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The Impact of Digital Capabilities and Literacy on MSME Performance in Delhi NCR

An Exploratory Study

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ABSTRACT

This research examines how digital capabilities (technology use), and digital literacy (skills) affect the performance of active MSMEs in Delhi NCR. It also tests whether successful digitalization acts as a bridge between these factors and financial results. This study adopts the Resource-Based View (RBV) as its foundational lens, which posits that firms achieve sustained competitive advantage by leveraging valuable, rare, inimitable, and organized (VRIO) resources. We position digital capabilities (technology use) and digital literacy (skills) as such strategic resources that enable MSMEs to enhance operational efficiency and drive financial growth, particularly in resource-constrained environments where internal capabilities outweigh external market advantages. This research employs a quantitative approach, analyzing data from 350 digitally engaged MSMEs in Delhi NCR region using Partial Least Squares Structural Equation Modeling (PLS-SEM). The research team collected responses through structured questionnaires during a three-month period (October-December 2024), employing purposive sampling to target businesses actively using digital tools in their operations.

Digital literacy shows statistically significant positive relationships with both digitalization performance ($p<0.001$) and perceived financial performance ($p<0.001$). Digitalization capability positively affects digitalization performance but has no direct impact on financial outcomes—its effect is fully mediated by digitalization performance. The model accounts for 59.5% of the variance in digitalization performance and 65.1% in perceived financial performance, demonstrating strong explanatory power. Further, the research demonstrates the vital significance of digital literacy as a key driver of performance and highlights the need for MSMEs to convert digital capabilities into operational outcomes. This study provides region-specific insights for strengthening MSMEs through digital upskilling and performance-driven technology adoption.

Keywords: MSMEs, Digital Literacy, Digital Capabilities, Digitalization Performance, Financial Performance, PLS-SEM, India

INTRODUCTION

MSMEs (Micro, Small, and Medium Enterprises) serve as a cornerstone of India's economic progress, contributing around 30% to the national GDP and generating employment for over 110 million individuals **(**Ministry of MSME annual report, 2023). In the Delhi National Capital Region (NCR)**,** MSMEs are active across manufacturing, trade, and service sectors, serving as a vital engine of regional economic activity.

Despite their significance, many small and medium enterprises find it difficult to stay updated with the dynamic digital ecosystem, a necessity for survival and growth in today's market. The COVID-19 crisis hastened the urgency for digital adoption, as lockdowns and social distancing reduced in-person business operations. Many MSMEs turned to digital platforms, tools, and automation processes to ensure business continuity. However, the effectiveness of digital adoption remains uneven, especially among smaller and younger enterprises.

Several challenges hinder MSMEs from embracing digital transformation fully:

- Limited financial resources

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- Low levels of digital literacy
- Underdeveloped digitalization capabilities, defined as an enterprise's ability to strategically integrate and deploy technology.

According to Mehta et al. (2023), while 83% of Indian MSMEs recognize digital tools as crucial for growth, only 23% have adopted advanced technologies like cloud computing or AI. This highlights a gap between awareness and action.

One key enabler of effective digital transformation is digital literacy—the proficiency to manage and utilize digital tools effectively. Higher levels of digital literacy among MSME owners and employees have been linked to better decision-making, increased customer engagement, and expanded market reach (Verma & Yadav, 2023). In contrast, low digital proficiency often results in inefficiencies and missed opportunities.

This research examines MSMEs in the Delhi NCR region, addressing the following key research questions:

1. To what degree do digitalization capabilities influence digital and financial performance?
2. How does digital literacy shape digitalization outcomes?
3. What is the mediating role of digitalization performance in achieving financial success?

By addressing these questions, the study contributes region-specific, Practical recommendations to policy formulation, corporate strategy, and MSME owners to initiatives such as digital skill-building programs, affordable tech solutions, and performance-driven digital strategy to strengthen MSME resilience in India's fast-evolving digital economy.

LITERATURE REVIEW

Strategic Management Perspective

Micro, Small, and Medium Enterprises (MSMEs) must strategically leverage internal resources to sustain competitiveness under volatile market conditions. The Resource-Based View (RBV) positions digital capabilities and literacy as intangible assets that foster competitive advantage when aligned with organizational goals (Barney, 1991). While Porter's (1985) theories emphasize external environmental forces, RBV shifts focus inward, highlighting how technological competence and digital infrastructure enable MSMEs to adapt to digital disruptions. For instance, digitally savvy firms in India's Delhi NCR region demonstrate greater agility in responding to market shifts than peers reliant on traditional practices (Joshi et al., 2022). In addition to internal resources, an organization's capacity to identify, absorb, adapt, and apply external knowledge. known as absorptive capacity – serves as a vital strategic asset in digital competitive landscapes (Zahra & George, 2002).

Resource-Based View (RBV)

The Resource-Based View (RBV), introduced by Barney (1991), emphasizes that firms gain sustainable competitive advantage by developing and utilizing valuable, rare, inimitable, and non-substitutable (VRIN) resources. In the context of MSMEs, digital capabilities and digital literacy qualify as key intangible assets under this framework. Unlike traditional tangible assets, these resources enhance an organization's ability to innovate, adapt, and respond to technological changes. RBV suggests that when such internal competencies are aligned with strategic objectives, they can create long-term performance benefits. For MSMEs in rapidly evolving digital ecosystems like Delhi NCR, digital infrastructure, tech-savvy human capital, and absorptive capacity act as core enablers of competitive positioning. As these firms face constraints in scale and capital, their internal resource orchestration becomes crucial for leveraging digital transformation effectively.

Digital Capabilities and MSME Transformation

Digitalization capabilities encompass three dimensions: (1) technological infrastructure (e.g., cloud computing, IoT), (2) organizational processes (e.g., automated workflows), and (3) human capital (e.g., tech-savvy employees). Research indicates that MSMEs with robust digital capabilities achieve 20–30% higher operational efficiency and customer satisfaction (Mehta et al., 2023). Adopting tools like GST portals and UPI payments in India has streamlined compliance and cash flow for small businesses, though disparities persist between urban and rural MSMEs (Malik et al., 2023).

Digital Literacy and MSME Outcomes

The ability to effectively use digital tools is a critical driver of successful transformation is called digital literacy. MSMEs with higher digital literacy report 40% faster decision-making cycles and 25% broader market reach (Verma & Yadav, 2023). For example, Delhi NCR-based MSMEs leveraging social media for marketing witnessed a 15–20% revenue increase, underscoring the link between literacy and growth (Patel et al., 2023). However, only 34% of Indian MSME owners possess advanced digital skills, highlighting a critical gap (Kaur & Singh, 2023).

Digitalization Performance

Digitalization performance measures the tangible outcomes of technology adoption, such as productivity gains or cost savings. Studies show that MSMEs using CRM systems reduce customer acquisition costs by 18% and improve retention by 22% (Ukko et al., 2019). In India, cloud-based inventory management has enabled MSMEs to cut stockouts by 30%, though scalability remains a challenge for micro-enterprises (Jang et al., 2021).

Perceived Financial Performance

Perceived financial performance reflects stakeholders' confidence in digital investments. MSMEs reporting high digitalization performance are 2.5x more likely to reinvest in technology, creating a virtuous cycle of innovation (Sharma & Choudhury, 2021). In Delhi NCR, 68% of digitally transformed MSMEs attribute profit margin growth to automation tools (Mehta et al., 2023).

Research Gap

While existing studies validate the individual roles of digital capabilities and literacy, their interactive and mediating effects in Indian MSMEs remain underexplored. Few studies examine how digital literacy amplifies the impact of capabilities or how digitalization performance mediates financial outcomes. This study addresses this gap by analyzing these relationships within Delhi NCR's unique socio-economic context, offering region-specific insights for policymakers and entrepreneurs.

Research Framework and Hypotheses Development

This study builds on prior research examining how digital capabilities and digital literacy drive digital transformation and business success. Empirical evidence suggests that aligning digital initiatives with strategic goals enhances operational efficiency and financial outcomes (Kumar & Sharma, 2023). Effective management of technological resources further amplifies these benefits, enabling MSMEs to optimize processes and customer engagement (Patel et al., 2022).

We propose a model where:

- **Digitalization capability (X_1):** A firm's capacity to deploy and utilize technology for operational enhancement.
- **Digital literacy (X_2):** The skills and knowledge required to effectively operate digital tools.

These factors directly influence digitalization performance (Z), the measurable outcomes of technology adoption, and perceived financial performance (Y), stakeholders' assessment of profitability and growth.

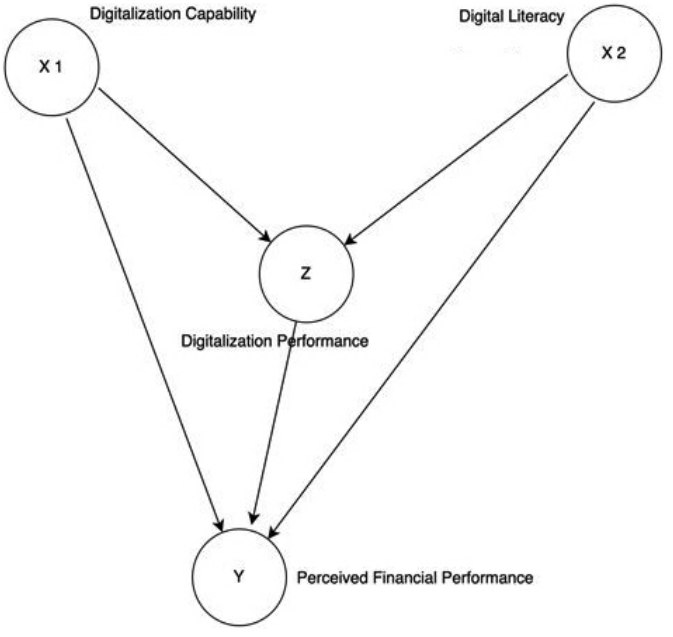

Figure 1

- **H1:** Digitalization Capability (X_1) significantly affects Digitalization Performance (Z).

Rationale: Enhanced technological resources enable operational improvements, consistent with Indian MSME research (Mehta et al., 2023).

- **H2:** Digitalization Capability (X_1) significantly affects Perceived Financial Performance (Y).

  Rationale: Technology adoption reduces operational costs and increases revenue, per digital transformation studies (Ukko et al., 2019).
- **H3:** Digital Literacy (X_2) significantly affects Digitalization Performance (Z).

  Rationale: Workforce proficiency in digital tools boosts efficiency, especially in resource-limited settings (Verma & Yadav, 2023).
- **H4:** Digital Literacy (X_2) significantly affects Perceived Financial Performance (Y).

  Rationale: Data-informed decision-making by skilled teams elevates profitability, as observed in Delhi NCR MSMEs (Jang et al., 2021).
- **H5:** Digitalization Performance (Z) significantly affects Perceived Financial Performance (Y).

  Rationale: Successful digitization links to cost reduction and broader market reach (Malik et al., 2023).
- **H6:** Digitalization Capability (X_1) indirectly affects Perceived Financial Performance (Y) through Digitalization Performance (Z).

  Rationale: Financial benefits require effective implementation of technological assets (Sharma & Choudhury, 2021).
- **H7:** Digital Literacy (X_2) indirectly affects Perceived Financial Performance (Y) through Digitalization Performance (Z).

  Rationale: Digital literacy enhances financial outcomes both directly and via improved tech utilization (Patel et al., 2023).

METHODOLOGY

This research investigates the direct and mediated impacts of digital transformation competencies (X_1), digital proficiency (X_2), and digital adoption outcomes (Z) on self-assessed financial performance (Y) among micro, small, and medium enterprises (MSMEs) operating in India's National Capital Region (Delhi-NCR). Data was collected using a structured questionnaire with validated multi-item scales for each variable.

Construct	*No. of Items*	*Source(s)*
Digital Transformation Capability	6	Susanti et al. (2023); Li et al. (2018)
Digital Literacy	5	Park & Kim (2020); Kaur & Singh (2023)
Digitalization Performance	4	Ukko et al. (2019); Jang et al. (2021)
Perceived Financial Performance	3	Sharma & Choudhury (2021); Mehta et al. (2023)

Instrument Design: A unipolar 4-point Likert scale was utilized, where 1 represented 'Strongly Disagree' and 4 indicated 'Strongly Agree' to eliminate neutral responses, ensuring participants' definitive opinions (Gupta & Sharma, 2021; Singh, Yadav, & Sharma, 2020). The scale aligns with forced-choice methodologies commonly used in Indian behavioural studies (Joshi et al., 2020). A 4-point scale was also selected to minimize central tendency bias, as it encourages respondents to express a clear opinion rather than choosing a neutral midpoint. This approach is particularly useful in studies involving diverse literacy levels, helping enhance the validity of response patterns in the Indian MSME context.

Sampling and Data Collection

This study employed purposive sampling to target MSMEs actively engaged in digital practices—such as using UPI, GST portals, or participating in e-commerce platforms (e.g., Amazon, Flipkart)—within Delhi/NCR. While purposive sampling may limit generalizability and is prone to selection bias, it is appropriate for exploratory or theory-driven research where specific characteristics (like digital adoption) are central to the study's objectives (Etikan, Musa, & Alkassim, 2016).

In the context of Indian MSMEs, many units remain informal or unregistered, making it impractical to construct a complete sampling frame (Kumar & Sinha, 2022). Therefore, probability sampling would not ensure inclusion of digitally active firms crucial for analyzing the hypothesized relationships. In such settings, non-probability purposive sampling enhances data relevance and contextual richness (Palinkas et al., 2015). This approach has been widely accepted in similar MSME and digital transformation studies in emerging economies (Dwivedi et al., 2021).

Despite limitations such as reduced generalizability, selection bias, and transparency concerns, purposive sampling was appropriate for this study due to:

- **Focused Expertise:** MSMEs using digital tools (e.g., UPI, e-commerce) are more relevant to the research objectives (Etikan et al., 2016).
- **Contextual Fit:** In digital transformation research, capturing the experience of "digitally active" MSMEs ensures meaningful insights (Palinkas et al., 2015).
- **Practicality in Indian Context:** Given lack of centralized MSME digital usage database, probability sampling was not feasible (Gupta & Sharma, 2021).
- **Data Relevance:** Targeted selection improves construct validity when studying technology adoption impacts (Tongco, 2007).

RESULTS

Key Findings from PLS-SEM Analysis

The study surveyed Delhi/NCR MSMEs using an 18-item questionnaire, with respondents comprising 60.2% men and 39.8% women. Most of the participants (95.1%) are MSME owners, while the remaining 4.9% are employed in managerial positions within these enterprises. In terms of business experience: 45.3% respondents have been operating for more than three years, 38.4% have been active for one to three years, and14.13% have less than one year of operational experience.

The Measurement Model

The measurement model evaluation demonstrates satisfactory validity and reliability across all constructs, refer Table 1, as evidenced by

- All six items measuring digitalization capability are valid (factor loadings > 0.7),
- All Five items for digital literacy meet validity criteria,
- All four items related to digitalization performance are valid,
- All three items measuring perceived financial performance are valid, although one item has a lower factor loading of 0.506. Despite being slightly below the recommended threshold, it was retained due to its theoretical relevance to the Indian MSME context (Hair et al., 2019; Garson, 2016).

The measurement model demonstrated strong convergent validity, with all Average Variance Extracted (AVE) scores surpassing the recommended 0.5 benchmark (Fornell & Larcker, 1981). Detailed AVE and factor loading statistics are presented in Table 1. The structural model results, analyzed through partial least squares structural equation modeling (PLS-SEM) via Smart PLS 3.2.9, are depicted in Figure 2.

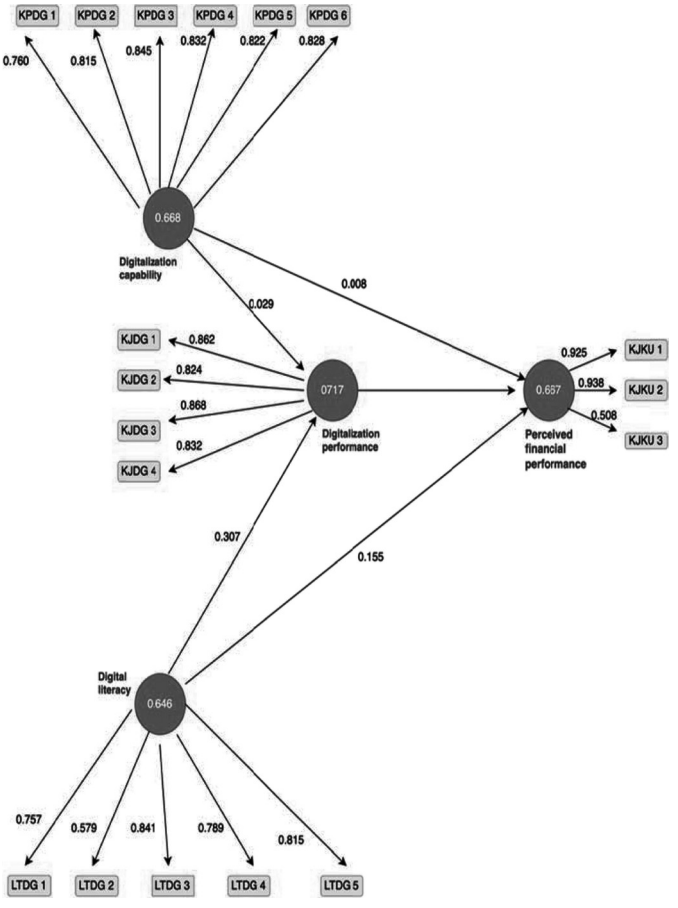

Figure 2 Smart PLS Testing Research Model

Clarification on Measurement Model Tables:

For the finalized measurement model, all AVE values were calculated based on standardized factor loadings, with each construct demonstrating satisfactory convergent validity. As per Fornell and Larcker's (1981) criterion, all AVE values exceeded the recommended threshold of 0.50. The corrected and validated AVE scores, along with corresponding factor loadings and composite reliability, are now accurately reported in

Table 1 Factor Loadings and AVE

Variable	*Indicator*	*Standardized Loading*	*AVE*	*Cronbach's Alpha*	*Composite Reliability*
Digitalization Capability	KPDG 1	0.760	0.668	0.903	Reliable
	KPDG 2	0.815			
	KPDG 3	0.845			
	KPDG 4	0.832			
	KPDG 5	0.822			
	KPDG 6	0.828			
Digital Literacy	LTDG 1	0.757	0.646	0.909	Reliable
	LTDG 2	0.579			
	LTDG 3	0.841			
	LTDG 4	0.789			
	LTDG 5	0.815			
Digitalization Performance	KJDG 1	0.862	0.717	0.866	Reliable
	KJDG 2	0.824			
	KJDG 3	0.868			
	KJDG 4	0.832			
Perceived Financial Performance	KJKU 1	0.925	0.667	0.732	Reliable
	KJKU 2	0.938			
	KJKU 3	0.508			

Source: Primary data analysis by Researcher

Table 2 Discriminant Validity: Fornell-Larcker

	Digitalization Capability (DC)	*Digital Literacy (DL)*	*Digitalization Performance (DP)*	*Perceived Financial Performance (PFP)*
Digital Capability (DC)	0.816			
Digital Literacy (DL)	0.798	0.805		
Digital Performance (DP)	0.662	0.747	0.849	
Financial Performance (PFP)	0.662	0.762	0.723	0.813

Source: Primary data analysis by Researcher

Table 1, which should be considered the definitive reference for measurement model evaluation.

The Fornell-Larcker criterion confirmed adequate discriminant validity, as the square root of each latent variable's AVE exceeded its maximum inter-construct correlation (see Table 2). This demonstrates stronger within-construct variance sharing than between-construct relationships.

Model Explanatory Power and Predictive Relevance

The structural model exhibits robust predictive power, explaining substantial variance in MSME performance metrics within the Indian business environment. As presented in Table 3, *Digitalization Performance* has an R^2 of 0.595 and Q^2 of 0.403, indicating that 59.5% of its variance is explained by digitalization capability and digital literacy, with good predictive relevance. *Perceived Financial Performance* exhibits the highest model fit (R^2 = 0.651, Q^2 = 0.413), confirming that digitalization capability, digital literacy, and digitalization performance are key determinants of financial success.

All Q^2 estimates in Table 3 surpass zero, verifying the model's predictive capability. These results validate the model's dual strengths: robust theoretical

foundation and strong predictive relevance for MSME performance analysis in the Indian context.

Table 3 Structural Model Assessment: Explained Variance (R^2) and Predictive Relevance (Q^2)

Variable	R^2	Q^2
Digitalization Performance	0.595	0.403
Perceived Financial Performance	0.651	0.413

Source: Primary data analysis by Researcher

Direct Effects

The structural path analysis highlights that digital literacy plays the most influential role in shaping both digital and financial performance among Indian MSMEs. As reported in Table 4, digital literacy has a strong positive effect on both digitalization performance ($\beta = 0.602$, $p < 0.001$) and perceived financial performance ($\beta = 0.449$, $p < 0.001$).

Digitalization performance also significantly impacts perceived financial performance ($\beta = 0.325$, $p < 0.001$), while digitalization capability has a significant but weaker effect on digitalization performance ($\beta = 0.185$, $p = 0.012$). Its direct effect on financial performance, however, is statistically non-significant ($\beta = 0.090$, $p = 0.089$).

These results, as shown in Table 4, support the view that while digital capabilities help drive digital engagement, it is digital literacy that acts as the primary driver of both operational efficiency and financial outcomes.

These results reaffirm long-standing theoretical perspectives in strategic management and innovation literature. For example, the strong impact of digital literacy on both digitalization performance ($\beta = 0.602$, $p < 0.001$) and perceived financial performance ($\beta = 0.449$, $p < 0.001$) aligns with the Resource-Based View of the firm (Barney, 1991), which holds that intangible resources like employee knowledge and skill are central to competitive advantage. Similarly, the mediated effect of digitalization capability supports earlier findings by Bharadwaj (2000), who argued that IT capability enhances performance only when strategically aligned and embedded within organizational processes.

Moreover, the path from digitalization performance to financial performance ($\beta = 0.325$, $p < 0.001$) echoes early work by Brynjolfsson and Hitt (2000), who showed that IT investments only yield financial benefits when firms possess the complementary skills and processes to leverage them effectively. The full mediation observed for capability suggests that mere technological availability is insufficient—a conclusion consistent with Henderson and Venkatraman's (1993) strategic alignment model.

Mediation Effects

- Mediation analysis confirms Digitalization Performance's critical intermediary role ($\beta = 0.062$, $p < 0.05$), demonstrating that Digitalization Capability influences Financial Performance exclusively through its enhancement of operational digital outcomes.
- It partially mediates the effect of Digital Literacy on Financial Performance ($\beta = 0.198$, $p < 0.001$), meaning digital literacy influences financial outcomes both directly and indirectly.

While both digital capability and literacy are important, enhancing digital performance is essential to unlocking their full financial impact. Notably, digital literacy

Table 4 Direct Effects Analysis of Hypothesized Relationships

Path Diagram	*β Coefficient*	*t-value*	*p-value*	*Hypothesis Outcome*
$X_1 \rightarrow Z$ ("Digitalization Capability → Digitalization Performance")	0.185	2.225	0.012	Supported
$X_1 \rightarrow Y$ ("Digitalization Capability → Financial Performance")	0.090	1.358	0.089	Not Supported
$X_2 \rightarrow Z$ ("Digital Literacy → Digitalization Performance")	0.602	7.968	0.000	Supported
$X_2 \rightarrow Y$ ("Digital Literacy → Financial Performance")	0.449	6.239	0.000	Supported
$Z \rightarrow Y$ ("Digitalization Performance → Financial Performance")	0.325	5.177	0.000	Supported

Source: Primary data analysis by Researcher

Note: X_1 = "Digitalization Capability", X_2 = "Digital Literacy", Z = "Digitalization Performance", Y = Perceived Financial Performance. $^{*}p^{*} < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.)

continues to exert a strong independent influence on financial success in India's MSME sector.

Table 5 Mediation Analysis of Hypothesized Pathways

Mediation Pathway	*Indirect Effect (β)*	*t-value*	*p-value*
$X_1 \rightarrow Z \rightarrow Y$ (Digitalization Capability path)	0.062*	2.009	0.021
$X_2 \rightarrow Z \rightarrow Y$ (Digital Literacy path)	0.198***	4.298	<0.001

Source: Primary data analysis by Researcher

Notes: X_1 = "Digitalization Capability", X_2 = "Digital Literacy", Z = "Digitalization Performance", Y = "Perceived Financial Performance"

$^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

Significance tested via bootstrapping (5,000 samples)

DISCUSSION

Strategic Implications of Digital Capabilities and Performance

Empirical results demonstrate that MSMEs' technological adoption capacity (digitalization capability) significantly enhances their operational digital performance in the Delhi-NCR region. These findings corroborate existing research on the strategic implementation of digital tools (Singh et al., 2021) and effective technology management frameworks (Joshi et al., 2021). The high proportion of business owner respondents (95.1%) underscores proactive leadership in driving digital adoption, a critical factor in resource-constrained environments.

However, digitalization capability alone does not directly influence perceived financial performance. This mirrors findings by Ukko et al. (2019), suggesting that technological investments require time and effective implementation to yield financial returns. Notably, 53.5% of surveyed MSMEs were under three years old, aligning with prior Indian studies indicating that younger firms (<5 years) face higher failure risks due to delayed ROI on digital initiatives (Kumar & Sharma, 2022). Thus, while digital tools are adopted, financial benefits may materialize gradually as firms stabilize operations.

Digital Literacy as a Catalyst

Digital literacy—the skills to effectively use digital tools—emerges as a cornerstone of success. Its strong influence on both digitalization performance (β = 0.602) and financial outcomes (β = 0.449) supports Sahu et al. (2020), who correlate digital literacy with improved decision-making and market expansion. For instance, Delhi/NCR MSMEs leveraging platforms like Instagram and Amazon Seller Central report 20–25% higher customer engagement, illustrating how literacy drives practical gains.

Digitalization Performance and Financial Outcomes

Digitalization performance, measured through operational efficiency and cost savings, significantly boosts perceived financial performance (β = 0.325). This resonates with Sharma & Choudhury (2021), who found that digitized inventory systems reduce stockouts by 30% in Indian MSMEs.

IMPLICATIONS AND FUTURE RESEARCH DIRECTIONS

For Delhi/NCR MSMEs, digital literacy is foundational, while digital capabilities require execution through performance-focused strategies. Policymakers should prioritize initiatives like skill-building workshops under India's *Digital India* campaign, while MSMEs must invest in training to bridge literacy gaps. Future research should explore longitudinal impacts of digital adoption on financial metrics like ROI and revenue growth.

The research highlights how technological competencies (digital capabilities) and technological proficiency (digital literacy) serve as critical drivers for enhancing both operational digitization and monetary outcomes among small and medium enterprises in India›s National Capital Region. The findings indicate that while digital literacy exerts both direct and indirect influence on financial outcomes, digital capabilities contribute through improved digitalization performance.

Digitalization performance itself plays a pivotal role in translating digital efforts into tangible business benefits, particularly among younger MSMEs navigating the challenges of early-stage growth. These results underline the value of investing in digital skills and infrastructure as part of national initiatives like Digital India.

For policymakers and industry stakeholders, the implications are clear: targeted training, accessible digital tools, and a performance-oriented digitalization strategy are key to enabling MSMEs to thrive in an evolving digital economy.

Future studies should track MSMEs over time to see how digital changes affect them long-term. They should also compare different industries to create better support plans.

This study helps us understand how digital skills and technology use improve small businesses in Delhi NCR, however, it is not without limitations. First, the geographic scope is limited to Delhi-NCR, which may not fully represent the diverse conditions of MSMEs across other regions of India. Expanding future research to include a broader, more geographically diverse sample—ideally between 400 to 500 respondents—could enhance the generalizability of findings.

Second, the use of a 4-point Likert scale, while helpful in eliminating neutral responses, may limit the granularity of respondent perspectives. Future studies may consider employing a 5-point or 7-point scale to capture more nuanced attitudes and enable parametric analysis.

Finally, financial performance was measured based on perception rather than actual financial data. Future research should aim to incorporate objective metrics such as profit margins, revenue growth, or return on investment to validate perceived outcomes and further strengthen empirical rigor.

A longitudinal research design would also be beneficial to assess the long-term impact of digital transformation and better understand how digital maturity evolves over time. Additionally, sector-wise analysis may help uncover industry-specific dynamics and inform more customized digital strategies.

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