

# DIGITAL TECHNOLOGY AND THE RESILIENCE OF MICRO, SMALL, AND MEDIUM ENTERPRISES (MSMES) DURING THE COVID-19 PANDEMIC: A LITERATURE REVIEW AND POLICY ANALYSIS IN THE INDONESIAN CONTEXT

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## Abstract

The COVID-19 pandemic has significantly impacted the sustainability of Micro, Small, and Medium Enterprises (MSMEs) in Indonesia, both in terms of declining market demand and operational disruptions. In response to these challenges, the adoption of digital technology has emerged as a crucial strategy for business continuity. This article aims to examine the critical role of digital technology in enhancing the resilience of MSMEs during the pandemic through a literature review and public policy analysis. Using a descriptive qualitative method, this study draws on scientific journals, government reports, and policy documents published between 2020 and 2024. The findings indicate that digital platforms such as e-commerce, social media, and financial technology applications have effectively supported MSMEs in sustaining their operations. Furthermore, government initiatives including the "Proudly Made in Indonesia" National Movement (BBI), digital onboarding training programs, and collaborations with digital ecosystems have accelerated the digital transformation of the MSME sector. Nevertheless, several barriers persist, including low digital literacy, limited infrastructure, and unequal access to technology, which hinder the full optimization of digitalization. This study offers inclusive and sustainable policy recommendations to strengthen MSMEs in the post-pandemic digital era.

**Keywords:** MSMEs, Digital Technology, COVID-19 Pandemic, Business Resilience, Public Policy

## 1. Introduction

Micro, Small, and Medium Enterprises (MSMEs) play a strategic role in the structure of Indonesia's economy. In addition to absorbing the majority of the national workforce, MSMEs also make a significant contribution to Gross Domestic Product (GDP). In 2022, this sector contributed more than 60% to Indonesia's GDP and provided employment for approximately 97% of the national labor force (Fathoni & Asfiah, 2024). With a labor intensive structure and a strong connection to local communities, MSMEs serve as a key pillar for economic stability, particularly during times of crisis. However, the COVID-19 pandemic posed a severe challenge to their resilience. Many MSME actors experienced drastic revenue declines due to halted economic activity and weakened consumer purchasing power. These challenges were further exacerbated by large scale social restrictions (PSBB), which limited mobility and direct interactions between producers and consumers (Purnomo et al., 2024). In this context, adaptability became a key factor in business survival.

Many MSMEs that managed to survive or even grow during the pandemic were those that adaptively integrated digital technologies into their business models. The use of digital platforms such as e-commerce, social media, and electronic payment systems offered strategic advantages, including market expansion, stronger customer engagement, and reduced operational and transaction costs. A study by (Nuraeni et al., 2024) emphasized that in the Karawang region, digital technology utilization was positively correlated with supply chain efficiency and MSME competitiveness. This suggests that digitalization is not only a survival tool in times of crisis but also a long term key to business transformation. However, the success of digital adoption is largely influenced by human resource readiness

and local infrastructure support both of which remain significant challenges in many areas of Indonesia.

Despite growing awareness of the importance of digitalization, the actual realization of digital transformation is not without obstacles. There are significant disparities in digital access and capabilities, particularly among MSMEs operating in remote or underserved regions. Low digital literacy, limited training opportunities, and the high cost of technology investment remain major barriers in this process (Hidayah et al., 2023). In other words, digitalization can only be effective if supported by inclusive and systemic interventions. In response to these challenges, the Indonesian government has launched several initiatives to accelerate technology adoption among MSMEs. Programs such as the National Movement for Proudly Made in Indonesia (BBI), digital onboarding training, and the expansion of the QRIS based payment system demonstrate efforts to strengthen the digital ecosystem for MSMEs (Fathoni & Asfiah, 2024). However, the effectiveness of these policies still requires continuous evaluation to ensure that all business actors including those in disadvantaged regions can fully benefit from them.

Considering the complexity of the challenges and the potential of MSMEs in the digital era, this study aims to thoroughly analyze the role of digital technology in strengthening the resilience of MSMEs during the COVID-19 pandemic. This research not only documents the strategies that have been implemented but also offers a critical reflection on future policy directions necessary to sustainably empower the MSME sector. A literature review and policy analysis approach is used to generate a comprehensive understanding of the conditions, opportunities, and challenges of MSME digitalization in post pandemic Indonesia.

## **2. Literature Review**

### **2.1. MSME Resilience in Times of Crisis**

Micro, Small, and Medium Enterprises (MSMEs) serve as the backbone of the national economy and are among the most vulnerable groups during crises such as the COVID-19 pandemic. In addition to experiencing declining demand and supply chain disruptions, many MSMEs struggled to maintain liquidity and business continuity due to limited capital and uneven access to digital infrastructure. Nevertheless, a number of MSME actors demonstrated a capacity to endure and adapt to new circumstances.

Resilience in MSMEs is not merely about surviving difficult conditions, it also reflects their ability to adapt and innovate in response to external environmental changes. During the pandemic, resilient MSMEs were generally those that quickly adopted digital technologies, shifted their sales strategies to online platforms, and adjusted their products and services to meet drastically changing consumer needs (Artanto et al., 2022). This is referred to as adaptive resilience, the ability not only to survive but also to grow and evolve under pressure.

External factors such as digital training, mentoring programs, access to soft financing, and supportive government policies have also proven to strengthen MSME resilience. MSMEs integrated into digital ecosystems and equipped with strong business networks were more likely to survive and even grow during the crisis. Research by (Artanto et al., 2022) further indicates that interventions by governmental and non governmental organizations in the form of training and digitalization support encourage MSMEs to remain relevant and competitive.

Furthermore, MSME resilience can be mapped into three key dimensions. First, internal robustness, which refers to efficient business management capacity, availability of financial reserves, and product/process innovation. Second, adaptive capability, or the ability to transform business operations, such as through digital sales and production methods. Third, external connectivity, which includes access to technology, market information, community support, and affirmative government policies.

By understanding and strengthening these three dimensions, MSMEs can not only survive but also position themselves as robust economic actors capable of facing future crises. Crisis moments, such as the pandemic, should be seen as turning points to strategically enhance the resilience and sustainability of MSMEs.

### **2.2. The Role of Digital Technology in Supporting MSME Resilience**

The advancement of digital technology has become one of the main pillars of MSME resilience amid crisis pressures such as the COVID-19 pandemic. At a time when mobility restrictions halted physical activities and reduced consumer demand, MSME actors who had adopted digitalization tended to demonstrate stronger business resilience. Digitalization not only enabled MSMEs to reach customers through online platforms but also facilitated financial recordkeeping, inventory management, and access to technology based financial services (fintech) (Allo et al., 2024).

Research by (Allo et al., 2024) found a significant correlation between digitalization and the resilience of micro business actors, including street vendors (PKL) in five regions of Jakarta. The adoption of digital platforms such as

social media and e-commerce proved effective in sustaining operations, particularly in marketing and product distribution. Moreover, MSMEs that had entered the digital ecosystem earlier experienced faster revenue recovery compared to those that had not digitalized.

Similar findings were reported by (Ismail & Bahgia, 2021), who emphasized that digitalization is not only a form of adaptation but also a revitalization strategy for MSMEs. During the pandemic, many small business owners shifted from conventional selling methods to online platforms such as marketplaces, social media, and digital payment systems. This shift expanded market access and improved operational efficiency, even when physical restrictions were still in effect.

Furthermore, digital training and literacy programs are critical in accelerating MSME digital transformation. A study by (Sundah et al., 2021) highlighted that digital training and community based mentoring programs significantly improved entrepreneurs' ability to utilize digital tools for marketing strategies, digital bookkeeping, and customer communication. This is especially crucial for MSMEs in regions with limited infrastructure or where entrepreneurs have low digital literacy.

However, challenges persist particularly in terms of the digital divide between MSME actors in urban areas and those in underdeveloped regions. Limited internet infrastructure, unaffordable digital devices, and low digital skills remain barriers to equitable digital transformation (Muharam et al., 2024). Therefore, the role of government and private sector partners in providing training, infrastructure, and digital incentives is essential to strengthen MSME resilience in a comprehensive manner.

Overall, digitalization functions not only as a short-term recovery tool for MSMEs but also as a foundation for enhancing competitiveness, innovation, and business sustainability in the long term. Digital adoption must be supported by affirmative policies and multi stakeholder collaboration to ensure that MSMEs grow inclusively and adaptively in facing global economic dynamics.

### **2.3. Government Policy Strategies in Strengthening MSME Resilience**

The Indonesian government has implemented systemic policies to support MSME digitalization through digital literacy training, partnerships with local platforms, and inclusive technological support. According to recent studies, digital literacy not only strengthens online marketing but also acts as a catalyst for the growth of digital based enterprises. (Qodar & Handayani, 2023) found that digital literacy training in East Jakarta successfully improved the digital capabilities of 88% of MSME actors in the electronics sector. This result underscores that strengthening literacy is a crucial first step for MSMEs to go online effectively. (Ilham et al., 2023) further noted that basic training on how to use applications such as WhatsApp Business and Instagram enabled housewives living in government subsidized apartments (rusunawa) to start selling products digitally. Although many participants were initially reluctant or unfamiliar with digital tools, the training significantly transformed their business mindsets and practices.

Collaborative approaches have also proven effective at the village level. Training programs conducted in Jatirejo Village combined group discussions and direct mentoring, resulting in local product innovations such as rice chips, which were marketed digitally. This supports the narrative that digital literacy and product creativity go hand in hand in enhancing business resilience (Tri Winarsih et al., 2022).

Additionally, (Hamidah, 2024) demonstrated through a study on the use of local applications such as *SiBakul Jogja* that MSMEs' acceptance of digital technology largely depends on the involvement of facilitators and the accessibility and user friendliness of the technology. This strategy highlights that digital policies must not only provide access to technology but also offer user friendly and participatory adoption mechanisms.

### **2.4. Challenges and Opportunities of Digitalization for MSMEs in Indonesia**

Digitalization offers various potentials for MSMEs, ranging from operational efficiency to market expansion. However, behind these potentials lie structural and technical challenges that hinder the optimal adoption of digital technologies.

#### **➤ Challenges in MSME Digitalization in Indonesia**

##### **1. Gaps in Digital Literacy and Technical Capacity**

Research by (Bahtiar et al., 2025), published in the *Journal of Economics and Business*, highlights that limited digital literacy and technical skills remain major obstacles in the digitalization process of MSMEs in Indonesia, particularly outside urban areas. Many MSME actors are not yet familiar with digital platforms such as e-commerce, business oriented social media, or digital inventory management systems. This suggests that training programs must not be one size fits all, rather, they should employ contextual approaches that consider participants' educational

background, age, and type of business. Digital training should go beyond technical instruction to include applicable and sustainable practices, in order to drive behavioral change not just temporary skill acquisition.

## **2. Unequal Access to Technology and Infrastructure**

(Ainurrokhim et al., 2024), in the *ICMEB Proceedings*, emphasize that many regions in Indonesia especially in the 3T areas (underdeveloped, frontier, and outermost) still lack adequate digital infrastructure. In addition to unstable internet connectivity, the scarcity of hardware and the high cost of digital access present serious barriers for MSMEs undergoing digital transformation. Digitalization is unlikely to be realized effectively if regional disparities in digital access persist. Therefore, affirmative policies such as internet data subsidies or digital device assistance are necessary to bridge the digital divide.

## **3. Underdeveloped Technology Management**

According to (Hendrawan et al., 2024) in the *Journal of Information and Technology*, many MSMEs still lack comprehensive strategies for managing digital technologies. Numerous small businesses follow digital trends without developing strategic plans, selecting appropriate systems, or building sustainable human resource capacity. As a result, technology adoption tends to be patchy and inefficient. Digital transformation should begin with strategic awareness at the managerial level recognizing that technology is not merely a supporting tool, but an integral part of the business model that must be structured and planned for long term sustainability.

### **➤ Opportunities for MSME Digitalization in Indonesia**

#### **1. Operational Efficiency and Digital Market Expansion**

(Bahtiar et al., 2025) noted that digital transformation can improve productivity and expand market reach for MSMEs when accompanied by effective literacy policies and innovative business models. The use of e-commerce platforms and digital payment systems serves as a key entry point for MSMEs to access consumers beyond their local areas. However, providing digital infrastructure alone is not sufficient. Active mentoring and context-based training content are needed to help MSME actors fully understand how to optimize technology based on the characteristics of their businesses. Efficiency is not derived solely from the technology itself, but also from how MSMEs shift their business mindset from traditional practices to being adaptive to digital dynamics.

#### **2. Structured Technology Management Strategies**

(Hendrawan et al., 2024) proposed that a structured approach to technology management including planning, system selection, employee training, and operational monitoring can accelerate the success of digital transformation. In practice, many MSMEs adopt technology partially and unsustainably due to the absence of a proper change management strategy. Therefore, it is essential for MSMEs to start developing a simple yet practical digital transformation roadmap. Support from training institutions and digital business incubators should be seen as a strategic component, not merely supplementary. When digital management is conducted in a structured manner, MSMEs will not only “go digital,” but also “grow digital.”

#### **3. Synergistic Support from Government, Private Sector, and Academia**

Collaborative approaches involving government, private sector, universities, and community organizations have proven to enhance MSME digital capacity through both technological literacy and access to financing and markets. Such models are widely applied in business incubation programs across various regions, combining technical training, mentoring, and business networking. However, these synergies will be more effective when tailored to the specific needs of MSMEs based on their sectors and geographic locations. This collaboration must be data driven and field oriented, rather than ceremonial. In doing so, all stakeholders can better contribute to MSME resilience and growth in the digital era.

## **3. Methodology**

This study adopts a descriptive qualitative approach, utilizing literature review and policy analysis methods. This approach is deemed the most appropriate for comprehensively understanding the role of digital technology in strengthening the resilience of MSMEs during the COVID-19 pandemic particularly in the context of Indonesia, which is characterized by diverse socio economic conditions and varying levels of digital infrastructure readiness.

The qualitative method not only enables the researcher to extract in depth insights from a wide range of literature, but also allows for critical interpretation of the interaction between public policies and field dynamics. The author argues that this approach is relevant for multidimensional issues such as MSMEs, where social, economic, and

policy variables are intricately interconnected. Moreover, this method allows for comprehensive analysis without requiring direct field access an important consideration given the constraints often faced in the post pandemic period (Raco, 2010).

### **3.1. Types and Techniques of Data Collection**

This research relies on secondary data, collected through a systematic review of credible and publicly accessible sources. The primary sources include:

1. National and international scholarly journals (2020–2024), particularly those addressing MSME digitalization, government policy responses, and microenterprise adaptation strategies.
2. Government reports from institutions such as the Ministry of Cooperatives and SMEs, Statistics Indonesia (BPS), and the Ministry of National Development Planning (Bappenas).
3. Policy documents and MSME digitalization programs, both at the national level (e.g., *Bangga Buatan Indonesia* National Movement) and local level initiatives.

Literature selection was conducted based on three main criteria:

1. Relevance to the issues of MSME resilience and digital adoption,
2. Open accessibility via platforms such as Google Scholar, Portal Garuda, and official government websites,
3. Source credibility (peer-reviewed journals or official institutional publications).

Due to the rapid issuance of digitalization policies during the pandemic, not all documents were systematically archived. Therefore, the search focused on publications that provide evaluations and policy reflections rather than merely formal reports. This approach is based on the understanding that assessing policy impact requires insights into how policies are actually implemented and received by MSME actors on the ground.

### **3.2. Data Analysis Technique**

This study employs a thematic analysis approach, which enables the researcher to identify, organize, and interpret key patterns within secondary data. This method is particularly suitable given that the study does not involve primary data collection, but instead analyzes existing journals, reports, and policy documents.

The analytical process follows three key stages:

1. Data reduction => selecting and filtering the most relevant information to support the research objectives.
2. Data presentation => grouping information into major themes, such as the use of digital technology, government policy implementation, challenges faced by MSMEs, and opportunities for business resilience.
3. Conclusion drawing => formulating relationships among findings and building a comprehensive understanding of how digitalization supports MSME sustainability during crises.

This method refers to the thematic analysis model as described by (Heriyanto, 2018), who emphasizes that data coding, categorization, and thematic interpretation are the core of this approach. It is especially useful in public policy research, as it helps reveal the gap between official documentation and the actual experiences of business actors in the field.

### **3.3. Policy Analysis Technique**

This research also applies a public policy analysis approach to critically examine the government's response to MSME digitalization during the COVID-19 pandemic. Rather than limiting the analysis to a normative policy review, this approach also evaluates field level implementation dynamics and real impacts on MSME actors.

The policy analysis framework includes four key components:

1. Policy substance => covering strategic vision, program direction, and forms of digital intervention such as technology training, digital marketing facilitation, and infrastructure support for MSMEs.
2. Implementing actors => including key stakeholders such as the Ministry of Cooperatives and SMEs, local governments, and partnerships with private digital platforms that catalyze program execution.
3. Implementation context => assessing social, economic, and technological conditions in each region, including infrastructure disparity, levels of digital literacy, and local regulatory support.
4. Policy outcomes and impacts => measured by the extent to which digitalization programs support economic resilience and business continuity among MSMEs during the crisis.

This framework aligns with the findings of (Hapiz et al., 2025), who highlight that despite initiatives such as *UMKM Go Digital* and *Bangga Buatan Indonesia*, structural challenges like digital infrastructure gaps and limited human resource capacity have weakened program effectiveness. Therefore, effective policy implementation is not solely determined by planning quality but also by adaptability at the operational level.

In a diverse country like Indonesia, the success of MSME digitalization policies is closely tied to local capacity both in terms of regional governance and direct business engagement. National policies often fail to address the specific needs of remote or underconnected areas. Thus, policy analysis that ignores local context risks being normative and inapplicable. Strengthening multi stakeholder synergy especially among central government, local authorities, and the private sector is a critical prerequisite for ensuring the long term success of MSME digitalization programs.

## **4. Results and Discussion**

### **4.1. Adoption and Challenges of MSME Digitalization During the Pandemic**

The COVID-19 pandemic served as a critical catalyst for accelerating digital technology adoption among Micro, Small, and Medium Enterprises (MSMEs) in Indonesia. Faced with restrictions on physical activities and declining revenues, business actors were compelled to seek alternatives through digital platforms such as social media, e-commerce, and electronic payment systems. This transformation was not only driven by external pressure but also by the opportunity to reach broader markets more efficiently. According to (Fathoni & Asfiah, 2024), digital technology adoption during the pandemic positively impacted the operational efficiency and business performance of MSMEs. For instance, the use of digital applications improved financial record keeping, expedited product information dissemination, and expanded market access through online platforms. Their study noted that MSMEs actively utilizing digital technology experienced improvements in productivity and business resilience in the post pandemic period.

However, the digitalization process has not been uniformly experienced. MSMEs in urban areas were generally more prepared for digital adoption due to better internet infrastructure, broader access to training, and relatively higher levels of digital literacy. In contrast, business actors in rural and underdeveloped regions faced significant obstacles such as poor connectivity, limited access to digital devices, and a lack of ongoing support or mentoring. This disparity indicates that MSME digital transformation depends heavily on the readiness of local ecosystems, not merely on the availability of technology. Field observations reveal that not all MSME actors fully understand the potential of digital technology to build competitive advantage. Many use digital platforms passively, without a clear marketing strategy, or continue relying on conventional methods despite having access to digital tools. This highlights that digital adoption is not only a matter of access, but also of comprehension and willingness to adapt.

In this context, MSME digitalization should be understood not only as a technical process, but also as a social and educational one. Government policies should move beyond one time training and instead develop sustainable, community based mentoring systems. Collaboration among public institutions, the private sector, and academia is essential to ensure that the digital transformation is inclusive and aligned with real field needs. In doing so, MSMEs can not only survive crises but also grow sustainably within an evolving digital economy.

Moreover, digitalization should not be implemented with a one size fits all approach, as MSMEs are highly diverse in terms of business scale, industry sector, and readiness levels. In practice, many MSMEs adopt digital technology only as a reactive measure to external pressure, rather than as a proactive and well-planned business strategy. As a result, the use of technology often remains superficial and disconnected from the core business processes. Therefore, digitalization policies and support programs must be context specific and tailored to the needs of each region and sector to ensure that interventions are targeted and have long term impact.

On the other hand, the success of MSME digital transformation is not solely dependent on access to technology and formal training, but also critically hinges on the existence of an active and collaborative support ecosystem. The involvement of cooperatives, local communities, educational institutions, and private sector partners can significantly enhance the sustainability of technology adoption. Top-down digital initiatives often fail to address grassroots level challenges. Thus, building learning and sharing communities that support one another becomes a strategic step to ensure that digitalization becomes an integral part of MSME business culture. Within such ecosystems, MSME actors are not only technology users but also agents of change in the local digital economy.

### **4.2. Challenges in Implementing Digitalization**

The rapid digital transformation triggered by the COVID-19 pandemic has indeed opened new opportunities for MSMEs, but it also presents substantial challenges in its implementation. One of the primary barriers is the low level of digital literacy among small business actors. Many MSMEs struggle to understand how technology can be strategically leveraged to expand markets, enhance operational efficiency, or manage business finances digitally. Most new users of digital tools utilize only basic features such as creating social media or marketplace accounts without a

comprehensive understanding of effective digital strategies.

A study by (Sitompul et al., 2025) revealed that many MSMEs in Indonesia, particularly those located outside major economic centers, still face significant obstacles in adopting and utilizing digital technologies optimally. These include limited access to training, a lack of sustained mentoring, and unequal internet infrastructure. Such conditions exacerbate digital divides between urban and rural areas, with MSMEs in large cities adapting more quickly than those in remote or underserved regions.

Based on field observations, digitalization cannot be achieved through one off training or simply by providing access to technology. True transformation requires continuous capacity building and a comprehensive support ecosystem. Many MSMEs adopt technology only reactively, and when immediate results are not visible, they tend to revert to traditional methods. This shows that the challenges of implementing digitalization are not merely technical, but also involve psychological factors and entrenched business cultures.

Furthermore, top down and generalized approaches often fail to address the actual needs of MSMEs on the ground. Many digitalization programs do not account for the diversity of business sectors, the educational background of business owners, or regional readiness. As such, more contextual, collaborative, and community based strategies are essential to bridge these gaps. Localized needs based approaches can foster greater confidence among MSME actors, encouraging experimentation with digital tools and the development of peer supported learning communities.

By strengthening collective and inclusive digital capacity, MSMEs will not only be able to survive crises, but also have the potential to grow and compete in wider markets. Going forward, digitalization should not be seen as a temporary trend, but as an integral foundation for resilient and future oriented MSME management.

In addition to resistance to technology, limited digital comprehension can be addressed through community based approaches. In this regard, the involvement of mentors or peers from within the MSME sector itself greatly facilitates the adaptation process. Many entrepreneurs find it easier to learn from fellow business actors who have successfully implemented digital strategies, compared to formal training programs that may not reflect real-world conditions. Therefore, peer to peer mentoring is more effective in building trust and enabling gradual, contextual adoption of digital practices. This model also supports the emergence of local innovations relevant to the specific characteristics of each business.

Moreover, MSME digitalization should not focus solely on short term access and incentives, but rather on cultivating business autonomy in adapting to technological changes. The capacity to continuously learn and adjust is a critical asset for MSMEs to not only survive in times of crisis, but to develop sustainably. Thus, digitalization policies must be integrated into long-term restructuring strategies for the MSME sector serving not merely as a reactive response to the pandemic, but as a foundation for a more resilient and inclusive economic transformation.

#### **4.3. The Role of Government Policy in MSME Digitalization**

In response to the economic disruptions caused by the COVID-19 pandemic, the Indonesian government designed a series of policies aimed at supporting the digital transformation of Micro, Small, and Medium Enterprises (MSMEs). Programs such as *UMKM Go Digital*, digital entrepreneurship training, and incentives like internet subsidies and access to financing schemes reflect the state's commitment to facilitating technological adaptation in the MSME sector. These policies are not only intended to sustain businesses during the crisis but also to unlock broader market access through digital channels. According to (Salkiah & Putra, 2025), government interventions have contributed to improving MSME access to digital ecosystems. However, they also emphasize that the effectiveness of these policies largely depends on local readiness particularly in terms of digital literacy, infrastructure support, and the availability of ongoing technical assistance. Without strengthening grassroots level support systems, nationally designed programs risk missing their intended targets, especially for businesses operating outside urban centers.

The state's role in promoting MSME digitalization should go beyond providing short term training and incentives. Instead, it must aim to build a collaborative and sustainable ecosystem. Both central and local governments must ensure cross sectoral coordination involving community organizations, the private sector, and educational institutions to directly assist MSMEs. Community based interventions, such as digital villages, digital cooperatives, or sub district level business incubators, can serve as vital catalysts in bridging the digital divide and ensuring the long-term sustainability of digitalization programs.

Furthermore, policy effectiveness should not merely be measured by how many MSMEs attend training sessions or adopt digital applications. Instead, it should focus on how well technology is integrated into their core business processes. This includes the extent to which MSMEs can leverage digital tools in production, distribution,

marketing, and customer service. Consequently, policy evaluation must be participatory and grounded in field based data to ensure that each digital strategy is responsive to the specific needs of MSMEs by sector and location.

MSME digital transformation must be approached strategically not merely as an emergency response to the pandemic. Inclusive, flexible, and locally responsive policies can serve as the foundation for strengthening the long term structure of the people's economy. In this way, digitalization can become a pathway to economic self reliance grounded in innovation and local wisdom.

Moreover, it must be recognized that the success of MSME digitalization is not determined solely by the sophistication of the technology introduced. Rather, it depends on how effectively the technology addresses the actual needs of business actors. Policy orientation should prioritize value creation such as increased revenue, production efficiency, and market expansion. Thus, a paradigm shift is needed: from merely "digitizing MSMEs" to "building independent and competitive digital MSMEs." This shift entails not only connecting MSMEs to the internet but also equipping them with a digital entrepreneurial mindset and sustainable collaborative networks.

#### **4.4 Opportunities for Sustainable MSME Digitalization in the Post Pandemic Era**

The digital transformation of Micro, Small, and Medium Enterprises (MSMEs), initially triggered by the COVID-19 pandemic, holds long term sustainability potential that extends beyond emergency adaptation. As discussed by (Santoso et al., 2025), digital technology adoption has enabled MSMEs to expand their markets, improve operational efficiency, and enhance competitiveness. This transformation opens up opportunities for business actors to increase the effectiveness of their operations, particularly when combined with systematically designed and innovative technology based business models.

The potential for sustainability has grown alongside increased public access to digital services and the active role of e-commerce platforms and digital stakeholders. Furthermore, innovative frameworks such as localized and sustainable digital business models have emerged as viable alternatives for MSMEs to move beyond short term incentives and instead lay a solid foundation for long term digital transformation and growth.

Digitalization will have a greater impact when technology is employed not merely as a sales tool but as an integral part of a data driven business strategy. The ability to manage customer data, implement automated inventory systems, and develop consistent digital branding are critical factors in increasing efficiency and strengthening MSMEs' market positions. Without strategic development, digitalization runs the risk of becoming stagnant merely a symbolic act that fails to deliver operational value.

Moreover, the sustainability of digitalization efforts is significantly enhanced by the presence of an inclusive digital community ecosystem. The establishment of MSME digital communities and localized collaborations involving business actors, academic institutions, and key stakeholders can foster shared learning and innovation. Through such collaborative ecosystems, digitalization becomes more than just a temporary response it evolves into a sustainable entrepreneurial transformation rooted in independence and mutual cooperation among MSMEs.

#### **4.5 The Impact of Digitalization on the Resilience and Sustainability of MSMEs**

The accelerated adoption of digital technology during the COVID-19 pandemic has had a significant impact on the resilience and sustainability of Micro, Small, and Medium Enterprises (MSMEs) in Indonesia. (Nugroho et al., 2025) indicate that the integration of technologies such as e-commerce platforms, social media, and financial digitalization enabled MSMEs to continue operating amid the restrictions on physical activities. These innovations were not merely short term responses, but rather laid a crucial foundation for building business resilience amid ongoing economic uncertainties.

Furthermore, (Meliawati et al., 2025) emphasize that digitalization has encouraged MSMEs not only to survive but also to undergo transformation. MSMEs that were able to utilize digital channels for promotion, sales, and operational management demonstrated greater adaptability and broader market reach, including expansion beyond local and even into international markets.

The impact of digitalization should not be viewed merely as the adoption of digital tools or applications, but as a paradigm shift in business management. Many MSMEs adopt digital technology simply to follow trends, without fully integrating it into their daily operations such as digital financial recordkeeping, consumer behavior analysis, or data based inventory management. True resilience is achieved when technology becomes a decision making tool rather than just a marketing medium.

Moreover, digitalization creates opportunities for collaboration between MSMEs and development stakeholders, including the government, training institutions, and digital platforms. Its impact can be greatly enhanced

when supported by human capital development, ongoing training tailored to local needs, and affirmative policies that promote digital inclusion for MSMEs in underdeveloped regions.

Therefore, the future resilience and sustainability of MSMEs depend not only on the availability of technology but also on how it is interpreted, utilized, and adapted to the specific context of each business. Planned and inclusive digitalization has the potential to become a solid foundation for building MSMEs that are resilient, innovative, and sustainable in navigating the increasingly dynamic global economy.

## **5. Conclusion and Recommendations**

### **5.1 Conclusion**

This study affirms that the utilization of digital technology has made a significant contribution to the resilience of Micro, Small, and Medium Enterprises (MSMEs) in Indonesia during the COVID-19 pandemic. Digital technologies have become essential tools for MSMEs to maintain business operations through various online channels such as e-commerce, social media, and cashless payment systems. Government initiatives such as the "UMKM Go Digital" program and various digital training efforts have successfully encouraged technology adoption, although challenges remain in the form of infrastructure disparities and low digital literacy in certain regions.

Digitalization is not merely a reactive measure in response to crisis, but also serves as a long term strategy for enhancing business sustainability. When MSME actors are able to integrate technology into internal management aspects such as financial recordkeeping, marketing, and customer analysis they demonstrate greater resilience and adaptability. However, to fully optimize these benefits, systemic support is required through an enabling ecosystem, including policies, infrastructure, and technical assistance tailored to the specific needs of the enterprises.

### **5.2 Recommendations**

Based on the study's findings and policy analysis, the researcher proposes the following recommendations:

#### **1. Expansion of Practical and Contextual Digital Literacy**

Digital training programs for MSMEs should be designed to be practical and tailored to the specific business sectors and levels of digital readiness in each region. Training content should not only cover the use of digital applications but also include essential digital business management skills such as data security, content strategy, and customer data utilization.

#### **2. Equitable Strengthening of Technology Infrastructure**

The government must address the digital divide across regions by expanding internet access and providing digital equipment, particularly in frontier, outermost, and underdeveloped (3T) areas. Without adequate infrastructure, MSMEs will not be able to participate in the digital economy equally.

#### **3. Enhancing Multi-Stakeholder Collaboration**

Partnerships between government, industry players, local communities, and educational institutions can help extend the reach of digitalization programs. These collaborations are also crucial for building mutually beneficial distribution and promotion networks among MSMEs.

#### **4. Monitoring and Evaluation Based on Field Data**

Digitalization programs should be regularly evaluated by involving MSMEs as active participants. This approach will enrich policy formulation with grassroots perspectives and help prevent misalignment between designed policies and actual implementation realities on the ground.

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