

The Impact of Digitalization and Innovation on the Sustainability of MSMEs in Malang City: The Role of Employee Adaptability as a Mediating Variable

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ABSTRACT

This study aims to analyze the impact of digitalization and innovation on the sustainability of MSMEs in Malang City, with employee adaptability as a mediating variable. A total of 100 MSME actors in Malang City were selected as respondents, with data collected through questionnaires and analyzed using the SmartPLS 3 application and purposive sampling method. The results show that digitalization positively affects the sustainability of MSMEs, where the implementation of digital technologies enhances efficiency and competitiveness. Furthermore, innovation in products and business processes also has a positive impact on the sustainability of MSMEs by increasing market appeal and operational efficiency. Employee adaptability was found to play a significant mediating role, influencing how successfully digitalization and innovation can be implemented in MSMEs. This study provides insights for MSME actors in Malang City to better optimize digitalization and innovation by involving the role of employee adaptability to enhance the longterm sustainability of their businesses.

Keywords: Digitalization, Innovation, MSME Sustainability, Employee Adaptability

1. INTRODUCTION

The emergence of new digital technologies, such as artificial intelligence (AI), the Internet of Things (IoT), big data analytics, and 3D printing, has had a significant impact on how companies transform and compete in the global market (Candi & Beltagui, 2019). Digitalization has become a key process that enables companies to survive and grow in an increasingly competitive business environment. For micro, small, and medium enterprises (MSMEs), adopting digital technology is a crucial step in improving operational efficiency, expanding market reach, and optimizing competitiveness in the global market (Onsardi; Juita, 2020).

However, implementing digital technology in MSMEs also presents challenges, particularly in terms of resource limitations and employees' ability to adapt to technological changes. Previous research has shown that the success of digitalization in MSMEs is significantly influenced by internal factors, such as employee adaptability, which plays a crucial role in ensuring the successful implementation of technological changes (Kusumawati, 2022). High employee adaptability enables MSMEs to more easily integrate new technologies, enhance work efficiency, and maintain business sustainability.

Innovation is also a critical factor in ensuring the sustainability of MSMEs. Innovation in products, services, and business processes provides the added value needed to maintain competitiveness. MSMEs that can innovate in response to changing market trends and consumer needs are more likely to survive and grow. According to data from the World Intellectual Property Organization (WIPO, 2023), Indonesia ranks 61st out of 132 countries in terms of innovation, indicating significant potential for innovation development, particularly in the MSME sector.

In Malang City, MSMEs play a vital role in the local economy, with leading sectors such as culinary, handicrafts, and tourism continuing to grow. However, despite the significant potential, MSMEs in Malang City still face various challenges, particularly related to the low adoption of digital technology, limited capital, and a lack of product innovation. These factors hinder the ability of MSMEs to grow and compete in an increasingly competitive market.

Additionally, according to the Malang City Office of Cooperatives and MSMEs (2023), the number of MSMEs in the city continues to increase each year, highlighting the sector's crucial role in the local economy. Malang City has more than 40,000 MSME units across various sectors, including culinary, fashion, handicrafts, and services. However, the level of digital technology adoption among MSMEs remains relatively low, with only about 40% of MSMEs effectively utilizing digital technology in their business operations. This indicates a digital gap that could hinder the

competitiveness of MSMEs in the era of digital transformation. Therefore, this study is relevant in understanding how digitalization can enhance MSME sustainability and how human resource readiness, particularly employee adaptability, plays a role in maximizing the positive impact of digitalization.

On the other hand, studies on innovation in MSMEs have also shown that product and business model innovation can increase business resilience in competitive environments. Merín-Rodrigáñez et al. (2024) emphasized that innovation in digital marketing strategies and platform-based business models significantly contributes to MSME growth. Meanwhile, Bocken et al. (2022) found that successful innovation often depends on workforce readiness to embrace change. However, research gaps remain in understanding how innovation and digitalization interact and how employee adaptability serves as a bridge between these aspects and MSME sustainability.

The contribution of this study lies in its holistic approach, integrating digitalization, innovation, and employee adaptability to analyze MSME sustainability in Malang City. This research provides new insights into the mediating role of employee adaptability, which has not been widely discussed in previous studies. Additionally, focusing on MSMEs in Malang City as the research object offers a more contextual perspective on the challenges and opportunities of digitalization and innovation in Indonesia's MSME sector. The findings of this study are expected to enrich academic literature while also providing recommendations for business owners and policymakers to enhance MSME competitiveness and sustainability in the digital era.

2. LITERATURE REVIEW

2.1. Digitalization in MSMEs

Digitalization has become a key element in enhancing the competitiveness of MSMEs, particularly through the use of technology in business operations. The implementation of digital technology enables MSMEs to improve work efficiency, expand market reach, and enhance customer interactions. The adoption of digital systems such as e-commerce, digital payments, and cloud-based management can increase productivity and accelerate business processes (Fathoni & Asfiah, 2024). Additionally, digital technology allows for more efficient inventory management, helping MSMEs optimize their supply chains.

The digitalization indicators used in this study include the use of digital technology in business operations, such as applications or management software, the adoption of digital platforms for marketing and sales, the implementation of digital payment systems, the integration of technology into customer management and production, and the ability of MSMEs to access business information digitally (Sjahrudin et al., 2024).

2.2. Innovation

Business model innovation plays a crucial role in enhancing the competitiveness and sustainability of MSMEs. It involves changes in how a company creates, delivers, and captures value (Chesbrough, 2010). In the context of MSMEs, this innovation can take the form of developing new products or services, diversifying revenue streams, and optimizing digital marketing strategies. Through innovation, MSMEs can become more flexible in responding to market changes and customer needs, ultimately driving business growth.

The indicators used to measure innovation in this study include the development of new products or services to meet market demand, changes in marketing strategies through innovative approaches, diversification of revenue streams (e.g., combining offline and online channels), improvement of operational efficiency through business process innovation, strategic collaborations with external parties to expand market reach, the use of data and analytics in business decision-making, and the ability to adjust business strategies to evolving industry trends (Endayani et al., 2024; Setiawan et al., 2024).

2.3. Employee Adaptability

Employee adaptability is a crucial factor in ensuring the success of MSMEs in facing technological and market changes. Employees with a high level of adaptability are better able to adjust to shifts in business strategies and new job demands (Hanum et al., 2024). In the digital era, adaptability not only includes flexibility in performing tasks but also the ability to learn new technologies and address the challenges of an ever-evolving industry. MSMEs with adaptive employees are more likely to successfully implement innovation and digitalization in their businesses.

Beyond enhancing individual performance, employee adaptability also contributes to overall organizational efficiency and productivity. The ability to learn new technologies and readiness to face change are key indicators for measuring workforce adaptability (Ayyasy & Maelani, 2024). In the MSME context, employees with adaptive skills

can more easily transition into new roles, especially in situations where the company must alter its business strategy. This also impacts employee loyalty, as they feel more prepared to tackle work challenges. The indicators used to measure employee adaptability include the ability to learn new technologies implemented in the company, flexibility in adjusting work tasks to business strategy changes, willingness to embrace change and innovate in daily work, and readiness to face new challenges in the work environment (Febriandono et al., 2019; Sutanto et al., 2024).

2.4. The Sustainability of MSMEs

The sustainability of MSMEs is a key indicator in assessing how well a business can endure and grow in the long term. MSME sustainability depends on three main factors: financial stability, operational efficiency, and customer satisfaction (Edwards-Schachter et al., 2015). MSMEs that can effectively manage resources and adapt to market changes have a greater chance of survival and growth. Therefore, the right business strategies must be implemented to achieve sustainable success.

One of the main factors contributing to MSME sustainability is the company's ability to retain customers and remain competitive in the market. Businesses that can innovate in their business models and marketing strategies are more likely to attract and retain customers (Rahadi & Wardiman, 2022; Sabuhari et al., 2020). Additionally, cost efficiency and effective resource management play a crucial role in ensuring business continuity. MSMEs with efficient operational systems are more resilient in uncertain economic conditions. The indicators used to measure MSME sustainability include financial stability and long-term revenue growth, the ability to remain competitive through effective business strategies, customer satisfaction and loyalty to products or services, and operational sustainability through cost efficiency and resource management (Kusuma et al., 2024; Siska et al., 2025).

3. RESEARCH METHODOLOGY

This study uses a quantitative approach with PLS-SEM analysis via SmartPLS 3 to examine the relationship between digitalization, innovation, employee adaptability, and MSME sustainability. Data were collected through questionnaires from 100 MSMEs in Malang City selected using purposive sampling. The sample criteria included MSMEs that have adopted digital technologies (such as social media, marketplaces, or digital payments), have operated for at least one year, and have at least one employee to assess adaptability to innovation and digital transformation.

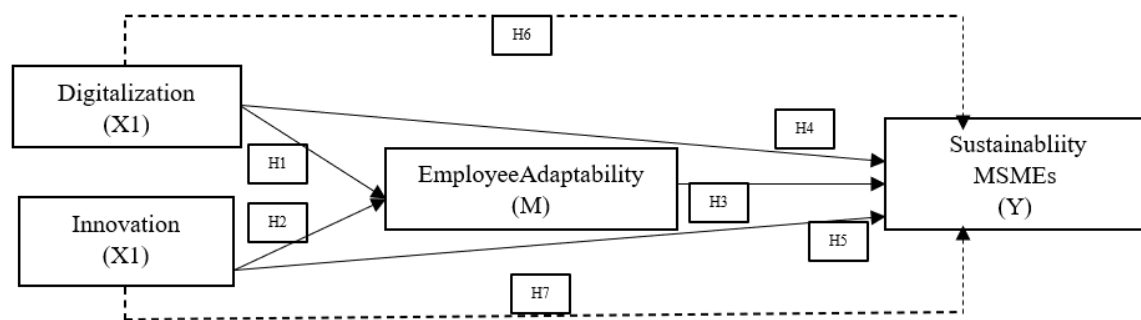


Figure 1 Research Framework

4. RESULT

Table 1. Hypothesis Testing Results

Original Sample (O)	TStatistics	PValues	Conclusion
Digitalization (X1) → MSME Sustainability (Y)	0.215	2.045	Supported ($p < 0.05$)
Digitalization (X1) → Employee Adaptability (M)	0.567	5.120	Supported ($p < 0.05$)
Innovation (X2) → MSME Sustainability (Y)	0.278	2.250	Supported ($p < 0.05$)
Innovation (X2) → Employee Adaptability (M)	0.533	4.580	Supported ($p < 0.05$)
Employee Adaptability (M) → MSME Sustainability (Y)	0.415	3.800	Supported ($p < 0.05$)

Original Sample (O)	TStatistics	PValues	Conclusion
Digitalization (X1) → MSME Sustainability (Y) through Employee Adaptability (M)	2.015	0.003	Mediasi signifikan (Parsial/Fully)
Innovation (X2) → MSME Sustainability (Y) through Employee Adaptability (M)	2.884	0.004	Mediasi signifikan (Parsial/Fully)

Table 1 shows that all hypotheses (H1–H5) are supported, with P-values below 0.05, confirming significant relationships. Digitalization and business model innovation both directly and indirectly through employee adaptability positively impact MSME sustainability.

5. DISCUSSION

5.1 Digitalization and MSME Sustainability

In the context of MSMEs in Malang City, the findings indicate that digitalization plays a crucial role in overcoming operational challenges and enhancing market reach. Many MSMEs in Malang have started adopting digital technology, such as e-commerce platforms, digital payment systems, and social media marketing, to improve their business operations. However, the level of digital adoption remains uneven, with some businesses still relying on traditional methods due to limited digital literacy and resource constraints.

Despite these challenges, the increasing number of MSMEs integrating digital tools into their operations has resulted in higher market accessibility and improved financial performance. This is particularly evident in sectors like culinary, fashion, and creative industries, where digital marketing and online transactions have become essential for business growth. Moreover, the findings suggest that digitalization in Malang City not only enhances efficiency but also helps MSMEs adapt to shifting consumer behaviors, which is essential for long-term sustainability.

However, the study also highlights the need for supporting programs such as digital literacy training, financial technology assistance, and improved digital infrastructure to maximize the impact of digitalization on MSMEs. The local government and business associations in Malang can play a more active role in facilitating technology adoption and digital upskilling programs for MSMEs to ensure sustainable growth in an increasingly competitive market.

5.2 Digitalization and Employee Adaptability

The findings from MSMEs in Malang City confirm that digitalization has significantly influenced employee adaptability, particularly in businesses that have adopted e-commerce, digital payment systems, and automated inventory management. Employees in digitally advanced MSMEs have developed higher adaptability, allowing them to integrate new tools, such as customer relationship management (CRM) systems and social media marketing, into their daily tasks.

However, not all MSMEs in Malang have fully embraced digitalization, leading to varying levels of employee adaptability. Many MSME employees still struggle with digital skills, especially in smaller businesses with limited access to digital training and technology infrastructure. This gap is particularly noticeable in traditional retail and service-based MSMEs, where digital transformation is still in its early stages.

MSMEs can ensure a smoother transition into the digital economy and strengthen their long-term sustainability. Employee adaptability is a crucial factor in enhancing efficiency and productivity, which in turn positively affects MSME sustainability. This finding aligns with the research of (Chen & Kim, 2023), which highlights that digitalization influences workforce readiness and adaptability to new technologies. Additionally, this study supports the findings of (Ratten & Usmanij, 2021), who state that digitalization accelerates adaptation within organizations, fosters business model innovation, and enhances MSME performance.

5.3 Business Innovation and MSME Sustainability

The findings of this study emphasize the importance of business model innovation in enhancing the sustainability of MSMEs in Malang City. Many MSMEs, especially in the culinary, handicraft, and tourism sectors, have begun to adopt digital platforms, diversify their income sources, and implement creative marketing strategies. Through the use of e-commerce, social media, and online payments, these businesses are better equipped to reach customers and compete in the digital marketplace.

However, challenges remain, particularly for micro and family-run MSMEs that face limited access to funding, lack strategic planning, and are hesitant to adopt structural changes (Vegholm, 2011). To overcome these barriers, strong government and private sector support is crucial. This includes providing business training, financial incentives, and incubation programs to encourage innovation adoption. With the right support, MSMEs can build more adaptive and sustainable business models that align with evolving market demands.

5.4 Business Innovation and Employee Adaptability

In the context of MSMEs in Malang City, the findings show that businesses that continuously innovate their models experience higher levels of employee adaptability. Many MSMEs, especially in the culinary, retail, and creative industries, have shifted to hybrid business models, combining offline and online sales channels. Employees in these businesses have adapted by learning new digital marketing techniques, mastering e-commerce platforms, and utilizing digital financial tools. However, challenges remain, particularly for traditional MSMEs that lack adequate digital training and resources. To fully optimize the impact of business model innovation on employee adaptability, investment in employee training programs, workshops, and mentorship initiatives is essential. With proper skill development and technological exposure, MSMEs in Malang can ensure that their workforce remains agile, competitive, and well-prepared for future business transformations.

When a company changes its operational strategies, organizational structure, or customer service systems, employees who can quickly adapt will be more productive and contribute optimally. Conversely, without sufficient adaptability, business model innovation may face obstacles due to employee resistance to change. Business model innovation must be supported by a prepared workforce capable of adjusting to new demands (Aula et al., 2022). Thus, MSMEs need to provide training, foster a work culture that supports innovation, and establish transparent communication systems to help employees navigate changes more effectively.

5.5 Employee Adaptability and MSME Sustainability

In Malang City, MSMEs with adaptable employees tend to perform better in adopting digital transformation and innovation. Sectors like creative, service, and retail show higher resilience due to employee training and skill development. In contrast, traditional MSMEs struggle due to limited digital skills. To overcome this, local governments and business associations should offer structured training to build workforce adaptability, helping MSMEs stay competitive and sustainable.

Employee adaptability also plays a crucial role in ensuring the successful implementation of digitalization and business model innovation within MSMEs. When companies adopt new technologies or modify business strategies, adaptive employees will more quickly understand new systems and integrate them into their workflows. Conversely, if employees struggle to adapt, the implementation of digitalization and business model innovation may face obstacles, ultimately hindering business sustainability. Research by (Huang & Ichikohji, 2023) shows that organizations with a highly adaptable workforce tend to be more successful in navigating market changes and business crises. Therefore, MSMEs should focus on employee training and skills development to better prepare them for the evolving industry challenges.

5.6 Digitalization and MSME Sustainability Mediated by Employee Adaptability

In the context of MSMEs in Malang City, the study findings highlight that businesses with highly adaptable employees experience smoother digital transitions and innovation processes, leading to greater sustainability. Several MSMEs in Malang, particularly in e-commerce, hospitality, and creative industries, have successfully adopted digital tools such as automated inventory systems, digital marketing, and online payment solutions. Employees in these businesses have shown higher adaptability, enabling them to maximize the benefits of digitalization and innovation. However, many traditional MSMEs still struggle with employee adaptability, particularly those with limited digital literacy and training opportunities. This gap suggests that investment in workforce training and capacity building is essential to ensure effective implementation of digital and innovative strategies.

These findings suggest that digitalization and business model innovation not only have a direct impact on MSME sustainability but also exert an indirect influence through the enhancement of employee adaptability. This means that the success of MSMEs in maintaining their operations is not solely determined by the adoption of digital technology or business model innovation alone but also by employees' ability to adapt to the changes brought about by these factors. This result aligns with research by (Lu et al., 2016; Zheng et al., 2021), which found that employees who are more adaptive to technological changes contribute to improving a company's competitiveness and long-term sustainability.

Furthermore, these findings support the study by (Chen & Kim, 2023), which highlights the crucial role of organizational and individual adaptability in the success of digital transformation for MSMEs.

5.7 Innovation and MSME Sustainability Mediated by Employee Adaptability

In the context of MSMEs in Malang City, the study findings reveal that businesses that actively innovate in product development, marketing strategies, and operational processes tend to have employees who are more flexible and quick to adapt. Several MSMEs, especially in the culinary, retail, and creative industries, have successfully transformed their business models by integrating offline and online sales channels, adopting technology-based customer management systems, and implementing digital services. Employees in these businesses demonstrate higher adaptability, allowing their companies to remain competitive amid shifting market trends. However, challenges persist for MSMEs that struggle to innovate due to a lack of training opportunities and limited resources to enhance workforce skills.

To ensure that employee adaptability continues to support MSME sustainability through business model innovation, collaboration among local governments, business associations, and educational institutions is essential. Programs such as innovation training, digital literacy enhancement, and mentorship in change management can help employees adapt to evolving business models. By doing so, MSMEs in Malang City can maximize the benefits of innovation, strengthen their competitiveness, and achieve long-term sustainability.

6. CONCLUSION

This study examines how digitalization and business model innovation influence the sustainability of MSMEs in Malang City, with employee adaptability acting as a key mediator. The findings show that both digitalization and innovation directly enhance sustainability and also improve employee adaptability, which in turn strengthens sustainability outcomes. Specifically, adaptable employees play a crucial role in helping businesses respond effectively to technological and strategic changes. Therefore, investing in employee training and fostering a culture of innovation are essential steps for MSMEs aiming to thrive in a dynamic, digital economy.

7. IMPLICATION

This study recommends that MSMEs, local governments, and support institutions prioritize sustainable digital transformation and innovation. MSMEs should actively adopt digital technologies and enhance employee skills, while government support is needed through training programs, financial access, and incentives to accelerate adoption and adaptability.

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