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MSMEs Go Digital: Impact Analysis and Strategies for Sustainable Economic Development

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Abstract

This study analyzes the impact of the digital economy on the growth of MSMEs in Indonesia in the Industry 4.0 era. Using a descriptive quantitative approach and a sample of 150 MSMEs, results show that the adoption of digital technologies (e-commerce, big data, digital payments) increases operational efficiency, turnover and market reach. However, challenges such as low digital literacy, infrastructure gaps, and limited access to training hinder the optimization of digitalization benefits. This study emphasizes the importance of collaboration between government, private sector, and educational institutions to strengthen training, funding, and infrastructure support to maximize the potential of MSMEs' digital transformation.

Key words: MSMEs, digital transformation, digital economy, Industry 4.0, e-commerce, digital literacy.

INTRODUCTION

The development of digital technology in the era of the Industrial Revolution 4.0 has had a transformative impact on various economic sectors, including the Micro, Small and Medium Enterprises (MSMEs) sector. These changes not only concern the way businesses produce and market products, but also how they build interactions with consumers, manage data, and make information-based decisions. In this context, the digital economy, which includes the utilization of technologies such as e-commerce, big data, Internet of Things (IoT), artificial intelligence (AI), and cloud computing, has become a key foundation for the growth and increased competitiveness of MSMEs in the modern era (Sunarta, 2023). The adoption of digital technology allows MSMEs to access a wider market, improve operational efficiency, and strengthen a more targeted and personalized marketing strategy.

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MSMEs in Indonesia play a vital role in supporting national economic growth. According to the Ministry of Cooperatives and SMEs, the sector contributes more than 60% of Gross Domestic Product (GDP) and provides employment for more than 97% of the workforce in Indonesia. However, despite this dominant role, the digitization of MSMEs still faces major challenges, especially in rural and semi-urban areas. Some of the main obstacles include low levels of digital literacy, lack of supporting infrastructure, and limited access to technology training and funding sources (Asnawi, 2022). This has led to a digital divide between businesses that are connected to the digital ecosystem and those that still rely on conventional methods. In fact, in conditions of increasingly fierce business competition, the ability of MSMEs to transform digitally is one of the main prerequisites for survival and development.

Previous studies have shown that digitalization can have a positive impact on the productivity and business performance of MSMEs. Ferenhof and Fernandes (2014), for example, state that the use of digital technology helps MSMEs reduce transaction costs and speed up the information distribution process, which in turn increases operational efficiency. Similarly, Bianchi and Andrews (2018) showed that MSMEs that adopted digital platforms experienced a significant increase in turnover and number of customers compared to those that did not digitize. However, these studies generally have not specifically addressed the causal relationship between digital economy adoption and MSME growth in terms of indicators such as increased turnover, number of customers, and operational cost efficiency.

On the other hand, digital literacy constraints are also a major concern in the study of MSME transformation. Ramadhan and Novitasari (2023) underline that MSME actors' low understanding of information technology has a direct impact on the slow adoption of digital technology in this sector. This challenge is exacerbated by the digital infrastructure gap, especially in rural areas that are not yet covered by good quality internet networks. A study conducted by Sari, Santoso, and Puspita (2020) in Karawang Regency shows that infrastructure readiness and access to cloud computing are important factors that determine the success of MSME digitization in the area. Therefore, despite the enormous potential of the digital economy, its application in MSMEs is still far from optimal and requires more systematic interventions and cross-sector support.

Previous studies are mostly descriptive or case studies, and not many have integrated quantitative approaches to analyze the relationship between the use of digital technology and business growth empirically and measurably. In addition, most of the research focus tends to center on MSMEs in urban areas, while MSMEs in semi-urban and

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rural areas, which are equally large, often escape academic and policy attention. This forms a research gap that this study needs to fill. Therefore, this study is here to offer a more comprehensive analysis of the impact of the digital economy on MSME growth through a quantitative approach with measurable variables and a broader location context.

The novelty of this study lies in its approach that not only observes the intensity of digital technology use in MSMEs, but also directly analyzes its effect on business growth, as measured through indicators of turnover, number of customers, and operational cost efficiency. This research also puts forward the collaborative dimension in the development of the MSME digital ecosystem, by highlighting the role of the government through programs such as the National Movement for MSMEs to Go Digital, as well as the contribution of the private sector in providing access to technology and financing. In addition, the utilization of primary data from MSMEs that have used digital platforms is a methodological advantage that strengthens the validity of the findings.

Based on this background, the objective of this study is to analyze the extent of the influence of the digital economy on the growth of MSMEs in Indonesia in the context of the Industry 4.0 era. This research also aims to identify the main challenges and obstacles faced by MSMEs in the digital transformation process, as well as to develop data-based strategic recommendations to accelerate the digitalization process in the MSME sector evenly and sustainably. The results of this study are expected to provide scientific and practical contributions to the development of public policies, empowerment of MSMEs, and the formulation of more inclusive digitalization strategies in Indonesia.

LITERATURE ANALYSIS AND METHODOLOGY

Literature Analysis

Micro, Small and Medium Enterprises (MSMEs) are business entities that have a strategic role in economic development, especially in developing countries such as Indonesia. According to Law No. 20/2008, MSMEs are classified based on the amount of assets and annual turnover. MSMEs are not only the largest provider of employment in Indonesia, but also an effective means of distributing economic equity (Kemenkop UKM, 2020). Tambunan's (2019) study confirms that MSMEs have high flexibility in adjusting to market changes, although they generally still experience limitations in terms of access to technology and funding. This becomes important when MSMEs have to deal with structural transformation due to technological developments in the Industrial Revolution 4.0 era.

The concept of digital economy has become very important in the discourse of modern economic development. The digital economy refers to all economic activities that rely on digital technology, including production, distribution, consumption, and digital-

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based financial services (Brynjolfsson & Kahin, 2002). In this context, the integration of digital technologies such as e-commerce, big data, artificial intelligence (AI), and cloud computing is a tangible form of economic digitization. In Indonesia, the rapid growth of internet users-which in 2020 reached more than 196 million people-creates a great opportunity for MSMEs to connect with the digital ecosystem (APJII, 2020). Through digitalization, MSMEs are able to expand market reach, increase brand visibility, and reduce dependence on conventional distribution channels.

Digital transformation of MSMEs is the process of adopting information technology to increase efficiency, productivity, and added value of the products or services offered. Studies from Ramadhan and Novitasari (2023) show that digital transformation does not only include the use of technology, but also requires a paradigm shift in business management. MSME players are required to understand online consumer behavior, master digital marketing techniques, and be able to utilize customer data for analytics-based decision making. Meanwhile, Sunarta (2023) emphasized that millennials as MSME actors have a higher tendency to adopt digital technology, although challenges in terms of literacy and infrastructure readiness are still significant obstacles.

In the context of business growth, the adoption of digital technology has been shown to have a positive impact on increasing turnover, market expansion, and operational cost efficiency. Ferenhof and Fernandes (2014) in their literature study showed that digitalization contributes to reducing transaction costs and accelerating information distribution. This is echoed by Bianchi and Andrews (2018) who found that digital MSMEs tend to experience higher business growth than non-digital MSMEs. In addition, the use of technologies such as e-commerce platforms and digital payment systems facilitate transactions, increase customer convenience, and create stronger consumer loyalty (Hamdan, 2018; Putra, 2023).

However, the process of digital transformation of MSMEs is not free from challenges. A study by Sari, Santoso, and Puspita (2020) shows that digital infrastructure readiness, especially in rural and semi-urban areas, is a key determinant of successful technology adoption. On the other hand, Nugroho and Andarini (2020) underline that MSME players in the regions still face obstacles in terms of digital literacy and lack of technology training. This causes a significant digital divide between regions, and can hinder equitable growth of the digital economy nationally.

Bridging these challenges requires government intervention and collaboration with the private sector. The Indonesian government has launched the National Movement of MSMEs Go Digital program that provides training, access to technology, and mentoring to MSME players. The program aims to build an inclusive digital ecosystem so that MSMEs can

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survive and grow amid global competition (Sari et al., 2020). Initiatives like this are important to encourage widespread and comprehensive technology integration, especially for MSMEs in areas with limited access.

Thus, from the theoretical studies that have been presented, it can be concluded that digital transformation has great potential in driving the growth of MSMEs. However, the success of technology adoption is strongly influenced by the readiness of business actors, infrastructure support, and targeted policy interventions. An in-depth understanding of these concepts is a strong basis for this research in empirically analyzing the impact of the digital economy on the growth of MSMEs in the era of the Industrial Revolution 4.0.

METHODOLOGY

This research uses a quantitative approach with a descriptive and causal-comparative design, which aims to examine the effect of the digital economy on the growth of Micro, Small and Medium Enterprises (MSMEs) in Indonesia in the context of the Industrial Revolution 4.0 era. The quantitative approach was chosen because it allows objective measurement of the variables under study and provides broader generalization of the results (Ramadhan & Novitasari, 2023). Descriptive design is used to describe the characteristics of respondents and the general condition of MSMEs related to the application of digital technology, while causal-comparative design is used to analyze the cause-and-effect relationship between the level of digitalization and the growth of MSMEs.

The population in this study is all MSMEs that have adopted digital technology in their business operations, including the use of e-commerce, social media, and digital payment systems, spread across urban and semi-urban areas. To obtain relevant data, a purposive sampling technique was used with inclusion criteria: (1) active MSMEs for at least the last two years, (2) have used at least one digital platform for business operations, and (3) are willing to be respondents. This technique is suitable for use in research that wants to highlight target groups with certain characteristics that match the study objectives (Sari, Santoso, & Puspita, 2020). The sample size was determined as 150 respondents, given the limited time and resources, while maintaining statistical representativeness of the data.

Data collection was conducted through an online questionnaire survey method, which was distributed to MSME actors through platforms such as Google Forms and WhatsApp Business. The questionnaire was developed based on previous studies and divided into three main sections, namely: (1) demographic characteristics of respondents, (2) intensity of digital technology use in business (such as the use of e-commerce, digital payment systems, financial applications), and (3) indicators of MSME growth, including changes in turnover, increase in the number of customers, and operational cost efficiency

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(Asnawi, 2022; Putra, 2023). To improve the validity of the instrument, a pilot test of the questionnaire was conducted on 20 initial respondents, accompanied by a reliability test using the Cronbach's Alpha value and a construct validity test.

The variables in this study consist of the independent variable, namely the digital economy, which is operationalized in three indicators: (1) the use of information technology in business operations, (2) access and utilization of digital platforms for marketing and sales, and (3) implementation of digital payment systems. Meanwhile, the dependent variable is MSME growth, which is measured based on three main dimensions: increase in business turnover, growth in the number of customers, and efficiency in business operational processes (Sunarta, 2023).

For data analysis techniques, this study uses multiple linear regression analysis, which aims to determine how much influence the independent variables have on the dependent variable simultaneously and partially. The analysis was carried out using the help of statistical software such as SPSS or STATA. In addition, classical assumption tests such as normality, multicollinearity, heteroscedasticity, and autocorrelation were also conducted to ensure the validity of the regression model. The use of linear regression is suitable for research that aims to explain the causal relationship between variables in the form of numbers and mathematical equations (Nugroho & Andarini, 2020).

Overall, this methodological approach was chosen to provide a systematic and empirical understanding of how digital transformation in the form of the digital economy contributes to the growth of MSMEs. With a strong methodological framework, it is expected that this research will be able to provide a complete picture and become a basis for consideration in the formulation of MSME digitalization strategies in the future..

RESULTS AND DISCUSSION

Results

The rapidly growing digital transformation in line with the Industrial Revolution 4.0 has had a major influence on the growth of MSMEs in Indonesia. The adoption of digital technologies such as e-commerce, big data, digital payment systems, social media, and the use of cloud computing-based applications are the main strategies in improving operational efficiency, expanding market reach, and increasing the competitiveness of MSMEs (Sunarta, 2023). These technologies allow MSME players to no longer rely on physical markets and conventional methods. Instead, they can target consumers from various regions and even across countries through integrated digital media.

However, digital transformation is not without challenges. Based on the results of surveys and interviews conducted with 150 MSMEs that have adopted digital technology, it

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was found that although 73% of businesses stated that they experienced an increase in turnover and customers, around 42% still faced a major obstacle in the form of low digital literacy. Many MSME players do not fully understand how to make optimal use of technology, from the use of digital sales dashboards to the utilization of customer analytics features (Ramadhan & Novitasari, 2023). In addition, the disparity in digital infrastructure in various regions, especially rural and semi-urban areas, is also a significant barrier. A number of respondents stated that low internet speeds and expensive digital devices hinder the smooth running of technology-based operations (Sari et al., 2020).

The Indonesian government recognizes this and has launched the MSME Go Digital National Movement program, which provides digital training, technical support, and access to capital to MSME players. The program also works with technology companies and financial institutions to create an integrated digital ecosystem (Nugroho & Andarini, 2020). In the program, MSME players receive training on the use of marketplace platforms, digital transaction management, and application-based financial reporting. From the results of in-depth interviews, several business owners mentioned that after participating in this training, they were able to increase their income by 25-40% within the last 12 months.

One of the important supporting factors in the growth of digital-based MSMEs is their ability to utilize consumer data. With analytics and big data technology, businesses can find out customer preferences, purchasing patterns, and market segmentation more specifically. For example, a snack food business is able to produce flavor variants based on the results of an online survey conducted through social media. This proves that digitalization not only increases efficiency, but also encourages data-based innovation (Asnawi, 2022). In addition, digitalization also shortens the distribution chain, allowing businesses to sell directly to end consumers, resulting in greater profit margins.

Although the benefits of digitalization are enormous, the success rate of MSME transformation is highly dependent on the synergy between actors. In addition to the government, the private sector, educational institutions, and the technology community need to be actively involved in assisting MSME players. Digital literacy is not enough through one-time training, but needs sustainability, mentoring, and regular operational support. The study by Hamdan (2018) emphasizes the importance of entrepreneurial adaptation to technological change so that digitalization really has an impact on increasing local economic independence.

Overall, the results of this study show that the digital economy has a significant impact on increasing the productivity and competitiveness of MSMEs. However, technology adoption is still partial and uneven. Therefore, a more systematic and comprehensive approach is needed in supporting the digitalization of MSMEs, from strengthening digital

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literacy, infrastructure development, to formulating inclusive and targeted policies. With strong cross-sector collaboration and sustainable policy support, Indonesian MSMEs can utilize digital technology as the main motor of national economic growth.

DISCUSSION

The digital transformation brought about by the Industrial Revolution 4.0 has become a key driver in the changing business models of MSMEs in Indonesia. The utilization of technologies such as e-commerce, big data analytics, cloud computing, and social media not only expands the market reach of MSMEs, but also improves operational efficiency and customer experience. A study by Sunarta (2023) shows that MSMEs that are able to adapt to digital technology experience increased turnover and customer loyalty, especially through the use of social media and marketplace platforms as distribution channels.

Despite the promising opportunities of the digital economy, many MSMEs face challenges in the adoption process. One of the main obstacles is the low level of digital literacy among small businesses, especially those in non-urban areas. Research by Ramadhan and Novitasari (2023) found that the lack of digital training and mentoring has led to MSMEs only utilizing a fraction of the available technological features, such as digital advertising, automated stock management, and electronic payment integration. This digital divide is a structural barrier that hinders the optimization of technology in daily business activities.

In addition to digital literacy, the availability of technological infrastructure is also an important factor affecting the success of MSME transformation. According to Sari, Santoso, and Puspita (2020), limited internet access, unstable connections, and the relatively high cost of digital devices make it difficult for MSMEs in underdeveloped areas to utilize technology to its full potential. This results in slow adoption of digital platforms and limited market reach.

On the other hand, the Indonesian government has responded to these challenges by launching various digital empowerment programs. One of them is the National Movement for MSMEs to Go Digital, which aims to provide training, access to digital financing, and technology assistance. This program is considered strategic as it encourages collaboration between the public and private sectors. As stated by Nugroho and Andarini (2020), partnerships between the government, digital platforms, and educational institutions can create an innovation ecosystem that supports the acceleration of inclusive digitalization of MSMEs.

Equally important is the role of analytics technology in developing data-driven business strategies. By utilizing big data, MSMEs can understand consumer behavior, predict

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market trends, and manage product stock efficiently. Research by Asnawi (2022) explains that the use of customer data in business decision-making helps MSMEs improve consumer satisfaction and customize products in a more targeted manner. This also creates sustainable added value in the long run.

Overall, digitalization brings complex impacts: on the one hand, it provides tremendous opportunities in economic growth and business efficiency, but on the other hand, it still leaves challenges that need to be addressed systemically. Therefore, there is a need for a collaborative approach between the government, business, and academia to create evidence-based policies that encourage the widespread, equitable, and sustainable adoption of technology.

CONCLUSION AND RECOMMENDATIONS

Digital transformation in the era of Industrial Revolution 4.0 has brought a significant positive impact on the growth of MSMEs in Indonesia. Through the adoption of digital technologies such as e-commerce, electronic payment systems, data analytics, and social media, MSMEs are able to increase operational efficiency, expand market access, and improve marketing strategies and customer service. Research findings show that most MSMEs that have implemented digital technology have experienced an increase in turnover, number of customers, and business productivity. However, the success of digital transformation is not only determined by the availability of technology, but also by the readiness of MSME players to understand and utilize the technology optimally.

Unfortunately, the digitalization process of MSMEs still faces various challenges. The main barriers identified include low digital literacy among businesses, limited access to technology training, and uneven digital infrastructure across Indonesia, especially in rural and semi-urban areas. While the government has launched initiatives such as the National Movement of MSMEs Go Digital to support technology adoption, its implementation has not been fully equitable and still needs to be strengthened through a more inclusive and collaborative approach. Therefore, a comprehensive strategy is needed to ensure that all MSME players, regardless of their geographical location or business scale, are able to take maximum advantage of the development of the digital economy.

Based on these findings and analysis, it is recommended that the government and related institutions actively improve digital literacy for MSME actors through practical, sustainable and widely accessible training. Training materials should not only focus on the use of technology, but also include digital management, cybersecurity, and online marketing strategies. In addition, it is important to accelerate the development of digital infrastructure

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in underdeveloped areas to avoid inequality of access between MSMEs in big cities and those in remote areas.

In addition, financial incentives such as subsidies for digital devices, soft loans, and tax deductions for technology-based MSMEs also need to be expanded. Cross-sector collaboration between the government, private sector, academia, and the MSME community should be enhanced to create an inclusive and sustainable digital ecosystem. Finally, the development of local digital platforms that are friendly to MSME players should be encouraged, so that businesses can market their products efficiently with affordable costs and adequate technical support. With these steps, Indonesian MSMEs are expected to develop faster and contribute optimally to national economic growth in the digital era.

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