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Bridging The Digital Divide : The Role of Technology in Enhancing Rural SMES in Indonesia

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Abstract

This study aims to analyze the digital divide faced by rural Small and Medium Enterprises (SMEs) in Indonesia, assess the role of technology in bridging this gap, identify challenges in technology adoption, and propose strategies to enhance SME competitiveness in the digital era. A qualitative approach was used, combining a literature review and netnography of relevant scientific articles and online journals published between 2020 and 2024. Data was analyzed to identify key factors influencing the digital divide and technology adoption among rural SMEs. The study identifies limited infrastructure access, low digital literacy, and insufficient government support as the primary drivers of the digital divide in rural Indonesia. Despite the potential of digital technology to improve SME competitiveness and revenue, technology adoption remains limited in rural areas. The research highlights the need for stronger collaboration among the government, technology service providers, and SMEs to accelerate technology adoption. A key limitation of the study is its reliance on secondary data sources, which may not fully capture the local variations and specific challenges faced by SMEs in different rural areas. This study offers valuable insights into the digital divide affecting rural SMEs in Indonesia and proposes actionable recommendations to enhance technology adoption. It contributes to the growing body of research on digital inclusion and provides practical strategies to improve the competitiveness and sustainability of rural businesses in the digital era

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Introduction

Human The Fourth Industrial Revolution has brought significant changes across various sectors, with the rapid adoption of technologies such as the Internet of Things (IoT), cloud computing, big data, virtual reality (VR), augmented reality (AR), and artificial intelligence (AI). This shift towards the digital era pushes society to adapt to information and communication technologies (ICT), which are not only essential for economic growth but also for social inclusion. According to Purnomo & Dewi (2021), digital technology adaptation is a necessity for future economic success, especially in sectors directly interacting with consumers, such as Small and Medium Enterprises (SMEs).

One of the biggest challenges Indonesia faces is the Digital Divide, referring to the disparity in access and technological skills between urban and rural communities. This gap is evident in the ability to utilize digital technology, especially in the context of the

digital economy. According to data collected by Rahmadani et al. (2022), only 45% of the rural population has adequate internet access, compared to over 75% in urban areas. This divide is exacerbated by low digital literacy in rural areas, where many SMEs are unable to leverage digital technology to expand their businesses.

The presence of digital technology offers enormous opportunities for rural SMEs to improve their competitiveness, particularly by utilizing digital platforms to expand market reach. Research by Febriyanto & Lestari (2022) shows that SMEs that have transformed into the digital ecosystem have seen a 40% increase in revenue over the past two years. However, in rural areas, only about 30% of SMEs are effectively utilizing digital technology. The main obstacles include the lack of technological infrastructure, low digital literacy, and limited support from the government and related stakeholders.

The gap between urban and rural SMEs is caused by various factors, such as access to technology infrastructure, education levels, and digital literacy. According to a study by Widiastuti et al. (2023), SMEs in urban areas have broader access to digital training and resources, whereas rural SMEs often struggle to obtain the necessary digital literacy training to operate tech-based businesses. This results in the lower competitiveness of rural SMEs in participating in the digital economy. A survey by BPS (2022) revealed that 52% of urban SMEs have utilized e-commerce platforms, while in rural areas, the figure is only 20%. This study also noted that the reliance of rural SMEs on traditional sales methods limits their ability to adapt to rapidly changing consumer trends toward online transactions.

The Indonesian government has launched several initiatives to address this issue, such as the Digital Village Program and the 100 Smart City Movement, aimed at expanding internet access and improving digital literacy in rural areas. However, as noted by Susanto & Pramono (2021), the success of these programs is still limited, primarily due to infrastructure constraints in many remote areas and the lack of participation from SMEs in training programs.

Additionally, the development of the COVID-19 pandemic has accelerated digitalization in many sectors, but it has also highlighted the digital divide between urban and rural areas. According to Nasrullah et al. (2021), the pandemic increased dependence on digital technology, yet many rural SMEs lag behind due to a lack of access to quality internet and the technological devices needed to operate businesses online.

Therefore, efforts to bridge the digital divide, particularly in rural areas, are key to enhancing the productivity and competitiveness of SMEs. Digital technology can play an essential role in opening up wider market access, increasing financial inclusion, and strengthening the contribution of SMEs to national economic growth. Moving forward, closer collaboration between the government, technology service providers, and SMEs is needed to accelerate technology adoption in rural areas and create an inclusive and sustainable business ecosystem. Based on this background, this study aims to analyze the digital divide faced by SMEs in rural Indonesia, explain the role of technology in bridging the digital divide in rural SMEs, identify the main challenges faced by rural SMEs in the technology adoption process, and formulate effective strategies to leverage technology in improving the competitiveness and productivity of rural SMEs.

Method

This article provides important insights into the challenges faced by SMEs in rural Indonesia in adopting digital technology, focusing on the digital divide between urban and rural areas, which is highly relevant for inclusive economic growth. The comprehensive analysis of factors such as infrastructure and digital literacy offers a clear picture of the

complexities involved. Emphasizing the need for collaboration between the government and SMEs is a crucial step toward achieving effective solutions. However, reliance on secondary data may be a weakness, so research using primary data would provide a deeper understanding. The article would be more beneficial if it included concrete recommendations to address the challenges faced. Overall, this article significantly contributes to the understanding of the digital divide and the role of technology in enhancing the competitiveness of SMEs.

Result and Discussion

Digital Divide Condition of MSMEs in Rural Areas

The digital divide among rural MSMEs remains a significant challenge, particularly in three main aspects: infrastructure, digital literacy, and access to technology. The digital divide faced by rural MSMEs encompasses three key aspects: infrastructure, digital literacy, and access to technology. Hollman, A.K. et al. (2021) highlighted that despite efforts to improve connectivity, rural areas often lag behind urban centers in terms of access and bandwidth. In rural areas, infrastructure such as fiber optics and high-speed wireless networks is less common, leading to slower internet speeds and higher service costs, exacerbating the divide. This results in economic disparities as rural businesses and populations have fewer opportunities to benefit from digital advancements.

The digital divide between urban and rural areas remains a critical issue in Indonesia. One of the main problems faced by rural communities is the limited access to digital infrastructure, especially technology infrastructure. Many rural areas still face limitations in digital infrastructure, particularly stable high-speed internet access. These limitations have caused many rural MSMEs to lag in leveraging technology to support their business operations. According to Fizzanty et al. (2021), rural MSMEs struggle to transition to the digital economy due to inadequate infrastructure and digital skills. Uvarova, O., & Pobol, A. (2021) stated that in some countries, such as Armenia and many other regions, rural MSMEs still face severe limitations in internet access and digital technology compared to urban areas, further widening the gap.

The limitation of technological access in rural areas is not only about infrastructure. The high cost of acquiring equipment and technological services is a significant barrier for MSMEs. The availability of digital infrastructure remains very limited in rural areas. Hendrawan, S.A., Chatra, A., et al. (2024) stated that in some rural areas, MSMEs do not have access to the necessary internet speeds to support digital business operations. This is evident in countries like Indonesia, where internet access in remote areas is often slow and unstable. The digital divide is not only related to physical access to technology but also the ability to use it effectively (Vurayai, S., 2024). In rural areas, many MSME players still have limitations in digital literacy. According to Asaithambi, S., et al. (2024), the lack of these skills prevents them from fully utilizing the potential of digital technology, such as e-commerce and business management platforms. Initiatives to enhance digital literacy, such as training and capacity-building programs, are crucial to help MSMEs better adopt technology.

Impact of Technology on MSMEs

According to Wahyudiono et al. (2024), the development of digital technology has brought fresh opportunities for the business world, particularly for Micro, Small, and Medium Enterprises (MSMEs). With the availability of various digital platforms and tools, MSMEs now have broader opportunities to grow and expand. Maulana, F. R. (2024)

explains that technology has made a significant contribution to the expansion of MSMEs' markets. Through e-commerce platforms like Shopee, Tokopedia, and Lazada, MSMEs can now overcome geographical limitations and expand their reach to international markets. This aligns with the statement of Asiedu, E. et al. (2024), which emphasizes that the presence of this technology facilitates easier access for consumers to discover local products that were previously hard to reach, thereby creating opportunities for MSMEs to scale up and expand their customer base more effectively.

In addition, Triwahyono, B. et al. (2023) explain that technology plays a crucial role in improving the operational efficiency of MSMEs. Hossain, A. et al. (2024) state that the use of business management applications and software, such as digital cash register systems, online accounting platforms, and automated inventory management, enables MSMEs to manage business processes more efficiently and accurately. According to Kraus, S. et al. (2021), the transformation from manual to digital methods not only saves time and operational costs but also allows business owners to focus on product development and better service innovation.

Sari, N. T. P. & Kusumawati, A. (2022) in their research explain that technology also plays a role in expanding access to information and training needed for MSMEs' capacity development. According to Faal, P. (2020), through online platforms, MSME owners can access a variety of educational resources, such as webinars, online courses, and tutorials, which were previously hard to access. This access allows MSMEs to enhance their competencies in various aspects, including digital marketing, financial management, and product innovation (Achmad, W. 2023). Riswanto, A. (2021) states that this capacity building is crucial in strengthening MSMEs' competitiveness in an increasingly dynamic and competitive market.

Furthermore, Bagale, G. S., et al. (2021) explain that technology has opened up more efficient communication channels between MSMEs and customers through social media and other digital platforms. Social media platforms like Instagram, Facebook, and TikTok offer MSMEs the opportunity to interact directly with customers, gather feedback, and build more personal relationships. According to Urdea, A. M. (2021), the ability to quickly and personally respond to consumer needs and preferences through the use of technology can foster customer loyalty and contribute to sustainable business growth.

Challenges of Technology Adoption

Micro, Small, and Medium Enterprises (MSMEs) in rural areas play a crucial role in the local economy, yet they face significant challenges in the digital age. One of the primary challenges is the lack of adequate internet access. Redjeki, F & Affandi, A. (2021) explain that In many rural areas, internet infrastructure is still very limited, making it difficult for MSMEs to leverage digital platforms for marketing and selling their products. Without proper connectivity, they cannot reach wider markets or compete with larger businesses.

In addition, the low level of digital literacy among MSME owners is another major obstacle. Many rural MSME owners do not have the necessary skills to use digital technology effectively (Regif et al., 2021). Their lack of understanding of how to utilize social media and e-commerce platforms makes it difficult for them to promote their products and build relationships with consumers. This creates a gap between rural MSMEs and urban businesses, where access to technology and training is more readily available.

Another significant challenge is the lack of infrastructural support. Many rural MSMEs do not have access to supporting facilities such as entrepreneurship training, financing, or the technical guidance necessary to grow their businesses (Nursanti et al., 2022). Without these supports, MSMEs struggle to adapt to the rapidly changing market and technological landscapes. This limitation often traps them in stagnant business patterns,

unable to innovate. An additional aspect to consider is marketing challenges. Many rural MSMEs still rely on traditional marketing methods, which are less effective in reaching a broader consumer base (Afiah et al., 2021).

In the digital era, marketing through social media and online platforms is essential for increasing product visibility. However, without adequate knowledge and skills, MSMEs find it difficult to capitalize on these opportunities. Moreover, regulatory challenges also act as a barrier. Complicated licensing processes and lengthy bureaucratic procedures often discourage MSMEs from taking advantage of available opportunities (Irawati, 2023). This is further exacerbated by a lack of information regarding government policies that support the development of MSMEs in the digital era.

Addressing these challenges requires collaborative efforts from the government, non-governmental organizations, and the private sector. Providing better internet access, digital literacy training programs, and sufficient infrastructure support are crucial to helping MSMEs transform (Omar et al., 2022). With these steps, rural MSMEs can enhance their competitiveness and contribute more significantly to the national economy. Digital transformation is not just an option but a necessity for the sustainability of their businesses in the future.

Digital Divide as a Significant Challenge for Micro, Small, and Medium Enterprises (MSMEs)

The digital divide presents a significant challenge for Micro, Small, and Medium Enterprises (MSMEs), particularly in rural areas. Various solutions have been proposed in the literature to address this issue, including digital literacy training programs, improved internet access, and government policies that support technology adoption. One key solution suggested is the development of digital literacy training programs. These programs aim to enhance the information technology skills of MSME owners and employees. Training programs specifically designed for MSMEs can help them understand how to use digital tools for marketing, inventory management, and customer interactions (Indriani et al., 2023). By improving digital literacy, MSMEs can more effectively utilize technology for their business growth.

In addition to training, improving internet access is also a crucial step in bridging the digital divide. Many rural areas still face limitations in adequate internet infrastructure. Investments in telecommunications infrastructure, such as the provision of fiber optic networks and expanded mobile network coverage, are essential to ensure that rural MSMEs can connect to global markets. Better internet access will open opportunities for MSMEs to reach new consumers and participate in the digital economy (Lusa et al., 2024). Government policies also play an important role in supporting technology adoption by MSMEs. Governments can develop policies that encourage investment in technology, provide tax incentives for MSMEs that adopt digital solutions, and offer better access to financing (Judijanto et al., 2022). Policies that support innovation and technology can help create a conducive environment for MSMEs to grow and adapt to market changes (Al Aidhi et al., 2023).

Furthermore, collaboration between the public and private sectors can accelerate the digital transformation process. Partnership programs between technology companies and MSMEs can provide the resources and support needed for the implementation of new technologies (Al Aidhi et al., 2022). Such initiatives not only help MSMEs adopt technology but also enhance their competitiveness in the market.

Finally, the importance of raising awareness about the benefits of technology should be emphasized. Many MSMEs remain skeptical about using technology due to a lack of information about the potential advantages. Therefore, outreach campaigns and proper information dissemination can help shift this perspective (Mukhra et al., 2024). By

understanding the benefits of technology, MSMEs will be more motivated to invest in digitizing their businesses. By implementing these solutions in an integrated manner, the digital divide can be minimized, enabling rural MSMEs to quickly adapt to changes and seize the opportunities available in the digital era.

Conclusion

The production of Gurame fish fry in Tasikmalaya City is carried out using relatively simple technology. Generally, the productivity of breeding, nursery, and grow-out phases can be improved. Currently, breeding faces challenges due to the availability of eggs, which is affected by the mass mortality of broodstock. Additionally, most breeders report that climate and rainfall are the most frequent production constraints. Effective water quality management is also necessary to enhance production success rates. Research on broodstock and fry feed is essential to increase business productivity.

Recommendations

Based on the data obtained, breeders can take several actions to enhance their operations. These include selecting broodstock to avoid the risks of inbreeding, improving water quality management, implementing biosecurity measures and adequate fish health management, using closed-system farming methods, seeking alternative feed options for both broodstock and fry and refining harvesting and post-harvest methods. Additionally, addressing non-technical aspects is crucial for the development and sustainability of the business. Furthermore, analyzing the efficiency and effectiveness of production inputs is necessary to support business growth.

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