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The impact of digital transformation and operational management on the financial performance of MSMEs in India

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ABSTRACT

The study investigates the impact of operational management and digital technology transformation on the financial performance of Micro, Small, and Medium Enterprises (MSMEs) in western India. This research examines the combined impact of these factors on the financial and operational outcomes of MSMEs, offering insights for business owners and policymakers. The study is based on empirical analysis of responses from 140 business owners and managers of MSMEs across industrial clusters in western India, using structured Likert scale questionnaires to assess relationships between operational management, technology transformation, and financial performance through Partial Least Squares Structural Equation Modeling (PLS-SEM) analysis. Findings indicate that both constructs positively influence financial performance, with technology transformation showing a comparatively stronger effect. Businesses leveraging both effective operational strategies and digital tools experience higher profitability, return on assets, and return on investment. The study further reveals significant differences in operational and technological capabilities across firm size categories, with medium-sized enterprises outperforming micro and small enterprises. The geographical scope is limited to select industrial clusters in western India, and findings may not be generalizable across India given regional variation. The study emphasizes that MSMEs must integrate operational excellence with digital innovation to remain competitive in an evolving market.

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1. Introduction

Micro, Small, and Medium Enterprises (MSMEs) are businesses characterized by their relatively small scale of operations, limited workforce, and modest capital investment; however, they play a vital role in the growth of the economy and generation of employment and innovation (Mudjahidin et al., 2024). Typically defined by criteria such as annual turnover and number of employees, MSMEs span various sectors, including manufacturing, retail, services, and technology (Sinha & Fukey, 2025). They are often considered the backbone of emerging economies due to their ability to adapt quickly, foster local entrepreneurship, and make significant contributions to GDP (Nuryanto et al., 2024). For India, according to the Ministry of Micro, Small, and Medium Enterprises, MSMEs contributed 30% to GDP and 46% to exports in 2024 while generating employment second only to the agriculture sector. However, MSMEs also face many challenges, such as technological barriers, limited access to financing, and competition from larger firms, making operational efficiency and digital adoption crucial for their sustainability and growth (Singh & Kaur, 2021).

The performance of MSMEs is significantly influenced by effective operational management and digital transformation (Sagala & Őri, 2024). Operational management—encompassing process optimization, supply chain efficiency, inventory control, and quality management—helps MSMEs reduce costs, enhance productivity, and improve customer satisfaction (Pfister & Lehmann, 2021). By implementing lean practices and efficient resource allocation, MSMEs can achieve better financial stability and competitiveness in their respective markets (Zuñiga-Collazos et al., 2025). However, many small

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businesses struggle with outdated operational methods, leading to inefficiencies that hinder growth (Rita & Nastiti, 2024).

Digital transformation, on the other hand, empowers MSMEs by integrating technologies such as data analytics, cloud computing, e-commerce platforms, and automation (Dutta et al., 2020). These tools enable faster decision-making, improved customer engagement, and streamlined operations (Mondal et al., 2023). For instance, digital payment systems and online marketing expand market reach, while AI-driven analytics optimize inventory and demand forecasting (Dutta et al., 2020). Despite these benefits, many MSMEs face barriers such as high costs of implementation, dearth of technical knowledge & expertise, and resistance to change, slowing their digital adoption (Rita & Nastiti, 2024).

Businesses that combine efficient operational processes with digital tools experience higher profitability, scalability, and resilience in dynamic markets (Teng et al., 2022). Policymakers and industry leaders must support MSMEs through training, funding, and infrastructure development to facilitate this dual approach (Rao et al., 2019). Ultimately, embracing both operational excellence and digital innovation is key for MSMEs to thrive in an increasingly competitive and technology-driven economy (Ghobakhloo & Iranmanesh, 2021).

2. Literature review

The theoretical basis for the structural relationships used in the research model of this study is based on the Research-Based View (RBV) (Barney, 1991) and the Dynamic Capabilities Framework (Teece et al., 1997). According to the RBV theory, an organization or business can have a sustained competitive advantage if they focus on the development of the internal resources and capabilities that are valuable, rare, inimitable, and have no substitutes. For MSMEs, enhancing Operations Management (OM) may act as a differentiating internal operational capability and would help to optimize resource utilization and enhance profitability (Bravo-Ortega et al., 2023).

Moreover, as the economic landscape changes rapidly due to the ever-evolving digital disruptions, efficient operational management alone would not be sufficient for long-term financial success (Hendrawan et al., 2023). Considering the same, the Dynamic Capabilities framework constructs on the traditional RBV theory, which focuses on the organization's capacity to strategically create, integrate, and align the internal competencies with the dynamic external environment. Hence, the Digital Technology Transformation is a critical dynamic capability for this study. MSMEs purposefully adopt and integrate digital tools into their internal ecosystem to respond to changing market demands faster and more efficiently (Behl et al., 2022). Therefore, this paper presumes that a combination of both these factors, viz., internal operational efficiency (RBV) and technological adaptability to changing dynamics (dynamic capabilities), serves as the key strategic factor driving the competitiveness and financial performance of MSMEs (Ghobakhloo & Ng, 2019).

The pace of digital technology transformation has been increasing exponentially, and new ways of working have been devised every day with the help of AI. However, their positive impact on a company's financial performance may not be directly proportional (De Simone et al., 2023). For instance, when the impact of social media, artificial intelligence, entrepreneurial leadership, and digital technology was assessed on business performance, the impact of artificial intelligence within the handicraft industry was not found to be statistically significant. On the contrary, there was a significant positive impact of the usage of digital technology and social media (Yadav & Rena, 2025). There is ample research establishing a strong positive correlation between the level of digital technology transformation and the performance of MSMEs across operational efficiency, customer satisfaction, and innovation (Teng et al., 2022). Digital transformation enables real-time decision-making, reduces operational costs, and improves responsiveness (Gonzalez-Varona et al., 2024). However, digital technology transformation in SMEs is not purely a technological shift but an innovation process requiring cultural change, employee involvement, and structural support (Romero & Mammadov, 2024). Ample research studies conclude that firms with agile operational processes, openness to experimentation, and strong leadership are more likely to achieve higher productivity, faster go-to-market times, and improved market positioning (Prakasa & Jumani, 2024). Lack of change management and rigid operational structures hinder the performance outcomes of digital initiatives (Liew & Loo, 2025).

Similarly, digital transformation in MSMEs is most successful when approached holistically, integrating not just technological upgrades but also operational, strategic, and cultural changes (Zall et al., 2025). Success factors include leadership commitment, staff digital skills, strategic alignment, and customer orientation (Naganjani & Sita, 2023; Rahawarin et al., 2023). Without these factors, digital investments may fail to improve performance (Rosyidiana & Narsa, 2024). A comprehensive digital transformation framework that addresses both technology and operational processes is key to driving productivity, flexibility, and competitive advantage in MSMEs (Sagala & Őri, 2024). It is established that the financial outcome is influenced by the firm's ability to strategically manage operational changes alongside technological transformation (Mittal & Soriya, 2025). Therefore, a balanced approach that integrates digital tools with operational best practices is necessary for sustainable performance gains (Teng et al., 2022). Successful digital transformation yields consistent performance benefits for SMEs in terms of profitability, efficiency, and scalability. The most successful digital transformations are those that are tied to operational improvements such as supply chain automation, lean production, and customer relationship management (Pfister & Lehmann, 2021). Firms that integrate digital tools into core operations outperform those that treat digitalization as a side project or isolated IT investment. Success is closely tied to having clear operational objectives (e.g. waste reduction, downtime minimization) that digital tools can address (Sundararajan et al., 2025). Firms that adopt digital transformation without operational readiness or workforce training often see limited or negative performance outcomes (Ghobakhloo & Iranmanesh, 2021). If there is a lack of operational alignment, digital strategy and leadership often results in underperformance (Jerónimo et al., 2020). Therefore, the digital technology transformation success in MSMEs depends less on the technology itself and more on how well it integrates with operational processes (Ghobakhloo & Tang, 2015).

Even in the context of India, digital technologies are recognized as vital sustainability drivers by enabling collaboration, innovation, and efficiency (Mondal et al., 2023). MSMEs face various internal and external challenges, especially in developing countries, including lack of capital, limited industry connections, affordability of new technology, and restricted access to relevant digital platforms and tools (Sinha & Fukey, 2025). Therefore, in developing countries such as India, where MSMEs face stronger barriers such as financial constraints and low digital literacy, operational management plays a pivotal role in overcoming these barriers. MSMEs prioritizing inventory management, process automation, and production scheduling as part of digital transformation achieve better performance results (Dutta et al., 2020). Operational efficiency acts as both a motivator and an enabler of digital maturity. Strategic operational planning must precede or coincide with digital tool adoption for meaningful results.

It is majorly observed for MSMEs across geographies that while digitalization brings growth opportunities, the path is fraught with operational challenges. Firms that actively reconfigure internal operations benefit from higher customer retention, better employee productivity, and innovation output (Jerónimo et al., 2020). However, underperformance is often a result of a lack of digital strategy, operational alignment, and leadership (Lokuge & Duan, 2021). Therefore, integration of digital technology transformation with operational management is crucial for the financial success of an MSME.

3. Research gap and hypotheses development

The reviewed literature affirmed that digital technology transformation enhances MSME performance along with good operational management practices. However, there is a research gap in understanding the impact of integrating these digital tools and operational workflows among different business sizes. Most studies emphasize the theoretical alignment of digital and operational strategies (e.g. leadership, change management, process automation), but few provide empirical models or case-based insights into whether the size of the enterprise can have an impact on the adaptation of MSMEs' operational structures to ongoing digital evolution. Furthermore, there is limited research focused on developing countries, particularly on how MSMEs, with even more resource constraints and higher competition than in developed markets, can be impacted by the size of the business in implementing digital transformation while simultaneously improving operational efficiency (Chotisarn & Phuthong, 2025). This calls for a more nuanced investigation into the impact of the size of an enterprise in developing countries on adopting digital transformation and enhancing operational efficiency. Moreover, whether these adoptions translate into positive financial

performance for the enterprise. Therefore, this paper investigates the role of the size of the enterprise within MSMEs on the adoption of digital transformation and tools for operational efficiency and thereby its impact on financial performance. The research gaps lead to two key objectives for the study:

Objective 1: To study the operational management and Digital Technology Transformation according to the Size of the company.

Objective 2: To study the relationship between Operational Management and Digital Technology Transformation with Perceived Financial Performance of MSMEs.

Based on the above discussion and to assess the above two objectives, 4 hypotheses and a conceptual framework shown in Figure 1 are constructed:

H1: The size of the company (Micro, Small, or Medium) has a positive and significant correlation on the maturity of operations management in MSMEs in India.

H2: The size of the company (Micro, Small, or Medium) has a positive and significant correlation on the level of digital transformation in MSMEs in India.

H3: Operations Management has a positive and significant impact on the financial performance of MSMEs in India.

H4: Digital Transformation has a positive and significant impact on the financial performance of MSMEs in India.

3.1. Conceptual framework

The conceptual framework shown in Figure 1 illustrates how the size of the company has an impact on the adoption of technology and the integration of operations management tools. It also illustrates how financial performance in MSMEs is influenced by both operational management and digital technology transformation. Operations Management serves as an independent variable, driven by four key antecedents: efficiency, standardization of processes, adoption of best practices and performance metrics factors. Similarly, Digital technology transformation serves as an independent variable, driven by three key antecedents: perceived usefulness, ease of use, and behavioral intention factors rooted in the Technology Acceptance Model. Together, these antecedents contribute to the successful adoption of Digital

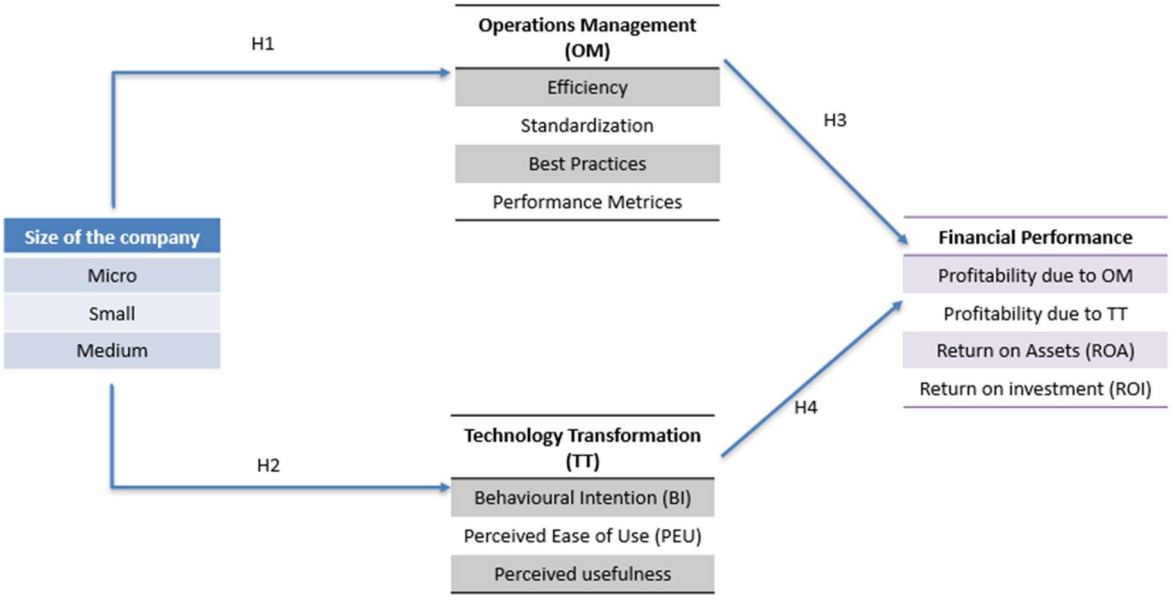

Figure 1. Conceptual framework. Note: H1 and H2 examine group differences across firm size categories and were investigated using one-way ANOVA. H3 and H4 examine structural causal relationships between latent constructs and were tested using OLS regression (baseline) and PLS-SEM (primary confirmatory analysis). Source: Authors' own work.

technology transformation. Although the Technology Acceptance Model primarily captures technology acceptance at the individual level rather than at the orgnisational level, it is relevant here because MSMEs are significantly driven by the owner/manager. Therefore, the owner/manager's acceptance of technology acts as a reliable proxy for organizational adoption. The model suggests that to achieve improved financial outcomes, the MSMEs should focus on integrating both digital and operational capabilities. It also highlights the need for strategic integration of human, technological, and process-based factors.

4. Research methodology

4.1. Data analysis technique

The proposed conceptual model and hypotheses were analysed through Partial Least Squares Structural Equation Modeling (PLS-SEM) using the SmartPLS 4 software. There were three main reasons to select PLS-SEM for this study. First, for a relatively small sample size (n-140), PLS-SEM offers a robust and statistically cogent tool well suited for the study. Second, PLS-SEM does not require that the data set be normally distributed, which makes it more appropriate than the covariance-based SEM for primary survey data that might have skewness. Lastly, PLS-SEM is designed for complex models aiming to predict and develop theory, which makes it the ideal analytical tool to simultaneously assess the measurement model (reliability and validity) and the structural model (path coefficients and hypothesis testing) in the process of identifying the key drivers of financial performance.

However, before evaluating the structural model, a preliminary analysis was conducted to test whether significant differences existed in the adoption of Technology Transformation (TT) and OM based on the size of the MSME. A one-way Analysis of Variance (ANOVA) was employed to test these group differences across micro, small, and medium-sized enterprises.

4.2. Sample and data collection

To test the proposed hypotheses empirically, the study adopted a quantitative, cross-sectional research design. The target population was MSMEs based in established industrial clusters in Western India. Considering the specialized nature of the data required, i.e., organizational-level technology integration, changes in operations management, and strategic financial metrics, a purposive sampling technique was used.

A stringent criteria for the inclusion of respondents were developed to ensure the reliability and external validity of the findings. First, respondents were required to be a promoter, founder or manager in a senior position. This ensured that the participants had the strategic understanding and financial oversight to adequately assess the operational workflows and profitability of the concerned MSMEs. Second, the participating MSMEs had to be in operation continuously for at least 3 years. This ensured that the firms had sufficient operational history needed to report on sustained financial performance indicators.

Data were collected by using a structured self-administered questionnaire through Google Forms between September and November 2025. In order to maintain academic ethical standards, an informed consent briefing was provided to all respondents, and verbal consent to participate in the study was obtained before we sent the survey form. In the consent briefing, all the participants were informed that it was voluntary to participate, that their responses would be completely anonymous, and that all personal information would be confidential. Participants were also briefed that they were allowed to withdraw from the study at any time.

Data were collected from 140 business owners and managers of MSMEs distributed across industrial clusters in western India. Specific questions were asked to categorize the MSMEs by company size, viz., micro, small, and medium. The frequency data provided respondents' demographic and organizational profiles involved in the study. A majority of the respondents were male (67.9%, 95 respondents), while only 32.1% were female (45 respondents), which reflected a male-dominant respondent base. With regard to the educational qualifications of the respondents, they all held at least a bachelor's or professional degree. Most of them were postgraduates (46.4%, 65 respondents), followed by professional degrees (37.9%, 53 respondents), while only 15.7% of them were graduates (22 respondents). The sample was fairly distributed across MSME categories with regard to the size of the enterprise. 58 respondents (41.4%) were working in small enterprises,

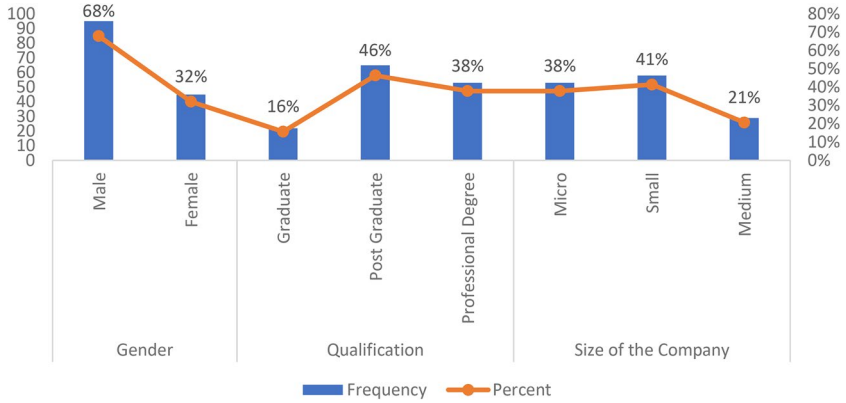

Figure 2. Summary of the demographic distribution of the respondents. Source: Authors' own work.

Table 1. Variable operationalization and measurement indicators.

Construct	Operational definition	Measurement indicators (survey items)
Digital technology transformation (TT)	The extent to which the MSME strategically integrates digital tools and systems into its organisational eco-system.	TT1: Perceived Usefulness TT2: Perceived Ease of Use TT3: Behavioural Intention
Operational management (OM)	The implementation of standardised, efficient, and quality-driven operational practices to optimise the firm's resource utilisation.	OM1: Standardized procedures. OM2: Continuous improvement to reduce waste and inefficiencies in operations. OM3: Employees trained in operational best practices. OM4: Monitoring of performance metrics
Perceived financial performance (FP)	The perceived economic and profitability outcomes achieved by the firm relative to its historical performance and industry benchmarks.	FP1: Perceived impact on Profitability due to best OM practices. FP2: Perceived impact on Profitability to digital improvements. FP3: The Return on Asset (ROA) of the digital tools meets expectation. FP4: The Return on Investment (ROI) of the digital tools meets expectation.

Source: Authors' own work.

followed by 53 (37.9%) in micro enterprises and 29 (20.7%) in medium-sized enterprises. The demographic and organizational profiles of the respondents suggested a good mix across gender, education, and MSME classifications with regard to their sizes. This balanced distribution provided diverse perspectives in the research. Figure 2 shows the demographic distribution and MSME classification of the sample set.

4.3. Measurement and variable definition

The structured Likert-scale questionnaires measured respondents' perceptions of the constructs underpinning the research model. The first part of the questionnaire covered the profile of respondents, including the size of the enterprise and thereby assessing whether they are Micro, Small or Medium scale enterprise. The second part assessed the elements of operational management, such as efficiency improvement, standardization of processes, employee training on best practices, and monitoring of performance metrics. The third part evaluated digital technology transformation in terms of its perceived usefulness, ease of use, and behavioral intention. Usefulness was assessed on company productivity, decision-making, gaining competitive advantage, and quality of products/services offered. Ease of use was evaluated on user-friendliness, ease of adaptation, availability and integration with existing systems. The behavioral intention was gauged by the company's plan to invest more in digital transformation, willingness to adopt new technologies, management support for the usage of digital tools for operational improvements, and the intention to expand the usage of automation AI tools in the business. The fourth part deliberated upon the perception of an increase in profitability due to operational efficiency gains and the adoption of digital tools. Moreover, whether the expectation of Return on Asset (ROA) and Return on Investment (ROI) was met or not. All indicators representing the variables from part 2 to part 4 of the questionnaire were measured using a Likert scale of 1 to 5 (1 = strongly disagree and 5 = strongly agree). Table 1 shows the operational definitions and the specific measurement indicators.

Table 2. Descriptive statistics by firm size.

Firm size	*N*	Operations management (mean)	OM (std. deviation)	Technology transformation (mean)	TT (std. deviation)
Micro	53	63.40	16.57	72.55	10.12
Small	58	67.67	16.76	70.17	15.38
Medium	29	77.76	18.35	77.41	14.18
Total	140	68.14	17.71	72.57	13.53

Source: Authors' own work.

Table 3. ANOVA results for OM and TT across firm size.

Variable	Source of variance	Sum of squares	df	Mean square	F-Statistic	*p*-value
Operations management	Between groups	3888.37	2	1944.19	6.704	0.002
	Within groups	39728.76	137	289.99		
Technology transformation	Between groups	652.78	2	326.39	4.541	0.012
	Within groups	9846.80	137			

Source: Authors' own work.

5. Results and discussion

With the different nature of the hypothesis in mind, a multi-method analytics framework was adopted. To investigate the H1 and H2 group comparison analysis, i.e. ANOVA was conducted. To investigate the relationship between H3 and H4, OLS regression was used as a baseline method, followed by PLS-SEM as the primary confirmatory method.

5.1. Group comparison analysis (ANOVA)

For Hypotheses H1 and H2, a preliminary analysis was conducted to test whether significant differences existed in the adoption of Digital TT and OM based on the size of the MSME. In order to test these group differences across micro, small, and medium-sized enterprises, a ANOVA was adopted. Table 2 represents the descriptive statistics based on the firm sizes.

As shown in Table 2, the highest mean scores were reported for medium-sized enterprises for both OM (77.76) and TT (77.41). This suggests a more robust integration of standardized operations and digital tools by the medium-sized enterprises compared to their smaller counterparts. Micro enterprises exhibited the lowest mean for OM (63.40), while small enterprises had the least mean for TT adoption (70.17).

To determine the statistical significance of these observations, the ANOVA results were evaluated and shown in Table 3.

The ANOVA results confirmed a statistically significant difference in OM based on the size of the enterprise, with the values of $F(2, 137) = 6.704$ and p-value = 0.002. Since the p-value obtained is below 0.05, the null hypothesis for H1 is rejected, and the alternative hypothesis is accepted. Similarly, a significant difference was observed for TT across the size categories, with values of $F(2, 137) = 4.541$ and p-value = 0.012 (<0.05), which means the second null hypothesis for H2 is rejected.

These findings substantiate that there is a significant correlation between the size of the enterprise and its capacity for technological and operational evolution, with medium-sized firms demonstrating a distinct structural advantage over micro and small entities.

While the preliminary ANOVA findings establish that the size of an enterprise influences its capacity to adopt operational management and digital tools, the core conceptual model of this study suggests that Digital TT and OM serve as drivers of Perceived Financial Performance (FP) across the MSME sector. These primary predictive relationships were further tested for robustness using PLS-SEM.

5.2. Baseline regression analysis

For H3 and H4, which examine the causal impact of Operational Management and Digital Technology Transformation on Perceived Financial Performance, OLS regression analysis was first conducted using SPSS as a baseline method. As shown in Table 4, the overall model is statistically significant ($F = 8.961$, $p < 0.001$) and accounts for 11.6% of the variance in Perceived Financial Performance (R2 = 0.116, Adjusted

Table 4. OLS regression results.

Variable	Coefficients
Operational management (OPM)	0.199** (0.068)
Digital technology transformation (TT)	0.254* (0.139)
Constant	37.933*** (9.513)
Observations	140
R-squared	0.116
Adjusted R-squared	0.103
F-statistic	8.961***

Notes: Standard errors in parentheses.
Dependent variable: Perceived Financial Performance.
*$p < 0.10$; **$p < 0.01$; ***$p < 0.001$.
Source: Authors' own work.

R2 = 0.103). Operational Management has a positive and statistically significant impact on Perceived Financial Performance (β = 0.199, $p < 0.01$), which signifies that the null hypothesis for H3 is rejected, and stronger operational practices such as continuous process optimization, supply chain efficiency, standardization and implementing performance metrics meaningfully boost the financial outcomes of MSMEs. Digital Technology Transformation also has a positive effect on Perceived Financial Performance (β = 0.254, $p < 0.10$), which indicates that the application of digital tools and technologies results in an increase in financial performance, but with marginal significance in this stage of analysis. Thus, H4 null hypothesis is rejected. These initial results provide a preliminary confirmation of the hypothesized relationships and form the basis for the more comprehensive PLS-SEM analysis presented in the next section, which further explores the complex latent variable relationships amongst the constructs.

The regression analysis, although confirming the directional relationships between the constructs, is not well suited to accommodate measurement error and latent variable complexity. Therefore, in the next section, a more robust PLS-SEM analysis is performed for a more in-depth analysis of the structural relationships.

5.3. PLS-SEM confirmatory analysis

As a primary confirmatory analysis for testing H3 and H4, PLS-SEM was conducted using SmartPLS software. PLS-SEM was selected for reasons such as its ability to simultaneously estimate both the measurement and structural models, thereby accounting for measurement error, which OLS regression does not (Hair et al., 2022). PLS-SEM is particularly well suited for studies with small to medium sample sizes, as it does not require multivariate normality assumptions (Ringle et al., 2015). Path coefficients are assessed using 500-iteration bootstrapping to derive standard errors, t-statistics, *p*-values, and 95% confidence intervals.

In this section, PLS-SEM is used to evaluate how Operational Management and Digital Technology Transformation (latent variables) influence Perceived Financial Performance, and to measure the strength of each construct through its respective indicators.

5.3.1. Outer loadings

Table 5 represents the outer loadings for the model, indicating the reliability of each observed item (indicator) and the correlation with the three main constructs, viz. Operations Management (OPM), Digital TT, and Perceived Financial Performance (FP). For the OPM construct, outer loadings of all four indicators (V11-V14) were between 0.570 and 0.677, with V14 showing the strongest correlation. Similarly, for the TT construct, outer loadings of all four indicators (V16-V19) were between 0.568 and 0.740, with V17 showing the strongest correlation. For the FP construct, the outer loadings ranged from 0.532 to 0.751 for the four indicators between V6 and V9, with V9 showcasing the strongest correlation. The data show that all the indicators were above the exploratory threshold of 0.5; hence, the indicators were reliable for the constructs under investigation.

5.3.2. Reliability and convergent validity

The measurement model was assessed through internal consistency reliability and convergent validity, as shown in Table 6. The Cronbach's Alpha values for Operations Management (OPM, 0.452), Technology

Table 5. Outer loadings from the SEM model.

Construct	Indicator	Outer loading
OPM	V11	0.636
OPM	V12	0.570
OPM	V13	0.591
OPM	V14	0.677
TT	V16	0.657
TT	V17	0.740
TT	V18	0.724
TT	V19	0.568
FP	V6	0.532
FP	V7	0.731
FP	V8	0.747
FP	V9	0.751

Source: Authors' own work.

Table 6. Reliability and convergent validity from the SEM model.

Construct	Cronbach alpha	CR	AVE
OPM	0.452	0.713	0.384
TT	0.597	0.769	0.456
FP	0.644	0.787	0.485

Note: OPM's Cronbach's alpha (0.452) is below the conventional threshold of 0.7, but Composite Reliability (0.713) meets the acceptable threshold, which is a more robust measure for PLS-SEM (Hair et al., 2022). AVE values for OPM (0.384) are slightly below the ideal threshold of 0.5 but are acceptable given the exploratory nature of this study.
Source: Authors' own work.

Table 7. Discriminant validity from the SEM model.

	OPM	TT	FP
OPM	**0.620**	0.423	0.292
TT	0.423	**0.676**	0.372
FP	0.292	0.372	**0.696**

The diagonal values (bold), as shown in Table 7, are higher than their corresponding off-diagonal correlations. Hence, as per the Fornell-Larcker criterion, the discriminant validity for the measurement model is successfully established.

Transformation (TT, 0.597), and Perceived Financial Performance (FP, 0.644) are below the traditional cut-off point of 0.70. However, solely relying on Cronbach's Alpha can be restrictive and too strict in PLS-SEM. Composite Reliability (CR) is a more robust and appropriate measure of internal consistency. The CR values of all constructs (OPM = 0.713, TT = 0.769, and FP = 0.787) are above the recommended threshold of 0.70, thus exhibiting satisfactory internal reliability. The convergent validity was evaluated later by the Average Variance Extracted (AVE). The AVE values for OPM (0.384), TT (0.456), and FP (0.485) are slightly below the conservative threshold of 0.50. However, these values are acceptable in the present study, as it is exploratory in nature. Thus, the constructs present acceptable reliability and convergent validity to proceed with the structural analysis.

5.3.3. Discriminant validity

Discriminant validity was assessed using the Fornell-Larcker criterion as the standard measure, as shown in Table 7. The standard is that a construct has sufficient discriminant validity if the square root of its AVE is higher than its highest correlation with any other construct in the structural model. The correlation matrix displays the square root of AVEs of Operations Management (0.620), Technology Transformation (0.676), and Perceived Financial Performance (0.696) on the diagonal; the values are strictly higher than the inter-construct correlation values on the corresponding rows and columns. For example, the highest shared correlation for OPM is with TT (0.423), well below OPM's diagonal cutoff of 0.620. The results therefore supported the empirical distinction and unique measurement of each variable, thus successfully establishing discriminant validity for the measurement model.

5.3.4. Path analysis from the PLS-SEM structural model

The results of the path analysis from the PLS-SEM structural model are displayed in Table 8. The findings reveal that TT has a positive and statistically significant effect on Perceived Financial Performance

Table 8. Results of path analysis.

Hypothesized path	Standardized estimates	*p*-value	Conclusion
(H3). OM → FP	0.164†	0.074	Marginal support
(H4). TT → FP	0.303**	0.001	Support

Source: Authors' own work.
†$p < 0.10$; **$p < 0.01$. Based on 500 bootstrap iterations.

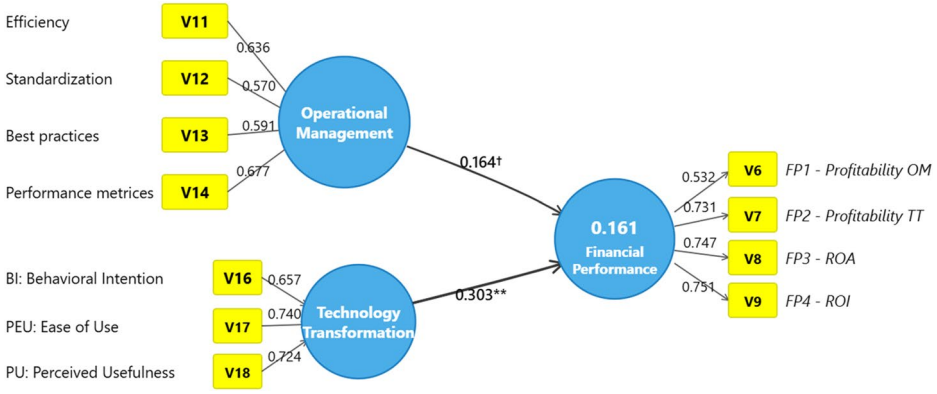

Figure 3. SEM to correlate perceived financial performance (dependent variable) with operational management and digital technology transformation (independent variables). Source: Authors' own work.

(β = 0.303, $p = 0.001$). Thus, H4 is supported and validates the significant positive impact of digital adoption on the financial performance of MSMEs. OM also has a positive effect on Perceived Financial Performance (β = 0.164, $p = 0.074$), providing marginal support for H3. This means that good operational practices do affect financial performance, but the effect is quite modest. The overall results indicate that the constructs have a positive impact on financial performance, with Digital Technology Transformation being a relatively stronger driver in the Western India MSME context.

Figure 3 shows the PLS-SEM measurement and structural model. Four indicators represent the construct Operational Management: Efficiency (OPM1 = 0.636), Standardization (OPM2 = 0.570), Best Practices (OPM3 = 0.591) and Performance Metrics (OPM4 = 0.677). The construct Technology Transformation is measured through Behavioral Intention (BI = 0.657), Perceived Ease of Use (PEU = 0.740) and Perceived Usefulness (PU = 0.724). Perceived Financial Performance is measured through four indicators representing the Profitability due to OM (FP1 = 0.532), the Profitability due to TT (FP2 = 0.731), the Return on Assets (FP3 = 0.747) and the Return on Investment (FP4 = 0.751). The structural model explains 16.1% of the variance in Perceived Financial Performance ($R^2 = 0.161$). While this is considered weak to moderate, it is acceptable in social science research involving complex human behavioral constructs (Hair et al., 2022). Technology Transformation (β = 0.303) has a higher path coefficient than Operational Management (β = 0.164).

6. Conclusion

The study conducted in MSMEs operating within industrialized clusters in Western India demonstrates that both operational management and digital technology transformation significantly vary according to the size of the company, with medium-sized enterprises performing better in both areas compared to small and micro enterprises. Furthermore, the study indicates that there is a statistically significant positive relationship between financial performance and both operational management and digital technology transformation. This further indicates that companies with more effective operations and greater technological advancement tend to achieve stronger financial outcomes. These findings emphasize the importance of enhancing operational efficiency and embracing digital technology transformation, particularly for smaller MSMEs, to improve overall financial performance and competitiveness. The synergy between these two factors yields a greater positive effect than either one alone. MSMEs that optimize their operations and adopt digital tools show the best results.

Despite MSMEs having a small scale of operations and modest capital investment, they play a critical role in the country's economic growth and also generate significant employment. This is due to the large number of these MSMEs and the workforce requirement they tap into for employment. Therefore, a thriving MSME sector is crucial for the inclusive growth of India, enabling higher employment opportunities, fostering entrepreneurial spirit, and supporting the Make in India initiative. The research emphasizes that MSMEs should adopt a balanced approach that integrates operational excellence with digital innovation to be able to thrive in a rapidly evolving and dynamic market. For MSME owners, investment in operational management practices and digital technology transformation is crucial for long-term profitability, financial health, and competitiveness. Similarly, policymakers should support systems and policies that focus on providing affordable digital solutions and training for MSMEs, along with promoting operational best practices.

7. Implications

The results of this study establish that Digital Technology Transformation and Operations Management are independent drivers of the financial performance of MSME's. Since both variables independently drive the performance of the organizations our study suggests that managers should try to find an integration of both to maximize the financial gains. There has to be a concurrent focus on both process and technological adoption. The study further suggests that managers should adopt a balanced portfolio for resource allocation. There is a need for deliberate investment in both digital tools and operational systems.

There is also a need for policymakers to come up with affordable MSME support initiatives, keeping the size of the organizations in mind. The programs should be designed integrating both operational training as well as digital capability building to foster stronger outcomes in terms of performance.

8. Limitations and future research

The study is conducted within a geographical scope, limited to certain industrial clusters in western India. Moreover, the sector in which an MSME operates can also have a significant impact on the adoption of digital technology and tools for operational management. These may yield a different result with respect to the size of the enterprise. Given these limitations, the results from the study may not be universally generalizable across India. Moreover, as prior research suggests, digital technology adoption in itself may not be a sufficient condition for the success of an MSME, but how well it is integrated with the operational processes defines the financial outcome. Moreover, financial outcomes are also multifaceted, with factors like competition and sector; however, the current empirical model purposefully captured the controllable internal drivers, viz., digital technology transformation and operations management. The extent and quality of integration of digital technology and operational management processes were not directly assessed in this study due to the non-availability of purely objective financial data in the case of the MSMEs surveyed in the study. With the advent of AI, the digital landscape is rapidly evolving, opening new avenues for MSMEs. Future research should focus on the impact of AI adoption and measure its long-term effects on MSMEs. Our study captures a snapshot in time when AI tools were not readily available and their application was not mainstream. Future studies should include parameters with regard to the adoption of AI and other emerging technologies as part of technology transformation and assess their impact on the financial performance of MSMEs. Moreover, more nuanced studies on specific sectors, such as services versus manufacturing, would impart greater insights.

Author contributions

CRediT: **Krishna Shetty**: Conceptualization, Data curation, Investigation, Project administration, Resources, Supervision, Writing – review & editing; **Shikha Jain**: Formal analysis, Methodology, Resources, Validation, Visualization, Writing – original draft.

Ethical approval

The research protocol was approved by the Ethics Committee of K.J. SIM (certificate no. KJSIM/2025-26/EC/11), dated September 26, 2025. The Google Form was sent from September to November 2025 to respondents who had agreed after outlining voluntary participation, anonymity, confidentiality, and the right to withdraw at any time. The consent procedure is therefore in line with institutional requirements.

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Data availability statement

The data supporting the findings of this study are available from the corresponding author.

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