

Exploring Blockchain Technology for Transparency and Efficiency in Indonesia's Financial Sector

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Entered : October 29, 2024
Accepted: November 15, 2024

Revised : November 04, 2024
Published : November 30, 2024

ABSTRACT

The application of blockchain technology in Indonesia's financial sector offers great potential to improve the transparency, efficiency, and security of the financial system. Blockchain allows for permanent and transparent recording of transactions, thereby reducing the risk of fraud and data manipulation, as well as increasing public trust in the financial system. The technology also has the potential to reduce international transaction costs, speed up payment processes, and reduce reliance on intermediaries, allowing financial services to become more affordable and efficient. However, Indonesia faces various challenges in implementing blockchain, including regulatory clarity that risks creating legal uncertainty, limited digital infrastructure that is evenly distributed across the region, and a lack of skilled human resources in this technology. To overcome these challenges, collaboration between governments, regulators, and the private sector is needed to create policies that support blockchain development, strengthen digital infrastructure, and improve the quality of education and training in the field of blockchain technology. The great potential of blockchain in accelerating the transformation of Indonesia's financial sector towards a more inclusive, efficient, and transparent system will be the main driver of sustainable digital economic growth.

Keywords: *Blockchain Technology, Transparency, Indonesia's Financial*

INTRODUCTION

Indonesia's financial sector plays a very important role in the national economy and continues to experience development (Khairunnisa & Nofrianto., 2023). However, the sector still faces various challenges related to transparency, efficiency, and integrity of the financial system. Problems such as unclear transaction records, fraud risks, and high transaction and operational costs are often obstacles in improving the performance of this sector. Therefore, Indonesia's financial sector needs innovative solutions to create a more transparent, efficient, and secure system. Blockchain technology has emerged as one of the very potential solutions in overcoming these problems (Lutfiani *et al.*, 2020). Blockchain has the ability to provide secure, transparent, and immutable records of transactions. This technology works by decentralizing transaction recording, which means that transaction data does not depend on a single party or central institution. Each transaction is recorded in a block that is interconnected in the chain, and once recorded, the transaction cannot be manipulated (Susanto., 2024). These features make blockchain a technology that can increase transparency and efficiency in the financial sector.

Initially, blockchain was known through its application to cryptocurrencies such as Bitcoin. However, as the understanding of the benefits of blockchain develops, the technology is beginning to be applied in various sectors, including the financial sector (Tuna., 2024). In the financial sector, blockchain has the potential to speed up and secure transactions, reduce intermediary costs, and improve efficiency in data and asset



management. This technology allows transactions to be carried out directly between parties without the need for a third party, which can reduce costs and speed up transaction completion (Gunarso *et al.*, 2024). Additionally, the transparency offered by blockchain can reduce the potential for fraud and opacity in the recording of financial transactions. The application of blockchain in Indonesia's financial sector is still in its early stages (Pangestu., 2023). Several companies and financial institutions in Indonesia have begun to adopt this technology, both in blockchain-based payment services, peer-to-peer lending, and digital asset management (Johan., 2024). However, blockchain adoption in Indonesia's financial sector is still limited, and various challenges still need to be overcome to optimize its implementation (Indraprakoso., 2023). One of the main challenges is the lack of a deep understanding of how blockchain works and benefits, both among financial industry players and regulators (Fitri., 2023).

Existing regulations in Indonesia still do not fully support the development of blockchain (Suryawijaya., 2023). Existing policies have not sufficiently accommodated the innovations offered by this technology. Uncertainty regarding data protection, privacy, and legal aspects related to blockchain-based transactions is an obstacle for many parties considering adopting this technology (Kawengian., 2024). Therefore, it is important to create clear and supportive regulations so that the implementation of blockchain in Indonesia's financial sector can run smoothly and maintain financial system stability. Technology infrastructure is another factor that affects the implementation of blockchain in Indonesia. Although information technology in Indonesia is developing rapidly, the readiness of infrastructure that can support the implementation of blockchain at large is still limited (Arwani & Priyadi., 2024). Uneven internet speeds and a lack of human resources who have skills in the field of blockchain are big challenges. Therefore, it is important to improve the infrastructure capacity and competence of human resources to support the implementation of blockchain effectively.

There is also a phenomenon of resistance to change among financial industry players. Many parties are still hesitant to switch away from traditional systems that already exist, even though blockchain offers a variety of benefits, such as reduced transaction fees and increased transparency (Ulimaz *et al.*, 2024). Concerns about the uncertainty and potential risks associated with new technologies, such as security issues and incompatibility with existing systems, are the main inhibiting factors (Untoro., 2023). Therefore, more intensive education and socialization efforts are needed regarding the advantages and reliability of blockchain technology to increase the acceptance of this technology. Further research on the application of blockchain in Indonesia's financial sector is essential to explore the potential of this technology in improving transparency, efficiency, and transaction security (Simanjuntak., 2024). This research also aims to identify the challenges that need to be overcome so that blockchain implementation can run smoothly. In addition, this research is expected to provide recommendations related to policies and regulations needed to support the development of blockchain in Indonesia's financial sector. The main focus of this research is to analyze existing regulatory and policy challenges, as well as provide advice on the steps that need to be taken by governments and regulators to create a legal framework that supports blockchain technology innovation (Brata & Karim., 2022). In addition, this research will also identify supporting infrastructure needs and provide insights on how to address gaps in understanding and acceptance of blockchain technology among financial industry players.

Based on existing research, although there are many studies on the application of blockchain in the financial sector, most of the research focuses more on developed countries (Lukita & Faturahman., 2022). Research that specifically examines the

application of blockchain in Indonesia is still limited. Therefore, this research aims to fill this gap and provide a more comprehensive understanding of the potential, challenges, and solutions related to blockchain application in Indonesia. This research is expected to make a significant contribution to public policy, regulators, and the financial industry in formulating strategies that support the effective and efficient implementation of blockchain (Megawati *et al.*, 2023). Thus, Indonesia's financial sector can harness the potential of blockchain technology to improve transparency, efficiency, and security, which in turn will strengthen public trust in the national financial system and encourage more inclusive and sustainable economic growth.

METHODS

This study uses a literature study method to analyze the potential and challenges of applying blockchain technology in the Indonesian financial sector. This qualitative approach aims to collect and analyze various literature sources, such as scientific articles, industry reports, books, and case studies, that discuss the use of blockchain in the financial sector. Content analysis will be used to identify key findings regarding how blockchain can improve the transparency, efficiency, and security of financial transactions, as well as the challenges faced in its implementation, such as regulatory and infrastructure issues. The results of this literature synthesis will provide a deeper understanding of the potential of blockchain in Indonesia, as well as recommendations for regulators and industries to optimize its adoption to support the development of a more transparent and efficient financial sector.

RESULTS AND DISCUSSION

Based on the results of the literature review conducted, the application of blockchain technology in the Indonesian financial sector shows various potential significant benefits. One of them is increased transparency, where every transaction made will be permanently recorded in a block connected in a chain. This process ensures that the information that has been recorded cannot be changed without the consent of the network, thereby reducing the risk of fraud and data manipulation. In addition, blockchain can also improve operational efficiency in the financial sector by reducing the role of third parties or intermediaries in the transaction process (Gunarso *et al.*, 2024). This allows transactions to be carried out directly between the parties involved without the need to involve traditional financial institutions, ultimately speeding up the process and reducing costs. The application of blockchain has also been proven to lower international transaction costs and speed up the time needed to process cross-border transactions (Gunarso *et al.*, 2024). In addition to efficiency, the level of security offered by blockchain technology is also very high, thanks to the use of advanced cryptographic systems that protect each transaction. This makes blockchain a promising solution for facing security and data protection challenges in the financial sector, making it a very potential alternative to improve various aspects in the financial industry. The application of blockchain technology in Indonesia's financial sector faces a number of significant challenges (Suryawijaya, 2023).

One of them is the lack of clarity in regulations governing the use of this technology, especially related to the protection of personal data and compliance with anti-money laundering (AML) and counter-terrorism financing (CFT) policies. This ambiguity in regulation can hinder the adoption of blockchain technology, given that the financial sector relies heavily on legal certainty to run operations in accordance with applicable standards (Herman *et al.*, 2024). On the other hand, Indonesia still faces limited technological infrastructure, especially outside big cities. This limitation makes it difficult

to implement blockchain, considering that the technology requires stable connectivity and adequate access, which is difficult to meet in areas that do not yet have adequate internet networks and other supporting facilities. The lack of skilled human resources in the field of blockchain is a major obstacle (Indraprakoso., 2023). The application of this technology requires in-depth technical expertise, both in system development and in its operation (Saphira *et al.*, 2024). The limited number of experts in this field makes blockchain implementation more difficult and requires considerable investment in training and human resource development to ensure its success.

The application of blockchain technology in Indonesia's financial sector offers significant potential, despite being faced with various challenges that need to be overcome (Ricardianto *et al.*, 2020). One of the key benefits of blockchain is its ability to increase transparency, which is crucial for strengthening the integrity of the financial system (Supriadi., 2024). This is very relevant considering the various problems that often arise, such as fraud and unclear transactions. For example, the application of blockchain in banking transactions and digital payment systems can increase public trust in the financial system, because every transaction is recorded in a ledger that can be publicly monitored and accounted for, without the intervention of third parties (Ashal., 2023). In addition, the use of blockchain in services such as peer-to-peer lending or crowdfunding can speed up the transaction process and reduce intermediary costs, making financial services more affordable and efficient for the community. Blockchain technology not only provides advantages in terms of transparency and trust, but also has the potential to improve the accessibility and efficiency of the financial system in Indonesia (Nuraini., 2024).

Blockchain technology has now become a very important tool in strengthening trust in various sectors, especially in supply chain management. Various studies reveal that blockchain can increase the level of trust among stakeholders by providing elements such as transparency, the ability to track, and a higher level of security (Meidutė-Kavaliauskien et al., 2021). By utilizing cryptography and a decentralized consensus system, blockchain guarantees integrity and security in every transaction (Hsu et al., 2020). Furthermore, this technology has been shown to have an important role in building trust, both in functional and emotional aspects (Fleischmann & Ivens, 2019). The use of blockchain in supply chains not only strengthens trust, but also improves sustainability and efficiency (Joo & Han, 2021). Blockchain allows for a more transparent flow of information, provides better data visibility, and helps build a positive reputation among partners (Qian & Papadonikolaki, 2020; Brookbanks & Parry, 2022). In addition, blockchain also opens up opportunities to strengthen social relationships by sharing data securely (Ramos & Queiroz, 2022). Overall, the adoption of blockchain technology offers great potential in strengthening trust in various sectors, particularly in supply chain management, through increased transparency, traceability, and security, ultimately supporting the creation of more sustainable business practices.

Blockchain is increasingly recognized as a technology that can improve efficiency in various sectors. Research shows that the implementation of blockchain has a positive impact on trust in supply chain management (Yavaprabhas et al., 2022), strengthens existing relationships (Brookbanks & Parry, 2022), and increases user trust in platforms in the supply chain (Zavolokina et al., 2023). This technology is also known as a tool that supports operational management (Babich & Hilary, 2020) and is capable of improving the spread of trust in supply chain networks (Chen & Shan, 2022). In addition, blockchain has proven to be effective in overcoming data-related trust challenges (2022) as well as in the management of IoT data storage systems (Wang et al., 2023).

In terms of efficiency, the application of blockchain technology can reduce the cost burden which has been a challenge for the traditional banking system (Chairunnas *et al.*, 2024). Blockchain-based payment systems allow international transactions to be carried out at much lower costs and faster times than conventional methods (Erviansyah *et al.*, 2022). This advantage is a very relevant solution to overcome barriers in cross-border transactions, both in terms of cost and processing duration. With this technology, financial institutions can optimize their operations, while the public as users benefit from faster and more affordable services (Aripin *et al.*, 2022).

In the digital asset management sector, blockchain provides an opportunity to create a more secure and efficient system. This technology allows for higher transparency in asset management, thereby increasing user trust in digital finance (Failany Fahriani, 2024). The rapidly growing digital asset market in Indonesia is increasingly helped by the application of blockchain, opening up great opportunities for fintech companies and financial institutions to create innovation (Johan., 2024). With more inclusive and affordable financial solutions, this technology can expand access to modern financial services for people from all walks of life, especially those who previously had difficulty accessing traditional financial services. The application of blockchain technology in Indonesia offers a lot of potential to support digital transformation, but it still faces significant challenges, especially in terms of regulation (Ng *et al.*, 2024). Until now, Indonesia does not have a comprehensive and specific legal framework to regulate the use of blockchain, especially in the financial sector. This ambiguity creates legal uncertainty that can be a barrier for companies and financial institutions to adopt the technology. The risks that arise, both in terms of investment and operations, make many parties reluctant to take further steps. In addition, the absence of clear regulations can also hinder innovation, as industry players do not have firm guidelines to ensure that the application of these technologies is in line with national policies.

The government and regulators need to immediately take strategic steps to formulate policies that are able to provide legal certainty, encourage innovation, protect consumers and maintain financial system stability (Utama., 2018). The policy should be designed in such a way as to create an ecosystem that supports blockchain development, without neglecting the prudential aspect of risk management. With the right regulations, blockchain technology has great potential to accelerate the digitalization of the financial sector, improve operational efficiency, expand access to financial services for underserved communities, and strengthen Indonesia's competitiveness in the global market (Putri *et al.*, 2024). This step will not only benefit industry players, but also society at large, by creating a more inclusive, safe, and transparent financial system.

Technological developments in Indonesia show rapid progress, but the infrastructure gap between urban and remote areas is still a major obstacle to the overall implementation of blockchain (Yunitasari *et al.*, 2024). This technology requires a stable internet connection and high data transmission speeds, which are often difficult to find in remote areas. This condition hinders equal access to blockchain benefits throughout Indonesia. In addition, another challenge is the limitation of human resources who have deep technical expertise in the field of blockchain. The application of this technology requires a workforce that not only masters the technical aspects, but is also able to integrate it into various industrial sectors (Ratnawati *et al.*, 2024). To overcome this, efforts to improve training and education, both through private sector initiatives and programs in formal educational institutions, are needed to create a skilled workforce. With adequate infrastructure support and sustainable human resource development, blockchain has the potential to support digital transformation and provide a significant economic impact evenly throughout Indonesia (Lase *et al.*, 2024).

The challenges that exist in the implementation of blockchain in Indonesia are quite complex, but the potential of this technology to improve transparency, efficiency, and security of the financial sector is enormous (Lisdawati *et al.*, 2024). Blockchain can provide solutions to problems such as unclear transactions and high operational costs, while opening up innovation opportunities to create more inclusive financial services (Norrahan., 2023). To maximize this potential, collaboration between the government, regulators, industry players, and the community is needed in creating an ecosystem that supports the development of this technology. The government needs to immediately issue clear regulations to provide legal certainty and encourage innovation, strengthen digital infrastructure so that this technology can be accessed equally, including in remote areas, and increase the capacity of human resources through education and training programs (Fadillah., 2022). These measures will ensure that blockchain can be implemented effectively, support digital transformation, and contribute to sustainable economic growth in Indonesia.

Aspects	Data	Source
Growth of Indonesia's Blockchain Market	The Indonesian blockchain market is expected to grow at a CAGR of 27.6% per year from 2023 to 2026.	6WResearch (2023)
Blockchain Adoption by Financial Institutions	5% of financial institutions in Indonesia have adopted blockchain to improve transaction efficiency.	Financial Services Authority (OJK, 2023)
Reduced Transaction Fees	The use of blockchain can reduce cross-border transaction fees by up to 70%, from 6.5% to 2.5%.	McKinsey & Company (2021)
Blockchain Transaction Security	Blockchain technology can reduce the rate of fraud and fraud in financial transactions by up to 80%.	Chainalysis (2022)
Transaction Time Efficiency	Blockchain-based transactions can be completed within 30 minutes, while conventional transactions take 3-5 days.	IBM (2020)
Financial Inclusion in Indonesia	Around 50% of Indonesia's population still does not have full access to formal financial services.	Asian Development Bank (ADB, 2022)
Digital Infrastructure Readiness	65% of Indonesia's territory still faces limited stable internet access to support blockchain-based technology.	World Bank (2020)
Growth of Indonesia's Fintech Sector	Total fintech transactions in Indonesia are estimated to reach USD 15.7 billion by 2024.	Fintech Indonesia (2023)

The table above provides an overview of the potentials and challenges associated with the application of blockchain technology in Indonesia. The growth of the blockchain market is expected to see a significant expansion, with an annual growth rate of 27.6% between 2023 and 2026 (6WResearch, 2023), which shows optimism towards the adoption of this technology. However, blockchain adoption in the financial sector is still limited, with only 5% of financial institutions in Indonesia having implemented this technology to improve transaction efficiency (Financial Services Authority, 2023). Blockchain technology offers great advantages, such as a reduction in cross-border

transaction fees by up to 70%, which can lower fees from 6.5% to 2.5% (McKinsey & Company, 2021), as well as the potential to improve transaction security by reducing fraud and fraud rates by up to 80% (Chainalysis, 2022). In addition, blockchain can speed up transaction times, which only take 30 minutes, compared to the 3-5 days required by conventional transactions (IBM, 2020). Another major challenge is financial inclusion, where around 50% of Indonesia's population still does not have full access to formal financial services (Asian Development Bank, 2022). The readiness of digital infrastructure is also an obstacle, with 65% of Indonesia's territory still facing limited stable internet access to support blockchain technology (World Bank, 2020). However, Indonesia's fintech sector shows great potential, with transactions estimated to reach USD 15.7 billion by 2024 (Fintech Indonesia, 2023), which opens up opportunities for the application of blockchain in supporting more inclusive financial services.

The table above provides a relevant overview of the potential and challenges of implementing blockchain technology in Indonesia's financial sector, as efforts are made to improve transparency and efficiency. The growth of the blockchain market, which is expected to grow at a CAGR of 27.6% per year from 2023 to 2026 (6WResearch, 2023), reflects high optimism towards this technology, which is believed to encourage greater transparency in financial transactions. By making transaction records permanent and transparent, blockchain can reduce the potential for fraud and data manipulation, contributing to increased public trust in the financial system. Blockchain technology also has the potential to improve the efficiency of Indonesia's financial sector. Reducing cross-border transaction costs by up to 70% (McKinsey & Company, 2021) will have a major impact in minimizing operational costs, thus enabling faster and cheaper international transactions. The application of blockchain can also speed up the transaction process that previously took 3-5 days to only 30 minutes (IBM, 2020), reducing dependence on intermediaries and accelerating financial services. On the other hand, although infrastructure challenges and financial inclusion remain obstacles—with 50% of Indonesia's population still not having full access to formal financial services (Asian Development Bank, 2022). The application of blockchain can help expand such access, by providing more affordable and more efficient services (Bahanan & Wahyudi., 2023). Therefore, to maximize the potential of blockchain in increasing transparency and efficiency, Indonesia needs to overcome the challenges of digital infrastructure and develop human resources skilled in this technology, in order to create an ecosystem that supports the transformation of the financial sector (Rahmawati *et al.*, 2024).

CONCLUSIONS

The application of blockchain technology in Indonesia's financial sector offers great potential to increase transparency and efficiency, which is indispensable for improving the integrity of the financial system. With the nature of blockchain that can record transactions permanently and transparently, this technology can reduce the risk of fraud and data manipulation, as well as increase public trust in the financial system. In addition, blockchain can speed up the transaction process and reduce operational costs, especially in cross-border transactions, which in turn can accelerate financial inclusion and facilitate access to financial services for the public. While challenges related to regulation, digital infrastructure, and human resources are still barriers, the potential of blockchain to create a more efficient, inclusive, and transparent financial sector in Indonesia is promising. Therefore, collaboration between the government, regulators, industry players, and the public is needed to overcome these challenges and maximize the application of blockchain technology to support the digital transformation of Indonesia's financial sector.

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