, maintain stable cash flow, and improve operational efficiency. This lending model reduces the stress of working capital without increasing debt, thereby supporting MSMEs in managing unpredictable payment cycles and tight margins.
- **Invoice financing** allows MSMEs to borrow money against unpaid customer invoices. Rather than waiting weeks or months for payment, businesses can access immediate funds based on outstanding bills. This model enhances liquidity, facilitates timely purchases of raw materials, and supports day-to-day management without disrupting cash flow, thereby fostering financial stability and scalability.
- **Mobile-based funding** platforms offer instant loans by leveraging digital transaction data, mobile wallets, and payment histories to facilitate quick and secure funding. The faster, paperless access to credit eliminates the need for extensive documentation and benefits MSMEs. Mobile-based funding platforms facilitate the growth of smaller and underserved businesses, often located in remote areas, by managing inventory and meeting seasonal demands through mobile devices, serving as gateways to finance.
- **Crowdfunding** allows MSMEs to raise funds from many individual contributors through online platforms in return for rewards, equity, or debt. This model benefits startups and innovative micro and small enterprises (MSMEs) with limited access to traditional credit. It validates ideas, builds a customer base, and increases visibility in the market arena beyond capital.

- **Cash flow-based lending** evaluates MSMEs' income streams and transaction patterns, rather than relying solely on assets and credit scores. This model offers flexible loan options tailored to the business's performance. This model of lending is most beneficial for MSMEs with irregular earnings, as it provides timely financing for payroll, inventory, or expansion, which in turn enhances credit access based on real-time financial activity.

- **Buy Now, Pay Later (BNPL)** enables MSMEs to purchase goods or services immediately and defer payment over time, typically without incurring interest charges. This model of lending aids small businesses in managing procurement, avoiding stockouts, and thereby enhancing the flow of cash. This model supports growth by enabling MSMEs to invest in operations, raw materials, or technology upgrades without needing immediate cash outflow, especially during peak demand.

6.13 Internet of Things(IoT) Applications

The Internet of Things (IoT) is a network of physical devices, such as machines and sensors, that are connected to the internet and can collect, send, and receive data. It can be utilised through various tools and platforms. The NASSCOM report, titled "IoT in India: The Next Big Wave" (2016), mentions multiple firms that provide IoT solutions. For instance, Maven Systems offers GPS monitoring, sales force tracking, asset monitoring, and smart metering for electricity, gas and water. TartanSense provides services for smart agriculture by leveraging its image analytics, GIS technology and computer vision to deliver intelligence using aerial imagery. Linkeddots works to provide smart tags, innovative tracking systems, intelligent monitoring, and alert systems, which can be customised for small and medium enterprises. PlantConnect is a web-based platform for the remote monitoring and control of plants and factories. It can be used for boilers, test beds, pumps, chillers, and other equipment. Wisense offers an industrial automation solution that tracks assets at an industrial site, gathers relevant sensor data and logs it on the printing press factory floor. The Wireless Smart Flow Meter by Cascademic Solutions is an automated reading-based flow meter that measures the amount of fluid travelling through the pipe [44].

6.14 Marketing and Sales Automation Platforms

Marketing platforms help MSMEs to enhance their online visibility, engage effectively with customers, and drive business growth by automating email campaigns, social media posts, and customer segmentation. HubSpot, for instance, provides an integrated solution for social media scheduling, lead nurturing, and email marketing. Mailchimp offers tools for AI-driven personalisation, audience segmentation, and email campaigns.

Sales automation tools help MSMEs enhance sales efficiency and foster customer relationships by automating lead generation, follow-up, and sales pipeline management. Freshsales offers email tracking, AI-powered lead scoring, and workflow automation, helping enterprises prioritise leads and close deals faster. Office24by7 integrates cloud telephony, providing contact, lead, and deal management features.

6.15 5G, the speed of MSME digitalisation

5G, the fifth-generation mobile network technology, offers significantly high data speeds, allows connecting many devices simultaneously, and enables real-time communication and seamless connectivity for advanced applications. It can be considered a foundational technology for supporting autonomous vehicles, smart factories, and the Internet of Things (IoT).

MSMEs can use this to transform their operations and improve efficiency. MSMEs in the manufacturing, logistics, or retail sectors can adopt real-time data analytics, automate machines and equipment, and enable remote monitoring and control of operations.

service-based or tech MSMEs, 5G facilitates seamless video conferencing, cloud-based collaboration, and faster digital transactions, boosting productivity, customer engagement, and operational agility in a highly connected environment. In healthcare, MSMEs benefit from 5G, which enables high-quality and lag-free video interactions with patients and the real-time monitoring of patient data from IoT health devices.

Taking the lead in 5G deployment, the Department of Telecommunications has offered the use of a 5G Test Bed free of cost to start-ups and MSMEs recognised by the Government of India until January 2024. It enables R&D teams from Indian academia and industry to test and validate their products, prototypes, and algorithms, offering researchers access to explore innovative ideas and facilitating experimentation and demonstration of 5G applications relevant to Indian needs [45].

6.16 Robotics for MSME digitalisation

Robotics refers to the use of programmable machines or systems that can perform tasks traditionally carried out by humans, either autonomously or semi-autonomously. In the Micro, Small and Medium Enterprises (MSMEs) domain, robotics is emerging as a key component of digitalisation. It includes automation of repetitive tasks on shop floors, robotic process automation (RPA) for back-end processes, and collaborative robots (cobots) that work alongside humans to improve productivity.

With India's focus on Industry 4.0 and initiatives like the Digital MSME scheme, robotics is becoming more accessible to smaller enterprises through cost-effective solutions, leasing models, and government support.

Robotics offers numerous advantages, including improved product quality, reduced errors, enhanced productivity, and lower operational costs. Sectors such as automotive components, electronics assembly, and packaging have been early adopters of this technology. For instance, several MSMEs across the country have integrated low-cost cobots to handle repetitive welding, assembly, and pick-and-place tasks, enabling them to meet global quality standards and export requirements.

Reports indicate that the adoption of robotics in Indian MSMEs is gradually increasing due to better awareness and falling technology costs. A 2023 report by the Federation of Indian Chambers of Commerce and Industry (FICCI) found that MSMEs reported a reduction in their annual operational costs by 11-20 per cent as a result of automation and digitalisation. Moreover, other government-led initiatives such as SAMARTH Udyog Bharat 4.0 and support from institutions like the Centre for Artificial Intelligence and Robotics (CAIR) are helping MSMEs build capabilities in robotics. As India aims to become a global manufacturing hub, empowering micro and small enterprises (MSMEs) with robotics can be a game-changer for competitiveness and resilience.

7. Artificial Intelligence (AI) for MSMEs

Artificial Intelligence (AI), which enables computers and machines to simulate human learning, comprehension, problem-solving, and decision-making, is among the most exciting emerging technologies. It has evolved remarkably since its genesis in the 1950s. Today, it permeates every aspect of our daily lives, from the phones in our hands to the products on our supermarket shelves; from selecting the route for our travel journey to suggesting the next song on our music platforms. It is equally pervasive at the macro level, assisting in tasks as varied as studying the impact of weather on crops, optimising supply chain risk and determining the best drug molecule for diseases. It has been reported that India is among the 3 top countries worldwide for developing AI-related technologies [46]. According to a NASSCOM report, India's AI market, which is growing at an annualised rate of 25%-35% between 2024 and 2027, is projected to touch $17 billion by 2027 [47].

Micro, Small, and Medium Enterprises (MSMEs), which play a critical role in the Indian economy, are crucial entities to consider in the context of the rapid technological changes and digitalisation of the Indian economy. The integration of AI in their businesses can be helpful and necessary to stay relevant and competitive, enhance productivity, and foster sustainable innovation. During the Digital MSME Yatra 2024, organised by CeDISI Trust, we found that respondent MSMEs were becoming increasingly aware of the benefits of AI in their businesses. The NASSCOM report also reveals that 94% of MSMEs acknowledge AI's ability to drive business growth, and 87% believe it can enhance overall productivity [47]. This acceptance of AI stems from the diverse range of functions AI performs, which can assist MSMEs in their day-to-day tasks and long-term operations.

AI responding to specific inputs can offer practical automation for MSMEs, particularly in customer service.

Its use cases include automated phone responses such as Interactive Voice Response (IVR) systems, basic chatbots for answering FAQs and guiding customers and security systems based on motion or facial detection tools. Basic AI chatbots can be added to websites or WhatsApp business accounts to answer common queries, take bookings, or guide users to relevant products or services. IVR systems can be used for customer support by handling incoming calls efficiently, booking or cancelling appointments, sending reminders about payments, feedback, collection, etc. AI can also be used in tools that analyse past data to make decisions or personalise services. It is often embedded in customer relationship management (CRM) systems. For example, a real estate MSME can use AI to track which listings a client interacted with and automatically suggest similar options. In e-commerce, AI recommends products based on browsing or purchase history. AI analyses data, identifies patterns, and predicts outcomes. It can analyse customer behaviour, forecast sales, find trends, and develop future strategies. AI can automate processes, enhance content creation and lead generation. Lead generation engines use AI to analyse customer data and personalise outreach. SEO content engines powered by AI generate SEO-friendly blog posts and landing pages to improve visibility and search engine rankings. AI can also suggest YouTube titles and video scripts based on performance analytics, audience preferences and trending topics.

AI also creates new content rather than solely analysing or predicting existing data, as traditional models do. This Generative AI can be used for writing blogs, posts, emails, marketing material, structured information extraction, client outreach, writing code, answering customer queries, and project management.

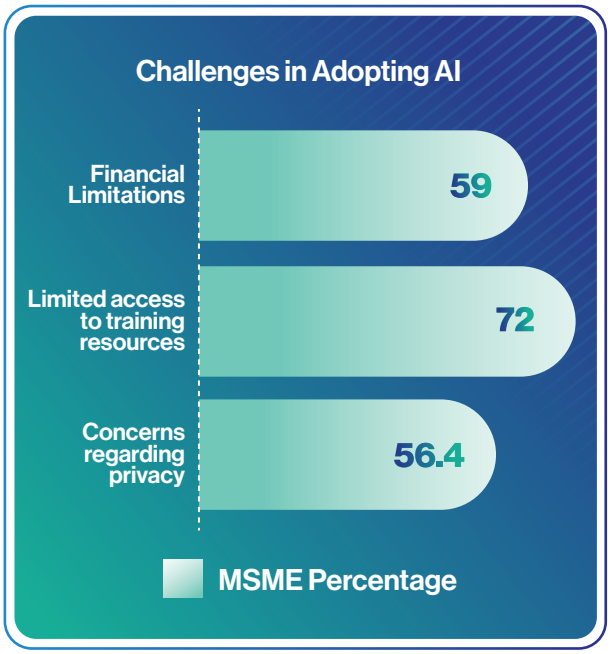
The report by EY explains several cases of AI use [35].

In the education sector, MSMEs can utilise AI for personalised learning paths, tutoring, content recommendations based on learning patterns, adaptive testing, automated grading, upskilling and reskilling programs with personalised learning tracks, among other applications. In the financial services sector, AI can be utilised for credit scoring models that leverage alternative data (such as social media and transaction history), Predictive risk assessment, personalised insurance policies, automated claims processing, personalised investment management, AI-driven wealth advisory services, and predictive analytics for portfolio performance, among other applications. AI-powered financial services help MSMEs access faster, more accurate credit assessments, personalised insurance, and investment advice, enabling better risk management and informed financial decisions for growth.

In healthcare, for instance, AI can be utilised for diagnostics, predictive health analytics, telemedicine with AI-driven triage, virtual consultations with specialists, and medical imaging analysis, among other applications. AI-driven solutions in healthcare enable timely diagnostics, patient prioritisation, and access to care, as well as remote consultations and predictive health insights, leading to more efficient healthcare delivery and improved management of patient health outcomes. Advanced project management software in the construction sector now incorporates drone footage to assess construction sites. GenAI processes this visual data, providing insights that integrate with traditional AI models to enhance project oversight and decision making. This technology enables MSMEs in the construction sector to strengthen site monitoring and improve decision-making accuracy, resulting in better project management and reduced delays and costs. GenAI exemplifies this paradigm by enhancing Financial services. Loan applicants interact with GenAI-powered chatbots to provide detailed information and answer follow-up questions. Traditional machine learning (ML) models process the collected data, refining credit decision-making processes and enhancing accuracy in risk assessment. The ensemble significantly reduces the time to make a decision.

Rather than serving as standalone solutions, GenAI models are increasingly embedded within traditional AI and ML processes, creating synergistic effects that amplify overall system capabilities.

However, this broad acceptance of AI's potential is not matched by its actual adoption by MSMEs. This gap is due to various hurdles in adopting AI, including a lack of resources, concerns about data privacy and security, and limited access to relevant talent. The white paper by NASSCOM and Meta revealed that 59% of MSMEs cannot invest in AI due to financial limitations, and 91% want the democratisation of AI technology accessibility. Moreover, as mentioned by 72% of MSMEs, there is limited access to training resources, hampering the development of expertise in AI. A lack of awareness regarding Data privacy laws is another concern, as 56.4% of MSMEs face issues with data protection and the implementation of security measures. Forty-five per cent of tech-enabled MSMEs emphasise the importance of access to information on the successful application of AI in their specific industry context [47].



Under Digital MSME Yatra 2025, CeDISI explores whether MSMEs are overwhelmed by the versions and numbers of AI tools and the pressure to master prompt engineering. During the Digital MSME Yatra 2024, we found that overstocking and dead stock are significant challenges in the garment industry, leading to dead stock, capital loss, prolonged cash realisation from the channel, and extended repayment times.

AI can predict the style, design, and stock required based on trends, market demand, and many other factors. Moreover, through initiatives like “AI for All" [48], the Government of India promotes AI skilling and innovation, encouraging MSMEs to adopt AI for enhanced productivity and long-term innovation.

8. Government and Non-Government Initiatives

The digital transformation of Micro, Small, and Medium Enterprises (MSMEs) in India has been significantly supported and shaped by a combination of both government and non-government efforts. Recognising the contribution of MSMEs to the Indian economy, the government has introduced a range of policy measures, schemes, and initiatives to facilitate their growth and digitalisation, encompassing the establishment of institutional frameworks and the implementation of targeted schemes. These initiatives aim to address barriers such as limited access to finance, technology, and markets, as well as a lack of digital literacy.

These efforts by the government are complemented by the contributions of non-government actors, including microfinance institutions (MFIs), NGOs, business correspondents, and fintech companies, which promote financial inclusion and digital literacy. Together, these collaborative efforts from both state and civil society actors are driving a more inclusive and resilient digital ecosystem for India's MSME sector. This section highlights most of the schemes and initiatives that directly or indirectly impact the Early, Nano and MSMEs' digitalisation journey.

8.1 A to Z of Government Schemes and Initiatives for MSME digitalisation

Over time, government support has played a crucial role in the evolution and growth of India's Micro, Small, and Medium Enterprises (MSMEs). The establishment of the National Small Industries Corporation (NSIC) in 1955, the formation of the Khadi and Village Industries Commission (KVIC) in 1957, the enactment of the Micro, Small and Medium Enterprises Development (MSMED) Act in 2006 that formalised the sector, the establishment of Ministry of Micro, Small and Medium Enterprises (MSME) in 2007 and other measures and policies collectively underscore the Indian government's sustained commitment to fostering the growth and development of Micro, Small, and Medium Enterprises (MSMEs). Government support to MSMEs has been pivotal in their digitalisation journey as well. By building robust infrastructure and implementing targeted schemes, the government has been able to address some of the key challenges faced by MSMEs, such as limited access to markets, finance, infrastructure, and technology, as well as digital illiteracy. Some key schemes and initiatives launched by government institutions to support the digitalisation of Micro, Small, and Medium Enterprises (MSMEs) aim to boost competitiveness, improve market access, and enhance digital literacy, enabling easier compliance.

a. DigiSaksham

The Minister for Labour and Employment launched DigiSaksham, a digital skills program aimed at enhancing the employability of youth by equipping them with essential digital skills needed in today's technology-driven world. This joint initiative with Microsoft India extends the government's ongoing efforts to support youth from rural and semi-urban areas [49]. DigiSaksham offers free training in key digital areas, including MS Excel, Azure, Security Fundamentals, Java, Python, and HTML. Registered job seekers on the National Career Service (NCS) portal can access self-paced and virtual instructor-led online training to strengthen their digital capabilities and improve employment prospects. DigiSaksham indirectly supports India's MSMEs' digitalisation journey by expanding their access to tech-ready talent and building a digitally skilled workforce [50]. This initiative facilitates the digitalisation of MSMEs by providing a skilled workforce trained in digital tools, making businesses adopt technology more effectively.

b. Digital India

The Government of India launched Digital India on July 1, 2015, to drive digital transformation in India, aiming to create a knowledge economy and a digitally empowered society. The initiatives and accomplishments under this programme encompass a wide range of sectors, including digital governance and public internet access programmes. The key focus areas identified under the programme are innovation, technology for good governance, capacity building and skill development, digital inclusion and accessibility, and supporting digital entrepreneurship. By fostering digital literacy, enhancing internet connectivity, and providing access to digital infrastructure, Digital India enables MSMEs to scale their operations, expand into broader markets, and contribute more effectively to the country's economy. Under the programme, various initiatives have been undertaken, including the launch of the Bharat Interface for Money (BHIM) app in 2016, the introduction of Common Services Centres (CSCs), the Startup India Initiative, and the GST e-Invoice System, among others. [51].

This initiative enhances the digitalisation of MSMEs by promoting digital literacy and enhancing digital infrastructure, which enables MSMEs to adopt digital technologies effectively.

c. Digital India internship scheme, 2025

The Digital India Internship Scheme 2025, launched by the Ministry of Electronics and Information Technology (MeitY), enables students to gain hands-on experience in areas crucial to India's digital transformation. This initiative provides exposure to real-world projects spanning 2-3 months in various domains, including digital forensics, cybersecurity, quantum technologies, AI/ML security, Public policy on the internet, cloud computing, mobile and app security, among others [52].

The internship is open to Indian students pursuing fields such as B.E./B.Tech. Tech, M.E/M.Tech (CSE/IT/Electronics), M.Sc. (CS/IT/Electronics), MCA, and even LL.B or Economics/Statistics for specific thematic areas [52].

While the scheme doesn't directly focus on MSMEs, several of its internship domains, such as cybersecurity, cloud computing, AI/ML, blockchain, and digital public infrastructure, are key enablers of digital transformation in the MSME sector. Interns working in these areas may contribute to the development of policies, digital tools, or frameworks that can be applied to enhance MSME access to digital platforms, financing, and secure transactions.

The internship helps create a digitally skilled talent pool that can later join or collaborate with MSMEs by equipping students with practical experience in emerging technologies and policy frameworks.

d. Digital Service Facilitation

Digital Service Facilitation launched by NSIC, for facilitating ICT-enabled digital Services to MSMEs at transparent and affordable prices through onboarding leading service providers offering different products/ services that MSMEs require to adopt the digital ways of managing their businesses in terms of enhancing operational efficiencies, implementing automation solutions and ensuring regulatory compliances. MSMEs can access trusted digital services through NSIC without facing market challenges. Moreover, MSMEs can access special offers and cost-effective solutions by aggregating bulk service requirements in identified categories and eliminating intermediaries, such as dealers and distributors [53].

The subcategories of ICT enabled digital services under this scheme are- Software Services (Such as ERP, Accounting, Manufacturing Design, Regulatory Compliance including GST, other software packages etc), Cloud Services, Platform as a Service (PaaS), Software as a Service (SaaS), Digital Infrastructure (IaaS, Hardware, Smart devices), Artificial Intelligence Solutions, Internet of Things (IoT) and Machine to Machine (M2M) solutions, B2B and B2C E-Commerce Solutions, and Other ICT Enabled Digital Services. Service providers, including MSMEs, can be onboarded with relevant products and services tailored to their specific needs [53].

Moreover, service providers with 'off the shelf' basis and 'plug-n-play' model-based products and services will be empanelled [53].

This scheme facilitates the confident adoption of digital technologies and tools by MSMEs by providing ICT-enabled digital services at affordable prices through trusted service providers.

e. Dx-EDGE (Digital Excellence for Growth and Enterprise)

The Digital Excellence for Growth and Enterprise (Dx-EDGE) initiative, launched on March 26, 2025, is a national program led by the Confederation of Indian Industry (CII) with support from the NITI Frontier Tech Hub (NITI FTH) and the All India Council for Technical Education (AICTE). Its primary objective is to digitally transform India's Micro, Small, and Medium Enterprises (MSMEs) by fostering innovation, enhancing competitiveness, and building resilience. Aligned with the vision of Viksit Bharat 2047, Dx-EDGE aims to empower MSMEs by providing access to affordable technology, promoting partnerships among MSMEs, academia, and technology providers, and facilitating their participation in global value chains [54].

The initiative establishes Digital Transformation Facilitation Centres (DTFCs) within academic institutions, transforming them into hands-on learning and support hubs. These centres assist MSMEs by diagnosing their digital maturity levels and developing tailored transformation roadmaps. Additionally, the tech industry plays a crucial role by collaborating with these centres to deliver sector-specific solutions, conduct training sessions, and offer implementation support. Through these efforts, dx-EDGE aims to establish a digitally capable MSME ecosystem, thereby making a significant contribution to India's economic growth and global competitiveness [54].

This initiative supports the digitalisation of MSMEs by providing access to affordable technology, digital transformation roadmaps, and collaborative support and training through Transformation Facilitation Centres (TFCs).

f. Entrepreneurship Skill Development Programme (ESDP)

It is a component of the main scheme, "Development of MSMEs," launched by the Ministry of Micro, Small and Medium Enterprises (MSME) to inculcate entrepreneurial skills in existing and potential entrepreneurs in India [55].

The scheme's objectives are to encourage youth from diverse backgrounds and sections of society, including the differently abled, Scheduled Castes (SCs), Scheduled Tribes (STs), women, Ex-Servicemen, and persons below the poverty line, to consider entrepreneurship as one of their career options. It aims to provide both basic and advanced training for scaling up businesses and enterprises, as well as assist in establishing and growing new Micro and Small Enterprises (MSMEs). The five training components of the ESPD scheme are Entrepreneurship Awareness Programme (EAP), Entrepreneurship-cum-Skill Development Programme (E-SDP), Management Development Programme (MDP, Advanced E-SDP (A-ESDP) and Advanced Management Development Programme (A-MDP).

Digitalisation efforts are present in the Management Development Programme (MDP) and Advanced Management Development Programme (A-MDP) [55].

EAP is a one-day programme to create awareness regarding entrepreneurship and self-employment. E-SPD is a six-week programme aiming to provide entrepreneurship and skill training in Agro-Based Products, Hosiery, Food & Fruit Processing Industries, Carpet Weaving, Mechanical Engineering Workshop/ Machine Shop, Heat Treatment, Electroplating, etc. Advanced E-SDP is conducted weekly through IITs, ICAR, IIMs, CSIR, and other institutions. Under the MDP, management capacity-building training is provided for a week to existing entrepreneurs and their supervisory staff, comprising 25-30 persons aged 18 and above. Two of the critical components of this programme are training in Information Technology and Digital Marketing [55].

Advance MDP as a one-week training programme provides MDP training to MSME promoters/executives through State Administrative Training Institutes (ATIs) and/or other reputed institutions in this domain of Central or State Governments, NITs, Regional Engineering Colleges, Agricultural colleges, and autonomous bodies of Central and State Governments [55].

According to data published by the DC (MSME), as of May 17, 2025, 32,536 programmes had been implemented under the scheme, with 14,76,466 beneficiaries. From 265 programmes in 2018-2019, the number increased to 12,519 in 2024-2025, and the number of beneficiaries over the years increased from 9505 in 2018-2019 to 5,68,351 in 2024-2025 [55].

The scheme enhances the digitalisation of MSMEs by providing entrepreneurs with training in Information Technology and Digital Marketing, improving their capacity to grow businesses in the digital era.

g. Establishment of New Technology Centres / Extension Centres

The Establishment of New Technology Centres/Extension Centres scheme, spearheaded by the Ministry of Micro, Small and Medium Enterprises (MoMSME), aims to enhance the technological capabilities of MSMEs across India by envisioning the establishment of 20 new Technology Centres and 100 Extension Centres. The primary focus of these centres is to support industries by providing access to advanced manufacturing technologies and technical and business advisory support to MSMEs, along with skilling the workforce in technology development, to increase the competitiveness and profitability of MSMEs. The Technology Centres will be equipped with advanced technological facilities, including Augmented Reality (AR), Virtual Reality (VR), Artificial Intelligence (AI), Internet of Things (IoT), and Robotics. The Extension centres are extended facilities of Technology Centres in unserved areas [56].

This scheme facilitates the digitalisation of MSMEs by establishing new Technology Centres and 100 Extension Centres, providing industries with access to advanced manufacturing technologies, training programmes, and consultancy services to enhance their competitiveness.

h. Government e-Marketplace (GeM)

DGS&D, with technical support from the National e-Governance Division (NeGD) and the Ministry of Electronics & IT (MeitY), launched a pilot version of the Government e-Marketplace on August 9, 2016. Subsequently, the Union Cabinet approved the establishment of GeM as a Special Purpose Vehicle (SPV), and it was officially set up as the National Public Procurement Portal on May 17, 2017. GeM now facilitates the transparent and efficient procurement of goods and services for Central and State Government organisations [57].

It created an open, transparent, and efficient marketplace for government departments, ministries, public sector units (PSUs), and autonomous bodies to procure goods and services directly from registered sellers. It is fully contactless, paperless, and cashless, with user authentication integrated through APIs with official databases, including Aadhaar, PAN, GSTN, and more. GeM has transformed public procurement through automation, analytics, and policy-driven processes, resulting in increased efficiency, transparency, shorter cycle times, and enhanced competition. This has led to significant savings for buyers and timely payments for sellers. With no registration or listing fees, GeM welcomes all types of vendors, OEMs, resellers, and service providers. It is an open and accessible platform that supports initiatives such as Make in India, the MSME Policy, and Start-up India [57].

One of the many initiatives under GeM, including TRIBESINDIA eSTORE, SARAS Collection, and others, is WOMANIYA.

This initiative supports women entrepreneurs and Self-Help Groups (WSHGs) by enabling them to sell handicrafts, handlooms, and organic goods to government bodies. This initiative promotes gender-inclusive economic growth and aligns with the government's mandate to reserve 3% of procurement from women-led Micro and Small Enterprises (MSEs) within the 25% target for MSEs [57].

GeM has recently undertaken significant policy reforms to enhance market accessibility and streamline seller participation. Key initiatives, such as reducing transaction charges, Vendor Assessment fees, and Caution Money requirements, have made the platform more accessible, particularly benefiting Micro and Small Enterprises (MSEs), startups, and women-led enterprises [58].

As of 13 February 2025, over 22 lakh sellers and service providers are registered on GeM, contributing to a diverse and competitive procurement ecosystem. GeM has also onboarded over 29,000 startups and 1.8 lakh Udyam-verified women-led businesses, fostering greater inclusivity and economic empowerment [58].

The Government e-Marketplace (GeM) enhances MSME digitalisation by providing a transparent, paperless platform for public procurement. This enables small businesses to access government contracts, reduce marketing costs, and receive timely payments.

i. MSME Champions Scheme

The MSME Champions scheme has been formulated by consolidating all six components of the erstwhile Technology Upgradation Scheme (TUS) for a period of 5 years, from 2021-22 to 2025-26. It seeks to modernise enterprises, increase competitiveness, facilitate national and global reach, and reduce wastages. There are three components under the scheme: 1) MSME-Sustainable (ZED), 2)MSME-Innovative(for Incubation, IPR, Design) and 3) MSME-Competitive (Lean). The fourth component, Digital MSME, is yet to be launched [59].

1. MSME Sustainable (ZED) Certification Scheme

This scheme was launched under the MSME Champions scheme on 28 April 2022 to create awareness among MSMEs about Zero Defect Zero Effect (ZED) practices while incentivising them for ZED Certification [59]. Under the scheme, MSMEs can increase productivity, reduce waste, enhance environmental awareness, and expand their business. They are encouraged to adopt best practices in their work culture to enhance their competitiveness, global and national reach, and sustainability. The scheme also mandates assessment, modification through guidance, handholding, and managerial and technological intervention for MSMEs. Certification costs for women-owned MSMEs have been set at zero [60].

There are three levels of certification under the scheme-

Certification Level 1:
BRONZE with cost of Rs. 8,000

Certification Level 2:
SILVER with a cost of Rs. 32,000

Certification Level 3:
GOLD with cost of Rs. 72,000

However, there are subsidies of 80%, 60%, and 50% for Micro, Small, and Medium Enterprises, respectively, as well as a 100% subsidy for women-owned MSMEs. According to the MoMSME Annual report 2023-2024 [1], over 2,52,000 MSMEs registered under the MSME Sustainable (ZED) certification Scheme in FY 2023-24 [59].

This scheme facilitates the digitalisation of MSMEs by encouraging the adoption of modern technologies and quality management practices.

2. MSME Competitive (LEAN) Scheme

The scheme was launched on 10 March 2023, aiming to achieve global competitiveness for the Indian MSMEs through the application of various Lean techniques including reduction in rejected Rates, product and raw material movements and product cost, optimisation of space utilisation and resources like water, energy, natural resources etc., and enhancement of profitability, introduction & awareness to industry 4.0 and digital empowerment including others [61].

Every MSME embarking on the Lean journey (Basic, Intermediate, Advanced) has to take a "Lean Pledge" before implementing Lean tools and techniques. All MSMEs registered with the UDYAM registration portal can participate in the scheme and receive related benefits. The scheme is also open to Common Facilities Centres (CFCs) under the SFURTI (Scheme for Fund Regeneration of Traditional Industries) and Micro and Small Enterprises - Cluster Development Program (MSE-CDP) Schemes [61].

Many LEAN tools support digitalisation of MSMEs including 5S (Sort, Set in Order, Shine, Standardize, Sustain) that prepares a clean and organised digital workspace (like cloud storage, folders, systems), improving data management; Value Stream Mapping (VSM) that helps in identifying processes that can be automated or digitised; Standard Works that encourages creation of digital SOPs (Standard Operating Procedures) using tools like Google Docs, Notion, or ERP systems; Poka- Yoke is applied digitally via system alerts, validation checks, or automation to reduce user errors in data entry or process flows etc. [61].

Financial assistance is available to MSMEs, providing a 90% subsidy on the implementation cost of consultant fees and a 5% additional contribution to MSMEs registering through an Industry Association/OEM after completing all levels. Another step towards encouraging MSMEs to participate in the scheme is the issuance of an E-Certificate upon completion of the Basic Level, Intermediate Level, and Advanced Level by MoMSME [61].

The list of MSMEs that have taken the Lean pledge and achieved implementation level is displayed on the Lean Scheme portal. Currently, 45173 MSMEs have been registered, 44984 MSMEs have taken the pledge, and 15484 have received Basic certificates [61].

The scheme fosters digitalisation among MSMEs by promoting digital empowerment, an organised digital workspace, and Industry 4.0 tools, including digital Standard Operating Procedures (SOPs), system alerts, data management systems, and financial assistance.

j. MSME Global Mart

The National Small Industries Corporation (NSIC) introduced the MSME Global Mart in 2020-21, an e-commerce platform functioning on a B2B model. Through an annual membership, MSMEs gain access to services that allow them to create a digital presence for their businesses. This platform facilitates MSMEs to exhibit their offerings, interact with buyers and sellers worldwide, and expand their network [62]. The portal provides relevant trade leads and detailed information on past tenders, enabling MSMEs to showcase their products and services virtually 24/7 and receive tender alerts tailored to their business profile. It also offers special offers on MSME business solutions, upcoming events, and exhibitions.

The MSME Global Mart helps digitalise MSMEs by providing a 24/7 online platform to showcase products, connect with global buyers, access trade leads, and receive tender alerts, expanding their digital market reach and business opportunities.

k. MSME SAMADHAAN

The Government of India launched the MSME Samadhaan Portal on October 30, 2017, to address the challenge of delayed payments faced by Micro and Small Enterprises (MSEs). It provides a platform for filing grievances and monitoring outstanding dues to Micro and Small Enterprises (MSEs) from buyers of goods and services, including government departments, public sector enterprises (PSEs), and private companies.

This platform is an essential part of the Micro, Small and Medium Enterprises Development (MSMED) Act, 2006, which mandates the creation of Micro and Small Enterprises Facilitation Councils (MSEFCs) in every state to address payment-related disputes [63]. 90,422 cases have been filed with the MSE Facilitation Council since the launch of MSME Samadhaan, with 47,302 cases disposed of so far [64].

The portal provides an online platform for filing and tracking delayed payment complaints, thereby facilitating the digitalisation of MSMEs and enhancing transparency and operational efficiency in financial dispute resolution.

l. MSME SAMBANDH

MSME Sambandh is a public procurement portal launched by the Ministry of Micro, Small and Medium Enterprises (MoMSME) to monitor the implementation of public procurement from micro and small enterprises (MSEs) by Central Public Sector Enterprises, and enhance the role of micro and small enterprises (MSEs). It strives to closely monitor the performance of ministries, departments, and central public sector enterprises (CPSEs) and oversee the implementation of the public procurement policy. Specifically, this policy mandates that 25% of the total annual purchase of products and services must be sourced from MSEs [65].

It promotes the digitalisation of MSMEs by offering an online platform to monitor and participate in public procurement, enhancing transparency and market access.

m. MSME Sampark

The MSME Sampark initiative, launched by the Ministry of Micro, Small and Medium Enterprises (MSME), is a digital platform designed to bridge the gap between job seekers and recruiters in the micro, small, and medium enterprises (MSME) sector [66]. Sampark aims to provide a robust, interactive interface where passed-out trainees and students from MSME Technology Centres can register and connect with prospective employers.

The portal facilitates free registration for candidates and recruiters, offering a user-friendly dashboard to manage applications, track interviews, and view job postings. This initiative reflects the government's commitment to enhancing employability and fostering industry linkages within the MSME ecosystem, thereby contributing to job creation and economic growth. So far, 498,600 job seekers and 6,785 recruiters are registered on the portal, with more than 40,072 candidates placed to date [66].

The initiative streamlines recruitment processes and enhances workforce development by providing an online platform that connects MSMEs with skilled job seekers from MSME Technology Centres.

n. MY MSME

My MSME is an online portal developed by the Ministry of Micro, Small and Medium Enterprises to provide MSMEs with single-window access to various services, schemes, projects, data and training the government offers. The platform enables entrepreneurs to register their enterprises, apply for schemes, track their applications, and access benefits, including financial assistance, credit support, and market promotion. It aims to simplify processes, improve transparency, and enhance the ease of doing business for MSMEs, thereby strengthening their role in India's economic growth. Some of the services on the portal include Udyam registration, data bank, MSME schemes, and the Grievance Monitoring System, among others [67].

This centralised digital access simplifies processes, enhances transparency, and improves ease of doing business for MSMEs across India.

o. National Single Window System

The National Single Window System is a digital platform initiated by the Department for Promotion of Industry and Internal Trade (DPIIT) under the Ministry of Commerce and Industry.

It is designed to simplify the process of getting regulatory approvals and clearances based on business requirements. Its Know Your Approvals module contains guidance about 32 Central Departments and 34 States. This reduces redundancy, ensures faster decision-making, and provides real-time updates and status tracking [68].

It supports the digitalisation of MSMEs by streamlining regulatory approvals through a unified digital platform, enabling faster clearances, reducing compliance burden, and improving ease of doing business.

p. Open Network for Digital Commerce (ONDC)

Launched in April 2022, the Open Network for Digital Commerce (ONDC) is an open-source initiative designed to transform digital commerce in India. It promotes an open network for exchanging goods and services across digital platforms, helping create a level playing field for sellers, buyers, and service providers, especially small and medium enterprises (SMEs). By reducing dependence on dominant platforms, ONDC fosters innovation, inclusivity, and competition [69].

ONDC employs a decentralised architecture, meaning it does not own or operate e-commerce services but acts as an enabler, connecting participants. Open and interoperable protocols and standardised APIs allow different buyer and seller platforms to interact seamlessly. Participants are divided into clear roles: Buyer Applications (platforms where customers can find sellers), Seller Applications (interfaces for businesses to manage their products), Logistics Providers (for the movement of goods), and Technology Enablers (offering IT tools and support) [69].

The network offers several benefits. Sellers can access a wider audience and reduce their reliance on big platforms, improving revenue opportunities. Due to a broader range of sellers and a network, buyers enjoy more choices and competitive pricing. Service providers, such as logistics, fintech, and IT companies, can integrate into the network, thereby expanding their reach and capabilities.

ONDC makes it easier for consumers to discover sellers and services on any compatible platform and to choose local businesses, supporting nearby suppliers. By integrating services like logistics, payments, and customer analytics, ONDC empowers MSMEs to compete effectively in the digital marketplace, fostering innovation and inclusivity.

It facilitates the digitalisation of MSMEs by providing access to an e-commerce network, increasing their market reach, reducing dependence on dominant platforms, and integrating services such as logistics, payments, and analytics.

q. PM SVANidhi scheme

It is a Central Sector Scheme, i.e., fully funded by the Ministry of Housing and Urban Affairs, to provide affordable working capital loans to street vendors affected by the COVID-19 pandemic, helping them resume their livelihoods and become self-reliant. The scheme offers collateral-free working capital loans of up to Rs. 10,000 for a 1-year tenure, with enhanced loans of up to ₹20,000 and ₹50,000 in the second and third tranches, respectively, upon repayment of the earlier loans. Street vendors can get an interest subsidy. Further incentives are provided to those who make timely repayments of loans, including cashback, by undertaking prescribed digital transactions. Digital payment channels are encouraged to promote cashless transactions [70]. In the Union Budget 2025, Finance Minister Nirmala Sitharaman announced revamping the PM Street Vendor's AtmaNirbhar Nidhi (PM SVANidhi) scheme. The updated scheme introduces enhanced bank loans, UPI-linked credit cards with a ₹30,000 limit, and capacity-building support for street vendors [71]. This promotes digitalisation for Micro (early and nano) entrepreneurs, who get a subsidy and use digital repayment tools.

r. PM Vishwakarma

The PM Vishwakarma Scheme was launched to support artisans and craftspeople of 18 trades who work with their hands and tools.

The scheme is being jointly implemented by the Ministry of Micro, Small and Medium Enterprises (MoMSME), the Ministry of Skill Development and Entrepreneurship (MSDE), the Department of Financial Services (DFS), and the Ministry of Finance (MoF), Government of India. The Scheme's components include recognition through the PM Vishwakarma Certificate and ID Card, Skill Upgradation, Toolkit Incentive, Credit Support, Incentive for Digital Transactions and Marketing Support. The scheme aims to help traditional artisans and craftspeople become entrepreneurs and self-reliant [72].

The need to transform to the digital arena is underscored by the fact that the beneficiaries are rewarded for every digital payment or receipt. Re. 1 per eligible digital transaction, up to 100 eligible transactions monthly, is provided to the beneficiary for digital payout or receipt. The Scheme facilitates the participation of beneficiaries in trade fairs, exhibitions, and selling on e-commerce networks, among other activities. Artisans are encouraged to list their products on digital platforms, such as the Government e-Marketplace (GeM) and the Open Network for Digital Commerce (ONDC), thereby expanding their market reach and facilitating online sales. To enhance efficiency and productivity, toolkits worth Rs. 15,000, based on cutting-edge technology, are delivered to the beneficiaries at their doorstep. The distribution of toolkits rests on state-of-the-art technology and digitalisation [73].

The Scheme has received an overwhelming response. As of 6th May 2025, there have been 2,979,097 registrations, with 2,216,327 beneficiaries completing their basic training [10]. Disaggregated by gender, out of 13,94,942 beneficiaries successfully registered by 18.07.2024, 5,42,222 are women, i.e. 38.87% [74].

The scheme promotes the digitalisation of MSMEs by incentivising digital transactions, providing e-vouchers for modern toolkits, and facilitating the integration of artisans into e-commerce platforms, thereby enhancing their market reach and digital presence.

s. Procurement & Marketing Support Scheme (PMS)

The scheme aims to promote new market access initiatives, including organising and participating in trade fairs held at national and international levels, exhibitions, MSME expo, etc., and making MSMEs aware of the import-export policy and procedure, the process of packaging in marketing, the GeM portal, and other topics relevant to market access developments. MSEs in the manufacturing and service sectors with a valid Udyam Registration (UR) Certificate are eligible for the scheme [75].

The scheme's components include: 1) market access initiatives, such as trade fairs and exhibitions, and the Vendor Development Program (VDP); 2) capacity building measures, including the adoption of barcodes, e-commerce platforms, modern packaging techniques, workshops, and seminars; and 3) development of retail outlets. Both micro and small enterprises benefit from an 80% subsidy on built-up space rent paid for general purposes, and 100% for SC, ST, Women, persons with disabilities, Aspirational Districts, and 100% contingency expenditure for Trade fairs. Furthermore, there is financial assistance on annual membership fee/subscription fee/ contingency expenses for photography, cataloguing, advertising, etc., for selling their products or services and financial assistance of 80% of the one-time registration fee and annual recurring fee for the first three years for adoption of Bar Code for micro enterprises [75].

By promoting the use of e-commerce platforms, providing training in digital marketing, and offering financial assistance for tools such as barcoding and online memberships, the scheme is helping MSMEs increase their online presence and access broader markets, thereby facilitating their digitalisation.

t. Raising and Accelerating MSME Performance (RAMP)

Supported by the World Bank, the central sector scheme, "Raising and Accelerating MSME Performance" (RAMP), was launched on June 30, 2022.

Implemented by the Ministry of Micro, Small and Medium Enterprises (MoMSME) over the five years 2022-23 to 2026-27, the scheme aims to scale up the implementation capacity and coverage of MSMEs with impact enhancement of existing MSME schemes by fostering innovation, encouraging ideation, digitisation, improving practices and processes, enhancing market access, promoting greening initiatives, scaling up guarantees to women-owned micro and small enterprises etc. The programme also aims to strengthen central and state institutions and enhance centre-state collaboration. Moreover, online mechanisms for faster dispute resolution related to delayed payments exist. RAMP scheme envisages to benefit more than 5.5 lakh MSMEs during the programme period (FY 2022-23 to 2026-27), and more than four lakh MSMEs were impacted by August 2024 [76]. According to the MTR from MoMSME, between April 1, 2022, and September 30, 2024, the total increase in volume of credit guarantees to women-headed businesses was INR 65,672 Crore. It aims to make MSMEs more competitive and integrated into the digital economy [77].

- **MSME Trade Enablement & Marketing (TEAM) Initiative**

This initiative was launched by the MSME industry in commemoration of MSME Day 2024 under the Central Sector Scheme "Raising and Accelerating MSME Performance." Launched under the World Bank-supported RAMP program, it aims to empower micro and small enterprises (MSEs) to expand their customer base, reach new markets, and increase income levels through the government-backed Open Network for Digital Commerce (ONDC). The scheme aims to benefit 5 Lakh MSEs, 50% of which are women-owned enterprises. NSIC is the implementing agency of this initiative [78].

MSEs face various challenges in accessing e-commerce, including financial constraints, limited digital access, and low confidence in operations based on digital platforms. The initiative aims to counter these challenges and boost e-commerce access to MSEs registered on Udyam [78].

Under the initiative, Seller Network Participants (SNPs) of ONDC connect MSEs to ONDC through a Seller Application and create digital catalogues, provide logistics and operations support, manage accounts and provide training and capacity building on e-Commerce. Eligible MSMEs receive subsidies via SNPs to help bear the costs for the services offered by SNPs. Moreover, to speed up execution while lowering the costs of preparing a digital catalogue, MSMEs will have access to AI-based Digital Cataloguing. AI-based digital cataloguing will also be available to MSEs through the initiative portal, enabling them to fast-track and reduce the cost of preparing their digital catalogues. 150 Workshops will be organised in Tier 2 and 3 cities to create awareness about the initiative among MSMEs and onboard them onto the ONDC network, along with demand generation drives through digital marketing [78].

The initiative facilitates the digitalisation of MSEs through its provisions, such as enhancing their presence on platforms like ONDC, providing AI-driven cataloguing, offering subsidies for e-commerce onboarding, and conducting training workshops.

u. Samarth Udyog Bharat 4.0

The SAMARTH Udyog Bharat 4.0 initiative, led by the Ministry of Heavy Industries, aims to accelerate the adoption of Industry 4.0 technologies across the Indian manufacturing sector, including micro, small, and medium-sized enterprises (MSMEs). Key activities include awareness campaigns, creation of master trainers, support for start-ups and incubators, and handholding of SMEs through consultancy services for implementing Industry 4.0 solutions. The initiative also promotes collaboration with local universities for training and internships, encourages e-waste management, and engages industry stakeholders through a Special Purpose Vehicle (SPV) membership model, fostering long-term sustainability. It aims to engage manufacturing clusters and establish a government-led platform for coordinated digital transformation efforts [79].

It is structured around six pillars: spreading awareness, setting demo centres, building skills and training capacity, strengthening industry-academia ties, fostering engineering research for localised Industry 4.0 applications, and enabling international cooperation. The initiative brings together stakeholders from government departments, industry associations, academic and research institutions, and support organisations, forming a comprehensive national alliance to ensure India's competitiveness in the evolving global manufacturing landscape [79].

v. SIDBI GST Sahay App

SIDBI, in collaboration with Online PSB Loans Ltd (OPL) and iSPIRT, has developed a model GST Sahay application leveraging the Open Credit Enablement Network (OCEN) and Account Aggregator (AA) frameworks. This app provides microenterprises with seamless, on-demand, invoice-based financing, enabling access to small-ticket, cash-flow-based credit. The entire loan process from application to repayment is digital and paperless. It draws trade data from GSTN, banking details via AA, and credit bureau information. It also integrates various elements of India Stack's comprehensive suite of digital public goods and open APIs to facilitate the paperless and cashless delivery of services across India, including e-sign, e-stamping, and e-NACH mandates. The initiative aims to incentivise more micro enterprises to join the GST ecosystem by offering unsecured, collateral-free loans based on GST invoices, thereby promoting their growth and formalisation [80].

It facilitates the digitalisation of MSMEs by providing a fully digital, paperless platform for invoice-based financing. It leverages GST data and digital public infrastructure to offer quick, collateral-free working capital loans.

w. Technology Incubation and Development of Entrepreneurs (TIDE 2.0)

The Technology Incubation and Development of Entrepreneurs (TIDE 2.0) scheme, launched by the Ministry of Electronics and Information Technology (MeitY),

aims to build a robust startup and innovation ecosystem in India, focusing on leveraging emerging technologies such as artificial intelligence (AI), the Internet of Things (IoT), robotics, and blockchain. TIDE 2.0 provides structured support to startups through a nationwide network of technology incubators categorised into three groups (G1C, G2C, G3C), based on their maturity and capabilities. These incubators are empowered to nurture startups working in sectors of national importance such as education, health, agriculture, financial inclusion, and clean energy.

The scheme's salient features emphasise creating an entrepreneurship ecosystem that inspires budding entrepreneurs and supports existing ones. TIDE 2.0 aims to develop entrepreneurial models that hold both financial and social value. It facilitates holistic incubation through co-working spaces, mentoring, networking, and essential financial assistance, along with guidance on intellectual property rights (IPR) filings. It supports 51 incubators and nearly 2,000 tech startups across India, making it a large-scale intervention in promoting innovation-led enterprises.

For MSMEs, TIDE 2.0 presents an incredible opportunity to access structured support and cutting-edge technologies. By connecting with incubators under the scheme, MSMEs can fast-track their digital transformation journey, gain mentorship, and scale up through innovation-driven growth models.

x. The Trade Receivables Discounting System (TReDS)

TReDS was launched in 2014 by the Reserve Bank of India as a digital platform that facilitates the financing of trade receivables of Micro, Small, and Medium Enterprises (MSMEs) from corporate buyers through invoice discounting. This system improves cash flow and reduces the waiting period for buyer payments. As per the Gazette notification (S.O.- 4845E) dated November 7, 2024, all companies with a turnover exceeding ₹250 crore must register on the TReDS platform by March 31, 2025 [9].

This system aims to alleviate liquidity issues for MSMEs by enabling them to receive early payment against receivables without waiting for the buyer to settle [81].

The three key participants on the TReDS platform, based on 2014 guidelines, were: buyers (corporates, government departments, and PSUs), Sellers (MSMEs registered under the Micro and Small Enterprises Development Act, 2006), and Financiers (banks, NBFCs, and financial institutions approved by the RBI). In 2023, the Scope of the Trade Receivables Discounting System (TReDS) is expanding, allowing insurance companies to participate. This enables financiers to obtain insurance coverage for discounted receivables, thereby mitigating default risks and encouraging financing for buyers with lower credit ratings. The financing options for MSMEs have also been increased by broadening the scope of eligible financiers. In addition to banks and Non-Banking Financial Companies (NBFCs), all entities authorised under the Factoring Regulation Act, 2011, can now participate as financiers [82].

Based on RBI data, the Trade Receivables Discounting System (TReDS) witnessed significant growth between FY23 and FY24. The number of invoices financed increased from 30.2 lakh in FY23 to 41.6 lakh in FY24, reflecting a growth of approximately 38%. Similarly, the value of the invoices funded rose from ₹1.02 lakh crore in FY23 to ₹1.38 lakh crore in FY24, marking an increase of around 35% [83].

The basic process followed by the system involves MSME suppliers uploading their invoices (bills) on the TReDS platform, followed by buyers accepting the invoices. Financiers bid to finance those invoices, followed by MSMEs receiving funds (after discount) instantly, and buyers repay the financier later. This system ensures transparent and digital transaction records, limits dependence on informal credit and integrates MSMEs into formal, tech-enabled financial systems.

TReDS helps MSMEs digitalise by providing a transparent, tech-enabled platform for early invoice financing, improving cash flow, reducing reliance on informal credit, and integrating them into formal digital financial systems.

y. Udyam Assist Platform (UAP)

The Udyam Assist Platform (UAP), developed by SIDBI, collaborates with regulated entities, including banks, NBFCs, MFIs, and government departments, as Designated Agencies (DAs) to assist Informal Micro Enterprises (IMEs) in registering under Udyam. Recognised by both MoMSME and RBI, certificates issued through UAP are treated at par with the Udyam Registration Certificate for Priority Sector Lending. Launched on January 11, 2023, by the Hon'ble MSME Minister, UAP has onboarded over 145 DAs and enabled registration of more than 1.5 crore unique IMEs. This initiative not only enhances the accessibility of financial services for micro enterprises but also supports their integration into the broader economic framework, enabling them to avail themselves of various government schemes and financial benefits [84].

It facilitates digitalisation by enabling IMEs to register online, giving them a digital identity to access government schemes and formal credit.

z. UDYAM portal

Following the adoption of the revised definition of Micro, Small, and Medium Enterprises (MSMEs) on 26 June 2020, which is based on investment in plant and machinery or equipment and turnover, the Udyam Registration Portal, the only Government Portal for MSME (Udyam) Registration, was launched on 1 July 2020. It was designed to promote ease of doing business and facilitate formalisation of the MSME sector through a completely digital, paperless, and cost-free system [85].

The registration process is self-declared and does not require any documentation or proof, as it is fully integrated with other government databases, including GSTN, the Income Tax Department, and PAN databases [85].

For businesses that are GST-exempt, a PAN alone is sufficient for registration. One of the most significant benefits of registering through the Udyam portal is that it provides enterprises with a unique Udyam Registration Number (URN) and an e-certificate recognised across government departments. Registered MSMEs become eligible for various government schemes and benefits, including priority sector lending, collateral-free loans, subsidies, market access support, and protection against delayed payments under the MSME Development Act. The portal has also been integrated with other platforms, such as TReDS (Trade Receivables Discounting System) and GeM (Government e-Marketplace), providing MSMEs with access to digital finance and procurement opportunities [85].

Marking a significant step toward formalising and digitalising India's MSME sector. 3,67,17,600 MSMEs have been registered on the Udyam portal, of which 3,61,56,134 are micro, 4,72,812 are small, and 35,271 are medium enterprises [86].

It facilitates the digitalisation of MSMEs by providing a fully online registration process and integration with government databases, such as GSTN, Income Tax, and PAN, which ensures seamless access to various government schemes and benefits. Thus, it enhances the formalisation and digital presence of MSMEs across India.

8.2 Non-government Contributions

a. Role of Microfinance Institutions (MFIs), BCs and NGOs

Since its inception in the 1970s, utilising the Grameen Bank model, the concept of microfinance has become a crucial element for financial inclusion. Microfinance institutions (MFIs), Business Correspondents (BCs), and NGOs primarily serve rural and marginalised groups, especially women and micro and small enterprises. Their customers are small business owners and self-employed individuals, such as daily wage workers, small farmers, traders, street vendors, shopkeepers and artisans [87].

Between February 2017 and June 2022, India's microfinance sector facilitated credit access for approximately 60 million unique borrowers through 118 million loan accounts, thereby playing a significant role in extending financial support to low-income households [88].

In India, Microfinance Lending is primarily operating through three models- Joint Liability Group (JLG), Self-Help Group (SHG), and the SHG-Bank Linkage model. NBFC-MFIs, Business Correspondents, NGO MFIs, and Small Finance Banks primarily implement the JLG and SHG models. In contrast, commercial banks, corporate banks, and regional rural banks adopt the SHG-bank linkage model. Over time, a hybrid model has emerged, integrating best practices from both SHG and JLG models [89].

Fintechs are emerging as valuable partners of MFIs, bringing much-needed innovations across all aspects of the customer journey, from marketing and onboarding to collections and debt recovery. Various use cases demonstrate how these technologies, leveraged by MFIs, bring streamlined and faster operations.

Features such as geo-tagging, digital applications, integration with multiple credit bureaus, and real-time verification enable MFIs to streamline their underwriting capabilities and onboarding processes. An NBFC-MFI in India has collaborated with a financial firm to develop a tech-enabled psychometric tool that evaluates the creditworthiness of borrowers, assessing their willingness and intention to repay the loan. A neo-banking platform in India catering to underserved populations utilises a digital financial services platform to collect vast amounts of data and analyse it using AI to enhance its underwriting decisions. Furthermore, a digital solution provider offers chatbot services to microfinance clients. This chatbot guides users by providing education on available financial products and services, loan eligibility, and other relevant information [87].

By integrating digital technologies into their operations, MFIs contribute to financial inclusion by enabling nano, micro, and small enterprises to access financial services and accelerate their digitalisation journey.

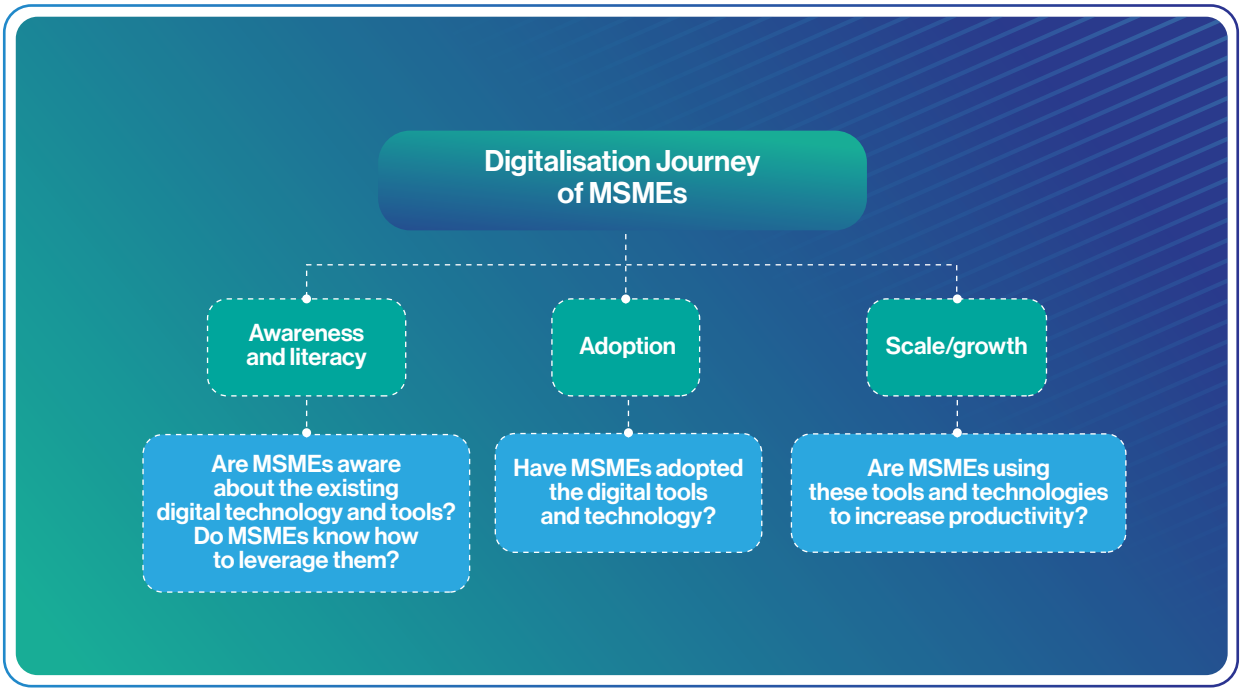
They utilise digital underwriting tools, including AI, data analytics, and psychometric assessments, to enhance credit risk evaluation and facilitate faster, more accurate lending decisions. Digital payment solutions, including UPI-based platforms, E-NACH, link-based repayment, Bharat Connect (Bharat Bill Payment System, BBPS) integration, cash-drop facilities, and non-smartphone payment systems, are helping streamline loan repayments and reduce reliance on cash handling. Additionally, MFIs are adopting customer engagement tools, such as chatbots, WhatsApp, and Interactive Voice Response (IVR), to promote digital literacy and educate clients on financial products and eligibility, thereby further advancing financial inclusion at the grassroots level.

NGOs also play a crucial role in driving digitalisation among nano and micro businesses by providing digital literacy training, capacity building, and access to digital tools [90].

The NIIT Foundation's Nreach initiative equips women with the confidence and knowledge to leverage technology for entrepreneurship, financial inclusion, and access to government services. The program also provides financial literacy to women. It addresses the gender gap, promoting equality and inclusion in the digital space [91].

b. CeDISI's Digital MSME Yatra and Other Initiatives

The Centre for Digital Inclusion and Social Impact (CeDISI) promotes digitalisation among Early, Nano, and Micro enterprises through various initiatives, including digital skill and tool development, entrepreneurship development, digital and financial literacy, and through our annual flagship on-ground MSME Connect program, Digital MSME Yatra. We understand the needs and challenges of these enterprises and help them learn, adopt, and scale their digital journey to improve efficiency and revenue.



The digitalisation journey of MSMEs can be divided into three key phases: literacy and awareness, adoption and scaling/growth. In the first phase, the focus is on building digital literacy and awareness about the benefits of digitalisation, as well as knowing the available tools, schemes, and initiatives and the ways to leverage them.

The second phase involves businesses adopting and implementing digital tools and platforms, including digital media platforms, financial technologies, artificial intelligence (AI), and e-commerce. Finally, in the scaling and growth stage, by leveraging these tools, businesses expand their reach, enter new markets, streamline operations and improve resilience.

The Centre for Digital Inclusion and Social Impact (CeDISI) NGO supports MSMEs, particularly Nano and Micro enterprises, in their digitalisation journey across the phases through capacity building and tools. We aim to do this by working with Corporates, NGOs, Multilaterals, MSMEs, Donor agencies, Civil Society Organisations (CSOs), Community Development Organisations (CDOs), Industry Associations and other Institutions relevant to our goals; organising workshops, training, financial literacy, mentorship programs, and access to digital tools, industry roundtables for discussion and initiatives and research-based projects.

c. Industry Collaborations

Collaborations between Indian fintech firms and microfinance institutions are becoming significant in driving digital inclusion.

A FinTech company in India has partnered with a microfinance institutions' association to advance digital payments tailored for users without smartphones in the microfinance segment. The initiative introduces UPI payment infrastructure, enabling auto-repayment of loans, and allowing non-smartphone users to make digital financial transactions such as merchant payments, utility bills, and loan instalments. Moreover, an Indian NBFC-MFI has partnered with a payments bank company to streamline digital loan repayments and tackle several challenges in cash collection, including the need for a physical touchpoint at remote locations, delays in settlement and reconciliation, and risk of potential fraud and theft. The MFI has also introduced a cash-drop facility, which reduces reliance on physical BC touchpoints and allows customers to repay in cash [87].

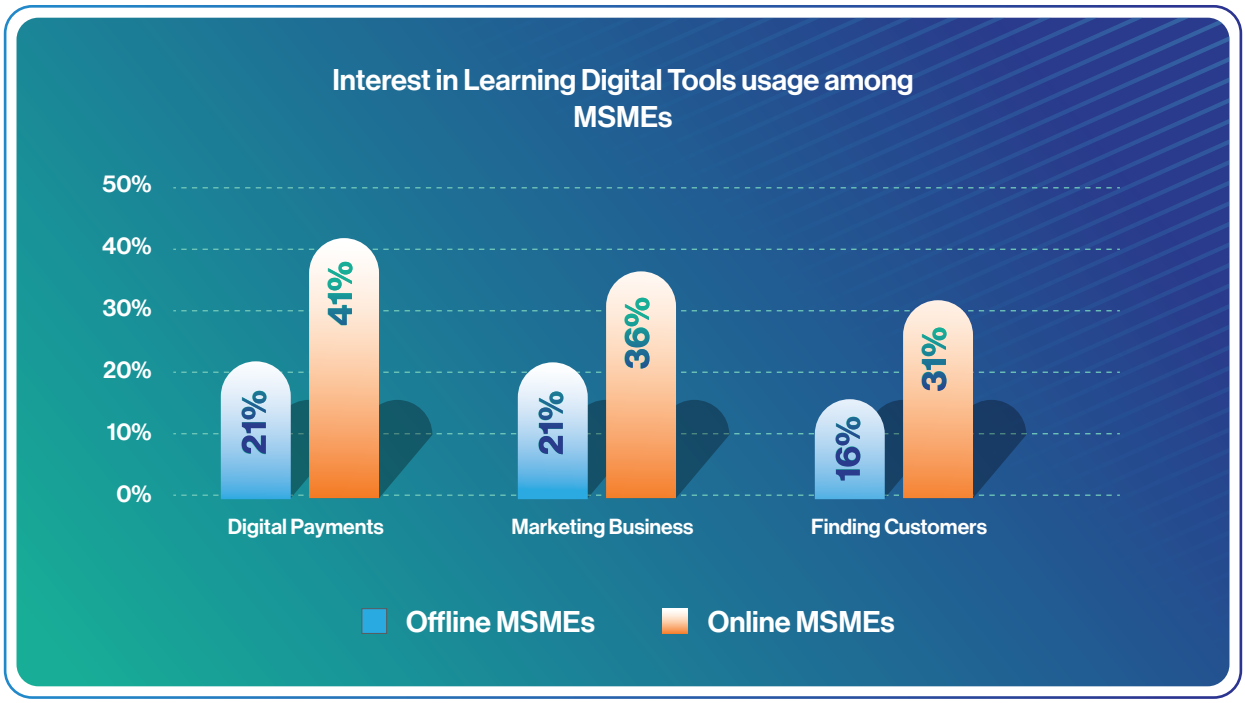
9. Challenges in MSME Digitalisation

MSMEs encompass a diverse range of enterprises that differ in scope, size, and operations, and are on various digitalisation routes. Despite various schemes and initiatives encouraging the digitalisation of MSMEs in India, significant obstacles persist, ranging from a lack of awareness and skill shortages to financial constraints. The Digital MSME Yatra 2024 learnings clearly show that a lack of access to credit is not the only challenge MSMEs face, as highlighted in many reports. Other challenges must also be confronted, including difficulty in accessing larger markets, a shortage of skilled labour, a digital literacy gap, and a lack of awareness regarding existing government schemes and initiatives.

9.1 Lack of Awareness and Digital Literacy

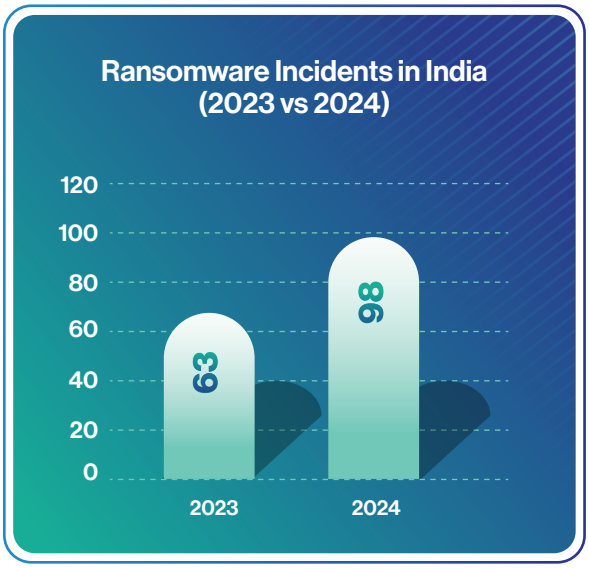
There is a lack of awareness and knowledge among MSMEs about the affordable and easy-to-use tools available for MSMEs. Many MSMEs see technology as a financial burden without understanding its objectives and benefits. As found during the Digital MSME Yatra 2024, conducted by CeDISI NGO, many are unaware of government schemes and initiatives, especially those aimed at facilitating digital adoption through government subsidies. Tasks such as digital marketing or e-commerce onboarding can be complicated for many MSMEs. Even when they are familiar with the tools, schemes, and initiatives, they often do not know which one is most appropriate for their business.

The report by DAI, Ipsos, and Meta reveals that 51% of offline MSMEs faced difficulty using digital tools due to a lack of knowledge. While 21% of offline MSMEs reported an interest in learning more about using digital tools for digital payments, another 21% and 16% expressed interest in learning more about using digital tools for marketing their business and finding new customers, respectively. Even those MSMEs that were already online were eager to gain more knowledge about using digital tools. While 41% of online MSMEs expressed interest in learning more about using digital tools for making digital payments, 36% and 31% wanted to learn more about marketing their business and finding new customers, respectively [36].



9.2 Digital Frauds and Cybersecurity Concerns

MSMEs are hesitant to adopt digital tools due to concerns about online fraud, fake service providers, phishing attacks, and cyberattacks. They fear losing sensitive customer data and money, and feel compelled to use offline methods. According to the VI business report, India ranks among the leading countries targeted by ransomware attacks, with over half of these attacks aimed at small businesses. MSMEs employing up to 500 people accounted for approximately 54% of the attacks recorded from January 2020 to July 2022 [12]. India is among the top 10 countries targeted by ransomware attacks. In 2024, 98 ransomware incidents affected various sectors in India, representing a 55% increase compared to the 63 incidents reported in 2023 [92].



9.3 Skill Shortages and Training Gaps

MSMEs often face skill shortages during their digitalisation journey. Most operate with a small team, and very few workers are skilled in handling digital platforms, such as website backend management, essential AI tools, or online sales channels. MSMEs find it difficult to spare resources for employee training.

Several government schemes actively support MSMEs in learning and upgrading their digital skills.

These initiatives provide training in digital tools, technology adoption, and capacity building to help MSMEs enhance productivity and competitiveness in a rapidly digitising economy. For instance, the MSME Trade Enablement & Marketing (TEAM) Initiative, under the Raising and Accelerating MSME Performance (RAMP) initiative, provides MSEs with training and capacity building on e-commerce. The Procurement & Marketing Support Scheme includes training on digital marketing to increase their online presence and access broader markets. However, due to a lack of awareness among many MSMEs, enterprises often remain unaware of these opportunities and fail to capitalise on these benefits.

9.4 Privacy and Data Security Issues

Findings from the Digital MSME Yatra by CeDISI indicate that MSMEs remain cautious about using online platforms due to concerns about information privacy. For instance, sellers in the commodity sector, such as those in the fabric and textiles industry, hesitated to list prices online for fear of being undercut by competitors. They fear disclosing rates could disrupt their local pricing dynamics. Concerns over who has access to their stock levels, pricing, and customer data remain high, limiting their willingness to adopt integrated solutions beyond trusted platforms like WhatsApp, where they have clear visibility and control of who will access their information.

9.5 Resource Constraints

Adopting digital tools requires resources, and MSMEs lack those. Investing in websites, cybersecurity solutions, and e-commerce logistics requires financial resources. Skilled workforce is also expensive. For a small business, the upfront investment needed to build an essential website or integrate with an e-commerce platform can feel overwhelming. The VI Business report reveals that formal credit supply caters to the financing requirements of MSMEs to the tune of only ₹10.9 Lakh Crore. However, the demand of MSMEs for financing is ₹69.3 Lakh Crore, with 70% of the credit necessary to address the deficit in working capital [12].

Moreover, during the Digital MSME Yatra 2024, it was found that MSMEs are reluctant to take loans because of a lack of stability in sales and credit cycles. Many entrepreneurs struggle to commit to monthly EMI payments due to delayed payments from their buyers, particularly in sectors such as textiles, where credit cycles can extend up to 6 months. Further, despite multiple government schemes, stringent criteria and collateral requirements limit MSME access to credit.

9.6 Unclear Return on Investment (ROI)

Many MSMEs are not sufficiently motivated and lack a clear vision for digitalisation. They are more focused on profits and short-term survival rather than long-term modernisation. They consider digitalisation an optional element of their business, which might also complicate business operations and lead to formal scrutiny regarding taxation or compliance. A major deterrent is the lack of clear, tangible ROI (Return on Investment) from digital adoption, making MSMEs hesitant to invest time and resources. Since the benefits of digitalisation, such as improved efficiency, market reach, and compliance, may take time to materialise or are challenging to quantify upfront, many MSMEs remain skeptical about its value and the required resource investment.

9.7 High cost of digital tools

The high cost of digital tools and the lack of awareness about free or economical tools schemes are also hurdles to MSMEs' adoption of digital tools. Paid digital ads, premium website hosting, and premium cybersecurity, among other expenses, can burden MSMEs, especially for micro and small businesses. Many products are one-size-fits-all solutions, not tackling MSMEs' fundamental challenges, including low budgets, small teams, etc. According to a report by DAI, Ipsos, and Meta, 20% of offline MSMEs reported that high costs were a difficulty their business faced in using digital tools. Conversely, 30% of online MSMEs reported the same difficulty [36].

9.8 Generational Divide in Business Practices

Findings from the Digital MSME Yatra by CeDISI NGO highlight that one of the significant obstacles to the digitalisation of MSMEs is the generational divide between the traditional business owners and the younger generation. Many family-run enterprises are operated by the first or second generation, using conventional methods for decades. Digitalisation often seems risky or unnecessary for these business owners, especially when the current way of doing things has proven profitable. This mindset is characterised by caution, resistance to change, and a preference for operational familiarity over technological disruption. On the other hand, the younger generation, digitally literate and exposed to global content and business trends, finds digital tools essential for scalability, visibility, competitiveness, and growth. However, in many cases, they lack the authority to make substantial decisions or face resistance from elder family members who fear that adopting digital tools might lead to data exposure, compliance scrutiny, or overcomplicating business processes. This intergenerational tussle creates a bottleneck where innovation is delayed or diluted.

9.9 Compliance and Regulatory Challenges

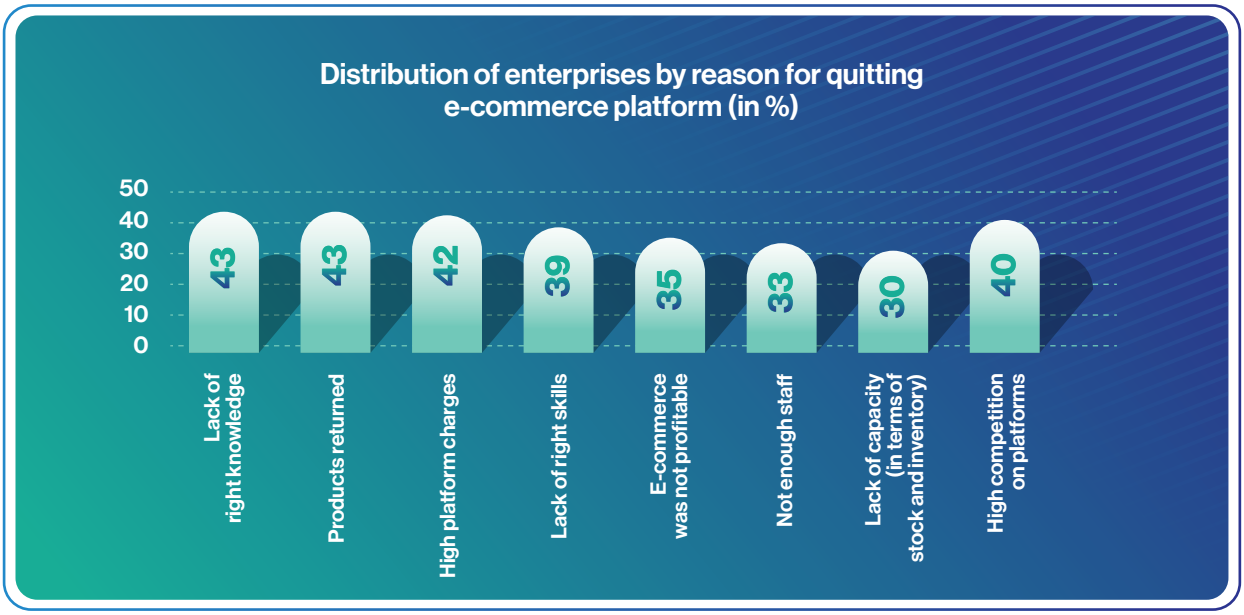
According to the Forvis Mazars report, MSMEs often lack comprehensive resources to navigate the complex and evolving regulations that underpin a proactive governance structure for digital systems. Additionally, in light of the growing concerns about data privacy, the introduction of the Digital Personal Data Protection Act (DPDPA) of 2023 marks a significant step towards streamlining data protection. However, not only do MSMEs need to understand the compliance obligations, which, if not fulfilled, can lead to penalties and legal liabilities. They also need to know the implications of cross-border data transfers. Awareness and being well-versed in the latest developments in compliance obligations require proper guidance for MSME [62].

9.10 Limited infrastructure

While MSMEs have been utilising the access to electricity, basic computing systems and internet connectivity in recent years, a genuinely digital-powered enterprise needs more than just what Forvis Mazars report calls 'hard' infrastructure. These processes and mechanisms must be seamlessly integrated into the business models to reap the benefits of electronic processes and mechanisms, thereby driving transformation in infrastructural progress. Many businesses struggle with inadequate IT infrastructure and partial integration with platform service providers, and feel hesitant to allow this shift due to the fear of transaction failure. Another obstacle to achieving digital transformation is the challenge of data security concerns and high service costs. Further, success in digital infrastructure also depends on whether their suppliers and partners are digitally equipped. Although digital uptake is growing on the retail side, it remains low across supply chains, forcing many MSMEs to rely on cash and credit transactions, which limits their digital advancement [62].

9.11 Asymmetric power and platform dominance

A fair degree of literature and Forvis Mazars report suggests an underserved dependence in the Indian e-commerce landscape, where most sellers must make fundamental changes to their business practices to accommodate and optimise operations on existing digital platforms. It signifies a structural issue in India's e-commerce ecosystem, where a few dominant digital platforms dictate the rules for sellers' engagement, particularly for micro, small, and medium-sized enterprises (MSMEs) and small entrepreneurs. These platforms often impose rigid operational requirements, including standardised listing formats, commission structures, mandatory logistics tie-ins, and algorithm-driven visibility rules. Consequently, according to Forvis Mazars, many sellers feel "locked in" the e-commerce system, unable to scale or innovate freely. Therefore, more inclusive and adaptable practices are needed. Open and user-friendly practices are necessary to enable small-scale entrepreneurs to have greater autonomy and operational freedom [62].



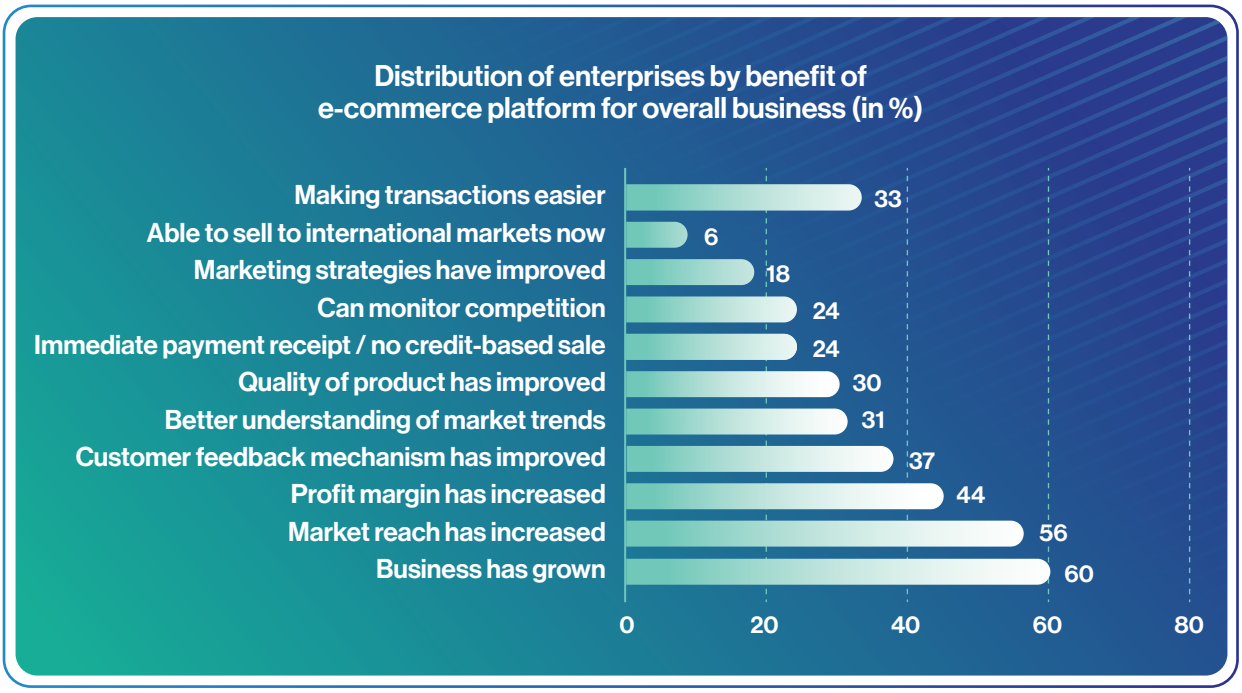
Source: ICRIER. Annual survey of micro, small and medium enterprises (MSMEs) in India: The role of digitalisation in enterprise development [24].

ICRIER's 'Annual Survey of Micro, Small and Medium Enterprises (MSMEs) in India' reveals that many of the MSMEs integrated with e-commerce platforms quit because of reasons including lack of knowledge, returned products, high platform charges, high competition on platforms, lack of the right skills, not enough staff, not enough capacity, and e-commerce being ünprofitable [24].

10. Impact of Digitalisation on MSMEs

The impact of digitalisation on MSMEs can be observed from the improvements in various parameters. According to a report by Forvis Mazars, MSMEs have overcome significant challenges in domains such as marketing, access to finance, skill enhancement, and infrastructure upgrades, thanks to digital solutions. Increased operational efficiency due to digitalisation has led MSMEs to tap and grow into international markets. Consequently, MSMEs have improved their strategies based on data-driven decisions, ensuring their flexibility in the face of fluctuations in the global market. Increased integration into foreign markets, improved customer engagement and delivery methods, reduced transactions, marketing, and operating costs, greater access to a broad client base, and a shift from a workforce to a knowledge-based innovation are all the results of the digitalisation of MSMEs [62].

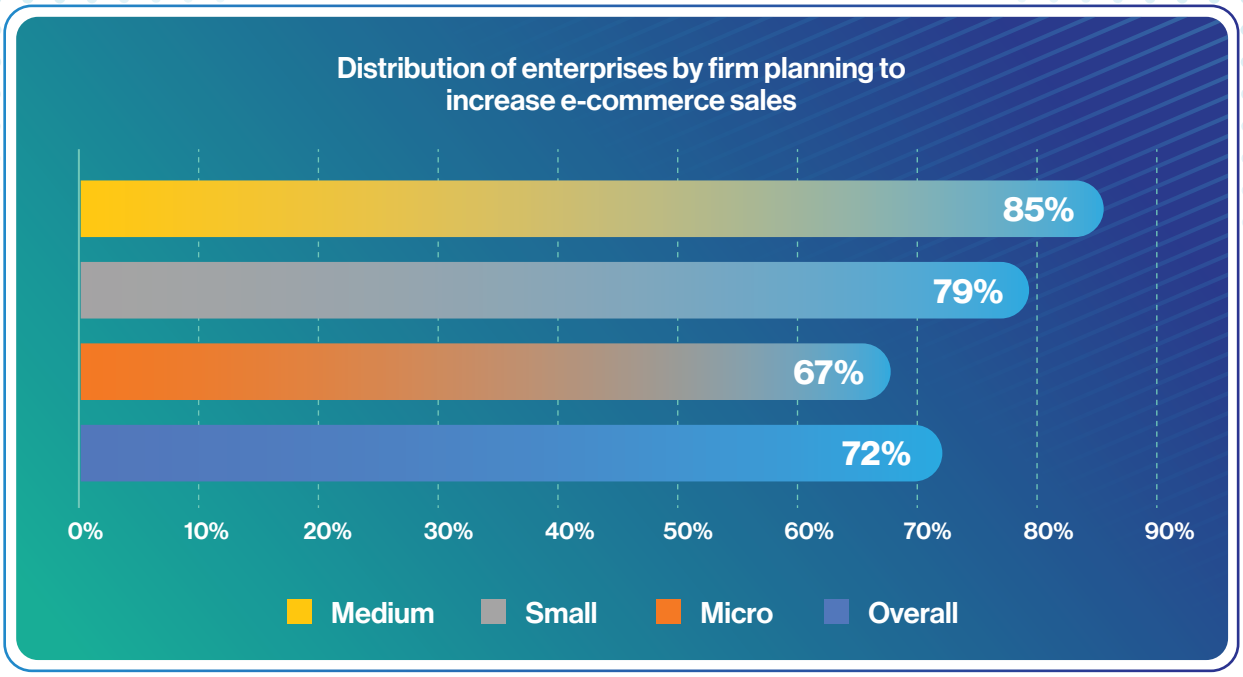
According to the ICRIER, MSMEs have experienced benefits through adopting e-commerce platforms. These benefits include business growth, increased market reach, improved profit margins, enhanced customer feedback mechanisms, and easier transaction processes. Additionally, enterprises have reported better understanding of market trends, improved product quality, quicker payment processes, enhanced ability to monitor competition, improved marketing strategies, and access to international markets [24].



Source: ICRIER. Annual survey of micro, small and medium enterprises (MSMEs) in India: The role of digitalisation in enterprise development [24].

Many enterprises of all sizes, whether micro, small, or medium, are on a mission to widen their e-commerce operations. This active trend of intent, with a notably high percentage of medium (85%) and small enterprises (79%), is a strong indicator of the potential of digital platforms to catalyse business growth [24].

The overall figure of 72% further underscores the growing confidence among MSMEs in leveraging digital tools to enhance market reach, improve efficiency, and adapt to evolving consumer behaviour [24].



Source: ICRIER. Annual survey of micro, small and medium enterprises (MSMEs) in India: The role of digitalisation in enterprise development [24].

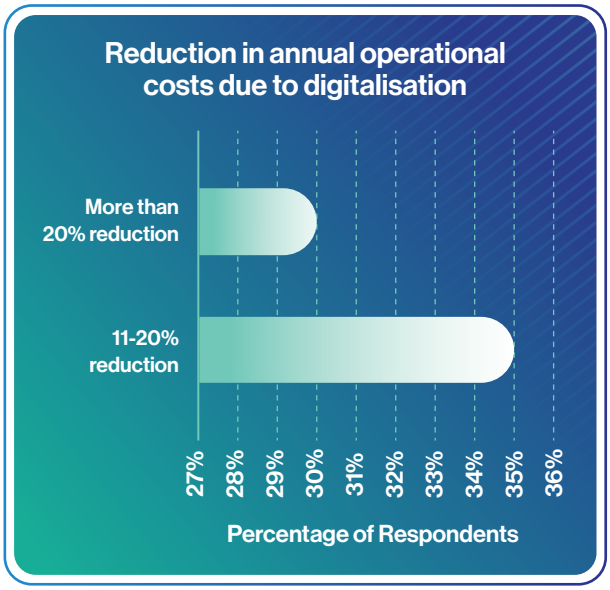
10.1 Increased Market Reach and Sales

Digital ecosystems enable MSMEs to participate in competitive markets by leveraging digital payment systems, joining e-commerce marketplaces, and adopting supply chain solutions. The ICRIER (2025) report highlights that most export-focused businesses integrated on e-commerce platforms use these platforms to access global markets. These comprise a sizable portion of microbusinesses, demonstrating that even smaller and less effective companies can capitalise on international opportunities through digital platforms. After integrating e-commerce, a significant portion of businesses (more than 90%) reported increased sales and profit margins. For small businesses, the expansion range is much better for both sales growth and profit margins [24].

Furthermore, after integration, a sizable portion of microbusinesses (almost 95%) experienced higher sales and profit margins. According to the FICCI Report on SMEs in India, amongst the enterprises that reported selling through online channels, 24 per cent reported that more than half (50 to 75 per cent) of their overall sales came through online platforms, such as e-commerce platforms or their websites. Another 39 per cent of respondents reported that one-fourth to half of their sales were through online platforms [26].

10.2 Reduced Operational and Marketing Costs

MSMEs can automate several operations, such as billing, inventory tracking, payroll, and marketing, by switching to digital tools, which can result in significant cost reductions. In terms of offering a better reach to the target audience/customers, digital ads have an impressive upper hand over traditional media, with considerably smaller costs. The FICCI report reveals that a significant share of the firms witnessed productivity improvements and reduced operational costs from incorporating digital technology into their business functions. Approximately 35 per cent of respondents reported a reduction in annual operational costs by 11-20 per cent due to digitalisation. Another 30 per cent of respondents indicated that their operational yearly costs had decreased by more than 20 per cent [26].



10.3 Improved Access to Finance

MSMEs' access to formal credit has been considerably improved by digitalisation, making their operations more transparent than ever and driven by data. Digital records, such as GST returns, e-invoices, transaction histories, and payment data, enable lenders to assess creditworthiness more accurately and efficiently. This shift reduces dependence on traditional collateral-based lending and enables more inclusive and data-based credit decisions. According to MSME Pulse 2023 by SIDBI, with the rapid evolution of information infrastructure and technology, MSME credit underwriting has become more information-oriented, quicker, and more trustworthy [93]. As the financial landscape continues to evolve and enhance the quality of banking services for customers, banks have collaborated with FinTechs to provide a range of services. FinTechs are further augmenting banking products and services with seamless delivery in Digital Loan journeys, such as account statement analysis and leveraging alternative data in underwriting, for quick credit assessment and real-time decision-making [94].

10.4 Enhanced Customer Engagement

Utilising digital tools allows MSMEs to provide personalised, consistent, and responsive customer interactions. By analysing customer data, businesses can offer personalised product recommendations, targeted email campaigns, and customised website content.

Implementing AI-powered chatbots and maintaining an active presence on social media platforms, such as WhatsApp and Instagram, enables MSMEs to engage with customers in real-time. Customer Relationship Management (CRM) systems allow MSMEs to centralise customer data, track interactions, and gain insights into customer behaviour. This comprehensive view enables businesses to personalise communications, anticipate customer needs, and foster long-term relationships.

A recent survey on Indian MSMEs by Zoho titled 'State of Digital and Customer Operations in Indian MSMEs' reveals that 87% of respondents have either used or are currently using a CRM solution, and 97% of these businesses reported improved customer operations as a result. Among CRM users, 72% saved time, 71% saw increased revenue, and 66% enhanced decision-making due to the transparency and data-driven insights provided by customer experience tools. Despite these benefits, 71% of businesses still rely on spreadsheets, either independently or in conjunction with CRM systems, indicating a need for more unified customer management solutions. Notably, 90% of MSMEs currently not using CRM plan to adopt one by 2026 [34].

10.5 Data-Driven Decision Making and Innovation

Digitalisation enables MSMEs to transform their decision-making processes by utilising insights from data analysis. With the implementation of digital tools for CRM, accounting, and inventory management, as well as marketing and sales automation, MSMEs can collect and analyse data on operational efficiency, customer behaviour, market trends, and sales. It provides valuable insights to forecast demand, understand customer preferences, and make informed and strategic decisions to optimise processes and enhance profitability. Data-driven decision-making also fosters innovation within MSMEs by equipping them to identify emerging market needs, explore new opportunities and experiment with novel services, products and business models.

11. Gender and Social Inclusion in MSME Digitalisation

Women entrepreneurs in India play a significant role in advancing the country's economic growth by contributing to industrial output and providing employment, with 10 per cent of the total workers engaged in various economic activities, as per the 6th Economic Census, 2016 in India [95]. As of 23 May 2025, there are 2,54,35,222 registered MSMSEs on the Udyam portal owned by women, accounting for approximately 39.83% of the total registered MSMEs on the portal [10]. As India pursues the digital transformation of its MSME sector, it is necessary to recognise the distinct challenges and opportunities for women-owned enterprises toward the digitalisation of MSMEs.

11.1 Challenges faced by women-led MSMEs

While there is immense potential for enhancing business outcomes through digitalisation, women-owned MSMEs face distinct financial, structural, and socio-cultural obstacles that hinder their integration into the digital world. Financially, many women entrepreneurs struggle to access capital due to limited collateral and perceived credit risks. Structurally, a lack of digital literacy and limited access to professional networks impede their ability to leverage digital tools for business growth. Socio-cultural norms further restrict women's entrepreneurial pursuits.

- **Gendered Digital and Financial Literacy Gap**

One significant barrier is the gender gap in digital literacy. There is a substantial gender divide in access to and use of digital technologies. According to GSMA, 'The Mobile Gender Gap Report 2020', women are much less likely to own a smartphone in India than men, with 37% of men and 14% of women owning smartphones, in contrast to 29% of men and 31% of women owning basic phones in 2019 [96].

According to an ICRIER report, while the proportion of women owning mobile phones increased from 45.9% in 2015–16 to 54% in 2020–21, around 70% of women had never used the internet. One of the significant factors contributing to this was the low levels of digital literacy among women, resulting in information asymmetry [97]. The gendered digital literacy gap restricts the ability of women entrepreneurs to participate in the digital economy, leverage digital tools for business growth, access government and non-government schemes and initiatives, secure financing, and engage in online training.

According to a report by the IFC, women entrepreneurs also struggle with limited financial literacy and product knowledge. While both government and financial institutions launch financial schemes with a varied focus on women entrepreneurs, only 17 per cent of women entrepreneurs are aware of these schemes. For 87 per cent of the women, the primary sources of information about the schemes were friends and family [95].

- **Limited access to financial resources**

Women entrepreneurs often face challenges in accessing the financial resources necessary for digitalisation. These include difficulties securing loans or investments due to a lack of collateral and systemic biases in lending practices that restrict their ability to invest in digital technologies and tools for the business.

While there is high account ownership among women in MSMEs, the actual usage of bank accounts and formal financial services is not at par. The percentage of women in India holding inactive accounts was 42% in 2021, compared to 30% of men. Furthermore, 47.7% of respondents believed that securing a loan is even more challenging for women entrepreneurs due to the perceived gender bias in lending practices [97].

According to an International Finance Corporation (IFC) report, women entrepreneurs often lack proper documentation or fixed assets, making it challenging to fulfil the traditional criteria set by financial institutions. As a result, they are usually perceived as riskier borrowers than they are. They tend to face higher interest rates, are required to offer more collateral relative to their loans than men, and typically receive loans with shorter repayment terms. In developing countries, loan applications from women entrepreneurs are rejected at a higher rate, mainly due to the perception that women-owned small businesses carry greater risk [95].

- **Cultural and sociological barriers**

Traditional gender roles and societal expectations often limit women's participation in entrepreneurial activities. Deep-rooted cultural norms seek to confine women to domestic roles and discourage them from pursuing entrepreneurial ventures. This mindset restricts women's economic participation and affects their self-confidence and ambition in the business domain. Further, women entrepreneurs often bear the burden of managing household duties and running a business.

Cultural expectations place the primary responsibility of family care on women, leaving them with limited time and energy to focus on their enterprises. This imbalance affects their productivity, business growth, and overall well-being.

Moreover, women have limited access to markets and digital infrastructure, which hinders their ability to build networks and limits the range of opportunities for them to engage in digital entrepreneurship. This isolation due to limited access to markets impedes their ability to gain market insights, collaborate with peers, and expand their businesses. The lack of exposure to market dynamics and networking opportunities places women entrepreneurs at a disadvantage compared to their male counterparts.

Patriarchal socio-cultural norms act as barriers for women, restricting them from owning mobile phones, especially smartphones, or using the internet and accessing other digital financial services [97]. As highlighted in the Women's World Banking report, having mobile access is essential for utilising most digital financial services, but many women do not own a personal technology device. This lack of access, combined with a lack of knowledge on how to utilise them in their businesses, makes it difficult for women-led MSMEs to prosper [98]. This technological gap limits their ability to leverage digital platforms for business development, marketing, and operations.

- **Safety and security concerns**

Safety concerns, including fears of cyber harassment, data breaches, and online fraud, can deter women from embracing digital platforms. Women face the threat of online abuse, including unsolicited messages, stalking and trolling, which creates a hostile digital environment. Further, the fear of personal information being leaked or misused discourages them from sharing data or engaging in online transactions.

Additionally, incidents of financial fraud and identity theft disproportionately affect women who may already have limited digital literacy.

According to a survey conducted by ICRIER, 63.7% of women rated mobile banking as "very easy" to "moderately easy" to use. Nearly 47.4% preferred in-person visits to the bank for transactions due to concerns regarding the safety of mobile financial services [97].

- **Non-gendered approach towards MSMEs; Digitalisation**

One of the biggest obstacles hindering the development of women's entrepreneurship and the digitalisation of women's Micro, Small, and Medium Enterprises (MSMEs) in India is the non-gendered approach to digitalisation of MSMEs.

This approach overlooks the distinct challenges that women entrepreneurs face, resulting in their underrepresentation and limited opportunities for advancement.

Furthermore, a lack of gender sensitivity training among the staff in financial institutions, which are predominantly male, results in preconceived notions about women entrepreneurs and biases where women's business acumen is underestimated, or their financial needs are not taken seriously. Consequently, it leads to environments that are less welcoming to women entrepreneurs and discourages women from seeking financial services or support

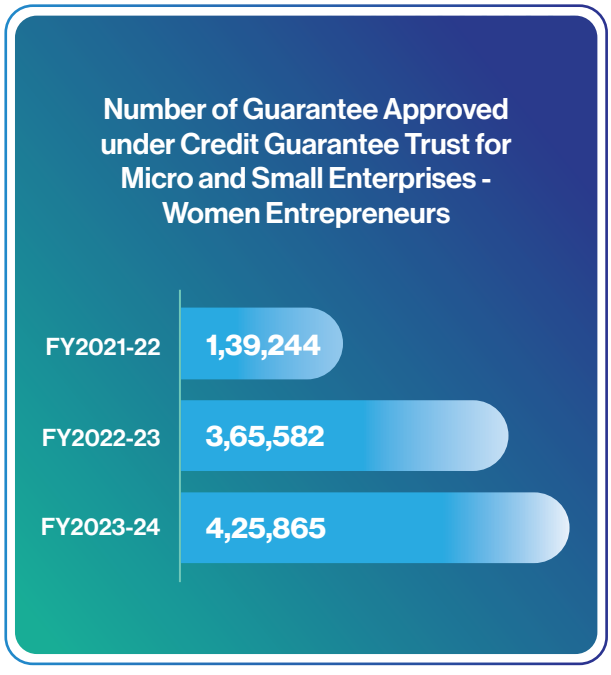
This approach results in the lack of suitable digital and financial products that align with the realities of women entrepreneurs' operations. For instance, traditional credit assessment models that require collateral, which many women lack due to limited asset ownership, restrict their access to formal credit channels. The lack of vernacular language support and limited customer assistance can deter women from adopting digital solutions.

11.2 Initiatives Supporting Women Entrepreneurs

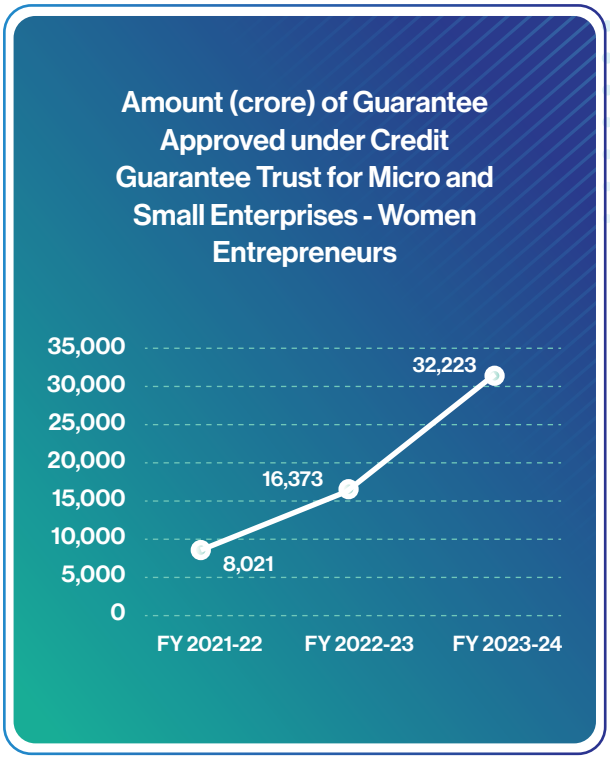
The digitalisation of women-owned MSMEs in India requires a tailored approach, including awareness, infrastructure, tools, and strong institutional support. Various initiatives aim to enhance access to finance, digital skills, and entrepreneurial resources for women entrepreneurs in India, as listed below.

- **Credit Guarantee Scheme**

  Under this scheme, collateral-free credit is provided to micro and small enterprises, with enhanced coverage for women-owned businesses. The guarantee coverage for loans to women entrepreneurs has been increased to 90%, facilitating more straightforward access to finance for digitalisation efforts [99].



Source: Press Information Bureau. Women-led MSMEs [100].



Source: Press Information Bureau. Women-led MSMEs [100].

- **Internet Saathi Program**

  In collaboration with Google, the Tata Trusts launched this program in 2015 to promote digital literacy among women in rural communities. The program aims to develop a cohort of digitally trained women in rural communities, who will in turn train other women, thereby establishing a growing network of trainers [101].

- **Mahila-E-Haat** is an initiative by the Ministry of Women and Child Development. It is an online marketing platform that enables women entrepreneurs to showcase and sell their products and services digitally, expanding their market reach [102].

- **Public Procurement Policy**
  It was amended in 2018 to require that at least 3% of the annual procurement be from women-owned micro and small enterprises [103].

- **Sarthika Program**
  It is an initiative by Tide, a UK-based SME-focused financial platform, and WE Hub, Telangana's state-led incubator for women entrepreneurs. The program offers a web portal to guide users through the eligibility criteria, application process, and other key aspects of government schemes specifically designed for women-led micro, small, and medium enterprises (MSMEs) [104]. Initially, the program focuses on the Prime Minister's Employment Generation Programme (PMEGP), the Raw Material Assistance Scheme, and the Barcode Registration Subsidy [104].

- **Stand-Up India**
  The scheme facilitates bank loans ranging from ₹10 lakh to ₹1 crore per bank branch for at least one woman entrepreneur, for establishing greenfield enterprises. It promotes digital onboarding through the Stand-Up Mitra portal [105].

- **The Women Entrepreneurship Platform,** launched by NITI Aayog in 2018, evolved into a public-private partnership in 2022 to create a comprehensive ecosystem that supports women entrepreneurs across India. It aims to empower women entrepreneurs by providing support across various pillars, including entrepreneurship promotion, access to finance, market linkages, training and skill development, mentoring and networking, and business development services [106].

12. Recommendations and Way Forward in the MSME Digitalisation

As the MSME sector is navigating the path of digitalisation, it is necessary to counter the obstacles that underscore the need for interventions. The transition of MSMEs towards digitalisation must be sustained with supportive structures, awareness, and strategic alignment through meaningful and inclusive interventions to counter the obstacles they face.

12.1 Enhanced Focus on Micro Enterprises & Two New Categories- Early and Nano

Based on Digital MSME Yatra's 2024 findings, there is a need to recognise the diversity within the 'Micro' sector beyond the existing MSME definition, based on Investment and Turnover. We propose the following subdivisions within the Micro category of MSMEs;

Proposed category	Investment (INR)	Turnover (INR)
Early	Up to ₹5 Lakhs	Up to ₹25 Lakhs
Nano	Up to ₹50 Lakhs	Up to ₹2.5 Crores

Therefore, MSMEs must be redefined as **EN-MSME- Early, Nano, Micro, Small and Medium Enterprises**. We overlook the specific challenges of these Ultra-Micro enterprises by not recognising them as sub-categories under Micro. An Early and Nano classification would allow for more precise policy measures, schemes targeting specific financial products, and training programs. It could create more inclusive growth opportunities by offering them the support they need to thrive.

A report by Forvis Mazars, insights from Digital MSME Yatra and other reports and sources inform the following recommendations, which are grounded in the realities of MSMEs and aim to strengthen efforts to digitalise them. These recommendations are interconnected and require coordinated efforts from industry, the civil sector, and government alike [62].

12.2 Raising Awareness of Government Schemes

The government of India and associated agencies spearhead various schemes and initiatives to drive the digitalisation of MSMEs that not all MSME owners know about. It is necessary to make MSMEs digitally literate and aware of the existing initiatives and their beneficiaries. Additionally, there is a need to provide them with proper training on how to utilise these initiatives and determine which scheme is best suited for them. Furthermore, it is necessary to train MSMEs to leverage government schemes to start and grow their business.

Leveraging digital platforms, such as official portals, mobile apps, social media, and traditional media like TV, radio, and newspapers in local languages, can also be beneficial. Collaboration with industry associations, NGOs, colleges, local government bodies, and financial institutions can also help spread the message and organise training workshops.

12.3 Promoting Digital Literacy and Training

Digital awareness and literacy are the foundation of digitalisation. MSMEs need to understand how digital transformation can impact their operations and the steps they must take to ensure all milestones are accounted for. They need to be aware of the significance and optimal use of the Internet, which includes being well-versed in e-commerce platforms, e-management tools, data privacy, and other relevant areas.

We can group existing geographic micro, small and medium clusters into sub-groups of enterprises with a similar level of digital maturity. The existing MSE-CDP cluster list can be utilised here, and a classification system can be employed to distinguish between graded

buckets, such as digital awareness Levels 1, 2, 3, etc. We can also draw inspiration from the ZeD scheme and create a digitalisation certificate for MSMEs.

Understand the mindset and willingness of entrepreneurs among different buckets towards digital platforms. Accordingly, identify and shortlist digital solution providers suited to each type of graded bucket within each enterprise cluster (micro, small and medium) that help bridge their knowledge gaps. Organise interactive sessions where each sub-group engages with representatives from these digital firms. Participants can be given a customised self-learning guide at the end of each session to reinforce the learning.

Medium-sized enterprises may require separate training due to their relatively larger scale and different digital transformation goals compared to their counterparts. The interactive sessions can be further enriched by integrating existing schemes, such as Digital MSME, Pradhan Mantri Kaushal Vikas Yojana (PMKVY), and e-NAM, among others. Industry-specific specialisation can also be introduced in the sessions. Rather than conducting standalone ad-hoc seminars, a periodic programme plan consisting of sessions can be more effective and will ensure continuous feedback and review.

12.4 Encouraging Targeted Investments

Ensuring MSMEs are digitally prepared demands continuous support from both public and private sectors, which shouldn't be confined to financial capital and simply infusing unidirectional funds. Instead, a balanced approach combining financing with strategic guidance is required to equip firms with the right digital tools at the proper stages of their growth. Rather than dispersing aid through fragmented subsidies or grants, converging these into a unified digital funding programme tailored for MSMEs is needed. Furthermore, provisions for expert consultancy, which many government schemes already cover under specific digitalisation efforts, should also be emphasised. Such a programme can cover software and hardware purchases, workforce training, and other related expenses. A dedicated local digital mentor may be appointed to guide firms through the operation and step-by-step integration of each technological component.

Furthermore, rather than disbursing a one-time lump sum, financial assistance should be structured in phased instalments, released upon the achievement of clearly defined digital milestones.

Tax deductions or credits can be extended to firms investing in digital infrastructure, including IT hardware, software, cybersecurity, and training, to incentivise digital adoption further. The ecosystem must also broaden access to private investment by motivating venture capitalists and angel investors to support MSMEs, driving digital innovation. Additionally, support can be extended to startup incubators and accelerators that offer digital solutions for micro, small, and medium-sized enterprises (MSMEs). These programs can provide a vital mix of funding, mentorship, and strategic networking to budding entrepreneurs in the digital sector. Another promising strategy is the formation of industry-specific or regional consortia, which can pool resources to finance digital transformation projects that benefit a broader ecosystem of enterprises.

12.5 Leveraging FinTech Innovations

While commercial banks have been traditionally leading in meeting credit demands, LendTech and FinTech firms have brought transformative changes to the lending landscape through innovation. By leveraging digital platforms, data analytics, and algorithmic evaluations, these companies can quickly evaluate loans, offer more favourable interest rates, and provide flexible repayment options with rapid disbursement. MSMEs need to be guided to explore these emerging spaces to fulfil their credit needs and better understand the potential of digital tools to simplify and improve business operations.

12.6 Foster Better Understanding of Regulatory Compliance

MSMEs often struggle to grasp the regulatory frameworks governing their industries. Furthermore, the challenge intensifies with the shift towards digital processes due to new compliance requirements. Thus, it is imperative to equip enterprises with a thorough understanding of the core regulatory obligations, emphasising that these are not intended to create unnecessary burdens.

Along with professional consultation, MSMEs must be empowered to help themselves through easily accessible, well-structured, and user-friendly guidelines in layperson's language. These resources can inform them about the responsibilities of digitalisation, the significance of fulfilling them, the implications of cross-border operations, and how compliance duties can be integrated into long-term business practices.

12.7 Foster Inclusivity for Medium Enterprises

Many existing schemes targeting MSMEs are disproportionately focused on micro and small units, often leaving medium-sized firms excluded due to their scale or turnover. This exclusion can discourage businesses from remaining below certain thresholds and from continuing to receive support. While this challenge has been addressed to some extent, as per the revised definition of MSMEs under the Union Budget 2025-26. Nevertheless, medium enterprises continue to face operational challenges that warrant assistance. While they may not require the same level of support as micro and small firms, it is incorrect to assume they do not. This logic also applies to digital transformation. Although familiar with basic electronic processes, medium enterprises may need more guidance about cloud integration, data analytics, ERP systems, cybersecurity, and Search Engine Optimisation. A tailored strategy that addresses these needs and integrates medium enterprises into the broader MSME support ecosystem is essential.

12.8 Engaging local governments

Many local businesses remain unaware of various government schemes and financial support packages available to them. To bridge this gap and prioritise outreach to the bottom of the pyramid, greater involvement of local government bodies, panchayats etc. In disseminating information and creating awareness is critical.

Many local businesses remain unaware of various government schemes and financial support packages available to them. To bridge this gap and prioritise outreach to the bottom of the pyramid, greater involvement of local government bodies, panchayats etc. In disseminating information and creating awareness is critical.

These institutions are best positioned to communicate in local languages, understand the unique challenges of their communities, and build trust with local entrepreneurs. Regular information camps, digital literacy drives, and partnerships with self-help groups (SHGs) and local non-governmental organisations (NGOs) can enhance outreach. Additionally, integrating MSME-related updates into existing public service platforms such as ration shops, community radio, and e-governance kiosks can ensure that critical information reaches the last mile, thereby fostering equitable access and inclusion for EN-MSMEs.

12.9 Gradual and Sustainable Digital Adoption

One major reason firms hesitate and fail in their digitalisation journey is the Fear of Missing Out (FOMO), which often leads them to adopt complex technologies before they are ready. Therefore, MSMEs should be encouraged to begin with digitisation, instead of digitalisation, at a suitable pace. Pressuring them into complete digitalisation can hinder progress rather than accelerate it. Service providers should instead focus on incremental innovations and integrating technology naturally into daily operations. A case in point is the 'Tohands' Smart Calculator, featured on Shark Tank India. Recognising calculators as a core tool for many small enterprises, the founders introduced a digital version that supports transaction recording and improved bookkeeping. Building on familiar tools, this approach can gradually increase MSMEs' confidence in digital systems and, over time, make more advanced investments, such as POS systems, more attractive and attainable.

12.10 Gender- Intentional Approach towards MSMEs' Digitalisation

A gender-intentional approach to MSME digitalisation is essential to address the challenges women entrepreneurs face. While gender-neutral policies aim for inclusivity, they often overlook the systemic barriers rooted in cultural and social norms. Organisations like Women's World Banking advocate for gender-intentional policies that proactively dismantle these barriers by tailoring financial products and services to women's specific needs [98]. This includes designing digital tools that consider women's usage patterns and constraints, enhancing their participation in the digital economy. Furthermore, awareness campaigns should aim to enhance knowledge and information about available schemes and initiatives for women entrepreneurs.

Collecting and analysing gender-disaggregated data is crucial for understanding the disparities and challenges women entrepreneurs encounter. This enables the development of targeted interventions and the creation of the schemes, initiatives, and digital and financial products that align with the ground realities of women's businesses [98]. For instance, the International Finance Corporation (IFC) emphasises the importance of simplifying collateral requirements [107]. Adopting non-conventional credit assessment approaches, which may include alternatives such as financing against receivables, movable assets, or cash flow estimations, can significantly improve women's access to credit [95].

Financial institutions also play a pivotal role in fostering an inclusive environment for women entrepreneurs. Providing gender-sensitive training to banking staff can help mitigate unconscious biases and enhance engagement with women-owned micro and small enterprises (MSMEs). Creating a welcoming atmosphere in bank branches encourages more women to seek financial services, promoting greater financial inclusion and empowerment [95].

12.11 Educational Institutions should train students on MSME

Educational institutions, including schools and colleges, can play a pivotal role in equipping students with the knowledge and skills necessary to work in the evolving and growing landscape of Micro, Small, and Medium Enterprises (MSMEs) and contribute to inclusive and sustainable entrepreneurial ventures.

Comprehensive training on MSME operations, regulatory frameworks and market dynamics must be provided to foster a generation of entrepreneurs ready to navigate the MSME landscape. Furthermore, awareness of multiple government and non-government schemes should be raised, as these are an essential support system for existing and budding entrepreneurs. These institutions can act as conduits, bridging the gap between government programs and potential beneficiaries, ensuring that students and budding entrepreneurs are well-informed about the resources available to them.

Another aspect of entrepreneurship that should be addressed is the promotion of women's entrepreneurship. Institutions must highlight the distinct challenges faced by women entrepreneurs. At the same time, institutions must play a transformative role by encouraging female students to consider entrepreneurship a viable career path. This can be achieved through mentorship programs, workshops, exposure to successful women entrepreneurs, and educating students about existing schemes and initiatives that cater to women entrepreneurs. Since digital tools have become indispensable for the growth and scaling of MSMEs, incorporating digitalisation modules becomes equally significant. Educational institutions should provide knowledge of the affordable technologies that MSMEs can leverage and provide hands-on training with these tools to enable students to understand their practical applications.

12.12 Not only Access but also improve their Capacity to Absorb Credit

While improving access to credit for MSMEs has been a major focus of financial inclusion efforts in India, it is equally critical to enhance their capacity to absorb and effectively utilise that credit. Many MSMEs, especially nano and micro-enterprises, struggle not because credit is unavailable, but also because they lack the digital and managerial capabilities to deploy capital productively. This results in suboptimal returns on borrowed funds, lower revenue per unit of capital deployed, and consequently, reduced repayment capacity. A one-sided push towards credit access without strengthening these underlying capabilities increases the risk of loan defaults and weakens the overall health of the MSME sector.

Therefore, it is essential to embed digitalisation, skill development, and business process automation into MSME development strategies. These interventions lower operational inefficiencies, reduce overheads, and enable data-driven decision-making, thereby improving capital productivity. By equipping MSMEs with tools and knowledge to manage their finances, track performance, and optimise their operations, we can ensure that borrowed capital translates into real growth.

This not only enhances their ability to service loans on time but also helps them build savings, invest in innovation, and become more resilient to market shocks. Strengthening credit absorption capacity is not just a complementary measure; it is a necessary pillar for building a financially healthy and growth-oriented micro, small, and medium-sized enterprises (MSME) ecosystem in India.

13. Conclusion and a call to build a digitally inclusive EN-MSME ecosystem

This report establishes that while India's MSME sector is a cornerstone of economic growth, contributing significantly to employment, GDP, and exports, most of these enterprises remain digitally underprepared, especially the Early, Nano, and Micro segments. These businesses face disproportionate barriers in their digital journey, including a lack of awareness and skills, limited access to tailored digital tools, and financing models that don't align with their scale and reality. Current classification frameworks and policy mechanisms continue to overlook their distinct operational constraints. A one-size-fits-all approach has not systematically supported early and nano entrepreneurs as it should.

This report calls for a paradigm shift, beyond token digital interventions, but a commitment to sustained, inclusive, and granular support. That means formally recognising the Early and Nano categories within the micro segment, building simplified and affordable digital solutions, and creating awareness around schemes in a language and format entrepreneurs understand. It means decentralising support through grassroots mentors, digitally inclusive financing, and community-based capacity building. The digital divide in India's MSME sector is a structural bottleneck to inclusive growth and must be treated through a deep, multi-pronged approach.

We invite policymakers, donors, corporations, fintech innovators, academic institutions, and civil society leaders to take digitalisation deeper into every district and region, shaping empathetic, effective, and empowering interventions. We are open to collaboration and support. Let us build an ecosystem where no entrepreneur is too tiny to matter, where digital inclusion becomes the foundation of economic dignity, resilience, and transformation.

14. Appendices

14.1 Appendix A: Digital Tools and Platforms for EN-MSME Digitalisation

#	Technology	How MSMEs can leverage these	Tools (non-exhaustive)
1	Accounting and Inventory Management Tools	Reduce error and save time by automating repetitive tasks such as data entry, ensure tax compliance by GST-compliant billing, minimise overstocking and stockouts by real-time stock tracking, and accelerate order processing by barcode scanning	Vyapar, Zoho Books, Zoho Inventory, TranZazt
2	Artificial Intelligence (AI)	Reduce overstocking by forecasting demand trends, save time by automating 24/7 customer interactions, do targeted marketing and improve engagement through analyses of customer data	ChatGPT, Aksum, Haptic, Zoho Analytics
3	Augmented Reality (AR)/Virtual Reality (VR)	Offer virtual product try-ons to customers, train employees in realistic and simulated environments, and create immersive virtual tours to showcase properties or destinations remotely	ZapWorks, Vuforia
4	Blockchain	Make secure and transparent transactions with suppliers and customers, manage inventory and logistics through real-time data sharing and track supply chain integrity	IBM Blockchain, Microsoft Azure Blockchain, Ethereum
5	Cloud Computing	Reduce IT expenses for hardware, enhance productivity by online teamwork and communication in real-time from anywhere, access data from any location, protect business data through advanced security measures, store and recover data with ease	Google Drive, Zoho WorkDrive, Microsoft Teams, Slack
6	Content Creation	Explain your product with images and videos, reduce your marketing efforts, reduce your pamphlet design cost, and subscribe to LinkedIn newsletters to explain products	Canva, Youtube, Zoho Writer

#	Technology	How MSMEs can leverage these	Tools (non-exhaustive)
7	Customer Relationship Management (CRM) Systems	Engage with current and potential customers, create personalised journeys for customers and get automated lead management	Zoho CRM
8	Cybersecurity	Protects sensitive data through barriers against unauthorised access, minimises exposure to known threats through software updates, and secures information during storage and transmission	DigiKavach, BLACKbox, Quick Heal
9	Digital Media platforms	Improve customer relationships, expand your social media presence, sell your products online, increase your customer base and digital distribution online	WhatsApp Business, Instagram, Facebook, LinkedIn
10	E-Commerce Platforms	Increase sales opportunities by selling products on digital platforms, improve products and services by collecting customer reviews, and reduce manual errors by managing orders through e-commerce tools	Shopify, Flipkart, Myntra
11	Enterprise Resource Planning (ERP) Software	Integrate business processes such as sales, accounting, and human resources into a single platform	ZohoERP, ERPNext, Odoo ERP, TallyPrime
12	Financial Technology	Accept Digital payments, avail digital lending	Razorpay, Bharatpe, Gpay, Paytm, BHIM
13	Internet of Things (IoT)	Ensure timely repairs by monitoring equipment, prevent overstocking and stockouts by tracking inventory, and reduce delays by supply chain tracking	Microsoft Azure IoT, Cavli Wireless, Bosch IoT Suite
14	Marketing and Sales Automation Platforms	Save time by automating email campaigns, maintain online presence by scheduling social media posts, personalise marketing by segmenting and targeting customers, increase leads by lead generation automation, and make sales efforts by AI-powered lead scoring	HubSpot, Mailchimp, Freshsales, Office24by7

#	Technology	How MSMEs can leverage these	Tools (non-exhaustive)
15	5G	Live-stream events or product launches without lag, enable real-time monitoring and automation of machinery through connected IoT devices, implement innovative inventory systems and conduct seamless high-definition video meetings	5G Test bed, 5G routers and gateways
16	Robotics	Automate repetitive tasks, improve production efficiency, and enable digital transformation in manufacturing and logistics.	UiPath, Automation Anywhere, ABB's RobotStudio, and GreyOrange

14.2 Appendix B: List of Government Schemes and Initiatives that can drive MSMEs' digitalisation

#	Name of Scheme (non-exhaustive)	Beneficiary	Benefits (Highlights)
1	DigiSaksham	Job seekers, youth	Digital skills training, employability boost
2	Digital India	Citizens as well as MSMEs	Promote digital literacy and infrastructure
3	Digital India internship	Students in select degrees	Hands-on experience in domains such as AI security, cloud computing, etc
4	Digital Service Facilitation (NSIC)	MSMEs	Access to affordable ICT services, no intermediaries, improved efficiency
5	Dx-EDGE (Digital Excellence for Growth and Enterprise)	MSMEs and Academic institutions	Digital transformation via Digital Transformation Facilitation Centres (DTFCs); tech support, roadmap creation, and global linkage
6	Entrepreneurship Skill Development Programme (ESDP)	Aspiring & existing entrepreneurs	Training in entrepreneurship, skills & digital marketing; support for MSME setup & growth

#	Name of Scheme (non-exhaustive)	Beneficiary	Benefits (Highlights)
7	Establishment of New Technology Centres / Extension Centres	MSMEs and skill seekers	Access to advanced technologies, business advisory and technical support, and training programs
8	GeM Platform	Government buyers and registered sellers, including MSMEs.	Public procurement with reduced fees, easier access, and timely payments
9	MSME Champions Scheme – a) Sustainable (ZED) Certification b) Competitive (LEAN) Scheme	MSMEs	a) Awareness about Zero Defect Zero Effect (ZED) practices, incentives for ZED Certification. b) LEAN techniques for global competitiveness
10	MSME Global Mart	MSMEs	E-commerce, B2B platform, global exposure
11	MSME Samadhaan	MSEs	Payment dispute redressal
12	MSME Sambandh	MSEs, CPSE	Monitors public procurement mandate; improves MSE participation in the government purchase
13	MSME Sampark	Skilled job seekers & MSMEs	Employment portal linking MSMEs with talent
14	MYMSME	MSMEs	Single-window digital access to MSME schemes and services
15	National Single Window System	Businesses, Startup	Simplifies approvals/clearances, real-time tracking, and reduces redundancy
16	ONDC (Open Network for Digital Commerce	MSMEs, Sellers, Buyers, Logistics Provider	Decentralised e-commerce expands market access and reduces dependency on big platforms.
17	PM Svanidhi Scheme	Street vendors	₹10,000 collateral-free loan; 7% interest subsidy; cashback for digital transaction

#	Name of Scheme (non-exhaustive)	Beneficiary	Benefits (Highlights)
18	PM Vishwakarma	Artisans and craftspeople in 18 trades	ID cards, skill upgradation, ₹15,000 toolkit, credit support, digital transaction reward, facilitating online sales
19	Procurement & Marketing Support Scheme (PMS)	MSMEs, especially micro and small units	Market access via fairs, product promotion, barcoding, e-commerce, 80–100% cost subsidies
20	Raising and Accelerating MSME Performance (RAMP); TEAM Initiative	MSMEs	Digitisation, credit enhancement, faster dispute resolution, fosters innovation, scaling up guarantees to women-owned micro and small enterprises; Supports market access, trade promotion, marketing, digital enablement, and capacity building
21	Samarth Udyog Bharat 4.0	Manufacturing industries	Access to Industry 4.0 technologies, training, and consultancy services
22	SIDBI GST Sahay App	GST & Udyam-registered MSEs	Invoice-based loans up to ₹50L, fully digital, collateral-free
23	Technology Incubation and Development of Entrepreneurs (TIDE 2.0)	Tech-based early-stage startups, Social impact MSMEs, First-generation digital entrepreneurs	Financial support, incubation, mentoring, and IPR filing assistance. Priority access to incubation, funding, and tailored mentoring support, co-working space and incubator etc.
24	Trade Receivables Discounting System (TReDS)	MSMEs, large buyers, and financiers	Early payment on invoices, digital discounting of trade receivables
25	Udyam Assist Platform (UAP)	Informal Micro Enterprises (IMEs)	Helps IMEs register as MSMEs for priority sector lending
26	UDYAM Portal	MSMEs	Free, paperless registration for schemes and benefits

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Centre for Digital Inclusion and Social Impact (CeDISI) Trust

103, Krishna Apra, Business Square
Netaji Subhas Place,
Delhi - 110034

contact@cedisi.org

www.cedisi.org

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