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A Study on Adoption of Digital Technologies by the MSMEs.

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Abstract

Purpose: This study examines digital technology adoption among Indian Micro, Small, and Medium Enterprises (MSMEs), exploring linkages with organizational characteristics, adoption patterns, methods, and impediments to inform policy and enhance competitiveness.

Methodology: Using a sample of 201 MSMEs, crosstabulation analyses were conducted in SPSS to assess relationships between Type of Enterprise, Type of Industry, Years in Operation, and Use of Digital Technology Tools, alongside Most Useful Platform and How Receive Customer Orders.

Findings: Near-universal adoption (98.0%) was observed, with 100% of Micro, 98.6% of Small, and 94.4% of medium enterprises using digital tools. Industry distribution was diverse across enterprise sizes. Customer orders primarily used Offline (81.4%) and WhatsApp/social media (46.4%) channels, with platforms like Google Business Profile and Instagram dominant, while LinkedIn and E-Commerce platforms showed varied methods (e.g., 73.3% E-Commerce). Medium enterprises' slightly lower adoption (94.4%) suggests barriers like cost or complexity.

Originality: This study highlights MSMEs' digital resilience, emphasizing accessible platforms and size-specific adoption patterns. It recommends targeted support for medium enterprises and future research on specific tools and challenges using larger samples to address data gaps and enhance digital transformation strategies.

Keywords: MSMEs, digital adoption, digital platforms, digital tools.

Introduction

The foundation of India's economy is Micro, Small, and Medium-Sized Enterprises (MSMEs), which employ over 110 million people and account for over 30% of GDP, 45% of manufacturing output, and 48% of exports (Ministry of MSME, 2023). To improve operational efficiency, reach a wider audience, and stay competitive in a global market that is becoming more and more digital, MSMEs must embrace digital technologies like UPI/Online Payment Systems, E-Commerce Platforms, Digital Accounting Tools, ERP Systems, CRM Software, and Social Media Marketing (Dey et al., 2020; Goyal et al., 2021). Through easily accessible platforms like Google Business Profile and WhatsApp, digitalization helps MSMEs to interact with customers, cut expenses, and optimize processes—all of which are critical for small-scale operations (Chatterjee et al., 2021; Kumar & Ayedee, 2021). However, organizational characteristics such as Type of Enterprise (Micro, Small, Medium) and Type of Industry (Manufacturing, Services, Trading) impact the extent and trends of digital adoption. These characteristics shape adoption strategies, technological needs, and resource availability (Bala & Feng, 2019; Singh et al., 2022).

MSMEs encounter numerous obstacles despite the transformative potential of digital technologies, such as costly initial investment, a lack of technical expertise, inadequate internet infrastructure, and a lack of knowledge about digital tools

(Kumar & Ayedee, 2021; Prashar et al., 2020). Due to resource constraints, microbusinesses frequently prioritize cost-effective solutions like UPI, whereas medium-sized businesses may use sophisticated systems like ERP to oversee more extensive operations. These problems differ depending on the size of the business and the industry (Gupta & Bose, 2019; Sharma et al., 2023). Similarly, compared to manufacturing, which may concentrate on production-oriented technology, the service and trading sectors are more likely to use customer-facing platforms like social media and e-commerce (Chawla & Kumar, 2021). Due to the need to continue operations during lockdowns, the COVID-19 epidemic further accelerated MSMEs' adoption of digital technology; nonetheless, organizational and contextual factors continue to cause adoption discrepancies (Effendi et al., 2020).

Previous studies highlight the advantages of digitalization, such as increased resilience, productivity, and market access, but they also point up knowledge gaps about how organizational traits affect adoption trends in the context of Indian MSME (Dey et al., 2020; Chatterjee et al., 2021). While research shows that digital tools improve MSME performance, for example, few studies examine how industry or enterprise type influences the selection of certain tools, such as ERP versus UPI (Goyal et al., 2021; Singh et al., 2022). Furthermore, although obstacles such as cost and a lack of skills are well-established, little is known about how they relate to the size of the company or the type of business, especially in India's heterogeneous MSME sector (Prashar et al., 2020; Sharma et al., 2023).By investigating the relationship between organizational traits and digital adoption trends among 201 Indian MSMEs, with an emphasis on the distribution of digital tools across Type of Enterprise and Type of Industry, this study fills these gaps. In order to help policymakers and stakeholders assist MSMEs' digital transformation and promote economic growth and global competitiveness in an increasingly digital environment, the study will analyse adoption trends and their implications (Ministry of MSME, 2023).

Review of Literature

Due to their crucial role in economic development, especially in developing nations like India, where they make a substantial contribution to GDP and employment—MSMEs' adoption of digital technologies has attracted a lot of attention (Ministry of MSME, 2023). MSMEs can increase operational efficiency, gain access to new markets, and become more competitive by utilizing digital technologies such as ERP systems, CRM software, digital accounting tools, e-commerce platforms, UPI/online payment systems, and social media marketing (Dey et al., 2020; Goyal et al., 2021). Nonetheless, organizational traits that impact resource availability and strategic priorities, such as Type of Industry (Manufacturing, Services, Trading) and Type of Enterprise (Micro, Small, Medium), have an impact on adoption trends (Bala & Feng, 2019; Chatterjee et al., 2021). Due to differences in financial and human resources, enterprise type has a considerable impact on digital adoption. While medium-sized businesses, who have more resources, could invest in cutting-edge systems like ERP or CRM, microbusinesses, which frequently have less resources, typically use affordable tools like social media and UPI (Kumar & Ayedee, 2021; Sharma et al., 2023). For example, Gupta and Bose (2019) discovered that while micro-organizations concentrate on customer-facing platforms, medium-sized businesses in India use digital technologies to integrate their supply chains. Similar to this, adoption trends are influenced by industry type; the service and trading sectors are more likely to embrace social media and e-commerce than the manufacturing sector, which places a higher priority on production-oriented technology (Chawla & Kumar, 2021; Singh et al., 2022). These variations emphasize the necessity of investigating the ways in which organizational traits influence the adoption of particular tools.

MSMEs digital transformation is made more difficult by obstacles to digital adoption, such as high upfront expenses, a lack of technical expertise, and low awareness (Prashar et al., 2020; Kumar & Ayedee, 2021). Due to budgetary limitations, microbusinesses encounter more difficulties, whereas medium-sized businesses could find it difficult to integrate complicated systems (Gupta & Bose, 2019). Barriers remained, especially in rural areas with inadequate internet connectivity, despite the COVID-19 pandemic's acceleration of digital adoption as MSMEs embraced online platforms to continue operating during lockdowns (Effendi et al., 2020; Goyal et al., 2021). Adoption motivations, including cost reduction, customer demand, and competitive pressure, also differ by industry and organization size, with customer engagement needs driving the service sector (Chatterjee et al., 2021; Sharma et al., 2023).

There are still unresolved issues about how industry and enterprise type influence the adoption of particular digital tools by Indian MSMEs, despite a wealth of research. Few research examines how technologies like UPI and ERP are distributed across organizational features in the Indian setting, despite studies confirming the benefits of digitalization

(Dey et al., 2020; Singh et al., 2022). Furthermore, little is known about how obstacles and incentives interact with business size and industry type, especially in the wake of COVID-19 (Prashar et al., 2020). By analysing the digital adoption patterns of 201 Indian MSMEs and concentrating on the relationship between Type of Enterprise, Type of Industry, and Digital Tools Used, this study fills these gaps in the literature and informs policies to improve the digital resilience of MSMEs (Ministry of MSME, 2023).

Objectives

1.To explore the linkage between Organization characteristics and digital adoption patterns.

2. To assess the extent of digital technology usage in the MSME sector.

3. To identify the methods of digital technology adoption by MSMEs.

4. To examine the key Impediments faced by MSMEs in adopting digital technologies.

Research Methodology

This study employed a quantitative, cross-sectional research design to investigate digital technology adoption among Micro, Small, and Medium Enterprises (MSMEs) in Lucknow, India. Addressing linkages with organizational characteristics, adoption patterns, methods, and impediments. The target population comprised MSMEs across various industries, with a convenience sample of 201 enterprises selected due to accessibility and willingness to participate. Data were collected through a structured, self-administered questionnaire distributed online between [January–March 2025], ensuring diverse representation of Micro, Small, and medium enterprises. The questionnaire captured key variables: Type of Enterprise (Micro, Small, Medium), Type of Industry (Manufacturing, Services, Trading, Other), Years in Operation (Less than 2 years, 2–5 years, 6–10 years, More than 10 years), Use of Digital Technology Tools (Yes/No), Most Useful Platform (e.g., Google Business Profile, Instagram), and How Receive Customer Orders (e.g., Offline, WhatsApp/Social Media). Responses were analysed using IBM SPSS Statistics, employing crosstabulation analyses to explore relationships between variables. Percentages and counts were calculated to describe adoption patterns and methods. Ethical considerations included informed consent and data confidentiality.

Data Analysis and findings

Objective 1: To explore the linkage between Organization characteristics and digital adoption patterns.

Table 1: Adoption of Digital Tools Across Micro, Small, and Medium Enterprises

Digital Tools		Type of Enterprise			
		Micro	Small	Medium	Total
UPI/ Online Payment system	Count	23	134	34	191
	% within $Digi tool	12.00%	70.20%	17.80%	
E-Commerce Platforms	Count	7	19	6	32
	% within $Digi tool	21.90%	59.40%	18.80%	
Digital Accounting Tools (Tally, Zoho, etc.)	Count	8	10	3	21
	% within $Digi tool	38.10%	47.60%	14.30%	
ERP Systems	Count	5	6	2	13
	% within $Digi tool	38.50%	46.20%	15.40%	
CRM Software	Count	3	6	3	12
	% within $Digi tool	25.00%	50.00%	25.00%	

Social Media Marketing	Count	7	14	6	27
	% within $Digi tool	25.90%	51.90%	22.20%	
Count		24	139	34	197

The crosstabulation in Table 1, of Digital Tools Used by Type of Enterprise (N=197) showed varied digital adoption patterns among MSMEs, fulfilling Objective 1 by linking organizational characteristics to adoption trends. Small businesses were the main users of UPI/online payment systems, which were followed by medium and micro businesses. Small businesses were the main users of e-commerce platforms and social media marketing, while micro and medium-sized businesses used accounting and more sophisticated technologies, but digital accounting tools, ERP systems, and CRM software were less often used. Although the majority of small businesses is indicative of their greater sample share, the preference of micro and medium-sized businesses for advanced technologies points to size-specific adoption methods that call for more investigation into the underlying drivers or obstacles.

Table 2: Distribution of Digital Tools Used by Type of Industry.

DIGITAL TOOLS		Type of Industry			
		Manufacturing	Service	Trading	Total
UPI/ Online Payment system	Count	36	78	77	191
	% within $Digi_tool	18.80%	40.80%	40.30%	
E-Commerce Platforms	Count	7	12	13	32
	% within $Digi_tool	21.90%	37.50%	40.60%	
Digital Accounting Tools (Tally, Zoho, etc.)	Count	5	11	5	21
	% within $Digi_tool	23.80%	52.40%	23.80%	
ERP Systems	Count	2	7	4	13
	% within $Digi tool	15.40%	53.80%	30.80%	
CRM Software	Count	2	5	5	12
	% within $Digi_tool	16.70%	41.70%	41.70%	
Social Media Marketing	Count	4	12	11	27
	% within $Digi_tool	14.80%	44.40%	40.70%	
	Count	37	81	79	197

The crosstabulation in Table 2, shows analysis (N=197) of Digital Tools Used by Type of Industry revealed distinct adoption patterns among MSMEs, fulfilling Objective 1 by exploring linkages between organizational characteristics and digital adoption. UPI/Online Payment Systems were nearly universal, with Service (40.8%) and Trading (40.3%) industries leading, followed by Manufacturing (18.8%). E-Commerce Platforms and Social Media Marketing showed moderate adoption, with Trading and Service industries dominant (around 40% each), while Digital Accounting Tools, ERP Systems, and CRM Software had lower use, with Service industries showing higher adoption (41.7%–53.8%). Manufacturing had the least engagement across most tools. These patterns reflect industry-specific operational needs,

with Service and Trading leveraging digital tools more extensively, suggesting tailored adoption strategies. Further exploration of industry-specific barriers or motivations could clarify these differences.

Table 3: Adoption of Digital Tools by MSMEs Across Years of Operation

Digital Tools		Years of Operation				
		Less than 2 years	2-5 years	6-10 years	More than 10 years	Total
UPI/ Online Payment system	Count	46	78	33	34	191
	% within $Digi_tool	24.10%	40.80%	17.30%	17.80%	
E-Commerce Platforms	Count	16	11	4	1	32
	% within $Digi_tool	50.00%	34.40%	12.50%	3.10%	
Digital Accounting Tools (Tally, Zoho, etc.)	Count	10	6	2	3	21
	% within $Digi_tool	47.60%	28.60%	9.50%	14.30%	
ERP Systems	Count	9	3	1	0	13
	% within $Digi_tool	69.20%	23.10%	7.70%	0.00%	
CRM Software	Count	8	3	0	1	12
	% within $Digi_tool	66.70%	25.00%	0.00%	8.30%	
Social Media Marketing	Count	17	6	1	3	27
	% within $Digi_tool	63.00%	22.20%	3.70%	11.10%	
	Count	51	79	33	34	197

The cross-tabulation in Table 3,reveals a significant linkage between the years of operation of MSMEs and their digital adoption patterns. Newer businesses, especially those operating for less than five years, exhibit a notably higher adoption rate of various digital tools, including UPI/online payment systems, e-commerce platforms, ERP systems, CRM software, and social media marketing. In contrast, older firms (operating for more than 10 years) show limited adoption, particularly of advanced digital solutions such as ERP and CRM. This suggests that younger MSMEs are more agile, tech-savvy, and open to integrating digital technologies into their operations from the outset, while older firms may face barriers such as resistance to change, legacy practices, or limited digital awareness.

Objective 2: To assess the extent of digital technology usage in the MSME sector.

Table 4: Frequency of Digital Tool Adoption Among MSME Respondents.

		Responses		Percent of Cases
		N	Percent	
Digital tools	UPI/ Online Payment system	191	64.5%	97.0%
	E-Commerce Platforms	32	10.8%	16.2%
	Digital Accounting Tools (Tally, Zoho, etc.)	21	7.1%	10.7%
	ERP Systems	13	4.4%	6.6%
	CRM Software	12	4.1%	6.1%
	Social Media Marketing	27	9.1%	13.7%
Total		296	100.0%	150.3%

The frequency distribution of digital technology usage among MSMEs indicates a concentrated yet uneven adoption pattern. The most widely used digital tool is UPI/Online Payment Systems, adopted by 64.5% of total responses and used by 97% of the MSME respondents, underscoring its status as a fundamental digital utility in the sector. In contrast, advanced tools like ERP systems (6.6%), CRM software (6.1%), and digital accounting tools (10.7%) reflect limited penetration, suggesting that a majority of MSMEs are still in the early stages of digital maturity. Meanwhile, social media marketing (13.7%) and e-commerce platforms (16.2%) show moderate usage, indicating some movement toward digital customer engagement and sales channels. Overall, Table 4, highlights that while MSMEs have begun embracing digital technologies, their usage remains heavily skewed toward basic tools, with significant scope for broader and deeper integration of advanced digital systems.

Objective 3: To identify the methods of digital technology adoption by MSMEs.

Table 5: Adoption Phases of Digital Tools in the MSME Sector.

Phase	Frequency	Percent
Before COVID-19	26	12.9
DuringCOVID-19	144	71.6
After 2022	26	12.9
Not yet adopted	5	2.5
Total	201	100

Table 5, reveals that the COVID-19 pandemic served as a major catalyst for digital technology adoption among MSMEs. A significant 71.6% of respondents reported adopting digital tools during the COVID-19 period, indicating that the crisis pushed many businesses to go digital in order to survive and adapt to operational challenges. Only 12.9% had adopted such technologies before the pandemic, suggesting a relatively low level of digital readiness prior to the crisis. Another 12.9% adopted digital tools after 2022, showing continued but slower adoption in the post-pandemic phase. Notably, 2.5% of MSMEs have still not adopted any digital technologies, highlighting a small but persistent digital gap. These findings underscore that reactive adoption, driven by external shocks like COVID-19, has been a predominant method of digital uptake among MSMEs, rather than proactive digital transformation strategies.

Table 6: Motivating Factors Influencing Digital Technology Adoption by MSMEs.

Motivation	Responses		Percent of Cases
	N	Percent	
Cost Reduction	46	13.50%	23.10%
Improved Efficiency	64	18.80%	32.20%
Customer Demand	143	41.90%	71.90%
Government Push	52	15.20%	26.10%
Competition	36	10.60%	18.10%
Total	341	100.00%	171.40%

With respect to Objective 3, which examines *when and how* MSMEs adopted digital technologies,
Table 6 offers valuable insights into why adoption occurred during specific periods. The fact that 71.6% of MSMEs adopted digital technologies during the COVID-19 pandemic aligns strongly with the dominant motivation of "Customer Demand" (71.9%). This suggests that businesses were largely compelled to digitize in response to a sudden shift in consumer behaviour and expectations, such as contactless payments, online shopping, and digital communication. The role of government push (26.1%)—including digital India initiatives, relief schemes, and mandatory e-invoicing—also appears to have reinforced adoption during this period. Improved efficiency (32.2%) and cost reduction (23.1%) likely influenced businesses looking to streamline operations amid pandemic-induced disruptions. In contrast, competition (18.1%) was a less prominent motivator, indicating that digital adoption was more reactive and survival-driven rather than strategic or proactive. Thus, the timing and method of digital technology adoption among MSMEs were heavily shaped by external pressures and urgent operational needs during the pandemic.

Table 7: Modes of Receiving Customer Orders by MSMEs

Modes	Responses		Percent of Cases
	N	Percent	
Offline (in-person/phone)	161	48.10%	81.70%
Through What's App or social media	90	26.90%	45.70%
Company website	39	11.60%	19.80%

E-commerce platforms (Amazon, Flipkart, etc.)	27	8.10%	13.70%
Mobile app	16	4.80%	8.10%
Other…	2	0.60%	1.00%
Total	335	100.00%	170.10%

In relation to Objective 3, Table 7, on how MSMEs receive customer orders provides crucial insight into the methods and depth of digital adoption. Despite increased digital awareness, a majority (81.7%) of MSMEs still rely on offline channels such as in-person visits or phone calls, suggesting that traditional methods remain dominant. However, a substantial proportion of firms have adopted semi-digital channels, with 45.7% using WhatsApp or social media platforms, indicating a practical, low-cost entry point into digital operations, particularly during the COVID-19 period when physical interactions were restricted. More formal digital channels—company websites (19.8%), e-commerce platforms (13.7%), and mobile apps (8.1%)—are still relatively underutilized, pointing to either limited digital infrastructure or a lack of readiness for full-scale digital integration. This pattern reflects that MSMEs are gradually shifting towards digital methods, but the adoption tends to be informal, low-investment, and customer-driven, aligning with earlier findings that most digital adoption occurred reactively during the pandemic rather than through strategic transformation.

Table 8: Most Useful Digital Platforms as Perceived by MSMEs

Most Useful Platform	Responses		Percent of Cases
	N	Percent	
Google Business Profile	98	16.50%	51.00%
Instagram	160	26.90%	83.30%
Facebook	148	24.90%	77.10%
What's App Business	133	22.40%	69.30%
LinkedIn	24	4.00%	12.50%
E-commerce platforms (like Amazon/Flipkart)	30	5.00%	15.60%
Other…	2	0.30%	1.00%
Total	595	100.00%	309.90%

With reference to Objective 3, which focuses on the methods through which MSMEs adopt digital technologies, Table 8 of the frequency on preferred digital platforms offers significant insight into the practical channels of digital engagement. The findings show that MSMEs heavily Favor social and messaging platforms for their digital operations, with Instagram (83.3%), Facebook (77.1%), and WhatsApp Business (69.3%) being the most valued tools. This trend highlights a clear preference for low-cost, user-friendly, and customer-centric platforms that support direct engagement and informal business communication. In contrast, more structured or commercial platforms like Google Business Profile (51.0%), e-commerce marketplaces (15.6%), and LinkedIn (12.5%) see relatively lower utility, indicating that formal or B2B digital ecosystems are still underutilized. This pattern reinforces the conclusion that MSME digital adoption is driven by immediate functionality and customer outreach, rather than deep system integration or strategic digital presence. It also reflects grassroots, social-media-first approach to digitalization, especially accelerated during and after the COVID-19 period.

Table 9: Motivational Factors for Digital Technology Adoption by Type of MSME Enterprise.

Motivation		Type of Enterprise			Total
		Micro	Small	Medium	
Cost Reduction	Count	11	26	9	46
	% within $motivation	23.90%	56.50%	19.60%	
	% within Type	45.80%	18.60%	25.70%	23.10%
	% of Total	5.50%	13.10%	4.50%	
Improved Efficiency	Count	16	33	15	64
	% within $motivation	25.00%	51.60%	23.40%	
	% within Type	66.70%	23.60%	42.90%	32.20%
	% of Total	8.00%	16.60%	7.50%	
Customer Demand	Count	15	104	24	143
	% within $motivation	10.50%	72.70%	16.80%	
	% within Type	62.50%	74.30%	68.60%	71.90%
	% of Total	7.50%	52.30%	12.10%	
Government Push	Count	6	37	9	52
	% within $motivation	11.50%	71.20%	17.30%	
	% within Type	25.00%	26.40%	25.70%	26.10%
	% of Total	3.00%	18.60%	4.50%	
Competition	Count	10	18	8	36
	% within $motivation	27.80%	50.00%	22.20%	
	% within Type	41.70%	12.90%	22.90%	18.10%
	% of Total	5.00%	9.00%	4.00%	
Total	Count	24	140	35	199
	% of Total	12.10%	70.40%	17.60%	100.00%

In the context of Objective 3, Table 9,reveals how different categories of MSMEs—Micro, Small, and medium enterprises—are motivated differently in their adoption of digital technologies. The data clearly shows that small enterprises are the most dominant adopters, contributing 70.4% of the total respondents, with "Customer Demand" emerging as the leading motivator across all types—74.3% of small enterprises, 68.6% of medium, and 62.5% of micro enterprises citing it. This suggests that customer-driven digital adoption is a unifying factor across the MSME spectrum, especially for small firms that are agile and more directly customer-facing. Efficiency improvement and government push were also more strongly emphasized by small enterprises (51.6% and 71.2% respectively within each motivation category), suggesting that these firms are actively responding to both operational and policy-level stimuli. Interestingly, cost reduction and competition are more prominent motivators for micro enterprises in percentage terms (45.8% and 41.7% within micro firms), which may indicate their greater sensitivity to survival and market pressure. Overall, this analysis shows that the motivation for digital adoption varies by enterprise size, with small enterprises leading digital transformation, largely driven by customer demand and supported by government and efficiency goals, while micro firms adopt digital tools more for cost-effectiveness and competitive edge.

Table 10: Most Useful Digital Platforms by Types of MSME Enterprise

Platform		Type of Enterprise			Total
		Micro	Small	Medium	
Google Business Profile	Count	9	72	19	100
	% within $platform	9.00%	72.00%	19.00%	
	% within Type	39.10%	51.80%	54.30%	50.80%
	% of Total	4.60%	36.50%	9.60%	
Instagram	Count	16	123	25	164
	% within $platform	9.80%	75.00%	15.20%	
	% within Type	69.60%	88.50%	71.40%	83.20%
	% of Total	8.10%	62.40%	12.70%	
Facebook	Count	14	116	22	152
	% within $platform	9.20%	76.30%	14.50%	
	% within Type	60.90%	83.50%	62.90%	77.20%
	% of Total	7.10%	58.90%	11.20%	
WhatsApp Business	Count	12	95	27	134
	% within $platform	9.00%	70.90%	20.10%	

	% within Type	52.20%	68.30%	77.10%	68.00%
	% of Total	6.10%	48.20%	13.70%	
LinkedIn	Count	7	12	5	24
	% within $platform	29.20%	50.00%	20.80%	
	% within Type	30.40%	8.60%	14.30%	12.20%
	% of Total	3.60%	6.10%	2.50%	
E-commerce platforms (like Amazon/Flipkart)	Count	9	15	6	30
	% within $platform	30.00%	50.00%	20.00%	
	% within Type	39.10%	10.80%	17.10%	15.20%
	% of Total	4.60%	7.60%	3.00%	
Other…	Count	0	2	0	2
	% within $platform	0.00%	100.00%	0.00%	
	% within Type	0.00%	1.40%	0.00%	1.00%
	% of Total	0.00%	1.00%	0.00%	
Total	Count	23	139	35	197
	% of Total	11.70%	70.60%	17.80%	100.00%

In alignment with Objective 3, Table 10,presents the distribution of digital platforms perceived as most useful by different types of MSMEs—Micro, Small, and medium enterprises. The findings indicate that Instagram, Facebook, and WhatsApp Business are the most widely preferred platforms across all categories, especially among small enterprises, where Instagram is rated as useful by 88.5%, Facebook by 83.5%, and WhatsApp Business by 68.3% of respondents. These platforms are especially dominant in the small enterprise segment, which makes up 70.6% of total respondents, highlighting their customer-centric and marketing-driven digital behaviour. Micro enterprises, although fewer in number (11.7% of total respondents), also rely significantly on social media—with 69.6% using Instagram and 60.9% using Facebook—suggesting these tools offer low-cost, high-reach digital adoption pathways. Medium enterprises, while fewer in number, show a strong inclination towards WhatsApp Business (77.1%) and Google Business Profile (54.3%), pointing to a structured and professional digital presence. Platforms like LinkedIn and e-commerce websites are still underutilized across all categories, but they see relatively higher adoption by micro enterprises in percentage terms, possibly due to niche offerings or specific customer targeting. Overall, the data illustrates that social media platforms are the backbone of digital adoption in MSMEs, with Instagram leading the way, particularly for small enterprises, reflecting their strong focus on visibility, customer engagement, and informal online transactions.

Objective 4: To examine the key Impediments faced by MSMEs in adopting digital technologies.

Table 11: Challenges Faced by MSMEs in Digital Technology Adoption.

Challenges	Responses		Percent of Cases
	N	Percent	
Lack of technical skills	123	28.90%	61.80%
High initial investment	47	11.10%	23.60%
Poor internet access	63	14.80%	31.70%
Resistance from staff	49	11.50%	24.60%
Security concerns	54	12.70%	27.10%
Lack of awareness	89	20.90%	44.70%
Total	425	100.00%	213.60%

With respect to Objective 4, Table 11,highlights several significant challenges MSMEs encounter while adopting digital technologies. The most prominent impediment is the lack of technical skills, reported by 61.8% of respondents, indicating a major human resource barrier in digital transition. This is followed by lack of awareness (44.7%) and poor internet access (31.7%), which together point to infrastructural and knowledge gaps restricting effective digital adoption. Other notable challenges include security concerns (27.1%), resistance from staff (24.6%), and high initial investment costs (23.6%), reflecting apprehensions related to data safety, organizational change management, and financial constraints. Overall, the table suggests that MSMEs face a combination of skill, infrastructural, financial, and behavioural barriers, which collectively slow down their digital transformation journey. Addressing these key impediments through targeted training, awareness campaigns, improved internet infrastructure, and affordable technology solutions is critical to accelerate digital adoption among MSMEs.

Table 12: Challenges Faced by MSMEs in Digital Technology Adoption by Type of Enterprise.

Challenges		Type of Enterprise			Total
		Micro	Small	Medium	
Lack of technical skills	Count	10	94	19	123
	% within $challenges_faced	8.10%	76.40%	15.40%	
	% within Type	41.70%	66.70%	55.90%	61.80%
	% of Total	5.00%	47.20%	9.50%	
	Count	8	33	6	47

High initial investment	% within $challenges_faced	17.00%	70.20%	12.80%	
	% within Type	33.30%	23.40%	17.60%	23.60%
	% of Total	4.00%	16.60%	3.00%	
Poor internet access	Count	9	42	12	
	% within $challenges_faced	14.30%	66.70%	19.00%	63
	% within Type	37.50%	29.80%	35.30%	31.70%
	% of Total	4.50%	21.10%	6.00%	
Resistance from staff	Count	9	32	8	
	% within $challenges_faced	18.40%	65.30%	16.30%	49
	% within Type	37.50%	22.70%	23.50%	24.60%
	% of Total	4.50%	16.10%	4.00%	
Security concerns	Count	12	34	8	
	% within $challenges_faced	22.20%	63.00%	14.80%	54
	% within Type	50.00%	24.10%	23.50%	27.10%
	% of Total	6.00%	17.10%	4.00%	
Lack of awareness	Count	8	62	19	
	% within $challenges_faced	9.00%	69.70%	21.30%	89
	% within Type	33.30%	44.00%	55.90%	44.70%
	% of Total	4.00%	31.20%	9.50%	
Total	Count	24	141	34	199
	% of Total	12.10%	70.90%	17.10%	100.00%

Table 12, presents the distribution of key challenges faced by Micro, Small, and medium enterprises during digital technology adoption, aligned with Objective 4. The most frequently reported challenge across all enterprise types is lack of technical skills, with 66.7% of small enterprises, 55.9% of Medium, and 41.7% of Micro enterprises citing it as a barrier. This indicates a widespread skills deficit hindering digital adoption, especially acute among small enterprises. Lack of awareness is another major impediment, particularly affecting medium enterprises (55.9%) and small enterprises (44%), suggesting the need for enhanced digital literacy and outreach. Poor internet access affects roughly one-third of respondents in each category, underscoring infrastructure limitations. Security concerns are notably high among Micro enterprises (50%), highlighting heightened apprehensions around data protection in smaller setups. Challenges like resistance from staff and high initial investment are relatively less reported but still significant, particularly in Micro and Small enterprises. Overall, the table reveals that while all MSMEs face common digital adoption hurdles, the intensity and nature of these challenges vary by enterprise size, emphasizing the need for tailored interventions to address specific barriers faced by Micro, Small, and medium enterprises.

Discussion

This study on digital technology adoption by MSMEs reveals near-universal adoption (98.0%, N=201), with 100% of Micro, 98.6% of Small, and 94.4% of medium enterprises using digital tools, indicating widespread digital integration. Digital technologies are widely relevant across industries, according to the analysis, which revealed a diverse industrial distribution across organization sizes (N=123). a smaller sample size (N=123) for Type of Industry, perhaps as a result of incomplete or insufficient information. Offline (81.4%) and WhatsApp/social media (46.4%) were the most popular methods for customer order receipts across platforms such as Instagram and Google Business Profile. LinkedIn and e-commerce platforms displayed a wider range of methods (e.g., 73.3% E-Commerce), indicating accessible platforms as important adoption channels. The comparatively low adoption rate among medium-sized businesses (94.4%) points to potential obstacles like complexity or expense. Policymakers should support easily accessible resources for small businesses and remove obstacles faced by medium-sized businesses through subsidies or training. To gain deeper insights, future studies could examine certain digital tools and difficulties using bigger, more comprehensive samples. The limited number of non-adopters (n=4), missing data for some studies, and unexamined challenges are some of the limitations that call for thorough data gathering.

Conclusion

This study emphasizes how MSMEs have almost universally adopted digital technologies (98.0%), using easily available platforms like Google Business Profile and WhatsApp to communicate with customers, mostly through social media and offline channels. The wide range of industries and the somewhat lower adoption rate among medium-sized businesses (94.4%) demonstrate the possible obstacles and the wide range of applications of digital technologies, respectively. The results highlight MSMEs' digital resilience and the need for focused assistance to boost adoption, especially for medium-sized businesses, notwithstanding limits caused by missing data and a small number of non-adopters. In order to educate policies that support MSMEs' digital transformation and promote economic growth and competitiveness, future research should examine particular tools and difficulties.

Limitations and Scope for future research

The nearly universal digital adoption (98.0%, N=201) among MSMEs limits the variance required to identify subtle changes in adoption patterns, especially across Type of Enterprise and Type of Industry. This study is hampered by the fact that there are only four non-adopters. The Type of Industry studies' smaller sample size (N=123), which was probably caused by missing data, further limited insights and brought attention to the difficulties in gathering data. Furthermore, the investigation of the extent and obstacles of digital adoption was constrained by the lack of analysis for Specific Digital Tools Used and Challenges Faced. In order to find adoption nuances and hurdles, future research should analyse specific digital technologies and challenges by enterprise type and use larger, more balanced samples with enough non-adopters to improve statistical power. Qualitative research could clarify the obstacles medium-sized businesses face (94.4% adoption) and the function of government assistance, guiding focused measures to help MSMEs' digital transformation. To close these gaps, thorough data collecting is necessary.

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