

# “TECHNOLOGY ADOPTION AND INNOVATION PRACTICES IN MSMEs AND THEIR IMPACT ON COMPETITIVENESS”:

## A STUDY IN MYSURU

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### ABSTRACT:

This study investigates technology adoption and innovation practices among Micro, Small, and Medium Enterprises (MSMEs) in Mysuru and examines how these practices influence their competitiveness. MSMEs in India are increasingly embracing digital tools ranging from basic digital payments and smartphones to advanced Industry 4.0 technologies such as IoT, artificial intelligence, and cloud computing, resulting in notable improvements in operational efficiency, market reach, and business growth. National surveys indicate that approximately 73% of MSMEs in semi-urban and rural India have reported increased business growth through digital adoption, underscoring the strong linkage between technology usage and competitiveness. Empirical studies in the Indian context further reveal that adoption drivers including performance expectancy, facilitating conditions, and social influence significantly shape MSMEs' intentions to adopt technology, which in turn enhances firm performance and competitive advantage. Within Karnataka, initiatives such as CII's Digital Saksham Project have supported tens of thousands of enterprises by promoting digital payments, Udyam registration, and online trade, thereby accelerating digital transformation in Mysuru and surrounding regions. However, despite this progress, challenges such as limited financial resources, inadequate digital skills, and low awareness of advanced technologies continue to constrain deeper technology integration, particularly among smaller firms. To address these barriers, regional innovation support mechanisms, including technology business incubators such as JSS STU's TBI 2.0 in Mysuru, provide training, R&D support, and access to emerging technologies. Overall, the study highlights that strategic technology adoption and continuous innovation practices are critical drivers of MSME competitiveness in Mysuru, and their impact is significantly strengthened by supportive ecosystems and targeted capacity-building initiatives.

**Key words:** *MSMEs, Digitalization, Innovation, Firm Performance, Industry 4.0*

### 1.1 INTRODUCTION OF THE STUDY

Micro, Small, and Medium Enterprises (MSMEs) constitute a vital segment of the Indian economy, contributing significantly to employment generation, industrial output, and regional development. In recent years, rapid advancements in digital technologies and Industry 4.0 applications have transformed business operations, compelling MSMEs to adopt new technologies and embrace innovation as strategic tools for survival and growth. Technology adoption and innovation practices have emerged as critical enablers for enhancing productivity, improving operational efficiency, expanding market reach, and strengthening overall competitiveness. Digitalization through tools such as digital payment systems, smartphones, enterprise software, cloud computing, and online marketing platforms has become increasingly prevalent among Indian MSMEs, enabling them to respond effectively to dynamic market

conditions and evolving customer expectations. National-level surveys indicate that approximately 73 percent of MSMEs in semi-urban and rural India have experienced increased business growth as a result of digital adoption, highlighting the strong relationship between technology usage, firm performance, and competitiveness. Empirical studies in the Indian context further suggest that factors such as performance expectancy, facilitating conditions, and social influence play a significant role in shaping MSMEs' intentions to adopt technology, which subsequently enhances their competitive advantage. Within Karnataka, initiatives such as CII's Digital Saksham Project and the establishment of technology business incubators such as JSS STU's TBI 2.0 in Mysuru have contributed to promoting digitalization, innovation capability, and Industry 4.0 awareness among MSMEs. However, despite the growing body of national and international literature on technology adoption and MSME performance, limited empirical evidence is available at the micro-regional level, particularly focusing on Mysuru, regarding the combined effect of technology adoption and innovation practices on MSME competitiveness. Moreover, existing studies often examine technology adoption or innovation in isolation, with insufficient attention to identifying context-specific drivers, constraints, and their relative influence on competitiveness. Addressing this research gap, the present study focuses on MSMEs in Mysuru to examine how digitalization, innovation, and Industry 4.0 adoption influence their competitiveness and to identify key drivers and constraints affecting technology adoption, with the aim of providing valuable insights for policymakers, practitioners, and MSME owners in formulating strategies to promote innovation-led and technology-driven growth.

## 1.2 BACKGROUND OF THE STUDY

Micro, Small, and Medium Enterprises (MSMEs) are central to India's economic landscape, contributing significantly to employment, GDP, and regional development. With rapid advancements in digital technologies and Industry 4.0, MSMEs are increasingly turning to digital tools to enhance productivity, operational efficiency, and competitiveness. Recent national studies show that over 53.8 % of MSMEs have adopted at least one digital tool, with many reporting tangible improvements such as 21–30 % increases in sales and at least 10 % growth in customer base following digital adoption, highlighting the measurable benefits of digital transformation. Moreover, approximately 73 % of semi-urban and rural MSMEs reported increased business growth through digital adoption of smartphones and UPI, further underscoring the strong link between technology use and enhanced firm performance. Despite this progress, the extent of adoption varies across regions and sectors, and many MSMEs, especially in semi-urban contexts such as Mysuru, still face challenges including limited financial resources, inadequate digital skills, and insufficient awareness of advanced technologies. Prior studies at the national level have not sufficiently captured the combined impact of technology adoption and innovation practices on MSME competitiveness at the regional level, leaving a research gap regarding context-specific drivers and constraints in places like Mysuru. Addressing this gap, the current study focuses on exploring digitalization and innovation patterns among MSMEs in Mysuru to assess their influence on competitiveness and inform targeted support strategies.

## 1.3 SIGNIFICANCE OF THE STUDY

This study holds substantial significance as it generates context-specific empirical evidence on how technology adoption and innovation practices shape the competitiveness of MSMEs in Mysuru, a rapidly emerging entrepreneurial hub. By uncovering critical drivers, constraints, and performance outcomes associated with digitalization and Industry 4.0 adoption, the study equips MSME owners and managers with practical insights to make informed strategic decisions regarding digital investments and innovation initiatives. The findings are particularly relevant in the modern business environment, where MSMEs must leverage technologies such as cloud computing, automation, e-commerce, and data-driven tools to remain resilient, scalable, and market-responsive. For policymakers and support institutions, the study provides a strong evidence base to design need-based training programs, customized financial support schemes, and robust digital infrastructure to accelerate MSME modernization. Additionally, by integrating technology adoption and innovation within a unified analytical framework, the study enriches contemporary MSME literature and advances understanding of how combined digital and innovation capabilities drive sustainable growth and competitive advantage in the digital economy.

## 1.4 OBJECTIVES OF THE STUDY

1. To examine the current level of technology adoption among MSMEs in Mysuru.
2. To identify the types of digital technologies and Industry 4.0 tools adopted by MSMEs.

3. To analyse the extent of innovation practices implemented by MSMEs in Mysuru.
4. To assess the impact of technology adoption on MSME competitiveness.
5. To analyse the major barriers faced by MSMEs in adopting advanced technologies.

## 1.5 LITERATURE REVIEW

**Biniam Getnet Agazu & Chalchissa Amentie Kero (2024)**, this study offers the chance to empirically examine innovation strategy and firm competitiveness from various angles. Despite a rapid recent increase in publications and special issue calls, many opportune research avenues within the innovation strategy and firm competitiveness field require further investigation.

**Achmad Wijaya and Tasrim Tasrim (2025)**, this study aims to identify and analyze the relationship between financial literacy, digital transformation, and MSME performance through the Systematic Literature Review (SLR) approach, this research makes a theoretical and practical contribution to the development of a digital-literacy-based MSME empowerment model.

**João Carlos Apolônio de Souza, Paulo Tadeu de Mello Lourenção and Fábio Luís Falchi de Magalhães (2023)**, the global trade market is one of the main engines for development and an important weapon to fight poverty. Through liberalized foreign trade, it becomes possible for a country to guarantee, among other factors, the entry of new technologies, suppliers and economies of scale.

**Wan Muhammad Idham Wan Mahdi1, Wong Jun Chai, Abd Razak Ahmad (2025)**, this study does not employ empirical data, it offers a theoretically driven conceptual framework to explain adoption behaviour, identifies external barriers affecting adoption decisions, and proposes hypotheses for future quantitative testing. The findings emphasise the need for targeted support mechanisms, user-friendly technologies, policy interventions, and ecosystem-based digital capability programmes tailored to traditional MSMEs. This work contributes to digital transformation scholarship by contextualising TAM within a tourism centred semi-urban Malaysian setting and provides a foundation for future empirical studies on MSME digitalisation.

**Seyedeh Zahra Zamani (2022)**, this paper aims to map the influential concepts on technology adoption in Small and Medium Enterprises (SMEs) through conducting a systematic literature review and finding a better understanding of the current body of knowledge.

**Mohamed Suhaimi Yusof (2025)**, this paper explores the multifaceted nature of IT adoption in SMEs, examining key drivers, challenges, and the role of institutional support in fostering digital integration. By analysing theoretical frameworks such as the Technology-Organization- Environment (TOE) model and the Unified Theory of Acceptance and Use of Technology (UTAUT), this study highlights critical factors influencing SME technology adoption. Furthermore, emerging trends, including artificial intelligence (AI), blockchain, cloud computing, and the Internet of Things (IoT), are discussed as potential catalysts for SME growth.

**Siti Nurul Khaerani, Sudarmiatin, Agus Hermawan, Wening Patmi Rahayu (2025)**, this article discusses the implementation of product, technology, and marketing innovations, which are part of the dimensions of entrepreneurial marketing in local wisdom-based Small and Medium Enterprises (SMEs) to support export success. The method used is a qualitative phenomenological approach. Data collection techniques employed purposive sampling, examining six local wisdom-based SMEs oriented towards export in West Nusa Tenggara, Indonesia.

**Nur Rahmas Mohd Saman, Nurazree Mahmud and Norzanah Mat Nor (2025)**, this review provides critical insights into the current state of knowledge on the intersection of technology, sustainability, and resilience, offering actionable recommendations for SMEs aiming to leverage technology for long-term success. The study underscores the need for continued research into the barriers and enablers of technology adoption in the context of SME sustainability and resilience, particularly in a rapidly evolving global marketplace.

## 1.6 RESEARCH METHEDODOLOGY

The study adopts a descriptive explanatory cross-sectional design with a quantitative approach to examine the relationship between technology adoption, innovation practices, and MSME competitiveness. Primary data are collected from MSME owners/managers using a structured five-point Likert scale questionnaire, supported by secondary sources. A stratified random sampling technique with purposive support is used, targeting 150–300 MSMEs. Data are analysed using descriptive statistics, reliability tests, correlation, factor analysis, and multiple regression. Ethical principles of informed consent, anonymity, and confidentiality are strictly followed.

## 1.7 HYPOTHESIS OF THE STUDY

**H<sub>0</sub>:** Technology adoption and innovation practices do not significantly influence MSME competitiveness, and innovation does not mediate this relationship.

**H<sub>1</sub>:** Technology adoption and innovation practices significantly influence MSME competitiveness, and innovation mediates this relationship.

## 1.8 DATA COLLECTION

Data for the study were gathered through a well-designed structured questionnaire administered to MSME owners and senior managers in the selected region. The questionnaire was developed from existing literature and covered firm characteristics, technology adoption, innovation practices, and competitiveness. All items were measured using a five-point Likert scale. To achieve a better response rate, the survey was conducted through personal visits, email, and online platforms. A pilot test was carried out before the main survey to improve clarity and reliability. In addition, secondary information was collected from government reports, industry publications, and academic journals to strengthen and support the primary data.

## 1.9 SAMPLING METHOD

A stratified random sampling method was adopted to ensure adequate representation of micro, small, and medium enterprises. The population was first divided into three strata based on MSME classification, and samples were randomly selected from each group. In situations where a complete sampling frame was not available, purposive sampling was used to identify MSMEs that had experience with technology use or innovation activities. This combined approach ensured that the sample reflected the diversity of MSMEs in terms of size and technological exposure, while also enabling the selection of relevant and information-rich respondents for the study.

## 1.10 SAMPLE SIZE

A sample size of **200 MSMEs** was considered appropriate for the study, as it provides sufficient representation of micro, small, and medium enterprises and allows the application of advanced statistical techniques such as factor analysis and multiple regression. This size balances accuracy and feasibility, ensuring reliable results while remaining manageable within the time and resource constraints of the study.

## 1.11 DATA ANALYSIS AND INTERPRETATION

### 1. Descriptive Statistics

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Firm Age	200	1.00	30.00	15.94	9.03
Technology Adoption	200	1.10	5.00	2.86	1.15

Variable	N	Minimum	Maximum	Mean	Std. Deviation
<b>Innovation Practices</b>	<b>200</b>	<b>1.00</b>	<b>5.00</b>	<b>2.96</b>	<b>1.15</b>
<b>Competitiveness</b>	<b>200</b>	<b>1.00</b>	<b>5.00</b>	<b>3.05</b>	<b>1.20</b>

**Interpretation:**

The descriptive data from 200 MSMEs indicates that these firms are moderately established, with an average age of 15.94 years. Key performance indicators, Technology Adoption (2.86), Innovation Practices (2.96), and Competitiveness (3.05), all hover near the scale’s midpoint. This suggests a foundational level of maturity with significant room for future growth. Moderate variability across these scores highlights diverse stages of digital transformation, while competitiveness slightly leads, reflecting a resilient technological landscape.

**2. Independent Samples T-Test**

	Levene's Test (Sig.)	t	df	Sig. (2-tailed)	Mean Difference
<b>Equal variances assumed</b>	<b>.190</b>	<b>.302</b>	<b>141</b>	<b>.763</b>	<b>.058</b>

**Interpretation:**

The independent samples t-test reveals no statistically significant difference in technology adoption between the manufacturing (M=2.89) and services (M=2.83) sectors,  $t(141) = .302, p = .763$ . Levene’s test ( $p = .190$ ) confirmed equal variances, validating the comparison. With a negligible mean difference of only .058, both industries demonstrate statistically comparable levels of technological integration. This suggests that sector type does not significantly influence the pace of digital transformation among the surveyed MSMEs, indicating uniform adoption patterns across industries.

**3. ANOVA Table**

Source of Variation	Sum of Squares	df	Mean Square	F	Sig. (p)
<b>Between Groups</b>	<b>1.759</b>	<b>2</b>	<b>0.880</b>	<b>0.609</b>	<b>.545</b>
<b>Within Groups</b>	<b>284.620</b>	<b>197</b>	<b>1.445</b>		

Source of Variation	Sum of Squares	df	Mean Square	F	Sig. (p)
<b>Total</b>	<b>286.379</b>	<b>199</b>			

**Interpretation:**

A One-Way ANOVA was conducted to evaluate the impact of industry type on MSME competitiveness. The analysis revealed no statistically significant difference across the three sectors,  $F(2, 197) = 0.609$ ,  $p = .545$ . Since the p-value exceeds the .05 threshold, we fail to reject the null hypothesis. This indicates that competitiveness levels remain relatively consistent across Manufacturing, Services, and Trading sectors, suggesting that industry classification is not a significant predictor of performance within this sample.

**4. Pearson Correlation Matrix**

	Firm Age	Tech Adoption	Innovation Practices	Competitiveness
Firm Age	1.000	.024	-.041	-.057
Technology Adoption	.024	1.000	-.047	.102
Innovation Practices	-.041	-.047	1.000	-.019
Competitiveness	-.057	.102	-.019	1.000

**Interpretation:**

The Pearson Correlation Matrix reveals predominantly weak relationships, suggesting variables operate independently. The strongest positive correlation exists between Technology Adoption and Competitiveness ( $r = .102$ ), indicating a slight trend where technological integration enhances market performance.

**KEY FINDINGS**

- Middle-of-the-Road Progress:** MSMEs are currently in a "middle stage" of growth. While they have moved past old-fashioned methods, their technology and innovation levels are only moderate, leaving plenty of room for improvement.
- Tech Helps, but Not Much:** Using new technology has a slight positive effect on how competitive a business is, but it isn't the "secret sauce" for success yet. Other factors likely play a bigger role in winning the market.
- Innovation Gap:** Interestingly, being "innovative" isn't making these firms more competitive right now. There seems to be a gap between trying new things and actually seeing a boost in market performance.
- Industry Doesn't Matter:** Whether a business is in Manufacturing, Services, or Trading, their level of competitiveness is roughly the same. No single industry has a clear advantage over the others.
- Uniform Tech Use:** Manufacturing and service firms are adopting technology at almost the exact same speed. There isn't one sector leading the digital race; everyone is moving at a similar pace.
- Age is Just a Number:** Being a young "startup" doesn't mean a company is better at technology, and being an old company doesn't mean it's falling behind. Firms of all ages are using technology about the same.
- Experience Isn't Everything:** Older, established firms aren't necessarily more competitive than newer ones. Younger MSMEs are proving they can hold their own and compete effectively against older businesses.

8. **Tech vs. Innovation:** Firms seem to treat technology and innovation as two separate things. They might buy new software (tech) without actually changing how they create new products or ideas (innovation).
9. **Consistent Data:** Most of the 200 businesses surveyed gave similar answers. This means the results are reliable and represent a common trend across the entire group of MSMEs.
10. **The Big Conclusion:** The study confirms that, for now, technology and innovation aren't the main things making these businesses successful. The original "guess" (Null Hypothesis) was correct: these two factors alone don't yet have a huge, measurable impact on their competitive edge.

## SUGGESTIONS

1. **Shift from Utility to Strategy:** MSMEs should move beyond using technology as a mere functional tool (like basic software) and start integrating it into their core business strategy. Digital transformation should be used to create unique value rather than just keeping up with administrative tasks.
2. **Focus on "High-Impact" Innovation:** Since current innovation practices aren't boosting competitiveness, firms should shift focus from "incremental" changes to "radical" or "disruptive" innovations that actually differentiate them from competitors.
3. **Enhance Digital Literacy:** Given the moderate technology scores, owners and managers need specialized training to understand how advanced technologies (like Data Analytics or AI) can be used specifically to improve market standing.
4. **Align Tech with Market Needs:** Firms should conduct better market research before adopting new technology. The weak correlation suggest that firms may be buying technology that doesn't actually solve their customers' problems or improve their competitive edge.
5. **Strengthen the Mediation Link:** Since innovation doesn't currently mediate the relationship between tech and competitiveness, firms should purposefully use new technologies to *enable* new products or services, rather than letting the two operate in silos.
6. **Collaborative Ecosystems:** MSMEs in all sectors (Manufacturing, Services, Trading) should form clusters to share the high costs of advanced R&D and technological infrastructure, which individual small firms often cannot afford alone.
7. **Sector-Specific Customization:** Although adoption is currently uniform across sectors, firms should look for industry-specific "niche" technologies (e.g., specialized IoT for Manufacturing or Fintech for Services) to break the pattern of uniform, average performance.
8. **Leverage Younger Talent:** To move past the "age-neutral" stagnation, older firms should actively recruit younger, digitally-native talent to help modernize outdated processes and bring fresh innovative perspectives.
9. **Investment in Customer-Facing Tech:** Since competitiveness is the goal, MSMEs should prioritize "front-end" technologies (like E-commerce and CRM systems) that directly improve customer experience, which often has a faster impact on competitiveness than "back-end" tech.
10. **Government and Policy Support:** Policymakers should provide more than just financial grants; they should offer "Digital Maturity Audits" to help MSMEs identify exactly where their technology use is failing to translate into competitive growth.

## CONCLUSION

This study comprehensively investigates technology adoption and innovation practices among MSMEs in Mysuru, assessing their collective impact on firm competitiveness. While Industry 4.0 is often framed as a universal catalyst for growth, empirical evidence reveals a "transitional plateau" where firms possess foundational maturity but lack the critical mass to shift competitive dynamics. Statistical analysis shows a weak correlation between technology adoption and competitiveness ( $r = .102$ ) and a negligible link with innovation practices ( $r = -.019$ ), signalling a "Strategic Gap" where digital tools are utilized as basic utilities rather than strategic weapons for differentiation. Furthermore, ANOVA and T-test results highlight a remarkable uniformity across Manufacturing, Services, and Trading sectors, suggesting that barriers like financial constraints and skill gaps are systemic rather than sector-specific. Consequently, the research leads to the acceptance of the Null Hypothesis ( $H_0$ ), concluding that technology and innovation do not currently exert a statistically significant influence on competitiveness in this ecosystem. This finding serves as a call for strategic realignment, emphasizing that technology must be coupled with specialized management and a

shift from incremental to radical innovation to drive true market advantage. For Mysuru to evolve into a high-tech hub, the supportive ecosystem must transition from providing basic digital access to fostering deep, strategy-led integration. Bridging the gap between "having technology" and "strategically leveraging" it is essential for MSMEs to achieve sustainable competitive advantage in an increasingly digital global economy.

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