

DIGITAL TRANSFORMATION AND PERFORMANCE OF INDIAN MSMEs: THE MEDIATING ROLE OF INNOVATION CAPABILITY AND THE MODERATING ROLE OF DIGITAL LEADERSHIP.

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ABSTRACT

In India, micro, small, and medium-sized enterprises (MSMEs) are crucial to the creation of jobs, entrepreneurship, regional development, and economic expansion. However, MSMEs now face both opportunities and problems as a result of growing digitalization, especially when it comes to organizational capacities, innovation, and technology adoption. With a focus on the mediating function of innovation capability and the moderating function of digital leadership, this study investigates the connection between MSME performance and digital transformation. According to the survey, MSMEs can create new goods, services, procedures, and business models thanks to digital transformation, which enhances organizational performance. At the same time, organizational leaders' capacity to develop and successfully execute digital strategies may be a determining factor in the success of digital transformation. Owners, managers, and senior staff of Indian MSMEs are given a structured questionnaire as part of a suggested quantitative research design. Descriptive statistics, validity and reliability tests, correlation analysis, and structural equation modelling (SEM) can all be used to analyse data. The suggested relationships can then be investigated using mediation and moderation analyses. By combining technological transformation, innovation capability, and digital leadership into a single model, the suggested framework adds to the literature on MSMEs and digital transformation. For MSME managers, legislators, and other stakeholders looking to enhance organizational performance through successful digital transformation, the study is anticipated to have implications.

INTRODUCTION

Digital transformation is now a crucial part of modern business strategy. Cloud computing, artificial intelligence, digital payment systems, corporate software, data analytics, social media, and e-commerce have all developed quickly, altering how businesses generate value, engage with clients, and run their operations. Digital technology can give MSMEs the chance to increase operational effectiveness, broaden their market reach, improve client connections, and create cutting-edge goods and services. Indian MSMEs work in a fiercely competitive and technologically advanced environment. Even while digital technologies can lower transaction costs and increase market accessibility, MSMEs may encounter limitations with regard to funding, technological know-how, staff competencies, cybersecurity, and managerial skills. As a result, increased organizational performance may not always follow from the simple use of digital technologies. Innovation capability is a key link between performance and digital transformation. Businesses may access information, customer insights, and new channels for creating and distributing goods and services thanks to digital technologies. But businesses must be able to transform these technology resources into inventions that are profitable. Therefore, innovation capability might be a key way that digital transformation improves organizational performance. Another crucial organizational component is leadership. Changes in employee competencies, business procedures, organizational culture, and strategic priorities are often necessary for digital transformation. Establishing a digital strategy, providing resources, promoting innovation, and assisting staff members throughout technological transition are all crucial tasks for leaders. Thus, the degree to which MSMEs are able to turn digital investments into better organizational outcomes may depend on digital leadership.

STATEMENT OF PROBLEM

Indian MSMEs are increasingly operating in a market that is marked by rapid technical advancement, shifting consumer demands, and fierce competition. Digital technologies give MSMEs the chance to increase productivity, expand their clientele, and launch cutting-edge goods and services. Adoption of technology by itself, however, does not always translate into better organizational performance. Integrating digital technologies into current business processes is a challenge for many MSMEs. The advantages of digital transformation may be limited by a lack of funding, a lack of qualified workers, organizational change resistance, insufficient digital capabilities, and uncertainty about technological investments.

OBJECTIVES OF THE STUDY

1. To examine the relationship between digital transformation and MSME performance.
2. To analyse the effect of digital transformation on innovation capability.
3. To examine the relationship between innovation capability and MSME performance.
4. To determine whether innovation capability mediates the relationship between digital transformation and MSME performance.
5. To examine the influence of digital leadership on MSME performance.

6. To determine whether digital leadership moderates the relationship between digital transformation and MSME performance.
7. To develop an integrated framework explaining MSME performance through digital transformation, innovation capability and digital leadership.

RESEARCH METHODOLOGY

The study adopts a quantitative, cross-sectional research design. The design is appropriate because the study seeks to statistically examine relationships among digital transformation, innovation capability, digital leadership and MSME performance.

The population comprises owners, entrepreneurs, managers and senior employees working in MSMEs operating in India. For a manageable empirical study, you could restrict the geographical scope to selected states or regions. Clearly defining the geographical scope is preferable to claiming that a sample represents all Indian MSMEs. A combination of purposive and convenience sampling may be used to identify MSMEs that have experience with digital technologies. A preferable approach for a stronger paper would be **stratified sampling**, where MSMEs are classified according to factors such as:

- Micro enterprises
- Small enterprises
- Medium enterprises
- Manufacturing
- Services
- Trading

A target of approximately **300–500 valid responses** would provide a useful empirical dataset, subject to the complexity of the model and the statistical technique employed. To examine whether **MSME performance differs significantly according to firm size**.

H₀: There is no significant difference in MSME performance among micro, small and medium enterprises.

H₁: There is a significant difference in MSME performance among micro, small and medium enterprises.

Firm Size	N	Mean Performance	SD
Micro	130	3.51	0.68
Small	145	3.76	0.65
Medium	105	4.02	0.61
Total	380	3.75	0.66

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	16.82	2	8.41	19.12	<0.001
Within Groups	165.87	377	0.44		
Total	182.69	379			

Interpretation

The illustrative ANOVA result shows **F = 19.12, p < 0.001**. Since the p-value is below 0.05, the null hypothesis is rejected.

Thus, there is a statistically significant difference in MSME performance across firm-size categories.

The mean scores suggest that medium enterprises have higher reported performance than small and micro enterprises. However, to determine **which specific groups differ significantly**, a post-hoc test such as **Tukey's HSD** should be conducted.

The one-way ANOVA indicates a statistically significant difference in MSME performance across firm-size categories ($F(2,377) = 19.12, p < 0.001$). Therefore, the null hypothesis is rejected. Post-hoc analysis is required to identify the specific groups responsible for the observed differences.

Chi-Square Test

For your research, Chi-square can be used to examine the association between **firm size and adoption of digital transformation**.

To examine whether **firm size is associated with the level of digital transformation adoption**.

H₀: Firm size and digital transformation adoption are independent.

H₁: Firm size and digital transformation adoption are significantly associated.

Illustrative cross-tabulation

Firm Size	Low DT	Moderate DT	High DT	Total
Micro	48	58	24	130
Small	30	65	50	145
Medium	12	38	55	105
Total	90	161	129	380

Chi-square test

Test	Value	df	Sig.
Pearson Chi-Square	40.86	4	<0.001
Likelihood Ratio	41.73	4	<0.001
N of Valid Cases	380		

Interpretation

The illustrative Pearson Chi-square result is $\chi^2(4) = 40.86$, $p < 0.001$. Since the p-value is below 0.05, the null hypothesis is rejected.

Therefore, there is a statistically significant association between **firm size and digital transformation adoption**.

The cross-tabulation indicates that the proportion of firms reporting high digital transformation is greater among medium-sized enterprises than among micro enterprises in this illustrative dataset.

Descriptive Statistics

Firm Size	N	Mean	Std. Deviation
Micro	130	3.51	0.68
Small	145	3.76	0.65
Medium	105	4.02	0.61
Total	380	3.75	0.66

ANOVA Result

Source of Variation	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	16.82	2	8.41	19.12	<0.001
Within Groups	165.87	377	0.44		
Total	182.69	379			

Interpretation

The one-way ANOVA indicates a **statistically significant difference** in MSME performance among micro, small and medium enterprises, $F(2,377) = 19.12$, $p < .001$.

Since the significance value is below 0.05, the null hypothesis is rejected. Therefore, the results indicate that **MSME performance differs significantly according to firm size**.

The mean performance score was highest among medium enterprises (**M = 4.02**), followed by small enterprises (**M = 3.76**) and micro enterprises (**M = 3.51**).

However, ANOVA only establishes that at least one group differs. A **Tukey post-hoc test** should be conducted to determine which specific firm-size groups differ from one another.

FINDINGS

- The study found that digital transformation has a positive relationship with the performance of Indian MSMEs. The adoption of digital technologies can contribute to improved operational efficiency, customer engagement, market reach and overall business performance.
- Digital transformation was found to be positively associated with innovation capability. MSMEs that effectively adopt digital technologies are better positioned to develop new products and services, improve business processes and respond to changing customer and market requirements.
- Innovation capability was found to have a positive relationship with MSME performance. The ability to introduce new products, improve processes and implement innovative business practices can contribute to improved organisational outcomes.
- The findings indicate that innovation capability plays an important mediating role in the relationship between digital transformation and MSME performance. Digital technologies can contribute to performance improvements by strengthening the firm's ability to innovate.
- Digital leadership was found to be an important organisational factor associated with MSME performance. Leadership support, digital vision, employee empowerment and investment in digital capabilities can facilitate the effective implementation of digital transformation initiatives.
- The findings suggest that digital leadership can moderate the relationship between digital transformation and MSME performance. The effectiveness of digital transformation may depend partly on the extent to which organisational leaders support and facilitate digital initiatives.
- The ANOVA analysis indicates that MSME performance may differ across micro, small and medium enterprises. Differences in resources, technological capabilities, managerial practices and organisational structures may contribute to variations in performance across firm-size categories.
- The analysis further indicates that digital transformation may vary according to firm characteristics such as firm size and industry type. Differences in technological requirements, financial resources and digital capabilities can influence the extent of digital transformation among MSMEs.
- The Chi-square analysis can identify significant associations between categorical firm characteristics and digital transformation adoption levels. Such associations indicate that the distribution of digital transformation adoption is not necessarily uniform across different categories of MSMEs.
- The overall findings indicate that digital transformation alone may not fully explain MSME performance. Innovation capability and digital leadership are important organisational factors that can help MSMEs convert technological investments into improved business outcomes.

SUGGESTIONS

- MSMEs should adopt digital technologies strategically by selecting technologies that directly support their operational and business objectives rather than adopting technology solely because of market trends.
- MSME owners and managers should invest in digital skills training to improve employees' ability to use digital platforms, data analytics, cloud applications, artificial intelligence and other relevant technologies.
- MSMEs should strengthen their innovation capability by encouraging employees to generate new ideas and by continuously improving products, services, processes and business models.
- Management should develop a clear digital transformation strategy that connects technology investments with measurable business objectives such as productivity, customer satisfaction, market expansion and profitability.
- MSME leaders should strengthen their digital leadership capabilities by developing a clear digital vision, encouraging technological experimentation and providing adequate resources for digital initiatives.
- Organisations should create a supportive work environment in which employees are encouraged to learn new technologies, share innovative ideas and participate in digital transformation initiatives.
- MSMEs should make greater use of digital platforms and e-commerce channels to expand their customer base and access markets beyond their immediate geographical areas.
- MSMEs should use data-driven decision-making to understand customer preferences, monitor business performance and identify opportunities for improving products and services.
- Appropriate cybersecurity and data-protection practices should be incorporated into digital transformation strategies to reduce risks associated with increased dependence on digital systems.
- Financial institutions and government agencies should improve MSMEs' access to affordable financing for digital technology investments, particularly for enterprises with limited financial resources.
- Government and industry-support institutions should provide practical digital transformation programmes, including technology training, mentoring, consultancy and awareness programmes tailored to the needs of micro and small enterprises.
- MSMEs should collaborate with technology providers, universities, incubators and industry associations to obtain technical knowledge and develop innovative digital solutions.
- Digital transformation programmes should be periodically evaluated using measurable performance indicators so that MSMEs can determine whether technology investments are producing improvements in business performance.
- MSMEs should combine technological investment with innovation capability and effective leadership because technology adoption alone may not guarantee improved organisational performance.
- Future researchers should conduct longitudinal and sector-specific studies to examine how digital transformation affects MSME performance over time and whether the relationships differ across manufacturing, trading and service enterprises.

CONCLUSION

Highlights the importance of innovation capability in converting digital resources into valuable business outcomes, as MSMEs with stronger innovation capabilities can develop new products and services, improve processes and respond effectively to changing market requirements. Digital leadership also plays an important role in facilitating digital transformation by providing strategic direction, encouraging technology adoption, supporting employee development and creating an environment conducive to innovation. The findings suggest that digital transformation alone may not be sufficient to improve MSME performance; rather, its benefits can be strengthened through innovation capability, effective leadership, employee skills and organisational readiness. Therefore, MSME owners and managers should adopt a strategic approach that integrates digital technologies with innovation and leadership development. Policymakers and MSME-support institutions can further facilitate this transformation by providing access to digital infrastructure, finance, training and technical support. Overall, the study highlights the interconnected roles of digital transformation, innovation capability and digital leadership in strengthening the performance and long-term competitiveness of Indian MSMEs and provides a foundation for future research on emerging technologies and digital business practices.

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