



Challenges Faced by Micro, Small and Medium Enterprises (MSMEs) in Adopting Digital Technologies: A Study in the Indian Context

Mr. Abhay Singh¹

DOI: <http://doi.org/10.5281/zenodo.22848596>

Abstract: The rapid pace of digital transformation presents both unprecedented opportunities and significant challenges for Micro, Small, and Medium Enterprises (MSMEs) in India. As the backbone of the Indian economy contributing approximately 30% to the nation's GDP and employing over 110 million people, MSMEs face unique impediments in embracing digital technologies that differ substantially from those encountered by larger corporate entities. This research paper investigates the multifaceted challenges encountered by Indian MSMEs in adopting and implementing digital technologies, examining factors ranging from financial constraints and infrastructure limitations to skill gaps and organizational resistance. The study employs a descriptive research design, synthesizing evidence from existing literature, government reports, and empirical studies to provide a comprehensive analysis of the digital adoption landscape for Indian MSMEs. Findings reveal that while government initiatives such as Digital India and various MSME support schemes have created a more conducive environment, significant barriers persist including high implementation costs, limited digital literacy among workforce and management, inadequate technological infrastructure, cybersecurity concerns, and market uncertainties. The paper concludes with actionable recommendations for policymakers, industry stakeholders, and MSME entrepreneurs to facilitate smoother digital transitions, ultimately contributing to the enhanced competitiveness and sustainability of India's MSME sector in the digital economy.

Keywords: Digital Technologies, MSMEs, Digital Transformation, Technology Adoption, Indian Context, Challenges

INTRODUCTION

The global business landscape has undergone a profound transformation in the twenty-first century, with digital technologies emerging as fundamental drivers of competitive advantage, operational efficiency, and market expansion. For businesses across all scales and sectors, the

¹ Assistant Professor, **JNM College for Advance Studies & Technology, Varanasi, Uttar Pradesh, India.**



adoption of digital tools, platforms, and processes has evolved from being a strategic differentiator to an existential necessity. Within this context, Micro, Small, and Medium Enterprises (MSMEs) occupy a particularly significant position in developing economies such as India, where they constitute the economic and social backbone of communities across urban and rural landscapes.

In India, the MSME sector represents one of the most dynamic and vibrant segments of the economy, encompassing a diverse range of activities from traditional handicraft and textile enterprises to modern technology-enabled service providers. According to the Ministry of Micro, Small and Medium Enterprises, Government of India, the sector accounts for approximately 30% of India's Gross Domestic Product (GDP), around 45% of the country's total manufacturing output, and provides employment to over 110 million people across more than 63 million registered enterprises. Beyond economic contributions, MSMEs serve critical social functions by providing livelihood opportunities, promoting regional development, reducing income inequalities, and fostering entrepreneurship.

However, the digital revolution presents a paradoxical situation for Indian MSMEs. On one hand, digital technologies offer transformative potential—enhanced market reach through e-commerce platforms, improved operational efficiency through automation, better customer relationship management through digital tools, access to government schemes and financial services, and competitive parity with larger enterprises. On the other hand, digital adoption presents significant challenges that are often more acute for MSMEs compared to their larger counterparts. These challenges span financial, technical, human resource, infrastructural, and perceptual dimensions, creating complex barriers that require multifaceted solutions.

Statement of the Problem

Despite the recognized importance of digital transformation for business sustainability and growth, Indian MSMEs continue to exhibit relatively low levels of digital technology adoption and integration. Various studies and government reports indicate that a substantial proportion of Indian MSMEs remain at nascent stages of digital adoption, with many relying on basic digital tools while shunning more sophisticated technological implementations. This digital divide assumes critical significance in an era where consumer preferences, supply chain



dynamics, competitive pressures, and regulatory expectations are increasingly mediated through digital platforms and processes.

The problem this research paper addresses centers on understanding the specific challenges that impeded Indian MSMEs from effectively adopting and leveraging digital technologies. While general barriers to technology adoption in small businesses have been documented in literature, the Indian context presents unique dimensions arising from the country's distinct economic conditions, regulatory environment, cultural factors, infrastructure limitations, and developmental priorities. Understanding these challenges is essential for designing effective interventions—whether through policy measures, institutional support mechanisms, capacity building initiatives, or industry collaborations—that can facilitate smoother digital transitions for the MSME sector.

Significance of the Study

This research paper holds significant relevance for multiple stakeholders invested in the growth and development of India's MSME sector. For policymakers in the Ministry of MSME and related government bodies, understanding specific challenges can inform the design of more targeted and effective support programs, subsidies, and regulatory frameworks. For industry associations and chambers of commerce, insights from this study can guide the development of sector-specific capacity building initiatives and collaborative platforms. For financial institutions and investors, understanding barriers to digital adoption can inform the design of appropriate financing products and risk assessment frameworks. For MSME entrepreneurs and managers themselves, recognizing common challenges can facilitate better planning, resource allocation, and strategic decision-making regarding digital investments. Finally, for academic researchers, this study contributes to the theoretical understanding of technology adoption in developing economy contexts while identifying gaps for further investigation.

Objectives of the Study

The primary objectives of this research paper are:

1. To identify and analyze the major challenges faced by Indian MSMEs in adopting digital technologies across various stages of digital transformation.



2. To examine the underlying causes and contributing factors that exacerbate these challenges within the Indian business context.
3. To evaluate the impact of existing government initiatives and support mechanisms in addressing digital adoption barriers.
4. To develop actionable recommendations for enhancing digital technology adoption among Indian MSMEs.

Scope and Limitations

This study focuses specifically on the challenges related to digital technology adoption among registered and unregistered MSMEs in India, with reference to manufacturing, trading, and service enterprises. The study draws upon existing literature, government reports, and empirical research conducted primarily in the post-2000 period, with particular emphasis on developments since the launch of the Digital India campaign in 2015. The study acknowledges certain limitations, including the vast diversity within the MSME sector encompassing different sectors, sizes, locations, and technological maturity levels, and the dynamic nature of both digital technologies and the policy environment.

Review of literature

Digital technologies encompass a broad spectrum of tools, platforms, and processes that leverage computing, telecommunications, and information management capabilities for business purposes. In the context of MSMEs, relevant digital technologies include enterprise resource planning (ERP) systems, customer relationship management (CRM) software, e-commerce platforms, digital payment systems, cloud computing services, digital marketing tools, data analytics applications, cybersecurity solutions, and various forms of automation technology including artificial intelligence and Internet of Things applications.

Digital transformation extends beyond mere technology adoption to encompass fundamental changes in business models, operational processes, organizational structures, and customer engagement approaches facilitated by digital technologies. Scholars such as Vial (2019) define digital transformation as "a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and



connectivity technologies." For MSMEs, digital transformation may range from basic computerization of administrative processes to comprehensive reinvention of business models around digital capabilities.

Global Perspectives on MSME Digital Adoption

Research on MSME digital adoption reveals consistent patterns across both developed and developing economies. Studies by OECD (2019) indicate that while SMEs globally have increased digital technology adoption, significant gaps persist compared to larger enterprises, with small firms often lacking resources, expertise, and strategic guidance for effective digital transformation. European and North American studies highlight similar challenges including cost constraints, technology complexity, cybersecurity concerns, and digital skill shortages, while also noting positive developments through government support programs and industry clusters.

In developing economies, research by UNCTAD (2019) emphasizes additional challenges arising from infrastructure limitations, connectivity gaps, regulatory uncertainties, and context-specific factors that shape technology adoption trajectories. Studies from neighboring economies such as Bangladesh, Vietnam, and Indonesia reveal parallel challenges in their MSME sectors, with financial constraints and skill gaps emerging as consistent barriers across contexts.

Indian Context: MSME Sector and Digital Landscape

The Indian MSME sector has been the subject of extensive research examining its characteristics, challenges, and development trajectory. Classical studies by Gopal (2000) and others documented the structural features of Indian MSMEs including their predominantly informal character, regional concentration, sectoral diversity, and financing constraints. More recent research by Ahluwalia (2018) and Chandrasekhar (2021) has examined the changing dynamics of the sector in the context of economic liberalization, global integration, and technological change.

Regarding digital adoption, several Indian studies have documented the current state and challenges. Research by Tata Consultancy Services (2019) indicates that while awareness of digital technologies among Indian MSMEs has increased significantly, actual adoption and

integration remain limited, with many enterprises using digital tools in fragmented and non-strategic ways. Studies by NASSCOM (2020) and various consulting firms identify key barriers including cost considerations, lack of technical expertise, uncertainty about return on investment, and organizational culture factors.

Government initiatives have played a significant role in shaping the digital landscape for Indian MSMEs. The launching of the Digital India program in 2015 marked a watershed moment, with its vision of transforming India into a digitally empowered society and knowledge economy having direct implications for the MSME sector. Additionally, the Ministry of MSME has implemented various schemes including the Credit Linked Capital Subsidy Scheme (CLCSS), the Prime Minister's Employment Generation Programme (PMEGP), and the MSME Samadhaan platform addressing various aspects of MSME development including digital adoption.

Research Gap

While existing literature provides valuable insights into both digital technology adoption challenges and the MSME sector in India, significant gaps remain. First, comprehensive studies synthesizing various dimensions of digital adoption challenges specifically within the Indian MSME context remain relatively limited. Second, much of the existing research predates the significant policy developments and technology changes of recent years, particularly following the Digital India initiative and the COVID-19 pandemic which accelerated digital adoption across sectors. Third, sector-specific and region-specific variations in digital adoption challenges warrant further investigation. This paper attempts to address these gaps by providing a current, comprehensive, and integrative analysis of digital adoption challenges for Indian MSMEs.

Theoretical framework

Technology-Organization-Environment (TOE) Framework

This study employs the Technology-Organization-Environment (TOE) framework developed by Tornatzky and Fleischer (1990) as its primary analytical lens for understanding digital technology adoption challenges among Indian MSMEs. The TOE framework provides a

structured approach for analyzing the adoption of technological innovations by considering three contextual dimensions:

Technological Context: This dimension encompasses both internal and external technologies available to an organization. For MSMEs, this includes existing technological infrastructure, access to digital tools and platforms, and the technological readiness of the enterprise. Internal technological factors relevant to Indian MSMEs include current IT infrastructure, existing systems and processes, and prior experience with technology adoption.

Organizational Context: This dimension refers to descriptive measures about the organization itself, including its size, scope, managerial structure, and amount of slack resources. In the MSME context, organizational factors such as entrepreneur's awareness and attitudes, organizational culture, financial resources, and human capital assume critical importance in shaping technology adoption decisions.

Environmental Context: This dimension encompasses the external environment in which an organization operates, including industry characteristics, regulatory environment, competitor behavior, and market conditions. For Indian MSMEs, environmental factors such as government policies and support programs, market competition, supply chain dynamics, customer expectations, and infrastructure availability play significant roles in digital adoption decisions.

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), originally developed by Davis (1989), provides additional theoretical grounding for understanding individual-level adoption decisions. TAM posits that user acceptance of technology is determined primarily by two factors: perceived usefulness (the degree to which a person believes that using a technology would enhance job performance) and perceived ease of use (the degree to which a person believes that using a technology would be free of effort). While originally developed for individual technology use in organizational settings, TAM principles can be adapted to understand adoption decisions at the enterprise level, particularly in the context of small business where owner-manager perceptions often drive strategic technology decisions.

Resource-Based View and Dynamic Capabilities Perspective



The Resource-Based View (RBV) of the firm, as articulated by Barney (1991) and others, provides theoretical support for understanding how organizational resources influence technology adoption capabilities. RBV suggests that firms achieve competitive advantage through possessing valuable, rare, inimitable, and non-substitutable resources. For MSMEs, digital adoption requires various resources—financial, human, technological, and organizational—that may be more constrained compared to larger enterprises.

The Dynamic Capabilities perspective, as developed by Teece, Pisano, and Shuen (1997), extends RBV to emphasize the firm's ability to integrate, build, and reconfigure competencies in response to changing environments. In the context of digital transformation, dynamic capabilities enable organizations to sense opportunities, seize technological benefits, and reconfigure organizational resources and routines accordingly. For Indian MSMEs, developing such dynamic capabilities for digital transformation represents both a challenge and a strategic imperative.

Integrative Analytical Framework

This study integrates these theoretical perspectives to provide a comprehensive understanding of digital adoption challenges. The TOE framework provides the primary structure for categorizing challenges into technological, organizational, and environmental dimensions. TAM concepts help explain how perceptions of technology benefits and ease of use influence adoption decisions at the enterprise level. RBV and dynamic capabilities perspectives illuminate the resource constraints and capability development challenges facing MSMEs in their digital transformation journeys.

Research methodology

Research Design

This research paper employs a descriptive research design, synthesizing and analyzing existing evidence from multiple sources to provide a comprehensive understanding of digital adoption challenges among Indian MSMEs. The study does not involve primary data collection but rather relies on systematic analysis of existing literature, government reports, policy documents, empirical research, and statistical data to derive insights and conclusions.



Sources of Data

The study draws upon data from multiple sources including:

Academic Literature: Peer-reviewed journal articles, conference papers, and academic dissertations examining digital technology adoption among Indian MSMEs and similar contexts. **Government Reports and Documents:** Reports from the Ministry of Micro, Small and Medium Enterprises, National Sample Survey Organization (NSSO), Central Statistics Office (CSO), and various government task forces and committees.

Industry Reports: Publications from industry associations including NASSCOM, CII, FICCI, and ASSOCHAM, as well as consulting firms and research organizations.

International Organization Reports: Publications from World Bank, International Monetary Fund, OECD, UNCTAD, and similar organizations examining SME digital adoption in developing economies.

Online Databases and Statistical Sources: Various online repositories providing data on Indian economy, MSME statistics, digital adoption metrics, and related indicators.

Analytical Approach

The study employs a thematic analytical approach, systematically categorizing identified challenges and examining relationships between factors. The TOE framework provides the primary structure for thematic categorization, with additional themes emerging from the literature synthesis. The analysis involves comparing findings across different sources, identifying convergences and divergences, and developing integrative conclusions.

Selection Criteria

For inclusion in this study, sources were selected based on relevance to the research topic, credibility of the source, recency (with preference to post-2015 publications), and applicability to the Indian context. Sources spanning different methodologies—including quantitative surveys, qualitative case studies, and mixed-method approaches—were incorporated to provide comprehensive perspectives.

Finding and discussion



Technological Context: Infrastructure and Systems Challenges

Inadequate Technological Infrastructure

One of the most fundamental challenges facing Indian MSMEs in digital technology adoption relates to inadequate technological infrastructure. Despite significant improvements in India's digital infrastructure—with internet penetration increasing substantially and mobile connectivity expanding—there remain notable gaps relevant to business operations, particularly in semi-urban and rural areas where many MSMEs are located.

Research indicates that reliable broadband connectivity remains a challenge for many MSMEs, with issues of bandwidth availability, connection stability, and service quality affecting digital technology implementation. The Quality of Service indicators for internet connectivity in India reveal significant variations across regions, with rural and semi-urban areas often experiencing inferior connectivity compared to metropolitan centers. For MSMEs dependent on cloud-based systems, SaaS applications, and real-time data exchange, such infrastructure limitations prove particularly constraining.

Moreover, power infrastructure challenges compound technological infrastructure issues. Frequent power cuts and voltage fluctuations in many parts of India—particularly in tier-II and tier-III cities and rural areas—create challenges for maintaining continuous digital operations, requiring additional investments in backup power systems that many MSMEs find difficult to afford.

Legacy Systems and Integration Challenges

Many established MSMEs operate with legacy systems—traditional processes, manual record-keeping, and older computing systems—that were implemented before the digital transformation era. Transitions from legacy systems to modern digital platforms present significant challenges including data migration complexities, process reengineering requirements, and integration issues between new and existing systems.

Studies indicate that Indian MSMEs often operate heterogeneous technology environments with multiple disconnected systems for accounting, inventory management, customer relations, and other business functions. Achieving seamless integration across these systems—a



requirement for realizing full benefits of digital transformation—presents technical challenges that many MSMEs lack expertise to address.

Technology Selection and Compatibility Issues

The rapidly evolving technology landscape presents selection challenges for MSMEs, with abundant options making technology choices complex. Selecting appropriate technologies—in terms of functionality, scalability, cost-effectiveness, and compatibility with existing systems—requires technical expertise that many MSME entrepreneurs and managers lack. Additionally, technology decisions made without adequate strategic planning often lead to suboptimal implementations that fail to deliver expected benefits while consuming resources.

Organizational Context: Resource and Capability Constraints

Financial Constraints and Cost Concerns

Financial constraints emerge as perhaps the most frequently cited challenge for Indian MSMEs in digital technology adoption. Digital transformation requires investments in hardware, software, implementation services, training, and ongoing maintenance—expenses that can prove substantial, particularly for more sophisticated technological implementations. Research consistently indicates that the cost of digital technology adoption is perceived as prohibitively high by many MSME entrepreneurs. Enterprise-grade software solutions—with licensing fees, implementation costs, and customization requirements—often exceed the budgets of small enterprises.

References:

1. Ministry of Micro, Small and Medium Enterprises, Government of India. (2022). Annual Report 2021-2022. Ministry of MSME. <https://msme.gov.in>
2. NASSCOM. (2021). MSME Digital Transformation: Unlocking the Potential. NASSCOM Strategic Review. NASSCOM.
3. Tata Consultancy Services. (2020). Digital Readiness of Indian MSMEs. TCS Digital Transformation Study Series. TCS Limited.



4. World Bank. (2022). MSME and Digital Transformation: Trends and Policy Implications. World Bank Group.
5. Organisation for Economic Co-operation and Development (OECD). (2021). SME Digitalisation: Building Digital Capabilities. OECD Publishing.
6. United Nations Conference on Trade and Development (UNCTAD). (2020). Technology and Innovation Report 2020. United Nations.
7. Ahluwalia, I. J. (2018). Transformation of India's MSME sector. *Indian Journal of Industrial Economics, 58(2), 145-168.
8. Tornatzky, L. G., & Fleischer, M. (1990). The Processes of Technological Innovation. Lexington Books.
9. Chandra, P. (2019). Digital transformation in Indian MSMEs: Challenges and opportunities. Journal of Business Economics, 8(3), 89-104.
10. Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3), 319-340.