



Research Article

Digital Technology Adoption in MSMEs: Challenges, Drivers and Impact on Business Performance

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DOI: <https://doi.org/10.5281/zenodo.16263401>

Abstract

The digital transformation of Micro, Small, and Medium Enterprises (MSMEs) has emerged as a strategic imperative in today's rapidly evolving business landscape. This study explores the adoption of digital technologies among MSMEs, analyzing the multifaceted challenges, key drivers, and resultant impacts on business performance. Drawing from extensive literature and supported by a conceptual framework, the research identifies critical barriers such as financial constraints, limited digital literacy, infrastructural gaps, and cultural resistance that hinder the effective implementation of digital solutions. Despite these challenges, compelling drivers including the pursuit of operational efficiency, customer expectations, market competition, and supportive government initiatives are accelerating the shift toward digitalization. The integration of tools such as cloud computing, enterprise resource planning (ERP), artificial intelligence (AI), and e-commerce platforms has shown to significantly improve productivity, customer engagement, market access, and data-driven decision-making capabilities in MSMEs. Empirical evidence reveals that MSMEs embracing digital technologies demonstrate increased agility, innovation, and resilience, particularly during economic disruptions such as the COVID-19 pandemic. The study concludes that digital adoption positively influences operational, financial, and strategic outcomes, yet its full potential can only be realized through targeted support mechanisms including training programs, policy incentives, and infrastructure development. By addressing existing gaps and leveraging digital tools effectively, MSMEs can enhance their competitiveness and contribute meaningfully to sustainable economic growth in the digital era.

Manuscript Information

- ISSN No: 2583-7397
- Received: 15-06-2025
- Accepted: 19-07-2025
- Published: 21-07-2025
- IJCRM:4(4); 2025: 246-254
- ©2025, All Rights Reserved
- Plagiarism Checked: Yes
- Peer Review Process: Yes

How to Cite this Article

Deshpande S, Bhavsar V, Devi H, Bishoni M, Dhiman T. Digital Technology Adoption in MSMEs: Challenges, Drivers and Impact on Business Performance. Int J Contemp Res Multidiscip. 2025;4(4): 246-254.

Access this Article Online



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KEYWORDS: Digital Technology, MSMEs, Business Performance.

1. INTRODUCTION

In the modern business ecosystem, digital technology adoption has become imperative for the survival and growth of Micro, Small, and Medium Enterprises (MSMEs). These businesses form the backbone of the global economy, particularly in

developing countries like India, where they contribute significantly to GDP, exports, and employment (Ministry of MSME, 2023). The rapid pace of technological evolution demands that MSMEs adopt innovative solutions to remain competitive, agile, and efficient. Digital transformation refers to

the integration of digital technologies into all business operations. This transition enables MSMEs to optimize their supply chains, enhance customer experiences, and streamline operational processes (Ghosh, 2022) ^[10]. The adoption of tools such as cloud computing, enterprise resource planning (ERP), artificial intelligence (AI), and customer relationship management (CRM) systems can create tremendous value across various business functions. However, this journey is not without hurdles. Despite their recognized potential, many MSMEs face significant challenges in adopting digital technologies, including lack of resources, digital skill gaps, cybersecurity concerns, and resistance to change (KPMG, 2021) ^[16]. These barriers create a digital divide that limits the growth potential of small businesses in an increasingly tech-driven economy. MSMEs are vital engines of innovation and economic development. In India alone, they account for approximately 30% of the GDP and 45% of total exports, employing over 110 million people (MSME Annual Report, 2023) ^[20]. With such a wide reach, their transition into the digital era holds the potential to unlock significant productivity gains and socio-economic advancement. Digital adoption can empower these enterprises to access new markets, reduce operational costs, and improve service delivery (World Bank, 2020) ^[34]. For instance, the implementation of digital payments and e-commerce platforms during the COVID-19 pandemic allowed many MSMEs to continue operations and serve customers remotely (OECD, 2021) ^[24]. Hence, leveraging digital tools is not just an option it is a necessity. Multiple factors drive the digital adoption process within MSMEs. Among the most influential are customer expectations, market competition, government policies, and technology affordability. Firstly, the rising demand for convenience and personalized services among customers compels MSMEs to embrace digital channels (PwC, 2022) ^[27]. Secondly, increased market competition, both from large enterprises and digital-native startups, pushes MSMEs to adopt technology to maintain their market position. Government initiatives like Digital India, Startup India, and the Production-Linked Incentive (PLI) Scheme have also acted as strong catalysts (MeitY, 2022) ^[19]. Subsidies, tax incentives, and digital literacy programs have helped reduce barriers to adoption. Furthermore, the availability of affordable digital infrastructure such as mobile internet, cloud services, and low-cost software solutions has made digitalization accessible even to micro-enterprises (NASSCOM, 2022) ^[22]. Despite these drivers, MSMEs face numerous obstacles in their digital journey. A primary concern is the lack of financial resources. Most small enterprises operate on tight budgets and cannot afford to invest in expensive digital tools or skilled IT professionals (FICCI, 2021) ^[9]. Another major barrier is the digital skill gap among owners and employees. Many MSMEs are family-run or informal businesses that rely on traditional practices and lack technical know-how (UNIDO, 2021) ^[33]. This results in hesitation to adopt new technologies due to fear of disruption or failure. Additionally, cybersecurity and data privacy issues are significant deterrents. With limited understanding of digital risks and no dedicated IT support,

small businesses are more vulnerable to cyberattacks and data breaches (Deloitte, 2021) ^[4]. Resistance to change and organizational inertia further compound the issue, especially among older entrepreneurs who are reluctant to shift from legacy systems. Despite the challenges, the benefits of digital adoption are significant. Numerous studies confirm that digital transformation positively influences business performance in terms of efficiency, customer satisfaction, and profitability (McKinsey & Company, 2020) ^[18]. For example, businesses that integrate CRM and ERP systems often experience better customer engagement and streamlined operations. Similarly, digital marketing allows MSMEs to reach a broader audience at lower costs compared to traditional methods (Accenture, 2022) ^[1]. Inventory management tools and AI-based analytics further improve decision-making and resource optimization. Moreover, digitally mature MSMEs have shown higher resilience during economic shocks. The COVID-19 pandemic showcased how digital tools enabled business continuity, even under severe mobility restrictions (ILO, 2021) ^[13]. MSMEs that had already digitized were more adaptable and agile, recovering faster than their traditional counterparts. Digital technology adoption is not merely a trend it is a transformative shift essential for the future of MSMEs. While the road is fraught with challenges, strategic investments, supportive policies, and capacity-building initiatives can bridge the digital divide. By embracing digital innovation, MSMEs can unlock new growth opportunities and contribute meaningfully to a resilient and inclusive economy.

2. LITERATURE REVIEW

The reviewed literature offers a comprehensive exploration of digital technology adoption among MSMEs, focusing on its drivers, challenges, and impact on business performance. A recurring theme is that digital transformation significantly enhances MSMEs' operational efficiency, productivity, innovation, and market reach. Technologies such as AI, IoT, cloud computing, blockchain, and digital payments are shown to positively influence business outcomes, including customer satisfaction, financial performance, and competitiveness (Chabalala *et al.*, 2024; Dimoso & Utonga, 2024) ^[3, 17]. Several enablers for digital adoption include availability of appropriate technologies, a digitally skilled workforce, strong social networks, and government initiatives. For example, studies highlight that social capital can improve access to digital tools and foster collaborative innovation (Setini *et al.*, 2024) ^[31]. Moreover, e-commerce and digital marketing are repeatedly emphasized as powerful tools driving MSME growth (Putra *et al.*, 2023; Rezkia, 2024) ^[26, 5]. Conversely, numerous barriers inhibit digital adoption. These include financial constraints, lack of digital literacy, resistance to change, cybersecurity threats, and outdated legacy systems (Omowole *et al.*, 2024; Hendrawan *et al.*, 2024) ^[2, 12]. Cultural and infrastructural issues, particularly in developing countries, add layers of complexity to the digitalization process (Anisah *et al.*, 2024) ^[11]. Government and institutional support emerge as crucial to overcoming these barriers. Supportive policies, financial assistance, digital literacy programs, and public-private

partnerships are essential to accelerate digital transformation across the MSME sector (Al Ubaidillah *et al.*, 2024) ^[21]. Overall, the literature underscores a strong positive relationship between digital technology adoption and improved business

performance, while calling for strategic interventions to overcome challenges and ensure inclusive digital growth among MSMEs.

Table 1: Literature Review Table

Author (Year)	Summary	Focus/Findings
Koketso Chabalala <i>et al.</i> (2024) ^[3]	This systematic review of 60 research papers (2014-2024) examines the impact of digital technologies (AI, cloud, blockchain, IoT) on SME performance, highlighting key drivers and barriers, and regional research gaps, but notes a potential bias towards quantitative methods.	<ul style="list-style-type: none"> Digital technologies significantly improve SME operations and performance. Challenges include limited resources and strategic focus.
Shashi Kumar <i>et al.</i> (2024)	This study examines the impact of digitalization on MSMEs' performance, identifying challenges and opportunities, and proposes effective technology management strategies to enhance productivity, innovation, and operational efficiency through digital transformation.	<ul style="list-style-type: none"> Digital transformation enhances MSMEs' productivity and innovation. Effective technology management is crucial for successful digitalization.
Andreas Kallmuenzer <i>et al.</i> (2024) ^[15]	This qualitative study explores digitalization adoption in small and medium-sized enterprises, identifying enablers (appropriate technologies, digital skills) and barriers (risk-averse culture, legacy systems) that impact performance outcomes and underscores the importance of strategic interplay between these elements.	<ul style="list-style-type: none"> Enablers: Appropriate technologies and skilled workforce facilitate digitalization in SMEs. Barriers: Risk-averse culture and reliance on outdated systems hinder digitalization.
Romanus Lucian Dimoso & Dickson Utonga (2024) ^[17]	Results reveal that adopting digital technology enhances SME performance across the operational, financial, market, and customer relationship metrics, emphasizing the importance of promoting digital technology adoption among SMEs through supportive policies, training, and infrastructure.	<ul style="list-style-type: none"> Digital technology adoption enhances SME performance in developing countries. Implications for policymakers and practitioners to promote digital technology adoption.
Sri Hariyanti & Desi Kristanti (2024) ^[32]	Digital transformation presents challenges and opportunities for MSMEs in Indonesia. To remain competitive, MSMEs need to adopt digital technology and overcome challenges such as digital literacy and access to technology. By implementing best practices in information management and developing a comprehensive digital transformation plan, MSMEs can expand market reach, increase operational efficiency and optimize business decision making.	<ul style="list-style-type: none"> Digital transformation enhances MSMEs' competitiveness and market reach. Challenges include digital literacy, technology access, and data protection.
Loso Judijanto <i>et al.</i> (2023) ^[14]	Strong positive correlations are found between digital technology, e-commerce adoption, business process automation, and business growth in MSMEs in Jakarta, suggesting that companies are more likely to use a whole range of digital technologies when they grow, automate processes, and implement e-commerce strategies.	<ul style="list-style-type: none"> Strong positive correlations between digital technology and business growth. E-commerce adoption motivates extensive digital reforms in MSMEs.
Satya Arisena Hendrawan <i>et al.</i> (2024) ^[12]	Digital transformation in MSMEs presents challenges and opportunities in technology management. Effective technology management strategies are key to overcoming challenges and leveraging opportunities for business growth and sustainability.	<ul style="list-style-type: none"> Effective technology management strategies are crucial. Digital transformation enhances MSME productivity, competitiveness, and market reach.
Susi Evanita & Zul Fahmi (2023) ^[7]	The results show that the digital era offers significant opportunities for MSMEs, especially in terms of increased access to markets, resources and information, but MSMEs also face various challenges, including a lack of digital literacy, limited resources, and intense competition.	<ul style="list-style-type: none"> MSMEs have opportunities in digital era for market access. MSMEs face challenges like digital literacy and intense competition.
Made Setini <i>et al.</i> (2024) ^[31]	This study examines the impact of social capital on MSME digitalization, finding that strong social networks facilitate access to and adoption of digital applications, improving business performance and innovation, and recommends initiatives to enhance collaboration among MSMEs.	<ul style="list-style-type: none"> Social capital enhances MSME access to digital applications. Strong networks improve digital technology integration and business performance.

Dicha Putri Rezkia (2024) ^[5]	This study examines the benefits and challenges of e-commerce adoption for Micro, Small and Medium Enterprises (MSMEs), highlighting sales and market growth, operational efficiency, and challenges such as technology adoption costs and digital literacy issues.	<ul style="list-style-type: none"> E-commerce benefits MSMEs with sales growth and operational efficiency. Challenges include technology costs, low digital literacy, and data security.
Nurchayati Nurchayati <i>et al.</i> (2024) ^[23]	This study examines the impact of fintech adoption, digital payment systems, and consumer trust on MSMEs' financial performance, revealing fintech adoption as the strongest influencer, with consumer trust moderating the relationship between digital payment systems and financial performance.	<ul style="list-style-type: none"> Fintech adoption positively influences MSME financial performance. Consumer trust moderates' digital payment systems' impact on performance.
Hastin Umi Anisah <i>et al.</i> (2024) ^[11]	This systematic literature review explores the impact of digitalization on Micro, Small, and Medium Enterprises (MSMEs) growth in Indonesia, the Philippines, and Vietnam, highlighting digitalization's significant contribution to productivity and sustainability, despite infrastructure, literacy, and regulatory challenges.	<ul style="list-style-type: none"> Digitalization enhances productivity and sustainability for MSMEs. Challenges include infrastructure, digital literacy, and regulatory frameworks.
Wira Pramana Putra <i>et al.</i> (2023)	This study looks into how digital technology has affected the expansion of MSMEs (micro, small, and medium-sized enterprises) in Bandung City and shows strong positive connections between E-commerce adoption, Digital Marketing, and business success.	<ul style="list-style-type: none"> Strong positive connections between E-commerce, Digital Marketing, and business success. E-commerce and Digital Marketing drive MSME growth in Bandung City.
Moch Rifqi Shihabuddin Al Ubaidillah <i>et al.</i> (2024) ^[21]	It is concluded that government support and collaboration with the private sector are needed to optimize the potential of e-commerce in empowering MSMEs in the digital era.	<ul style="list-style-type: none"> E-commerce benefits MSMEs with increased sales and efficiency. Challenges include digital capacity and technological infrastructure requirements.
Eric Opoku, Maureen Okafor <i>et al.</i> (2024) ^[6]	This study examines digitalization trends in Slovenian SMEs, highlighting challenges, required support, and differences between small, micro, and medium enterprises, with a focus on financial constraints, employee digital competencies, and cultural changes.	<ul style="list-style-type: none"> SMEs in Slovenia use traditional digital tools like websites. Small companies face financial constraints and need tailored support.
Surya Ryan Pratamansyah (2024) ^[25]	This study examines the impact of digital transformation on Indonesian Small and Medium Enterprises (SMEs), finding a positive correlation between technology adoption and SME performance, with high internet access and digital literacy being crucial factors for maximizing digital transformation benefits.	<ul style="list-style-type: none"> Digital transformation positively impacts SME performance in Indonesia. Increased digital transformation correlates with higher SME revenue and efficiency.
Bamidele Micheal Omowole <i>et al.</i> (2024) ^[2]	This study conceptualizes barriers (financial constraints, skills gaps, resistance to change) and drivers (efficiency, customer satisfaction, competitive pressure) of digital transformation in SMEs, proposing strategies to overcome these challenges and enhance long-term sustainability and competitiveness.	<ul style="list-style-type: none"> Key barriers: limited resources, digital skills, resistance, data security concerns. Drivers: operational efficiency, customer satisfaction, competitive pressure, government support.
Alok Raj <i>et al.</i> (2024) ^[28]	The results indicate that both functional and symbolic benefits positively impact managers' intention to adopt digital technology, but subgroup analysis reveals that in the case of service enterprises, only functional benefits have a positive influence on managers' intention to adopt digital technology.	<ul style="list-style-type: none"> Functional and symbolic benefits drive technology adoption intentions. Viability significantly influences MSMEs' intention to adopt technology.
Retnawati Siregar & Eko Sudarmanto (2023) ^[29]	In this paper, the authors explored the role of digital transformation in improving management efficiency in micro and small enterprises (MSEs) in West Java and found that significant adoption of digital technologies among MSEs, resulting in improved supply chain management, inventory control, decision-making, and customer relationship management.	<ul style="list-style-type: none"> Digital technologies improve supply chain, decision-making, and customer management. Challenges include limited resources, digital skills, and resistance to change.
Faradillah Iqmar Omar <i>et al.</i> (2024) ^[8]	This systematic literature review synthesizes 150 articles to examine the significance of Digital Business Entrepreneurs (DBEs) in MSMEs, identifying 8 strategies, 9 challenges, and 8 requirements, providing actionable insights for entrepreneurs and managers navigating the digital landscape.	<ul style="list-style-type: none"> Identified eight strategies, nine challenges, and eight requirements for DBEs. Highlighted practical challenges for MSME administrators in digital entrepreneurship.

3. RESEARCH OBJECTIVES:

RO1: To analyze the key drivers influencing digital technology adoption among MSMEs

This includes examining factors like customer expectations, government policies, competitive pressures, and access to digital infrastructure.

RO2: To identify the major challenges faced by MSMEs during digital transformation

The objective is to assess financial, cultural, technological, and knowledge-based barriers affecting adoption.

RO3: To evaluate the impact of digital technology adoption on the operational and financial performance of MSMEs

This includes measuring outcomes such as productivity, innovation, market reach, customer satisfaction, and business sustainability.

4. Conceptual Framework

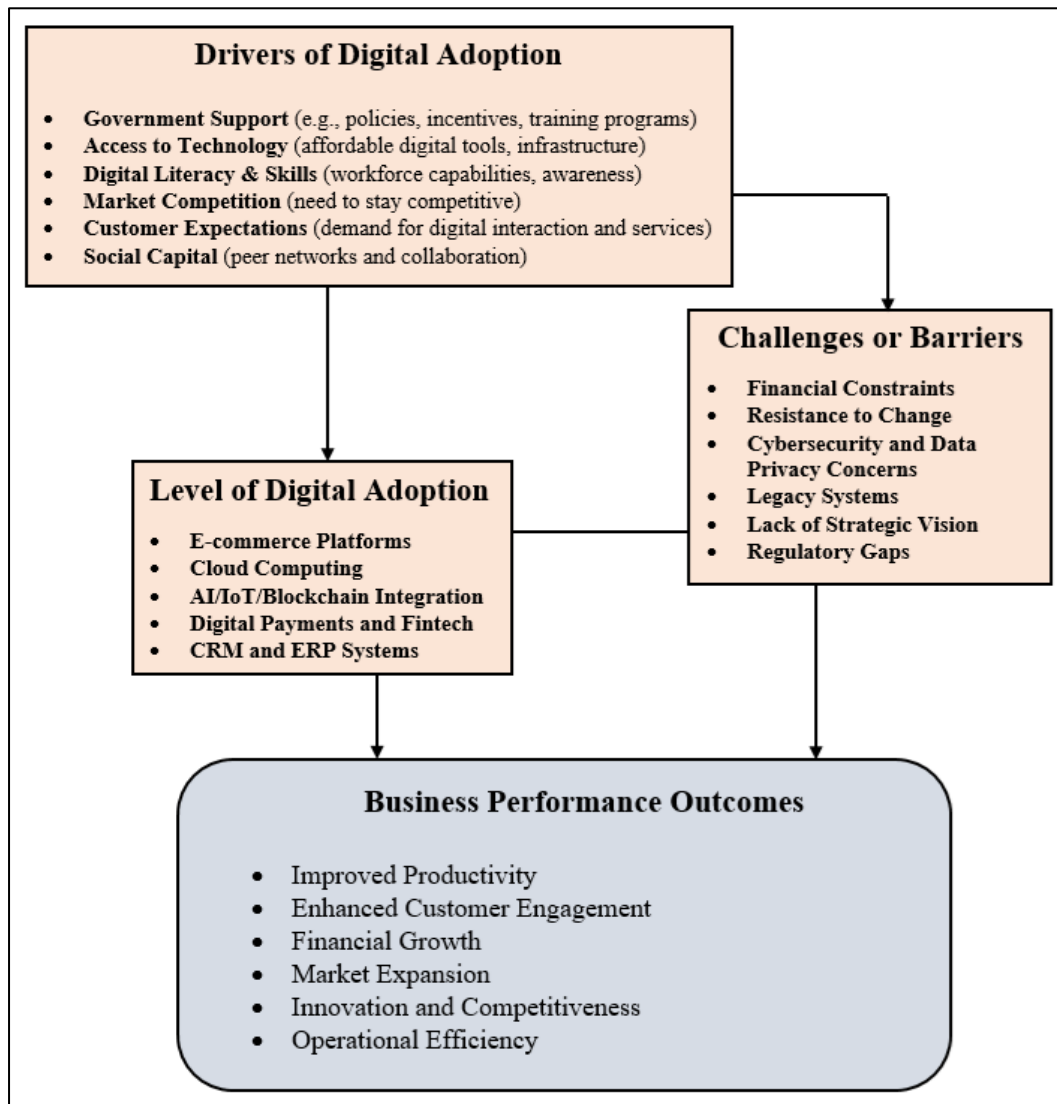


Fig 1: Conceptual Framework

5. DISCUSSION

5.1 Challenges in Digital Technology Adoption

The adoption of digital technologies in Micro, Small, and Medium Enterprises (MSMEs) faces several formidable challenges that can significantly hinder the pace and success of transformation. One of the primary barriers is resource constraints. Most MSMEs operate with limited capital, making

it difficult to allocate sufficient funds for digital tools, software licenses, and IT infrastructure. These financial limitations also restrict the ability to hire or train skilled personnel capable of managing digital systems effectively (Shashi kumar *et al.*, 2024). In addition to financial barriers, human resource limitations are common, as many MSMEs lack dedicated IT departments or digital transformation officers. Another major

hurdle is digital literacy. Many MSME employees, especially in traditional industries, are unfamiliar with emerging technologies, which limits their ability to implement and utilize digital solutions effectively. According to Hariyanti and Kristanti (2024) ^[32], the lack of technical knowledge significantly impedes digital adoption, as employees may struggle to operate digital tools, interpret data analytics, or manage cloud-based systems. Training programs are often scarce or too costly, leaving businesses unable to upskill their workforce. Cultural resistance also plays a significant role in slowing down digital transformation. MSMEs, particularly those run by older or family-based management, often adopt a risk-averse mindset. As Kallmuenzer *et al.* (2024) ^[15] explain, such enterprises tend to rely on legacy systems and traditional workflows, showing reluctance toward adopting unfamiliar or disruptive technologies. This resistance is further reinforced by fears of failure, concerns over data security, and uncertainty about return on investment. Infrastructural limitations, especially in developing regions, compound these challenges. Poor internet connectivity, lack of access to modern hardware, and inadequate support services make it harder for MSMEs to maintain digital continuity. Regulatory ambiguities and the absence of standardized digital frameworks also discourage adoption. Collectively, these challenges create a digital divide between MSMEs and larger firms, potentially reducing the sector's competitiveness and hindering inclusive economic growth. To overcome these barriers, comprehensive support in the form of subsidies, training programs, and infrastructure development is necessary. Only then can MSMEs harness the full benefits of digital transformation and integrate seamlessly into the digital economy.

5.2 Drivers of Digital Technology Adoption

Despite significant challenges, several compelling drivers are accelerating digital technology adoption among MSMEs. One of the foremost incentives is the pursuit of operational efficiency. Digital tools such as cloud computing, enterprise resource planning (ERP), and customer relationship management (CRM) systems streamline business processes, reduce manual errors, and cut down overhead costs. These technologies automate routine operations, enabling MSMEs to manage their inventory, sales, and finances more effectively, thus improving overall productivity (Dimoso & Utonga, 2024) ^[17]. Market expansion is another strong motivator. With digital platforms such as e-commerce websites and social media, MSMEs can transcend geographical boundaries and tap into global markets. This broader market reach translates into increased sales opportunities and greater customer engagement. According to Chabalala *et al.* (2024) ^[3] and Hariyanti & Kristanti (2024) ^[32], MSMEs that leverage digital channels not only enhance brand visibility but also build long-term customer relationships through real-time communication and personalized services. The ability to serve a global customer base also provides a buffer against local economic disruptions. Another critical driver is the advantage of data-driven decision-making. Modern digital tools offer advanced analytics that help

MSMEs track performance metrics, understand customer behavior, and forecast trends. By accessing real-time insights, businesses can make informed strategic decisions that align with market demands and internal goals (Shashi Kumar *et al.*, 2024). For instance, sales data can guide inventory planning, while customer feedback can help tailor product development and marketing campaigns. Furthermore, competitive pressure in a digitized global economy pushes MSMEs to adopt technology to remain relevant. As larger firms and startups become increasingly agile through digital tools, MSMEs must follow suit to maintain their market position. Additionally, government incentives and digital literacy programs under national digitalization initiatives further encourage adoption. Supportive policies like tax benefits, funding access, and technology infrastructure development act as catalysts for digital transformation across the MSME sector. Overall, the drive toward efficiency, market competitiveness, and informed decision-making is compelling MSMEs to embrace digitalization. While challenges remain, these motivating factors are helping businesses gradually overcome resistance and unlock the transformative power of digital technologies.

5.3 Impact on Business Performance

The adoption of digital technologies has a transformative impact on the business performance of MSMEs, enhancing operational, financial, and strategic outcomes. One of the most immediate benefits is the improvement in performance metrics across various domains. Technologies like ERP and CRM systems help streamline internal operations, reduce waste, and improve workflow efficiency. This results in better resource management, time savings, and cost reductions. As noted by Dimoso and Utonga (2024) ^[17], MSMEs that embrace digital solutions often report significant improvements in productivity and financial performance, particularly in inventory control, cash flow management, and customer engagement. Digital adoption also fosters greater innovation and competitiveness. MSMEs that utilize advanced digital tools can rapidly innovate products, services, and business models, staying ahead of changing market demands. Hariyanti and Kristanti (2024) ^[32] emphasize that digital transformation empowers MSMEs to respond quickly to customer preferences, personalize offerings, and introduce agile processes that differentiate them in competitive markets. This adaptability is essential in today's volatile business landscape, where consumer behavior and industry trends evolve rapidly. Moreover, digital technologies enhance strategic decision-making capabilities. Access to real-time data allows MSMEs to identify emerging opportunities, predict market trends, and make proactive decisions. For instance, data analytics can inform marketing strategies, production schedules, and customer service approaches, all of which contribute to higher profitability and business sustainability. This data-driven culture helps MSMEs become more resilient and responsive to internal and external changes. Digital transformation also expands market access. By utilizing e-commerce platforms and digital marketing, MSMEs can reach a broader customer base, including international clients. This

global presence boosts sales potential and provides new revenue streams, strengthening business stability. Finally, digital adoption improves customer relationships by enabling faster communication, responsive support, and tailored services. Features like chatbots, online service portals, and automated email systems enhance customer satisfaction and retention. MSMEs that successfully implement digital technologies are better positioned to compete, grow, and thrive in the modern economy. Digital transformation is not only a performance booster it is a strategic imperative for long-term success in the digital age.

6. FINDINGS

The findings of this study offer an insightful understanding of the dynamics involved in digital technology adoption among Micro, Small, and Medium Enterprises (MSMEs), especially in the context of developing economies. The analysis of multiple scholarly works and practical case studies reveals a complex landscape of interrelated challenges, driving forces, and performance outcomes. A recurring theme across the reviewed literature is that digital technology adoption significantly enhances MSMEs' operational performance, customer reach, innovation capacity, and strategic agility. However, the extent of this adoption is moderated by various structural and cultural barriers that limit its universal application and impact. One of the key findings is the persistent challenge of financial and infrastructural constraints. Many MSMEs operate on limited budgets, which restricts their ability to invest in modern digital tools, hire IT professionals, or upgrade existing systems. Several studies, including those by Dimoso & Utonga (2024)^[17] and Omowole *et al.* (2024)^[2], highlight that this limitation is especially acute in micro-enterprises and informal business units. The lack of funding not only affects the purchase of technology but also limits access to training and support services required for effective implementation. This challenge is compounded by poor digital infrastructure in certain regions, particularly in rural and semi-urban areas, where internet connectivity and hardware support remain inconsistent. Another significant finding relates to the digital literacy and skills gap. Across various studies, it is evident that MSME owners and employees often lack the technical proficiency required to use digital tools effectively. According to Hariyanti & Kristanti (2024)^[32] these skills gap not only hinders adoption but also affects the sustainability and success of digital transformation initiatives. Without adequate training and ongoing support, the technology either remains underutilized or is used inefficiently, resulting in limited returns on investment. Despite these challenges, the research clearly shows that several strong drivers motivate digital adoption. The quest for operational efficiency and cost reduction is a primary force behind the shift toward digital processes. Tools such as Enterprise Resource Planning (ERP), Customer Relationship Management (CRM) systems, and cloud-based platforms are helping MSMEs automate routine tasks, streamline workflows, and manage resources more effectively. Chabalala *et al.* (2024)^[3] and Kallmuenzer *et al.* (2024)^[15] assert that such tools not only

increase productivity but also enhance service delivery and customer engagement, especially in highly competitive markets. The need for market expansion and customer reach is another critical driver. E-commerce platforms and digital marketing have enabled MSMEs to tap into new markets, both domestically and internationally. This global reach, coupled with low-cost digital channels, has allowed businesses to scale without massive capital investments. In particular, the integration of social media marketing and online sales portals has empowered MSMEs to build brand identity, generate leads, and maintain customer relationships with minimal overhead costs. The findings also underscore the importance of data-driven decision-making as a benefit and motivator for digital adoption. With access to analytics tools, MSMEs can now track consumer behavior, assess operational performance, and forecast future trends. This strategic insight allows for more informed decision-making, better product development, and efficient inventory and supply chain management. On the performance side, the adoption of digital technologies has a measurable and positive impact on business success metrics. Numerous studies confirm that MSMEs which successfully adopt and utilize digital tools experience enhanced productivity, better customer engagement, higher revenue growth, and improved competitiveness. Additionally, those that embrace digital tools demonstrate more agility and resilience during market disruptions, such as during the COVID-19 pandemic. Lastly, the role of external support systems such as government policies, industry networks, and private sector collaborations emerged as a vital enabler. Government programs offering digital literacy, funding support, and infrastructure development have been instrumental in helping MSMEs overcome entry barriers and reduce digital inequality.

7. CONCLUSION

Digital transformation is no longer a luxury or an option for Micro, Small, and Medium Enterprises (MSMEs); it is a strategic necessity for survival and long-term success in an increasingly digital and globalized economy. The research clearly indicates that digital technology adoption significantly enhances MSME performance across operational, financial, and customer-centric dimensions. However, the process is neither uniform nor easy, as it is influenced by a combination of enabling and restraining factors. One of the central conclusions drawn from this study is that resource limitations and knowledge gaps remain the most pressing barriers. Many MSMEs are trapped in a cycle where they lack the funds to invest in digital tools, which then restricts their ability to scale, compete, and attract funding. Financial constraints are exacerbated by the absence of structured digital training and technical support, especially in underserved regions. Bridging this digital divide requires proactive government intervention, including subsidies, tax reliefs, public-private partnerships, and infrastructure development. Another major conclusion is the critical importance of digital literacy and mindset change. For digital transformation to succeed, MSME stakeholders must adopt a forward-looking mindset and invest in skill

development. Owners and managers should not only recognize the value of digital tools but also foster a digital culture within their organizations. Efforts to upskill workers, attract young digital talent, and integrate digital thinking into everyday operations are essential for ensuring sustainable transformation. At the same time, the study reveals several powerful incentives driving adoption. MSMEs are motivated by tangible benefits such as improved efficiency, reduced costs, wider market access, and stronger customer relationships. These drivers demonstrate that when properly implemented, digital technologies provide significant returns on investment. The shift to online platforms, automation tools, and data analytics enables MSMEs to achieve scale, personalize offerings, and innovate business models key ingredients for remaining competitive in today's fast-changing landscape. The impact of digital adoption on performance is significant and well-documented. From increasing revenue and reducing downtime to enhancing customer satisfaction and enabling real-time decision-making, the outcomes of digitalization are profound. Furthermore, MSMEs that embrace digital tools tend to show greater resilience during crises and more agility in responding to market shifts, thereby gaining a competitive edge over their non-digital counterparts. Finally, the role of institutional and policy support cannot be overstated. Governments, industry associations, and ecosystem stakeholders must create an enabling environment that encourages and facilitates digital adoption. This includes offering financial incentives, fostering innovation hubs, providing access to affordable digital infrastructure, and running nationwide digital awareness campaigns tailored to MSMEs. Digital technology adoption holds immense potential to transform MSMEs into efficient, resilient, and future-ready businesses. However, realizing this potential requires a holistic strategy that addresses both the enablers and the barriers. By aligning efforts across public policy, private innovation, and grassroots capacity-building, stakeholders can ensure that MSMEs not only survive but thrive in the digital era. The pathway to inclusive and sustainable economic growth lies in empowering MSMEs to participate fully in the digital economy.

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About the Corresponding Author



Tushar Dhiman pursued Ph.D. from Faculty of Management Studies, Gurukula Kangri Deemed to be University, Haridwar. He has done his graduation B. Com, post-graduation M.Com. and done B.Ed. His interest areas include Financial Accounting, Economics, Business Studies, E-Commerce, Supply Chain Management etc. Mr. Dhiman also participated in 50+ national/international level workshops and presented papers in 15+ national conferences and 10+ international conferences. The topic of the thesis is based on supply chain dynamics related to DPI and MMC.