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Encouraging Local MSME Products Towards Global Through Blockchain Technology

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Abstract

This study aims to analyze the role of blockchain technology in enhancing global market access for local MSME (Micro, Small, and Medium Enterprise) products, identify key barriers to its adoption, and formulate implementation strategies tailored to the needs and capacities of MSMEs. The research employs a qualitative case study approach based on a literature review. Data were obtained from academic journals, reports, and policy documents related to blockchain, MSMEs, and international trade. Analysis was conducted using content analysis methods, supplemented by source and theoretical triangulation to enhance the validity of the findings. Blockchain technology has proven capable of supporting MSME products in entering global markets through product traceability, supply chain efficiency, and cross-border payment systems. The challenges faced by MSMEs include low technological literacy, high implementation costs, and inadequate regulatory frameworks. Recommended implementation strategies include improving technological literacy, providing subsidies for blockchain adoption, and developing adaptive regulations. This study contributes by offering a strategic framework for MSMEs to adopt blockchain technology and serves as a reference for policymakers and business stakeholders in fostering an innovation ecosystem that supports the global competitiveness of MSMEs.

Keywords: Blockchain, MSMEs, global trade, technology literacy, adoption strategy.

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INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) are among the main pillars of the economy in many countries, including Indonesia (Tambunan, 2024; Kurniadi et al., 2022). According to data from the Ministry of Cooperatives and SMEs, MSMEs contribute over 60% to Indonesia's Gross Domestic Product (GDP), accounting for approximately IDR 9,580 trillion (61%) in 2023. Additionally, this sector absorbs more than 97% of the national workforce, involving approximately 117 million workers (Junaidi, 2023). However, the contribution of MSMEs to international trade in Indonesia remains relatively low, with less than 15% successfully penetrating global markets. Data from the Ministry of Cooperatives and SMEs reveals that MSMEs' share of Indonesia's total exports stood at around 14.5% as of January 2020. This figure is significantly lower than that of neighboring countries, such as Malaysia and Vietnam, which record contributions exceeding 20%, and Thailand, which achieves 35% (Asngadi, 2024). The low international market penetration of MSMEs is attributed to several factors, including limited market access, logistical challenges, and trust issues from global consumers (Tambunan, 2021; Tambunan, 2024). On the other hand, the development of blockchain technology has introduced significant disruption across various sectors, including international trade (Ashveen Kutowaroo, 2023; Yoon et al., 2019; Chang et al., 2019). Blockchain, as a technology that enhances transparency, security, and transactional efficiency, holds substantial potential to address the challenges faced by MSMEs in expanding their presence in global markets (Nagariya et al., 2023). Through this technology, MSMEs can enhance product credibility by ensuring transparency in provenance, reduce reliance on intermediaries in trade, and leverage cryptocurrency-based payment systems to broaden market access (Pandey & Singh, 2022).

However, the adoption of blockchain technology by Micro, Small, and Medium Enterprises (MSMEs) continues to face significant challenges, including limited technological literacy, high implementation costs, and insufficient regulatory support (Prasad et al., 2022). Therefore, this study is crucial in identifying effective strategies for leveraging blockchain technology to support local MSME products in accessing global markets.

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This study aims to address several key questions regarding the role of blockchain technology in supporting local MSME products to compete in global markets. The primary questions include: how can blockchain enhance the competitiveness of local MSME products in international markets? What barriers do MSMEs face in adopting this technology? And what strategies can be implemented to maximize the benefits of blockchain for MSME development?

The objectives of this study are to analyze the role of blockchain technology in improving local MSME products' access to global markets, identify the main barriers to blockchain adoption by MSMEs—such as technological challenges, costs, and regulatory constraints—and formulate implementation strategies tailored to the needs and capacities of MSMEs. These strategies aim to enable MSMEs to effectively optimize opportunities in international markets. Blockchain has been widely adopted in various sectors, including finance, logistics, and agriculture (Tijan et al., 2019; Rocha et al., 2021). In the context of international trade, this technology is employed to enhance supply chain efficiency, strengthen payment systems, and create transparency (S. E. Chang et al., 2019; Y. Chang et al., 2019; Lahkani et al., 2020). Previous research indicates that blockchain can assist small-scale producers in building consumer trust through transparent product provenance tracking systems. However, the adoption of this technology in the MSME sector, particularly for global market access, remains relatively novel and requires approaches that are specifically adapted to local needs.

Numerous studies have explored the potential of blockchain technology in enhancing the competitiveness of the business sector, including MSMEs. Pournader et al., (2019); Hou & Zhou, (2024); Ran et al., (2024) revealed that blockchain technology has the capability to improve logistics efficiency and transparency in cross-border trade—factors that are crucial for MSMEs aiming to enter international markets. Their research demonstrated that blockchain can reduce the risk of fraud in supply chains and strengthen consumer trust through reliable tracking systems. Meanwhile, Lin et al., (2020); Alobid et al., (2022); Rocha et al., (2021) focused on the application of blockchain in the agribusiness sector, particularly to support MSMEs in penetrating export markets. They found

that blockchain can document product provenance in detail, adding value by meeting stringent global consumer demands for quality and safety. However, their study was limited to the agribusiness sector and did not encompass other MSME sectors that also have significant potential for global expansion. On the other hand, Kilay et al., (2022) highlighted key challenges in blockchain adoption among MSMEs in Indonesia. Low technological literacy, high implementation costs, and insufficient regulatory support were identified as major barriers hindering the adoption of this technology. While their study provided valuable insights into the obstacles to be addressed, it fell short of offering specific and practical implementation strategies for MSMEs. Further research by Habib et al., (2022); Islam et al., (2023) indicated that blockchain not only enhances transparency but also accelerates cross-border payments through the use of digital currencies. However, its implementation remains largely concentrated among large corporations with sufficient resources. Similarly, Schmeiss et al., (2019); Zhang et al., (2021); da Silva & Angelis, (2024); Agrawal et al., (2022) emphasized the importance of collaboration between governments and businesses in creating an inclusive blockchain ecosystem. However, their study did not elaborate on technical strategies that could be directly applied, particularly for MSMEs.

Although these studies demonstrate the significant potential of blockchain technology, there is a lack of research specifically addressing practical strategies to enable local MSME products to enter global markets using this technology. Most previous studies have focused on blockchain applications in large-scale sectors or multinational corporations. Research on how this technology can be effectively adapted and applied to local MSMEs to expand their access to global markets remains highly limited. This study aims to bridge this gap by offering relevant and measurable implementation strategies tailored to MSMEs. It holds significant value in providing practical contributions to MSME development through the utilization of blockchain technology. First, this research is expected to provide clear guidance for MSME practitioners on adopting blockchain technology to enhance the competitiveness of their products in international markets. Second, its findings are anticipated to offer valuable input for policymakers in designing regulations that support blockchain adoption by MSMEs, thereby facilitating their expansion into global markets. Third, the

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study also opens opportunities for further research on blockchain applications in empowering MSMEs, uncovering additional potentials to strengthen this sector in the future.

METHODS

This study employs a qualitative research approach with a case study design. The primary focus of the research is to identify the role of blockchain technology in supporting local MSME products in penetrating the global market. The case study approach was chosen as it allows for an in-depth exploration of a specific phenomenon within the context of MSMEs and blockchain technology. A literature review was utilized as the main method to support both theoretical and empirical analysis. Data was collected through an extensive review of scholarly journals, reference books, and publications related to blockchain technology, MSMEs, and international trade. These sources were identified with the assistance of artificial intelligence tools such as consensus.app, elicit.ai, typeset.io, and similar applications. The literature selection was based on relevance, credibility, and the currency of the information. Following the selection process, 48 reference sources were obtained, with 74.5% from Q1-indexed articles, 12.8% from Q2-indexed articles, 6.4% from Q3-indexed articles, and the remainder from official websites. The data collected from the literature was analyzed to identify key themes, relational patterns, and gaps in previous research. Triangulation was employed to enhance the validity and reliability of the data. The triangulation technique used was data source triangulation, in which data were compared across various literatures and policy reports to ensure consistency. Additionally, theory triangulation was conducted by integrating perspectives from various theories related to blockchain, MSMEs, and global trade.

RESULTS AND DISCUSSION

1. Blockchain Concept in Supply Chain Network

Blockchain is an innovative technology that underpins decentralized record-keeping systems, where each transaction is recorded as an immutable block linked to others (Zheng & Lu, 2021). This technology

operates through a distributed network of computers, ensuring that stored data is secure from manipulation or corruption (Singh et al., 2021). Figure 1 illustrates that each block in a blockchain contains transaction details, a timestamp, and a cryptographic link to the previous block, forming a transparent chronological chain (Alzhrani et al., 2022). The key advantages of blockchain include transparency, security, efficiency, and immutability, making it a powerful tool for enhancing trust and collaboration across various sectors (K. Agrawal et al., 2022).

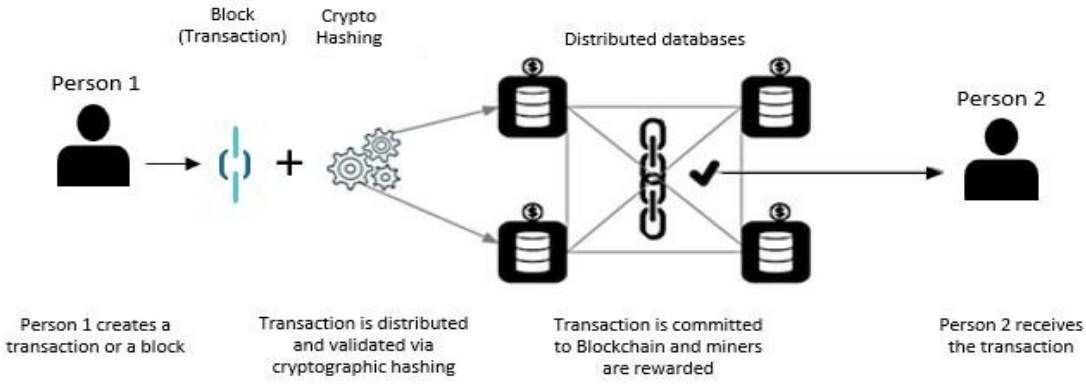

Figure 1 Blockchain Concept Source: (Chainbits, 2018)

In supply chain networks, blockchain serves as a platform that ensures transparency and accountability at every stage of product distribution, from raw materials to end consumers (Park & Li, 2021). Information such as product provenance, quality certifications, shipping schedules, and logistics status is recorded in real time on the blockchain, enabling all stakeholders in the supply chain to verify data authenticity without the need for intermediaries. This system allows blockchain to minimize fraud, enhance logistical efficiency, and ensure compliance with international standards, making it highly relevant for MSMEs aiming to enter global markets (Ran et al., 2024).

A blockchain-based supply chain network is an integrated system involving various partners within the logistics and product distribution ecosystem (Azzi et al., 2019). These partners include raw material suppliers, manufacturers, distributors, logistics providers, retailers, and end consumers. By utilizing blockchain technology, the network enables all parties to engage in transparent, secure, and efficient data-sharing

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processes. Figure 2 illustrates that every transaction along the supply chain—such as raw material procurement, production processes, goods shipment, and final delivery to end consumers—is recorded on the blockchain as encrypted data blocks (Pournader et al., 2019). These blocks are interconnected in chronological order and verified by a distributed network. This system ensures that all stored information is immutable and tamper-proof, fostering trust among partners without the need for intermediaries (Truong et al., 2021).

The primary advantage of a blockchain-based supply chain network lies in its ability to enhance operational efficiency (Park & Li, 2021). For instance, suppliers and manufacturers can monitor raw material availability in real time, while logistics providers can track shipment status with high accuracy. Additionally, end consumers can verify product origin and quality through information recorded on the blockchain. This framework also strengthens compliance with regulations and international standards, such as organic certifications, intellectual property protection, or product safety standards. In the context of international trade, blockchain reduces logistical barriers, such as manual documentation or information discrepancies, thereby accelerating export-import processes (S. E. Chang et al., 2019; Epps et al., 2019). By fostering seamless collaboration among partners within the network, blockchain-based supply chains not only ensure transparency and accountability but also drive innovation and global competitiveness (Azzi et al., 2019; Saberi et al., 2018; Kshetri, 2018). This creates significant opportunities for Micro, Small, and Medium Enterprises (MSMEs) to access global markets by leveraging an inclusive and adaptive technology.

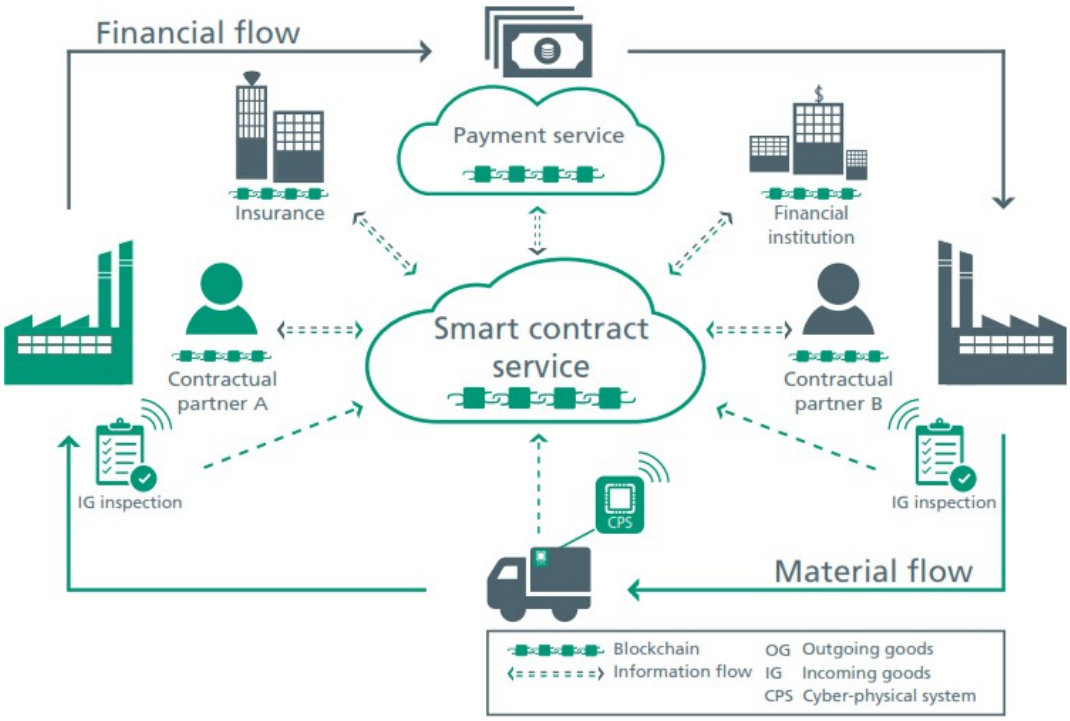

Figure 2 Blockchain-based supply chain network made up of various partners
Source: (Schütte et al., 2018)

2. The Role of Blockchain Technology in Improving MSME Competitiveness

The concept of blockchain in supply chain networks highlights the significant role of this technology in enhancing the competitiveness of local MSME products in global markets through three key mechanisms. First, blockchain supports transparency and global consumer trust by providing accurate information regarding product provenance, production processes, and relevant certifications (Nikolakis et al., 2018; Montecchi et al., 2019). This capability enables MSMEs to build trust among global consumers, particularly in markets that place high importance on quality standards, sustainability, and social responsibility. Second, blockchain improves the efficiency of international transactions by reducing reliance on intermediaries and offering cross-border payment solutions based on cryptocurrency (Islam et al., 2023; S. E. Chang et al., 2019; Attarde et al., 2024). This approach not only reduces transaction costs but also accelerates payment processes, providing a competitive advantage for MSMEs in international trade. Third, this technology facilitates global supply

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chain integration through the use of smart contracts (Omar et al., 2022; Hasan et al., 2019; T. K. Agrawal et al., 2022). Smart contracts enable MSMEs to maintain operational integrity and efficiency within the supply chain, ensure compliance with global standards, and ease access to international trade networks. With these three mechanisms, blockchain offers innovative solutions that empower MSMEs to compete in global markets more effectively and sustainably.

In the context of global supply chain integration, smart contracts play

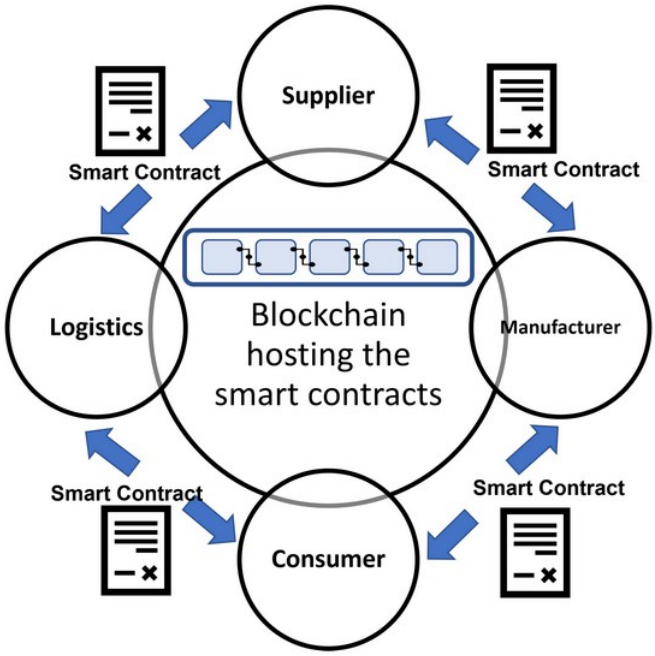

Figure 3 Smart contracts Source: (Alqarni et al., 2023)

a crucial role by replacing manual mechanisms that are often slow, costly, and prone to errors (Dolgui et al., 2019; S. E. Chang, Chen, & Lu, 2019). This technology enables supply chain processes to be more efficient, transparent, and accountable (Saberi et al., 2018; Moosavi et al., 2021). Figure 3 illustrates how smart contracts work, starting with the establishment of rules and conditions that must be met by the partners in the supply chain. For example, smart contracts can include provisions such as automatic payment to suppliers upon receipt of goods, release of goods upon payment confirmation, or the delivery of certification documents after quality inspection. These rules are stored on the blockchain, ensuring data security and validity without the need for third-party involvement. When the

specified conditions are met, smart contracts automatically execute the relevant actions. For instance, in international shipping, smart contracts can verify that goods have been shipped based on IoT sensor data or GPS tracking. Once the goods arrive at the destination, the system automatically processes payment to the logistics provider. This process eliminates the need for manual verification, accelerates workflows, and reduces the risk of human error. Additionally, smart contracts enable real-time integration among various partners in the global supply chain network. Every transaction or status change is recorded on the blockchain, ensuring that all parties have access to the same information. In this way, smart contracts support better coordination, enhance transparency, and ensure compliance with agreements. This technology helps MSMEs overcome the complexities of global supply chains while strengthening their competitiveness in international markets.

3. Barriers to Blockchain Adoption by MSMEs

Despite offering numerous potential benefits, the adoption of blockchain technology by Micro, Small, and Medium Enterprises (MSMEs) faces several barriers that may hinder its optimal utilization. These barriers include issues related to technological literacy, implementation costs, and inadequate regulatory support. First, low technological literacy serves as a major obstacle for many MSME entrepreneurs. Most MSME owners lack a sufficient understanding of how blockchain works and how it can enhance their competitiveness. Pournader et al., (2019); Hou & Zhou, (2024); Ran et al., (2024) identify that the low level of technological literacy among small business owners impedes the adoption of new technologies, including blockchain. Continuous education and training are essential to enhance their capacity to leverage this technology effectively. Second, high implementation costs represent another significant challenge. The adoption of blockchain requires substantial initial investment, including infrastructure development, technology integration, and user training. Kilay et al., (2022) show that MSME owners in Indonesia often face financial constraints when adopting new technologies, making the sustainability of blockchain adoption difficult to achieve without financial subsidies or support from the government or donor institutions. Third, inadequate regulatory frameworks also pose a major hurdle to blockchain implementation. Lin et al., (2020);

Alobid et al., (2022); Rocha et al., (2021) note that in many developing countries, including Indonesia, blockchain-related regulations are still in the early stages and have not fully accommodated cross-border transactions based on this technology. Ambiguous regulations may create legal uncertainties and reduce MSMEs' confidence in adopting blockchain technology.

4. Blockchain Implementation Strategy for MSMEs

This study successfully formulates an implementation strategy for blockchain technology designed to assist MSMEs in overcoming barriers to accessing global markets. The first strategy focuses on enhancing technological capacity through training and mentoring for MSME entrepreneurs. This approach includes collaboration with educational institutions and training organizations to improve technological literacy. This aligns with the recommendations of Kilay et al., (2022), who assert that technological literacy is a fundamental foundation for the adoption of blockchain among MSMEs. The second strategy involves the development of affordable infrastructure. The provision of communal or government-managed blockchain platforms can significantly reduce implementation costs. These platforms enable MSMEs to share infrastructure without the need for substantial investments in standalone systems. This approach has proven effective in other sectors, as highlighted by Lin et al., (2020); Alobid et al., (2022); Rocha et al., (2021), who emphasize the importance of infrastructure support for the successful adoption of new technologies. The third strategy is the formulation of supportive regulations, including those that enable the secure use of cryptocurrencies and facilitate the integration of blockchain in international trade. With adaptive regulations, MSMEs can gain greater confidence in using blockchain for cross-border transactions.

5. Implications for MSME Development

The findings of this study offer significant implications for the development of MSMEs, particularly in the context of enhancing competitiveness in the global market. One of these implications is the acceleration of digitalization. Blockchain technology can serve as an entry point for MSMEs to adopt broader digital transformation, enabling them to

compete in the technology-driven economy. This finding aligns with the research of Pournader et al., (2019); Hou & Zhou, (2024); Ran et al., (2024), which demonstrates that the adoption of blockchain fosters operational efficiency and digital innovation in the logistics sector, which can be replicated by MSMEs. Furthermore, this study highlights the opportunity for market diversification. With the data transparency offered by blockchain, MSMEs can not only penetrate global markets but also enhance competitiveness in domestic markets through improved efficiency and consumer trust. Lin et al., (2020); Alobid et al., (2022); Rocha et al., (2021) note that blockchain helps MSMEs in the agribusiness sector reach export markets by leveraging verifiable product data. This finding broadens the perspective that the same technology is relevant for other sectors as well. The final implication is the importance of increased cross- sector collaboration. A synergy between MSMEs, government, and technology providers is necessary to create an inclusive and efficient blockchain ecosystem. This collaboration will strengthen technological infrastructure and improve accessibility for smaller-scale MSMEs. Kilay et al., (2022) emphasize that cross-sector collaboration is essential to overcoming barriers related to technological literacy and implementation costs. Therefore, this study underscores the need for the development of collaborative policies that enable MSMEs to fully leverage blockchain technology.

The discussion of previous studies indicates that blockchain holds significant potential to address the key challenges faced by MSMEs in accessing global markets. For instance, blockchain's ability to trace product origins enhances global consumer trust in MSME products. This trust is crucial in international markets, which are highly sensitive to quality standards and sustainability. Additionally, blockchain can reduce transaction costs and expedite cross-border payment processes, thereby boosting the competitiveness of MSMEs. This study also reaffirms the relevance of blockchain, as highlighted by Pournader et al., (2019); Hou & Zhou, (2024); Ran et al., (2024), who found that the technology is effective in enhancing logistics efficiency and trade transparency. However, the contribution of this research lies in providing evidence that blockchain can be effectively adapted for MSMEs, provided that challenges such as

technological literacy, implementation costs, and regulatory barriers are addressed through the strategies formulated.

CONCLUSION

This study explores the potential of blockchain technology in supporting local MSME products to penetrate global markets. Based on the analysis, blockchain has been proven to provide solutions to several key challenges faced by MSMEs, such as product origin transparency, supply chain efficiency, and access to global payment systems. Barriers such as low technological literacy, high implementation costs, and the lack of supportive regulations have been identified as major constraints. With the right strategies, blockchain can serve as a catalyst for enhancing the competitiveness of MSMEs in international markets, particularly through strengthening global consumer trust and simplifying cross-border trade processes.

As a policy recommendation, strategic measures are required to encourage the adoption of blockchain by MSMEs. The government can develop integrated technology literacy programs within MSME training initiatives, introduce financial incentives to reduce the implementation costs of blockchain, and design regulations that are adaptable to technological advancements. Collaboration between the public, private, and academic sectors is also crucial to create an ecosystem that supports blockchain-based innovation. Through the implementation of these policies, Indonesian MSMEs can optimally leverage blockchain technology to enhance their global market penetration and contribute more significantly to the national economy.

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