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Digitalization on Micro, Small, and Medium Enterprises (MSMEs) : A Systematic Literature Review

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Abstract. *This research explores the impact of digitalization on Micro, Small, and Medium Enterprises (MSMEs) using a systematic literature review (SLR) approach based on the PRISMA method. The data collection process began with the identification of relevant scientific articles using the keywords "digitalization," "MSMEs," and "digital transformation," through leading academic databases, such as Scopus, Google Scholar, and JSTOR. The initial search identified 278 articles, of which 35 met the predetermined inclusion criteria. A thorough analysis of these 35 articles revealed that digitalization plays a pivotal role in fostering innovation within the MSME sector, offering benefits such as enhanced operational efficiency, expanded market access, and strengthened social, economic, and environmental sustainability. However, the implementation of digitalization in MSMEs is encumbered by several challenges, including limited resources, uneven digital infrastructure, and cyber security threats. The study underscores the significance of the government's role in establishing regulatory frameworks, offering financial incentives, and fortifying infrastructure to facilitate the sustainable digital transformation of MSMEs. This research provides strategic insights for policymakers, practitioners, and academics, offering guidance on the successful adoption of digitalization in the MSME sector.*

Keywords: *Micro, Small, and Medium Enterprises (MSMEs); Digitalization; Systematic Literature Review (SLR)*

1. INTRODUCTION

The development of information and communication technologies in recent decades has profoundly transformed how people interact and conduct business. The advent of digitization, encompassing the Internet, mobile applications, cloud-based software, big data, artificial intelligence (AI), and the Internet of Things (IoT), has been instrumental in the paradigm shift towards modern business processes (Cetindamar Kozanoglu & Abedin, 2021; George et al., 2021; Hervé et al., 2020). Digital transformation, in this sense, can be conceptualized as the fourth industrial revolution, which brings about radical changes in business models and performance (Warner & Wäger, 2019). A substantial body of research has emerged on the subject, underscoring the pivotal role of digitalization in catalyzing business transformation, particularly to enhancing operational efficiency(Akpan & Ibidunni, 2023; Priyono et al., 2020) and expanding market reach (Parviainen et al., 2017). A significant body of research has demonstrated that companies that transition to digital platforms experience a productivity surge of 15-25%, attributable to streamlined work processes and diminished transaction costs (Chaffey and Ellis-Chadwick, 2019). A similar phenomenon has been observed in the context of micro, small, and medium enterprises (MSMEs). Adopting digital technologies in MSMEs has been shown to enhance operational efficiency by up to 30% (Kusuma, 2020).

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According to data from the World Bank (2021), micro, small, and medium-sized enterprises (MSMEs) account for approximately 60-70% of total employment in developing countries. Furthermore, MSMEs contribute approximately 40% to global GDP and 60-70% to GDP in developing countries. This underscores the pivotal role of MSMEs in driving economic growth, particularly in job creation and fostering local economic development. Digitalization has the potential to further bolster the role of MSMEs by offering opportunities to enhance operational efficiency, expand market reach, and improve competitiveness and customer experience (Dutta et al., 2021; Giones & Brem, 2017; Hervé et al., 2020; Salsabila et al., 2024).

Integrating digital technology facilitates the optimization of business processes, thereby reducing the time and financial investments required for daily operations (Giones & Brem, 2017). The implementation of ERP systems, for instance, enables the integration of diverse business processes, thereby automating routine tasks, mitigating manual errors, and enhancing overall efficiency (Kapulin et al., 2019; Oksamytna & Praha, 2022). Furthermore, MSMEs that adopt cloud-based management systems can enhance operational efficiency, particularly in areas such as inventory management, order processing, and decision-making processes related to purchasing, storage, and other operational aspects (Babiceanu & Seker, 2016; Giannakis et al., 2019; Helo & Hao, 2017; Jede & Teuteberg, 2016; Sukasih & Ariyanto, 2024; Vazquez-Martinez et al., 2018; Wu & Chiu, 2018).

Digitalization has had many positive impacts on MSMEs, including increased access to global markets (Giones & Brem, 2017; OECD, 2021; Telukdarie et al., 2023). Before the digital era, MSMEs frequently encountered limitations in terms of their market reach, often confined to local or regional markets due to constraints in capital and resources. However, the advent of digital technologies, such as e-commerce platforms, social media, and marketing applications, has profoundly altered this landscape. These technologies have enabled MSMEs to expand their reach, accessing consumers on a national and even international scale. Research by Bohlmann et al. (2020) has demonstrated that MSMEs that leverage digital platforms experience a substantial increase in sales. This enhances their competitiveness in the global market, facilitates access to customers worldwide, and amplifies their brand visibility. The integration of information technology systems facilitates interaction with customers and the delivery of services through social media platforms (Bouwman et al., 2019).

Notwithstanding the beneficial impact of digitalization on MSMEs, a predominant challenge confronting these entities pertains to the dearth of digital knowledge and skills, compounded by disparate access to technology, particularly in remote regions of developing countries. Consequently, not all MSMEs possess the capacity to adapt to this transformation,

and the repercussions of digitalization are not universally favorable. Research by Bohlmann et al. (2020) indicates that MSMEs undergoing digital transformation face novel challenges, including cybersecurity concerns.The proliferation of digitalization among MSMEs has led to an escalation in cyber threats, with many MSMEs lacking the resources and expertise to safeguard themselves from cyberattacks.

Digitalization presents significant potential for MSMEs to enhance competitiveness, operational efficiency, and market access at the global level. However, substantial challenges persist in the form of digital literacy, technological infrastructure, and regulatory preparedness, which act as significant barriers to this process. Consequently, this research endeavors to contribute to the extant literature on the impact of digitalization on MSMEs. It aims to explore various aspects of digitalization, to provide deeper insights and strategic recommendations for policymakers, practitioners, and academics. These recommendations are designed to support MSMEs in adapting to rapid and complex changes in the digital business environment. Additionally, this research endeavors to make an academic contribution by augmenting the extant literature on digitalization and MSMEs, while concomitantly creating opportunities for further research in related domains.

2. METHODS

This research adopts a systematic literature review (SLR) approach guided by the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) method to investigate and analyze the impact of digitalization on Micro, Small and Medium Enterprises (MSMEs).The utilization of PRISMA ensures enhanced transparency and reproducibility in this study. The PRISMA guidelines provide a systematic framework for reporting the results of SLRs, encompassing the steps involved in study selection, data collection, and analysis (Page et al., 2021). In accordance with these guidelines, this study endeavors to offer a more profound comprehension of the ramifications of digitalization for MSMEs.

The data collection process commenced with the identification of pertinent scholarly articles through reputable academic databases, including Scopus, Google Scholar, and JSTOR. Inclusion criteria were established to ensure the inclusion of studies exclusively focusing on the impact of digitalization on MSMEs, with a publication time limit between 2014 and 2024 to encompass the latest developments in the field. A comprehensive search was conducted using predefined keywords, such as "digitalization," "MSMEs," and "digital transformation." The identified articles were then screened based on abstract and topic suitability, taking into account quality criteria, including the methodology used in each study. The screening results

produced many articles that met these criteria, which were further analyzed using thematic analysis techniques. The criteria of the articles determined by the research are as follows:

Table 1. Inclusion and exclusion criteria.

Criterion	Eligibility	Exclusion
Literature type	Journal articles including case studies	Review articles, chapters in the book, conference proceeding
Language	English	Non-English
Focus of study	Digitalization and Small and Medium Enterprises	Non- Digitalization /Non- Small and Medium Enterprises
Methodology	Quantitative and Qualitative	Systematic Literature Review
Access	Open access	Paid

Based on the predetermined criteria in Table 1, which included the keywords "digitalization," "Small and Medium Enterprises," and "digital transformation," a total of 278 articles were identified. However, during the identification process, 13 duplicate articles were removed, and 184 articles were rejected due to their non-compliance with the established criteria. Additionally, 46 articles were excluded during the eligibility stage. Following a thorough screening process, 35 articles were deemed suitable for inclusion in this study.The PRISMA flowchart, illustrating the study's systematic approach, is presented below.

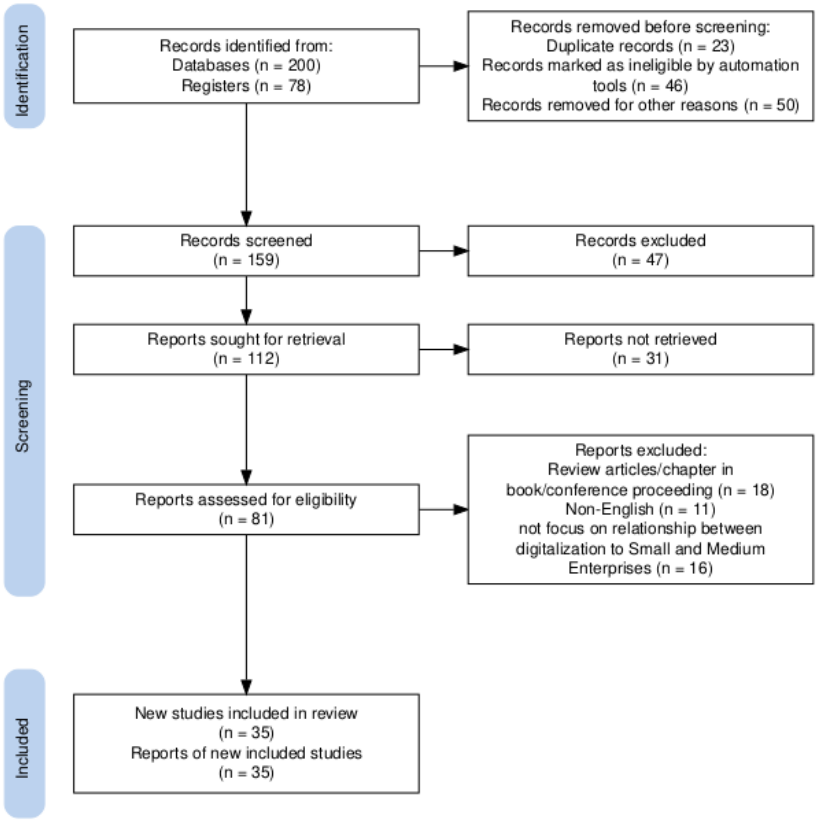

Figure 1. The flow diagram of the study.

3. RESULTS AND DISCUSSION

Based on the 35 articles that were reviewed and then analyzed, this research can summarize several main findings:

Digitalization as a catalyst for SME innovation

Digitalization has become an important catalyst for driving innovation in various aspects of SME business, including products, processes, services, and business models. Digital technologies, such as the Internet of Things (IoT), big data, and artificial intelligence (AI), expand the ability of organizations to manage internal and external resources more effectively, thereby supporting sustainable innovation. Garzella et al. (2021) note that the expansion of organizational boundaries facilitated by digitalization enables optimal management of relationships and technology, which in turn drives the creation of innovative business models. At the same time, technologies such as IoT, blockchain, and big data strengthen the ability of SMEs to analyze data at scale, creating opportunities for innovation in the manufacturing and service sectors through data-driven product development and more efficient business processes, as well as economic and social value creation for SMEs (Akpan & Ibidunni, 2023; Hassan et al., 2024; Hervé et al., 2020; Kääriäinen et al., 2020; Kilimis et al., 2019; Vrontis et al., 2022).

Digitization also paves the way for external collaborations that accelerate innovation (Hassan et al., 2024; Hervé et al., 2020; Molotkova et al., 2019; Reim et al., 2022; Wang et al., 2023). Priyono et al. (2020) found that digital platforms enable SMEs to collaborate with technology partners to develop new personalized products and adapt their business models to dynamic market needs. Furthermore, Franco et al. (2021) pointed out that digitalization encourages the formation of strategic alliances that not only improve efficiency but also expand global market reach. In addition to these benefits, sustainability aspects are also a major focus of digital-based innovation (Akpan & Ibidunni, 2023; Franco et al., 2021; Kilimis et al., 2019; Marcysiak & Pleskacz, 2021). According to (Costa Melo et al., 2023; Viswanathan & Telukdarie, 2021), digitalization enables waste reduction, energy efficiency, and supply chain optimization, which contributes to economic and environmental sustainability. Thus, digitalization not only supports innovation, but also strengthens the competitiveness of SMEs to face the challenges of an ever-evolving global market.

Challenges in implementing digitization in MSMEs

The main challenges of digitization implementation in MSMEs include internal and external barriers, which influence each other. Internal barriers include limited financial resources (Alraja et al., 2020; Guan et al., 2020; Strilets et al., 2022; Telukdarie et al., 2023;

Traşca et al., 2019), low digital skills (Guan et al., 2020; Le-Dain et al., 2023; Strilets et al., 2022; Traşca et al., 2019; Wang et al., 2023) and organizational resistance to change (Dutta et al., 2021). Alraja et al. (2020) found that budget constraints often prevent SMEs from fully adopting digital technologies, especially when it comes to investing in hardware, software, or employee training. Low digital literacy among employees is an additional barrier that hinders the mastery of technology and its optimal use. In addition, internal resistance, such as fear of operational disruption and uncertainty about the outcome of adopting new technologies, often slows down the transformation process. This condition is even more complex when the organization has a traditional structure that lacks flexibility for innovative change.

Externally, challenges include inadequate digital infrastructure (Akpan & Ibidunni, 2023; H. Guo et al., 2020; Telukdarie et al., 2023), inconsistent supporting policies (Brodny & Tutak, 2022), and the digital divide between regions (Akpan & Ibidunni, 2023; Strilets et al., 2022). Akpan & Ibidunni (2023) highlight that in many developing countries, limited access to high-speed internet and the high cost of digital technologies hinder SME transformation efforts. Inconsistent policy support, such as a lack of tax incentives and subsidized training, also limits the ability of SMEs to adapt to the digital ecosystem. Research by (Strilets et al., 2022) highlights the existence of a digital divide between developed and developing countries, largely due to differences in technology adoption rates and infrastructure capacity. Therefore, a comprehensive strategy is needed to overcome these barriers, including the provision of financial incentives, improving digital literacy through training, strengthening infrastructure, and cross-sector collaboration to create an ecosystem that supports the sustainable digital transformation of SMEs.

The role of government and the digital ecosystem

The government plays a strategic role in accelerating the adoption of digital technologies by SMEs by providing incentives, training, supporting regulations, and strengthening digital infrastructure (Guan et al., 2020; Marcysiak & Pleskacz, 2021; Martins, 2023; Molotkova et al., 2019; Strilets et al., 2022; Teng et al., 2022; Traşca et al., 2019; Wang et al., 2023). Strilets et al. (2022) showed that countries with progressive digitization policies, such as Finland and Denmark, achieved higher technology adoption rates than developing countries. These supportive policies include grants, subsidies for the purchase of digital devices, and technology skills training programs that directly increase SMEs' access to technology. Akpan & Ibidunni (2023) also emphasized the importance of regulations that encourage the integration of digital technologies into the economic ecosystem, especially to reduce the digital divide between

developed and developing countries. This will provide a fairer opportunity for SMEs to participate in a competitive digital economy.

In addition to policy support, an inclusive digital ecosystem is a key component of SME transformation (Becker & Schmid, 2020; Kilimis et al., 2019; Molotkova et al., 2019; Priyono et al., 2020). The government can facilitate collaboration between firms, technology providers, and educational institutions to create an enabling environment for digital innovation. Priyono et al. (2020) found that cross-sector collaboration through digital platforms helps SMEs expand their market networks and access strategic partners. Meanwhile, (Trașca et al., 2019) emphasized the importance of strengthening infrastructure, including high-speed internet access and reducing technology costs, to accelerate digital adoption in regions with less developed infrastructure. In addition, clear regulations on data security and privacy protection play an important role in building SMEs' trust in new technologies. With this integrated approach, the government not only supports but also promotes the creation of a sustainable and inclusive digital ecosystem, which is an important foundation for SMEs' competitiveness in the global market.

Business transformation during the pandemic.

The COVID-19 pandemic was a major catalyst for digital transformation in the SME sector, forcing many businesses to adopt digital technologies in order to survive and remain competitive (Guan et al., 2020; P. Guo et al., 2020; Hetami & Aransyah, 2021; Marcysiak & Pleskacz, 2021; Martins, 2023; Priyono et al., 2020; Trașca et al., 2019). Priyono et al. (2020) identified three digital transformation paths taken by SMEs during the pandemic: accelerating towards full digitalization for companies with high technological maturity, digitizing the sales function to maintain revenue amidst physical constraints, and collaborating with digital partners to overcome internal constraints. This transformation is evident in the adoption of e-commerce, digital marketing, and cloud-based collaboration tools such as Zoom and Microsoft Teams, which ensure operational continuity despite significant disruptions to traditional ways of working. Trașca et al. (2019) add that many SMEs have begun to use data analytics to understand changing consumption patterns during the pandemic, allowing them to personalize offerings and improve customer relationships through digital platforms.

In addition to improving operational efficiency, digital transformation during the pandemic also creates opportunities for innovation and diversification. Guo et al. (2020) highlight that SMEs with high levels of digitalization are able to adopt strategies such as product diversification and market expansion through digital platforms, giving them an edge in responding to changing market demands. Cloud-based technologies and digital supply chain

integration also help reduce logistics costs and improve operational agility. Guan et al. (2020) found that SMEs that had embarked on a digital transformation journey before the pandemic showed greater resilience, leveraging technologies such as digital payments and customer service automation to sustain their operations. The pandemic not only accelerated technology adoption, but also paved the way for the development of more innovative and adaptive business models, putting SMEs in a more competitive position in the ever-evolving digital economy.

Implications for sustainability

Digitization plays a strategic role in supporting social, economic and environmental sustainability by improving operational efficiency and reducing the negative impacts of business activities. Technologies such as the Internet of Things (IoT) and big data enable SMEs to monitor production processes in real time, identify waste, and optimize resource use (Costa Melo et al., 2023; Dutta et al., 2021; Kilimis et al., 2019; Vrontis et al., 2022). This approach allows SMEs to reduce waste, improve energy efficiency, and reduce carbon emissions (Depaoli et al., 2020; Kilimis et al., 2019). In addition, the integration of digital technologies in the supply chain increases transparency, speeds up logistics processes, and reduces operational disruptions . This transformation not only supports global sustainability goals, but also gives SMEs a competitive advantage in an increasingly environmentally conscious market (Matalamäki & Joensuu-Salo, 2022; Abidin et al., 2022).

In addition to environmental impacts, digitization also offers significant social and economic benefits. Hassan et al. (2024) showed that the application of digital technologies creates new employment opportunities in technology-based sectors, while expanding social inclusion by increasing people's access to digital services. This is supported by (Strilets et al., 2022), who found that countries with high levels of digitization have SMEs that are more resilient in the face of global economic challenges and climate change. On the other hand, (Priyono et al., 2020) found that digital technology helps SMEs reach a wider market through e-commerce, which directly contributes to local economic growth. Thus, digitalization is not only a technical tool for efficiency, but also a strategic solution to promote sustainable development that balances economic, social and environmental dimensions.

4. CONCLUSION

Digitalization provides significant opportunities for the improvement of operational efficiency, innovation, and access to global markets for small- and medium-sized enterprises (SMEs) through the use of technologies such as the Internet of Things (IoT), big data, and artificial intelligence. However, various challenges, including low digital literacy, limited

financial resources, uneven technology infrastructure, and cybersecurity risks, are still major obstacles in the adoption process. To address these challenges, the government must assume a proactive role in fostering a conducive digital ecosystem. This can be achieved through the implementation of fiscal incentive policies, the provision of inclusive digital skills training, the enhancement of internet infrastructure in remote regions, and the establishment of comprehensive data protection regulations. Furthermore, the government, technology providers, academic institutions, and educational organizations must collaborate across sectors to ensure the successful and sustainable digital transformation of MSMEs. Further research is recommended to explore strategies for improving digital literacy, affordable cybersecurity, developing technology infrastructure in remote areas, the social impact of digitalization, implementing environmentally friendly technology, and developing digital business models that are adaptive to market dynamics. This integrative approach is expected to make digitalization the main catalyst for strengthening MSME competitiveness in the industrial era 4.0 while supporting global economic, social, and environmental sustainability.

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