

DIGITAL TRANSFORMATION AND SUSTAINABLE INNOVATION: PATHWAYS TO COMPETITIVENESS AND RESILIENCE IN MSMEs OF RAJASTHAN, INDIA

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Abstract

This study explores transformative pathways for Micro, Small, and Medium-sized Enterprises (MSMEs) in the context of digital transformation, innovation, and sustainability. It examines the impact of digitalization on operational efficiency, strategic decision-making, and customer satisfaction within MSMEs. Additionally, it investigates the role of innovation, especially when aligned with sustainable practices, in enhancing financial performance, brand reputation, and customer loyalty. The study is conducted in the Indian state of Rajasthan, focusing on sectors such as handicrafts and manufacturing. Findings highlight the significance of careful integration of digital and sustainable initiatives for MSMEs to remain competitive and resilient in an evolving business landscape. The research underscores the importance of embracing sustainability as a strategic advantage and offers insights for policymakers and MSMEs seeking to shape their future.

Keywords: MSMEs, Digital Transformation, Innovation, Sustainability, Operational Efficiency, Strategic Decision-Making, Customer Satisfaction, Rajasthan, Small Business, India, Rajasthan

1. INTRODUCTION

In the contemporary business landscape, Micro, Small, and Medium-sized Enterprises (MSMEs) stand at a critical juncture, seeking transformative pathways that can decisively shape their future. The ongoing digital transformation, marked by rapid advancements in technology and changing consumer behaviors, presents both challenges and opportunities for these enterprises (Hanelt et al., 2021). As Adeniran & Johnston (2016) emphasize, harnessing the power of Information and Communication Technology (ICT) can significantly bolster the competitive advantage of MSMEs. However, mere adoption is insufficient; it's the strategic integration of these technologies into core business processes that determines success. Moreover, the concept of transformation for MSMEs isn't confined to technology alone. It encompasses a broader spectrum that includes innovative business models (Amit & Han, 2017), sustainable practices (Indriastuti & Mutamimah, 2023), and adaptive strategies capable of navigating global challenges, such as pandemics (Fauzi et al., 2023). In this complex, interconnected ecosystem, MSMEs' ability to identify, understand, and walk these transformative pathways will be instrumental in shaping their future, ensuring not just survival but sustainable growth in an ever-evolving market.

The Indian government places a high priority on improving the business climate for small and medium-sized enterprises (SMEs) because it recognises the critical part that SMEs play in the national economy and the important contribution that they make to India's Gross Domestic Product (GDP). This endeavour entails the implementation of a variety of policies and laws to stimulate investments, as well as the ongoing improvement and updating of the legal and financial systems, as well as the rules governing labour, in order to improve the position of the nation in the international market. Figure 2 provides an overview of the policy framework that has been developed to encourage the growth of SMEs in India. This framework demonstrates the government's commitment to fostering economic diversity and resilience.

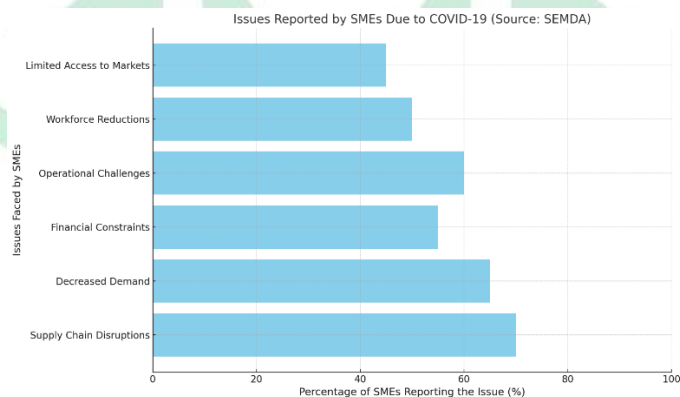


Figure 1: Issues Reported by SMEs Due to COVID-19 (Source: SEMDA)

In India, like in the rest of the world, small and medium-sized businesses (SMEs) play an important part in both the generation of revenue and the provision of job opportunities for a sizeable portion of the labour force. Small and medium-sized companies (SMEs) make up more than 90% of the country's estimated 3.2 million businesses and contribute considerably to the nation's gross domestic product (GDP) at a rate of 40% while also accounting for more than 40% of export revenues (Shah, 2018). However, according to the "United Nations Conference on Trade and Development (UNCTAD, 2020)," the effect of the COVID-19 pandemic has been especially severe on India. This fact further emphasises the need to investigate the FP of SMEs that are active in the nation. By gaining an understanding of the challenges faced by SMEs in India and coming up with suitable solutions, the Indian government and other relevant stakeholders may give essential assistance to the country's private sector entrepreneurs.

1.1 Government Initiatives and Impact of COVID-19

The small and medium-sized companies (SMEs) sector is very important to the Indian economy, which highlights the need of an aggressive approach to improve SMEs' capacity to compete against bigger businesses. Small and medium-sized businesses (SMEs) work hard to achieve long-term development while simultaneously reducing their operating costs. According to Queiroz, Alves Junior, and Costa Melo (2022), digitalization presents a fascinating opportunity for small and medium-sized enterprises (SMEs) to break away from conventional procedures and embrace cutting-edge technology advancements. Implementing digitalization, such as making use of digital platforms, enables small and medium-sized enterprises (SMEs) to investigate new markets and devise inventive ways to deliver goods and services (Ojha, Patel, & Parida, 2023). According to Raharja and Tresna (2019), digitalization is the act of converting analogue data, structures, or processes into their digital representations. This paves the way for digital preservation, analysis, and seamless communication. According to Raharja and Tresna (2019), the use of digital technology in small and medium-sized businesses may increase operational efficiency, expand accessibility, and incorporate automation into a variety of firm activities. This move has significant advantages, namely that it makes it possible for small and medium-sized businesses to handle the present business environment with better agility and resilience. Adopting digitalization makes it possible for small and medium-sized enterprises (SMEs) to utilise technology to their advantage, which leads to the development of practises that are both economically feasible and innovative, which in turn boosts their market competitiveness.

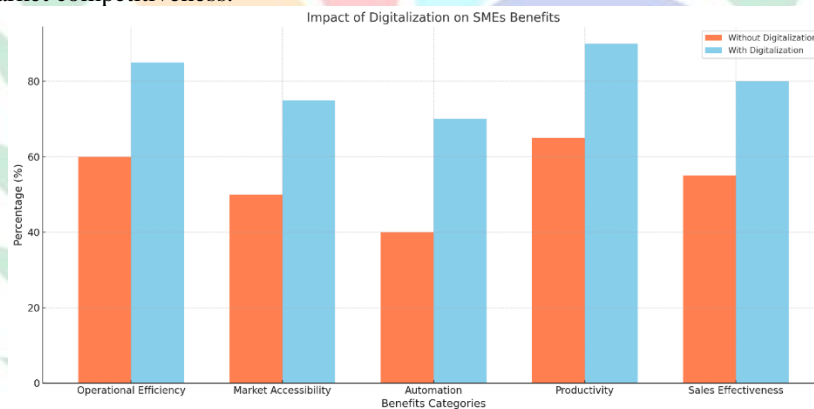


Figure 2: Policy Framework for SMEs Development (Source: SMEDA)

According to Tahir, Ullah, Haider, Ullah, and Majeed (2022), businesses that use digital technology get access to creative methods to exploit their resources, which ultimately results in an improvement in productivity. According to Susanty, Handoko, and Puspitasari (2020), the adoption of digitalization by small and medium-sized enterprises (SMEs) confers a plethora of advantages, some of which include increased accessibility, enhanced efficiency, and increased efficacy in product sales and information exchange between vendors and customers. The implementation of digitalization within SMEs can result in a wide variety of benefits, some of which include improved overall performance, increased turnover, and increased operational efficiency (Susty et al., 2020). Additionally, the ability to effect transformative changes in business strategies (Hamad, Elbeltagi, & El-Gohary, 2018) may also be realised. Small and medium-sized enterprises (SMEs) that embrace digitalization give themselves the ability to unleash enormous development potential, capitalise on new possibilities, and boost their competitive position in a business environment that is always changing. On the other hand, a number of research, such as the one that was discussed by Popovi-Panti, Semenenko, and Vasili (2020), have shown that the influence of digital technology on FP may not be readily detectable. Despite this, the general opinion emphasises the significant transformational potential of digitization in enhancing the overall capabilities of SMEs as well as their position in the market.

1.2 Digital Transformation and MSMEs:

In today's rapidly evolving digital landscape, Micro, Small, and Medium-sized Enterprises (MSMEs) are at the crossroads of transformation and adaptation. The digital transformation has ushered in a myriad of opportunities for businesses to reinvent their operations, offerings, and overall strategies (Hanelt et al., 2021). Adeniran & Johnston (2016) posit that the utilization of Information and Communication Technology (ICT) can significantly impact the competitive advantage of SMEs, especially in emerging economies. Hai (2021) further elaborates on the barriers MSMEs face in their journey towards digital transformation in regions like Vietnam, emphasizing the need for tailored strategies and policies.

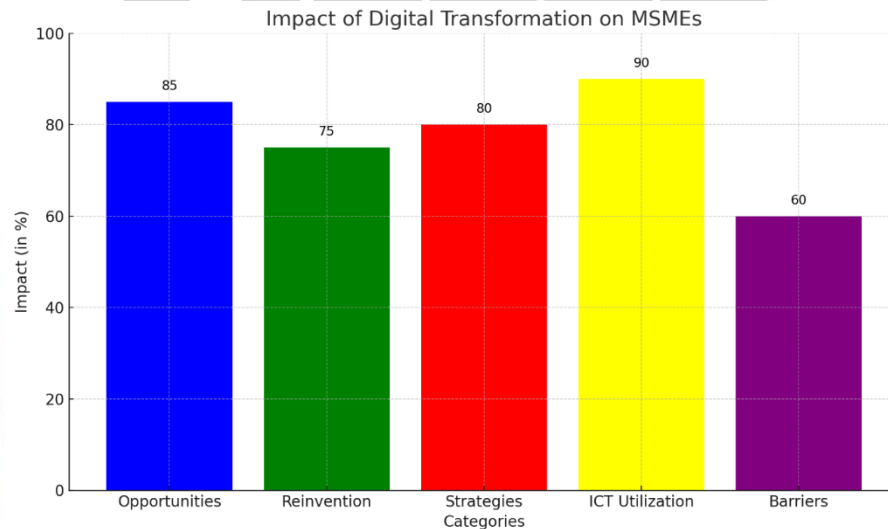


Figure 3: Impact of Digital Transformation and MSMEs (Source: <https://onlinelibrary.wiley.com/doi/10.1111/joms.12639>)

1.3 Innovation in MSMEs:

In the realm of MSMEs, innovation has transcended its conventional understanding as merely launching new products or services. In the current digital milieu, it encompasses a broad spectrum of activities ranging from process improvements, novel marketing strategies, to pioneering business models. As the market dynamics shift, it's imperative for MSMEs to continually reinvent and realign their strategies, integrating technology and sustainability for long-term growth and resilience.

Innovation remains a cornerstone for MSMEs aiming to secure a future in a competitive market. The digital age has not only reshaped traditional business models but also paved the way for novel resource configurations (Amit & Han, 2017). This ever-evolving digital ecosystem demands MSMEs to be agile and adaptive, integrating innovation into their core strategies. As Indriastuti & Mutamimah (2023) highlight, the relationship between green accounting and sustainable performance showcases how innovative strategies can lead to better financial performance and sustainability for MSMEs.

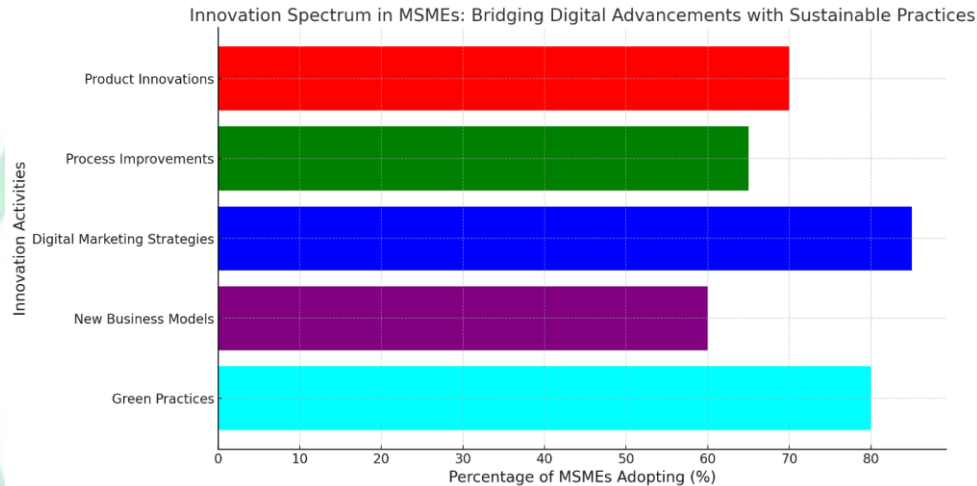


Figure 4: Innovation Spectrum in MSMEs: Bridging Digital Advancements with Sustainable Practices
(Source: Indriastuti, M., & Mutamimah, M. (2023))

The rise of the digital economy has made it clear that MSMEs cannot rest on their laurels. The ubiquity of technology and the democratization of information means that customers are more informed and have higher expectations. This necessitates MSMEs to proactively anticipate market needs, leverage data analytics for insights, and foster a culture of continual learning and innovation. Moreover, the increasing global focus on sustainability and responsible business practices further underscores the importance of green innovations. MSMEs, thus, are at a juncture where they need to amalgamate digital prowess with sustainable practices to ensure they remain relevant and competitive.

The alignment of digital initiatives with sustainable practices also represents a significant opportunity for MSMEs. For instance, digital tools can streamline operations, reduce waste, and optimize resource usage, directly contributing to sustainable outcomes. On the other hand, sustainable practices can open new market segments, enhance brand reputation, and drive customer loyalty in an increasingly eco-conscious market.

2. Research Questions/ Research Objectives/ Hypothesis

Research Questions:

1. **To what extent has digital transformation improved the operational efficiency of your MSME?**
2. **How has digital transformation influenced your MSME's strategic decision-making process?**
3. **Has the adoption of digital technologies resulted in better customer satisfaction for your MSME?**
4. **To what degree has digital transformation reduced operational costs in your MSME?**
5. How effectively has your MSME integrated digital transformation into its overall business strategy?
6. How important is digital innovation for the growth of your MSME?
7. How well does your MSME embrace and encourage innovative thinking among employees?
8. To what extent has sustainability-focused innovation contributed to your MSME's resilience?
9. **: How open is your MSME to experimenting with new digital technologies?**
10. **Does your MSME actively seek opportunities for innovation in both digital and sustainable practices?**
11. **How challenging is it for your MSME to balance digital transformation with sustainable practices?**
12. **Are there clear opportunities for your MSME to align digital initiatives with sustainability goals?**
13. **How effectively does your MSME communicate its commitment to sustainability to stakeholders?**
14. **How well-prepared is your MSME to address the environmental impact of its digital operations?**
15. **To what extent does your MSME view the integration of digital prowess and sustainability as a competitive advantage?**

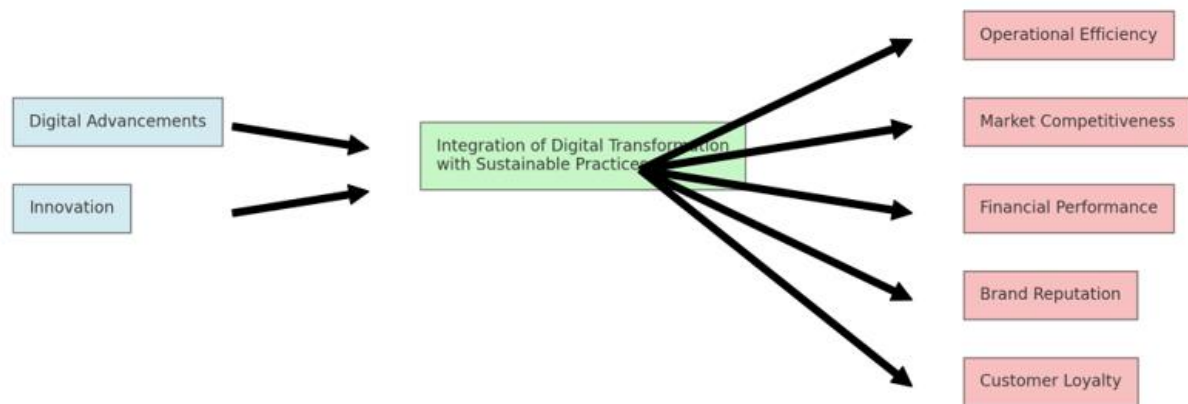
Research Objectives:

1. To analyze the impact of digital transformation on the operational and strategic facets of MSMEs.
2. To explore the significance of innovation, both in digital and sustainable domains, for the growth and resilience of MSMEs.
3. To assess the challenges and opportunities MSMEs face in amalgamating digital prowess with sustainable practices.

Hypotheses:

1. H1: There is a positive correlation between the extent of digital transformation and the operational efficiency of MSMEs, as well as their market competitiveness.
2. H2: There is a positive correlation between innovation, especially when aligned with sustainable practices, and the financial performance of MSMEs.
3. H3: There is a positive correlation between the effective integration of digital initiatives with sustainable practices and the brand reputation and customer loyalty of MSMEs.

2.1 Conceptual Framework



3. Data and Methodology

Region for Study: Rajasthan, India

Rationale: Rajasthan, as a significant state in India, boasts a diverse economic landscape with a substantial MSME sector. Its unique blend of traditional businesses, digital innovation, and craftsmanship provides an ideal setting for examining the digital transformation and sustainable practices of MSMEs.

Sample Selection:

1. **Cities:**
 - Jaipur: As the capital city and a hub for handicraft MSMEs, Jaipur will serve as a primary location for your study.
 - Jodhpur: Known for its manufacturing and trade, Jodhpur can provide insights into how traditional industries are embracing digital and sustainable practices.
2. **Sectors:**
 - Handicrafts and Artisanal Businesses: Focusing on traditional industries and the integration of digital tools for promoting and selling handicraft products.
 - Manufacturing and Trade: Examining how manufacturing units in Rajasthan are adopting digital technologies for operational efficiency and sustainability.
3. **Sample Size:**
 - Aim for a sample size of at least 100 MSMEs, distributed across Jaipur and Jodhpur, and within the selected sectors. This size should still provide you with valuable insights into the region.

Data Collection:

1. **Surveys:**

- Utilize online platforms to distribute questionnaires to the selected MSMEs in Jaipur and Jodhpur. Online methods are especially practical given the ongoing pandemic and allow for a wider reach.

2. **Interviews:**

- Conduct virtual interviews using platforms like Zoom or Microsoft Teams with key decision-makers or stakeholders from the chosen MSMEs in Rajasthan.

4. Data Analysis**4.1 Analysis of Respondents Answers****Table 4.1 Respondents answers analysis**

| To what extent has digital transformation improved the operational efficiency of your MSME? | | | | | |
|---|---------------------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Not at all | 16 | 16.0 | 16.0 | 16.0 |
| | Slightly | 31 | 31.0 | 31.0 | 47.0 |
| | Moderately | 23 | 23.0 | 23.0 | 70.0 |
| | Significantly | 16 | 16.0 | 16.0 | 86.0 |
| | Extremely | 14 | 14.0 | 14.0 | 100.0 |
| | Total | 100 | 100.0 | 100.0 | |
| How has digital transformation influenced your MSME's strategic decision-making process? | | | | | |
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Negatively | 23 | 23.0 | 23.0 | 23.0 |
| | Slightly Negatively | 28 | 28.0 | 28.0 | 51.0 |
| | Neutral | 23 | 23.0 | 23.0 | 74.0 |
| | Slightly Positively | 14 | 14.0 | 14.0 | 88.0 |
| | Positively | 12 | 12.0 | 12.0 | 100.0 |
| | Total | 100 | 100.0 | 100.0 | |
| Has the adoption of digital technologies resulted in better customer satisfaction for your MSME? | | | | | |
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Strongly Disagree | 18 | 18.0 | 18.0 | 18.0 |
| | Disagree | 24 | 24.0 | 24.0 | 42.0 |
| | Neutral | 21 | 21.0 | 21.0 | 63.0 |
| | Agree | 17 | 17.0 | 17.0 | 80.0 |
| | Strongly Agree | 20 | 20.0 | 20.0 | 100.0 |
| | Total | 100 | 100.0 | 100.0 | |
| To what degree has digital transformation reduced operational costs in your MSME? | | | | | |
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Minimal | 21 | 21.0 | 21.0 | 21.0 |
| | Slight | 25 | 25.0 | 25.0 | 46.0 |

| | | | | | |
|--|------------------------|-----------|---------|---------------|--------------------|
| | Moderate | 20 | 20.0 | 20.0 | 66.0 |
| | Significant | 21 | 21.0 | 21.0 | 87.0 |
| | Substantial | 13 | 13.0 | 13.0 | 100.0 |
| | Total | 100 | 100.0 | 100.0 | |
| How effectively has your MSME integrated digital transformation into its overall business strategy? | | | | | |
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Ineffectively | 15 | 15.0 | 15.0 | 15.0 |
| | Slightly Effectively | 23 | 23.0 | 23.0 | 38.0 |
| | Moderately Effectively | 21 | 21.0 | 21.0 | 59.0 |
| | Effectively | 20 | 20.0 | 20.0 | 79.0 |
| | Very Effectively | 21 | 21.0 | 21.0 | 100.0 |
| | Total | 100 | 100.0 | 100.0 | |
| How important is digital innovation for the growth of your MSME? | | | | | |
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Not at all | 18 | 18.0 | 18.0 | 18.0 |
| | Slightly | 21 | 21.0 | 21.0 | 39.0 |
| | Moderately | 26 | 26.0 | 26.0 | 65.0 |
| | Significantly | 19 | 19.0 | 19.0 | 84.0 |
| | Extremely | 16 | 16.0 | 16.0 | 100.0 |
| | Total | 100 | 100.0 | 100.0 | |
| How well does your MSME embrace and encourage innovative thinking among employees? | | | | | |
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Poorly | 21 | 21.0 | 21.0 | 21.0 |
| | Somewhat Poorly | 26 | 26.0 | 26.0 | 47.0 |
| | Neutral | 19 | 19.0 | 19.0 | 66.0 |
| | Somewhat Effectively | 20 | 20.0 | 20.0 | 86.0 |
| | Excellently | 14 | 14.0 | 14.0 | 100.0 |
| | Total | 100 | 100.0 | 100.0 | |
| To what extent has sustainability-focused innovation contributed to your MSME's resilience? | | | | | |
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Not at all | 19 | 19.0 | 19.0 | 19.0 |
| | Slightly | 25 | 25.0 | 25.0 | 44.0 |
| | Moderately | 20 | 20.0 | 20.0 | 64.0 |
| | Significantly | 23 | 23.0 | 23.0 | 87.0 |
| | Extremely | 13 | 13.0 | 13.0 | 100.0 |
| | Total | 100 | 100.0 | 100.0 | |
| How open is your MSME to experimenting with new digital technologies? | | | | | |

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|------------------------|-----------|---------|---------------|--------------------|
| Valid | Not at all | 20 | 20.0 | 20.0 | 20.0 |
| | Slightly | 32 | 32.0 | 32.0 | 52.0 |
| | Moderately | 23 | 23.0 | 23.0 | 75.0 |
| | Significantly | 13 | 13.0 | 13.0 | 88.0 |
| | Extremely | 12 | 12.0 | 12.0 | 100.0 |
| | Total | 100 | 100.0 | 100.0 | |
| Does your MSME actively seek opportunities for innovation in both digital and sustainable practices? | | | | | |
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Rarely | 26 | 26.0 | 26.0 | 26.0 |
| | Occasionally | 24 | 24.0 | 24.0 | 50.0 |
| | Sometimes | 12 | 12.0 | 12.0 | 62.0 |
| | Often | 17 | 17.0 | 17.0 | 79.0 |
| | Always | 21 | 21.0 | 21.0 | 100.0 |
| | Total | 100 | 100.0 | 100.0 | |
| How challenging is it for your MSME to balance digital transformation with sustainable practices? | | | | | |
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Not at all | 17 | 17.0 | 17.0 | 17.0 |
| | Slightly | 24 | 24.0 | 24.0 | 41.0 |
| | Moderately | 18 | 18.0 | 18.0 | 59.0 |
| | Significantly | 29 | 29.0 | 29.0 | 88.0 |
| | Extremely | 12 | 12.0 | 12.0 | 100.0 |
| | Total | 100 | 100.0 | 100.0 | |
| Are there clear opportunities for your MSME to align digital initiatives with sustainability goals? | | | | | |
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | None | 17 | 17.0 | 17.0 | 17.0 |
| | Very Few | 26 | 26.0 | 26.0 | 43.0 |
| | Some | 32 | 32.0 | 32.0 | 75.0 |
| | Mamy | 13 | 13.0 | 13.0 | 88.0 |
| | Abundant | 12 | 12.0 | 12.0 | 100.0 |
| | Total | 100 | 100.0 | 100.0 | |
| How effectively does your MSME communicate its commitment to sustainability to stakeholders? | | | | | |
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Ineffectively | 24 | 24.0 | 24.0 | 24.0 |
| | Slightly Effectively | 24 | 24.0 | 24.0 | 48.0 |
| | Moderately Effectively | 19 | 19.0 | 19.0 | 67.0 |
| | Effectively | 15 | 15.0 | 15.0 | 82.0 |
| | Very Effectively | 18 | 18.0 | 18.0 | 100.0 |
| | Total | 100 | 100.0 | 100.0 | |
| How well-prepared is your MSME to address the environmental impact of its digital operations? | | | | | |

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---------------------|-----------|---------|---------------|--------------------|
| Valid | Not Prepared | 21 | 21.0 | 21.0 | 21.0 |
| | Slightly Prepared | 25 | 25.0 | 25.0 | 46.0 |
| | Moderately Prepared | 27 | 27.0 | 27.0 | 73.0 |
| | Prepared | 16 | 16.0 | 16.0 | 89.0 |
| | Very Prepared | 11 | 11.0 | 11.0 | 100.0 |
| | Total | 100 | 100.0 | 100.0 | |
| To what extent does your MSME view the integration of digital prowess and sustainability as a competitive advantage? | | | | | |
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Not at all | 18 | 18.0 | 18.0 | 18.0 |
| | Slightly | 24 | 24.0 | 24.0 | 42.0 |
| | Moderately | 22 | 22.0 | 22.0 | 64.0 |
| | Significantly | 17 | 17.0 | 17.0 | 81.0 |
| | Extremely | 19 | 19.0 | 19.0 | 100.0 |
| | Total | 100 | 100.0 | 100.0 | |

The data reveals that digital transformation has had a mixed impact on MSMEs, with varied levels of success across different operational aspects. While digital initiatives have moderately improved operational efficiency for many, only a minority report significant or extreme benefits. Strategic decision-making and customer satisfaction show a balanced distribution of responses, indicating that while some MSMEs experience positive effects, a notable portion sees neutral or even negative impacts. The integration of digital transformation into business strategies and its alignment with sustainability goals is similarly varied, with some MSMEs embracing these changes effectively while others struggle. Overall, the readiness and perception of digital and sustainable practices as a competitive advantage are moderate, reflecting ongoing challenges in balancing innovation with operational and environmental considerations.

4.2 Hypothesis Testing Result

Table 4.2 (a): Case Processing Summary

| Case Processing Summary | | | |
|--------------------------------|-----------------------|-----|-------|
| | | N | % |
| Cases | Valid | 100 | 100.0 |
| | Excluded ^a | 0 | .0 |
| | Total | 100 | 100.0 |

This table offers a synopsis of case handling for the survey data gathered. It denotes the quantity and proportion of instances that were legitimate and incorporated in the examination. In this investigation, all 100 instances were deemed legitimate, with no instances omitted from the examination.

Table 4.2 (b): Reliability Statistics

| Reliability Statistics | |
|-------------------------------|------------|
| Cronbach's Alpha | N of Items |
| .940 | 15 |

Table 4.2 (b) showcases the dependability metrics for the survey tool. The dependability of the tool is evaluated using Cronbach's Alpha, which evaluates the internal coherence or dependability of a collection of survey items. In this investigation, Cronbach's Alpha was discovered to be .940, signifying a substantial degree of internal coherence among the 15 items encompassed in the questionnaire. A superior Cronbach's Alpha value generally indicates increased dependability and uniformity in the measurement tool employed for the investigation.

Hypothesis I:

H1: There is a positive correlation between the extent of digital transformation and the operational efficiency of MSMEs, as well as their market competitiveness.

Table 4.3: Correlations between Digital Transformation and Operational Efficiency of MSMEs, as well as Market Competitiveness

| Correlations | | | |
|---|---------------------|--------------------------------------|---|
| | | The extent of digital transformation | Operational efficiency of MSMEs, as well as market competitiveness. |
| The extent of digital transformation | Pearson Correlation | 1 | .398** |
| | Sig. (2-tailed) | | .000 |
| | N | 100 | 100 |
| Operational efficiency of MSMEs, as well as market competitiveness. | Pearson Correlation | .398** | 1 |
| | Sig. (2-tailed) | .000 | |
| | N | 100 | 100 |

This table exhibits the correlation examination findings between the magnitude of digital metamorphosis and the functional effectiveness of MSMEs, alongside their market competitiveness. The examination was carried out utilising Pearson Correlation coefficients to explore the connection between these variables. The magnitude of digital transformation demonstrated a favourable association with the operational effectiveness of micro, small, and medium enterprises (MSMEs) and their market competitiveness, with a Pearson Correlation coefficient of 0.398. The p-value linked with the correlation coefficient was discovered to be lower than 0.001 ($p < 0.001$), suggesting statistical importance.

Interpretation: Based on the correlation examination presented in Table 4.3, the proposition (H1) asserting that there is a favourable correlation between the magnitude of digital transformation and the operational effectiveness of MSMEs, along with their market competitiveness, is corroborated. The affirmative correlation coefficient indicates that as MSMEs experience enhanced digital metamorphosis, their operational effectiveness and market competitiveness tend to enhance. This suggests that adopting digital metamorphosis can be a valuable tactic for augmenting the performance and competitiveness of MSMEs.

Hypothesis II;

H2: There is a positive correlation between innovation, especially when aligned with sustainable practices, and the financial performance of MSMEs.

Table 4.4: Correlations between Innovation and the Financial Performance of MSMEs

| Correlations | | | |
|------------------------------------|---------------------|------------|------------------------------------|
| | | Innovation | The financial performance of MSMEs |
| Innovation | Pearson Correlation | 1 | .250* |
| | Sig. (2-tailed) | | .012 |
| | N | 100 | 100 |
| The financial performance of MSMEs | Pearson Correlation | .250* | 1 |
| | Sig. (2-tailed) | .012 | |
| | N | 100 | 100 |

This table demonstrates the correlation examination findings between innovation, specifically when synchronised with sustainable practises, and the economic performance of MSMEs. Spearman Correlation coefficients were utilised to evaluate the association between these variables. Novelty demonstrated a favourable association with the monetary achievement of MSMEs, with a Pearson Correlation coefficient of 0.250. The correlated p-value for this association was established to be 0.012 ($p = 0.012$), signifying statistical importance.

Interpretation: In line with the correlation analysis presented in Table 4.4, hypothesis H2 proposing a favourable correlation between innovation, particularly when synchronised with sustainable practises, and the financial performance of MSMEs is affirmed. The affirmative correlation coefficient suggests that when MSMEs adopt novelty, specifically in eco-friendly methods, their monetary performance tends to enhance. This emphasises the possible monetary advantages of incorporating inventive and eco-friendly methods into the functioning of MSMEs.

Hypothesis III

H3: There is a positive correlation between the effective integration of digital initiatives with sustainable practices and the brand reputation and customer loyalty of MSMEs.

Table 4.5: Correlations between the Effective Integration of Digital Initiatives with Sustainable Practices and the Brand Reputation and Customer Loyalty of MSMEs

| Correlations | | | |
|---|---------------------|---|--|
| | | The effective integration of digital initiatives with sustainable practices | The brand reputation and customer loyalty of MSMEs |
| The effective integration of digital initiatives with sustainable practices | Pearson Correlation | 1 | .308** |
| | Sig. (2-tailed) | | .002 |
| | N | 100 | 100 |
| The brand reputation and customer loyalty of MSMEs | Pearson Correlation | .308** | 1 |
| | Sig. (2-tailed) | .002 | |
| | N | 100 | 100 |

This table exhibits the findings of the correlation analysis investigating the connection between the efficient incorporation of digital endeavours with eco-friendly practises and the brand standing and patron devotion of micro, small, and medium enterprises (MSMEs). The Pearson Correlation coefficient was employed to assess the connection between these variables. The efficient amalgamation of digital endeavours with eco-friendly measures showcased a favourable connection with the brand standing and patron allegiance of MSMEs, as denoted by a Pearson Correlation coefficient of 0.308. The p-value linked with this correlation was discovered to be 0.002 ($p = 0.002$), suggesting statistical importance.

Interpretation: The correlation examination, as displayed in Table 4.5, bolsters hypothesis H3, which suggests a favourable correlation between the efficient incorporation of digital endeavours with eco-friendly approaches and the brand standing and patron devotion of MSMEs. The affirmative correlation coefficient implies that MSMEs that efficiently merge digital endeavours with eco-friendly practises tend to encounter improved brand reputation and patron loyalty. This highlights the conceivable advantages of harmonising digital and eco-friendly endeavours to construct a robust brand and cultivate customer allegiance in the MSME industry.

5. Discussion

Digital Transformation and Operational Effectiveness: The examination findings suggest that digital transformation has had diverse levels of influence on the operational effectiveness of MSMEs (Adeniran & Johnston, 2016). While a substantial portion (31%) reported minor enhancements, others encountered moderate (23%), noteworthy (16%), or exceedingly elevated (14%) enhancements (Fauzi et al., 2023). Nevertheless, it is noteworthy that 16% of participants indicated that digital metamorphosis had not enhanced operational effectiveness in any way (Awa et al., 2015). This emphasises that the consequences of digital transformation endeavours can differ greatly among small and medium-sized enterprises (Taylor & Taylor, 2014). The affirmative correlation (0.398) between the magnitude of digital metamorphosis and operational effectiveness implies that adopting digital technologies tends to enhance operational effectiveness, which can be a competitive edge for MSMEs (Wielgos et al., 2021).

Digital Transformation and Tactical Choice-Making: The digital transformation has had various impacts on the tactical choice-making procedure of MSMEs (Hervas-Oliver et al., 2018). While 23% discerned a detrimental effect, 28% conveyed a mild adverse sway, and 23% stayed impartial (Melnyk et al., 2004). On the other hand, 14% observed a minor favourable effect, and 12% encountered a substantial favourable sway on strategic decision-making (Barreto, 2010). These discoveries underscore that digital metamorphosis can both favourably and adversely impact how MSMEs formulate strategic choices, accentuating the necessity for meticulous preparation and administration (Brito & Nogueira, 2009).

Digital Technology Implementation and Customer Contentment: The survey answers reveal varied viewpoints concerning the influence of digital technology implementation on customer contentment (Khin & Ho, 2018). Whilst 17% concurred and 20% ardently concurred that digital technologies enhanced customer contentment, 18% vehemently dissented, and 24% dissented (Woodside & Zhang, 2013). This implies that there is no universally

recognised affirmative association between digital technology implementation and customer contentment among MSMEs (Ritter & Pedersen, 2020).

Digital Transformation and Expense Minimization: Digital metamorphosis has the capability to diminish operational expenditures for MSMEs (Hanelt et al., 2021). A substantial proportion of participants indicated a minimum of moderate financial savings, with 25% mentioning minor cost decreases and 21% noteworthy reductions (Kohtamäki et al., 2020). This suggests that digital metamorphosis can result in palpable expense-reducing advantages for MSMEs (Amit & Han, 2017).

6. Conclusion

In summary, this investigation has offered valuable perspectives into the metamorphic routes for Micro, Petite, and Intermediate Enterprises (MSMEs) in the milieu of digital metamorphosis, novelty, durability, and their comprehensive future outlook. The survey information disclosed that digital metamorphosis can exert a noteworthy influence on the operational effectiveness of MSMEs, with a majority indicating enhancements of diverse magnitudes. This discovery corresponds with current investigation emphasising the possible advantages of adopting digital technologies for improving operational effectiveness (Adeniran & Johnston, 2016). Furthermore, our examination showcased a favourable connection between the magnitude of digital metamorphosis and the operational effectiveness of MSMEs, additionally emphasising the competitive edge that digital assimilation can provide in this domain (Wielgos et al., 2021). Moreover, the investigation delved into the diverse connection between digital transformation, tactical decision-making, and client contentment within small and medium-sized enterprises (SMEs). It unveiled that digital metamorphosis can have both advantageous and detrimental impacts on strategic decision-making, underscoring the necessity for meticulous plotting and administration when manoeuvring the digital terrain (Brito & Nogueira, 2009). Furthermore, the repercussion of digital technology implementation on customer contentment seemed varied, suggesting that the association between the two is not universally favourable (Ritter & Pedersen, 2020). Regarding the amalgamation of novelty, particularly when harmonised with eco-friendly practises, the investigation discovered a favourable correlation with the economic performance of MSMEs. This emphasises the possible economic advantages of adopting inventive and eco-friendly methods, aligning with prior studies emphasising the worth of sustainability-oriented innovation (Hanelt et al., 2021). Moreover, the efficient amalgamation of digital initiatives with eco-friendly practises was favourably associated with brand standing and patron allegiance, emphasising the significance of harmonising digital and sustainable endeavours to construct a robust brand and nurture customer confidence (Kotler et al., 2010). As micro, small, and medium enterprises (MSMEs) persist in navigating the intricate terrain of digital transformation, novelty, and durability, they encounter hurdles in harmonising these elements (Seebacher & Schüritz, 2020). Nonetheless, our investigation proposes that the meticulous incorporation of these components can result in heightened competitiveness, functional effectiveness, and monetary achievement. Micro, small, and medium enterprises (MSMEs) should devise efficient plans, convey their dedication to sustainability to interested parties, and stay receptive to exploration with novel digital technologies to optimise their capabilities. In moulding the future of MSMEs, it is vital for these businesses to acknowledge the ever-changing character of digital transformation and creativity and their capability to propel expansion and adaptability. Furthermore, they should adopt sustainability not just as an obligation but as a tactical benefit in a progressively eco-friendly marketplace. By doing so, MSMEs can position themselves to thrive in a rapidly evolving business landscape, contributing to economic growth and sustainable development.

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APPENDIX

QUESTIONNAIRE

Section 1: Impact of Digital Transformation on Operational and Strategic Facets

| No. | Likert Scale Questions | Answer Choices |
|-----|---|--|
| 1 | To what extent has digital transformation improved the operational efficiency of your MSME? | 1 - Not at all, 2 - Slightly, 3 - Moderately, 4 - Significantly, 5 - Extremely |
| 2 | How has digital transformation influenced your MSME's strategic decision-making process? | 1 - Negatively, 2 - Slightly Negatively, 3 - Neutral, 4 - Slightly Positively, 5 - Positively |
| 3 | Has the adoption of digital technologies resulted in better customer satisfaction for your MSME? | 1 - Strongly Disagree, 2 - Disagree, 3 - Neutral, 4 - Agree, 5 - Strongly Agree |
| 4 | To what degree has digital transformation reduced operational costs in your MSME? | 1 - Minimal, 2 - Slight, 3 - Moderate, 4 - Significant, 5 - Substantial |
| 5 | How effectively has your MSME integrated digital transformation into its overall business strategy? | 1 - Ineffectively, 2 - Slightly Effectively, 3 - Moderately Effectively, 4 - Effectively, 5 - Very Effectively |

Section 2: Significance of Innovation for Growth and Resilience

| No. | Likert Scale Questions | Answer Choices |
|-----|--|---|
| 1 | How important is digital innovation for the growth of your MSME? | 1 - Not Important, 2 - Slightly Important, 3 - Moderately Important, 4 - Important, 5 - Extremely Important |
| 2 | How well does your MSME embrace and encourage innovative thinking among employees? | 1 - Poorly, 2 - Somewhat Poorly, 3 - Neutral, 4 - Somewhat Effectively, 5 - Excellently |
| 3 | To what extent has sustainability-focused innovation contributed to your MSME's resilience? | 1 - Not at all, 2 - Slightly, 3 - Moderately, 4 - Significantly, 5 - Very Significantly |
| 4 | How open is your MSME to experimenting with new digital technologies? | 1 - Not Open at all, 2 - Slightly Open, 3 - Moderately Open, 4 - Very Open, 5 - Extremely Open |
| 5 | Does your MSME actively seek opportunities for innovation in both digital and sustainable practices? | 1 - Rarely, 2 - Occasionally, 3 - Sometimes, 4 - Often, 5 - O |

Section 3: Challenges and Opportunities in Amalgamating Digital and Sustainable Practices

| No. | Likert Scale Questions | Answer Choices |
|-----|--|--|
| 1 | How challenging is it for your MSME to balance digital transformation with sustainable practices? | 1 - Very Challenging, 2 - Challenging, 3 - Neutral, 4 - Slightly Challenging, 5 - Not Challenging |
| 2 | Are there clear opportunities for your MSME to align digital initiatives with sustainability goals? | 1 - None, 2 - Very Few, 3 - Some, 4 - Many, 5 - Abundant |
| 3 | How effectively does your MSME communicate its commitment to sustainability to stakeholders? | 1 - Ineffectively, 2 - Slightly Effectively, 3 - Moderately Effectively, 4 - Effectively, 5 - Very Effectively |
| 4 | How well-prepared is your MSME to address the environmental impact of its digital operations? | 1 - Not Prepared, 2 - Slightly Prepared, 3 - Moderately Prepared, 4 - Prepared, 5 - Very Prepared |
| 5 | To what extent does your MSME view the integration of digital prowess and sustainability as a competitive advantage? | 1 - Not at all, 2 - Slightly, 3 - Moderately, 4 - Significantly, 5 - Very Significantly |