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Driving Economic Growth: Digital Transformation for Local SMEs in Banda Aceh

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Abstract. *In today's digital landscape, Small and Medium Enterprises (SMEs) face numerous opportunities and challenges. Digital transformation has become essential for these enterprises to enhance competitiveness, expand market reach, and foster innovation, especially in urban settings. This study examines how digital transformation can optimize economic potential for SMEs in Banda Aceh, Indonesia—a region with a vibrant yet digitally underserved SME sector. Despite contributing significantly to Indonesia's Gross Domestic Product (GDP) and employment, digital adoption among local SMEs is hindered by infrastructural limitations, low digital literacy, and financial constraints. Employing a qualitative methodology, this research analyzes data from a stratified random sample of 100 SMEs across key sectors, including food, handicrafts, and textiles—core components of Banda Aceh's local economy. Findings reveal that SMEs utilizing digital tools report sales increases of up to 60%, highlighting the substantial impact of digital integration on business performance. However, the study also identifies persistent barriers to digitalization, primarily involving inadequate infrastructure and skill gaps. To address these issues, the study offers evidence-based recommendations for enhancing digital infrastructure, expanding access to training, and fostering public-private partnerships aimed at accelerating digital transformation within Banda Aceh's SME sector. By providing insights into the digitalization of urban SMEs, this research contributes to a broader understanding of how emerging economies can leverage digital transformation to drive sustainable growth. These findings have significant implications for policymakers, business leaders, and stakeholders seeking to build a more inclusive digital economy.*

Keywords: *digital transformation, urban economy, local SMEs*

1. Introduction

Small and Medium Enterprises (SMEs) play a crucial role in driving economic growth and creating employment opportunities, particularly in emerging economies like Indonesia. As global markets become increasingly digital, SMEs face the dual challenge of staying competitive while overcoming inherent limitations related to technology adoption (Ayyagari, Demirguc-Kunt, & Maksimovic, 2014). Digital transformation is widely recognized as a critical enabler for SMEs to enhance operational efficiency, expand market reach, and foster innovation (Matt, Hess, & Benlian, 2015). However, despite the apparent advantages, digital adoption among SMEs in developing regions remains limited due to infrastructural challenges, financial constraints, and low digital literacy (Gomez, Manez, & Rochina, 2021).

In Indonesia, SMEs contribute significantly to the Gross Domestic Product (GDP) and are instrumental in sustaining local economies. Nevertheless, the level of digital adoption among Indonesian SMEs is relatively low, especially in smaller urban areas like Banda Aceh. Banda Aceh is a regional hub with a vibrant local economy, heavily reliant on sectors such as food production, handicrafts, and textiles. These sectors are integral to

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the city's economic fabric but have yet to fully benefit from the transformative potential of digital technologies (Tambunan, 2019). The need for digital integration is underscored by global research that links digitalization to enhanced business performance and resilience, particularly for SMEs operating in urban environments (Bouwman, Nikou, & Reuver, 2019).

Prior studies on digital transformation in SMEs often highlight the benefits of digital tools, such as increased sales, improved customer engagement, and enhanced operational capabilities (Garzoni et al., 2020). However, there is limited empirical research that focuses on the specific challenges and potential solutions for SMEs in Indonesian urban economies. Addressing this research gap, this study aims to explore the impact of digital transformation on the economic potential of SMEs in Banda Aceh. Through qualitative analysis of 100 SMEs across key sectors, the research seeks to identify both the benefits and the barriers associated with digital adoption.

This study is particularly relevant given the pressing need for sustainable economic growth strategies in Indonesia's urban areas. By examining the unique conditions of Banda Aceh, this research provides valuable insights into how emerging economies can leverage digital transformation to optimize SME performance. Furthermore, it contributes to the broader discourse on digital inclusion by offering evidence-based recommendations for policymakers and stakeholders to accelerate digital adoption among urban SMEs. The findings from this study have important implications for fostering an inclusive digital economy and ensuring that SMEs can participate fully in the digital age.

2. Method

This study employs a qualitative research design to explore the impact of digital transformation on Small and Medium Enterprises (SMEs) in Banda Aceh, Indonesia. The research focuses on understanding the barriers and facilitators of digital adoption within key economic sectors, namely food, handicrafts, and textiles. These sectors were selected due to their significant contribution to the local economy and their potential for growth through digitalization.

The population for this study consists of SMEs operating within the urban economy of Banda Aceh. To obtain a representative sample, a stratified random sampling technique was used. Stratification was based on the three primary sectors (food, handicrafts, and textiles), ensuring that SMEs from each sector were proportionally represented. From this stratified population, a sample of 100 SMEs was selected, with approximately equal representation from each sector. This sampling method was chosen to capture sector-specific insights while maintaining generalizability across the SME landscape in Banda Aceh.

Data were collected through semi-structured interviews and direct observations. The semi-structured interview format allowed for flexibility in exploring various aspects of digital adoption, including perceived benefits, challenges, and future plans. The interview guide included questions related to current digital practices, infrastructural support, financial capabilities, and digital literacy levels among employees. Interviews were conducted in-person and lasted approximately 30 to 45 minutes each. In cases where in-person interviews were not feasible, telephone interviews were conducted to ensure data completeness.

Additionally, direct observations of the SMEs' digital tools and processes were carried out to complement the interview data. Observational data included the types of digital tools utilized, the extent of integration with business operations, and the general

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proficiency levels of employees in using these tools. This multi-method approach allowed for a more comprehensive understanding of the digitalization process within the local SME context.

The data analysis followed a thematic approach, where transcripts from the interviews and field notes from observations were systematically coded to identify recurring themes and patterns. Initially, open coding was performed to capture key concepts emerging from the data. This was followed by axial coding to link related concepts and form broader categories. NVivo software was utilized to organize and manage the data during this process.

Thematic analysis allowed for the identification of core themes related to digital transformation, such as infrastructural limitations, financial constraints, and skill gaps. The results were then compared across sectors to highlight any significant differences in digital adoption and its impact on business performance. Finally, the findings were triangulated with existing literature to ensure validity and to position the study within the broader discourse on SME digitalization.

By adopting a rigorous qualitative approach, this study aims to provide in-depth insights into the digital transformation landscape for SMEs in Banda Aceh, contributing valuable information to policymakers, business leaders, and researchers interested in fostering digital growth in similar urban economies.

3. Results and Discussion

Level of Digital Technology Adoption among SMEs

The study reveals a varied landscape of digital technology adoption among Small and Medium Enterprises (SMEs) in Banda Aceh. While many SMEs have initiated the use of digital platforms—such as e-commerce and social media—for marketing, the depth and extent of adoption differ significantly across businesses. The adoption spectrum ranges from basic utilization of social media accounts for simple promotional activities to advanced integration of digital tools into nearly all operational facets.

Some SMEs are at the early stages of adoption, using social media for limited promotion without effectively leveraging e-commerce platforms or other digital tools. In contrast, others have established a more systematic approach, including having their own websites, setting up online stores on e-commerce platforms, and engaging in digital marketing via social media advertising to reach new customers.

At the highest end of the adoption scale, a few SMEs have fully integrated digital technology into their operations. These businesses utilize data analytics to understand consumer behavior, employ automation in inventory management and logistics, and maintain a strong online presence across multiple digital platforms. This level of digital adoption correlates with enhanced business capabilities and a stronger competitive position in the market.

Factors Influencing Digital Technology Adoption

The extent of digital adoption among SMEs in Banda Aceh is shaped by several critical factors:

a. Digital Knowledge and Skills

SMEs with owners or managers who possess higher levels of digital knowledge and skills are more likely to adopt digital technologies swiftly. This underscores the importance of training and education as key drivers for increasing adoption rates among SMEs that are less familiar with digital tools. Improved digital literacy enables

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SMEs to navigate and leverage technology more effectively, making them more competitive and resilient.

b. Access to Digital Infrastructure
The availability and quality of digital infrastructure, particularly fast and stable internet access, play a significant role in adoption levels. SMEs located in areas with subpar infrastructure face limitations in their ability to integrate digital technologies. Poor connectivity not only hampers day-to-day operations but also deters businesses from exploring advanced digital tools, thereby reducing their potential market reach and operational efficiency.

c. Government and Institutional Support
Support from government programs and institutions, such as digital training workshops, technology subsidies, and tax incentives, can accelerate digital adoption among SMEs. Many SMEs in Banda Aceh reported that access to such support facilitated their entry into digital markets. This finding aligns with existing literature suggesting that public and private sector collaboration is essential for overcoming barriers to technology adoption in emerging economies (Yunis, Tarhini, & Kassar, 2018).

d. Cost and Investment Considerations
The financial costs associated with digital adoption—such as website development, software purchases, and digital advertising—pose a challenge for SMEs with limited resources. However, SMEs that recognize the potential return on investment, such as increased revenue and operational efficiencies, are more willing to allocate funds towards digital technology. Addressing the financial barriers through low-cost solutions or financing options can make digital adoption more accessible for resource-constrained businesses.

e. Impact of Digital Technology Adoption
SMEs that have adopted digital technology report substantial benefits, including increased sales, enhanced operational efficiency, and expanded market reach. Specifically, those utilizing digital tools more extensively have experienced a notable improvement in sales performance, often reporting revenue growth exceeding 50% within the first year of digital adoption. This positive impact highlights the transformative potential of digital technology for SMEs aiming to scale their operations and improve their competitive edge.
However, SMEs at the initial stages of digital adoption have not fully realized these benefits, indicating that a more comprehensive and supported approach is required to accelerate adoption. These findings emphasize the need for targeted interventions that can bridge the gap between basic and advanced digital adopters, ensuring that all SMEs have the opportunity to benefit from digital transformation.

f. Challenges in Digital Technology Adoption
Despite the evident advantages, SMEs in Banda Aceh face persistent challenges that hinder digital adoption. These include limitations in digital knowledge, skills, and financial resources, as well as inadequate access to necessary infrastructure. Addressing these barriers will require a multifaceted approach, combining educational programs, improved internet access, and financial support.

To overcome these challenges, the study suggests that policymakers and stakeholders should focus on providing tailored training programs that enhance digital

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skills, investing in infrastructure development to improve connectivity, and offering financial incentives or subsidies to reduce the cost burden of digital adoption.

Overall, while the level of digital adoption among SMEs in Banda Aceh remains varied, there is significant potential for optimization through targeted support and interventions. With the right infrastructure and resources in place, SMEs can leverage digital technologies more effectively, thereby contributing to the broader goal of sustainable economic growth in the region.

Level of Digital Technology Adoption among SMEs

The study found that the level of digital technology adoption among Small and Medium Enterprises (SMEs) in Banda Aceh varies widely. The data collected indicates that 35% of SMEs are at the initial stage of adoption, where digital engagement is limited to basic social media promotion. These businesses do not yet utilize e-commerce platforms or other digital tools effectively due to limited knowledge and access (Table 1).

In the intermediate stage, 40% of SMEs have taken steps to engage more actively in digital markets. These SMEs use e-commerce platforms to sell their products, maintain simple websites, and invest in social media advertising. However, their use of digital tools remains focused on marketing and sales, with limited integration into other operational areas such as inventory and logistics management.

Finally, 25% of SMEs have reached an advanced stage of digital adoption. These businesses have integrated digital technology across multiple operational facets, including the use of data analytics for consumer insights, automated inventory management, and sophisticated digital marketing strategies. Such SMEs are leveraging tools like Google Analytics and Facebook Ads to optimize their marketing efforts and expand their market reach, demonstrating a comprehensive approach to digital transformation. Table 1. illustrates the distribution of SMEs across different levels of digital adoption, highlighting the varying degrees of digital integration within their operations.

Table 1. Levels of digital technology adoption among SMEs

Level of Adoption	Description	Percentage of SMEs (%)
Initial	Basic use of social media for simple promotions, with no significant use of e-commerce or other digital tools	35%
Intermediate	Engagement in e-commerce, basic websites, and some digital marketing through social media ads. Limited operational integration	40%
Advanced	Comprehensive digital integration across operations, including data analytics, automated inventory management, and advanced digital marketing	25%

Factors Influencing Digital Technology Adoption

The study identified several key factors that influence the adoption of digital technology among SMEs in Banda Aceh. First, digital knowledge and skills play a critical role. SMEs whose owners or managers possess greater digital literacy are generally more proactive in adopting technology. Training programs have been instrumental in this regard, as they help SMEs acquire the skills needed to utilize digital tools effectively. For

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instance, one SME owner stated, "After attending a digital training session provided by the government, we started using e-commerce, and our sales increased by around 20% within three months."

Access to reliable digital infrastructure, particularly stable and fast internet, is another essential factor. SMEs in urban areas of Banda Aceh benefit from better infrastructure, which facilitates their engagement with digital platforms. However, SMEs located in rural areas face connectivity issues, which restrict their ability to adopt digital tools fully. One rural SME owner shared, "We struggle to access digital platforms because of slow internet, making it difficult to sell products online."

Government support and institutional programs, such as digital training, technology subsidies, and tax incentives, also encourage digital adoption. Initiatives like the "Aceh SME Digital Training" program have significantly contributed to raising digital literacy and improving the digital capabilities of SMEs. Additionally, the financial costs associated with digital adoption, such as expenses for website development and software, remain a challenge for SMEs with limited resources. However, those who recognize the potential returns on investment in terms of increased revenue and operational efficiencies are more likely to invest in digital tools. Table 2. outlines the main factors influencing digital adoption among SMEs, emphasizing the role of digital skills, infrastructure, government support, and financial considerations.

Table 2. Factors influencing digital technology adoption

Factor	Description	Impact on Adoption
Digital Knowledge and Skills	SMEs with higher digital skills adopt technology more readily. Training programs improve adoption rates	High
Access to Digital Infrastructure	Reliable internet access is crucial for digital engagement. Urban areas benefit more, while rural areas face connectivity challenges	Moderate to High
Government and Institutional Support	Programs like training, subsidies, and incentives encourage adoption by providing resources and knowledge	High
Cost and Investment	Financial constraints can limit adoption, but perceived ROI motivates SMEs to invest in digital tools. Financial support can enhance adoption	Moderate to High

Impact of Digital Technology Adoption

The adoption of digital technology has resulted in significant benefits for SMEs, particularly in terms of increased sales, operational efficiency, and market expansion. SMEs in sectors like traditional food reported a 30% increase in sales after adopting e-commerce platforms. Similarly, SMEs in the crafts sector have expanded their reach beyond Aceh through social media marketing, showcasing the transformative potential of digital tools for local businesses.

However, the extent of these benefits varies according to the level of digital adoption. SMEs at the initial stage primarily benefit from improved online visibility through social media, while those at intermediate and advanced stages report more substantial gains, such as time savings from automated inventory management and

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enhanced customer loyalty through data-driven insights. As one advanced SME noted, "Using digital tools for stock management has saved us up to 50% in time, allowing us to focus more on marketing strategies."

Challenges in Digital Technology Adoption

Despite the positive outcomes, SMEs continue to face challenges in adopting digital technology. Limited digital knowledge, skills, and financial resources, as well as inadequate digital infrastructure, hinder the adoption process. Many SME owners, particularly those with less exposure to technology, struggle to understand and utilize digital tools effectively, necessitating continuous training and support.

In addition, while urban areas in Banda Aceh benefit from adequate internet access, rural areas still suffer from slow and unstable connections, which restrict SMEs' ability to fully participate in digital markets. Financial constraints also remain a significant barrier, as digitalization often requires upfront investments that are difficult for resource-limited SMEs to afford. Consequently, there is a need for ongoing support in the form of training, infrastructure improvements, and financial incentives to help SMEs overcome these challenges and fully realize the benefits of digital transformation. By addressing these challenges through targeted interventions, Banda Aceh's SMEs can optimize digital adoption, enhance their competitive edge, and contribute more significantly to regional economic growth.

The results indicate that digital technology adoption among SMEs in Banda Aceh is still in its developmental stages, with considerable potential for growth. While digitalization offers clear economic benefits, the extent to which these benefits are realized depends on the level of adoption. SMEs that embrace a more comprehensive digital strategy tend to outperform those with limited digital engagement, underscoring the importance of full digital integration.

The findings also highlight the critical role of external support in overcoming barriers to adoption. Government programs and institutional initiatives can significantly influence digital transformation by providing the necessary resources and knowledge. Moreover, improving access to affordable and reliable digital infrastructure, particularly in rural areas, will be essential for enabling broader adoption.

For policymakers, the study underscores the need to focus on both infrastructure development and capacity-building initiatives. Expanding internet connectivity in rural areas and providing targeted digital training can help bridge the adoption gap. Additionally, financial incentives or subsidies for digital investments can encourage SMEs to take on the initial costs of digital transformation. For SMEs, the study suggests that investing in digital skills development for owners and employees is crucial. As digital tools become increasingly central to business success, building a digitally skilled workforce will be key to sustaining competitive advantage.

This study was limited to SMEs in Banda Aceh, and findings may not be generalizable to other regions with different economic and infrastructural contexts. Future research could expand the scope to include other areas or conduct a comparative analysis across regions to gain a broader understanding of digital adoption trends among SMEs in Indonesia. Additionally, further quantitative research could help to quantify the specific financial impacts of digital adoption across various business sectors.

Overall, this study contributes to the growing body of knowledge on digital transformation among SMEs by providing insights into the current state of digital adoption in Banda Aceh. The results highlight both the opportunities and challenges of

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digitalization, offering valuable guidance for stakeholders seeking to foster a more inclusive and digitally empowered economy.

4. Conclusions

This study aimed to explore the level of digital technology adoption among Small and Medium Enterprises (SMEs) in Banda Aceh, identify the factors influencing adoption, and assess the impact of digitalization on business performance. The findings reveal a varied landscape of digital adoption, with SMEs falling into three main categories: initial, intermediate, and advanced adopters. Each category reflects differing levels of digital engagement, from basic social media use to fully integrated digital operations.

Varied Levels of Adoption: The study shows that 35% of SMEs are at an initial stage, utilizing digital tools mainly for basic promotion. Meanwhile, 40% are at an intermediate stage, engaging with e-commerce platforms and digital marketing but with limited operational integration. The remaining 25% are advanced adopters, leveraging digital technologies across all aspects of their operations, including analytics, automation, and sophisticated digital marketing strategies. These findings suggest that while many SMEs recognize the value of digital tools, a significant portion still faces barriers that limit deeper digital engagement.

Influencing Factors: Four key factors influence the level of digital adoption: digital knowledge and skills, access to digital infrastructure, government and institutional support, and financial considerations. SMEs with better digital skills and knowledge, often gained through training, show higher adoption levels. Access to reliable internet infrastructure, particularly in urban areas, also plays a crucial role. Government support in the form of training programs and subsidies has a positive impact, facilitating faster adoption. However, financial constraints remain a significant barrier, as many SMEs are unable to afford the costs associated with digital implementation.

Positive Impact on Business Performance: SMEs that have integrated digital technology report numerous benefits, including increased sales, improved operational efficiency, and market expansion. Advanced adopters, in particular, experience significant gains, as digital tools allow them to optimize inventory management, understand consumer behavior, and reach broader audiences through digital marketing. However, SMEs at the initial adoption stage report limited benefits, indicating that further support is needed to help them progress to higher levels of digital maturity.

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