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Blockchain Integration in Sharia Finance: Building a Shariah-Compliant Decentralized Finance Ecosystem

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Abstract: This study aims to examine the potential integration of blockchain technology in building a decentralized and sharia-compliant Islamic financial ecosystem. Using a Library Research approach and Integrative Literature Review design, this study analyzes scientific articles published between 2015 and 2024 from various reputable databases such as Scopus, Google Scholar, DOAJ, and Scispace. The literature selection process was carried out systematically by referring to the PRISMA principle and analyzed using the thematic method. The results of the review show that blockchain technology can improve the transparency, efficiency, and accountability of the Islamic financial system through the application of smart contracts that comply with sharia principles. However, significant challenges remain, such as regulatory readiness, technological infrastructure, and human resource capacity. This study emphasizes the importance of cross-sector collaboration to optimally support the adoption of blockchain in Islamic finance. The findings provide conceptual and practical contributions to the development of sharia-based financial innovation and open up opportunities for further research that is more empirical and contextual.

Keywords: Blockchain, Islamic Finance, Smart Contract, Decentralized Ecosystem, Integrative Literature Review.

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A. INTRODUCTION

Blockchain is a distributed record-keeping technology that allows transactions to be recorded in a transparent, secure, and immutable manner. In the context of finance, blockchain enables the elimination of intermediaries, reduces transaction costs, and increases efficiency and trust (Nakamoto, 2008; Tapscott & Tapscott, 2016). On the other hand, Islamic finance is a financial system based on Islamic principles, such as the prohibition of usury, gharar, and speculation, and emphasizes fairness and clarity of contracts (Antonio, 2001). The combination of blockchain technology and Islamic finance principles creates a great opportunity to build a new decentralized and ethical financial system. However, to be Shariah-compliant, smart contracts and verification processes in blockchains must be adapted to the fatwas and principles of Islamic law (Dusuki & Abdullah, 2007).

Several studies have examined the integration of blockchain in Islamic finance. For example, Hasan and Aliyu (2018) emphasized that blockchain can be a solution for transparency and efficiency in the Islamic finance sector, particularly in microfinance and zakat. The study by Aji et al. (2020) shows that blockchain can be used to manage waqf and zakat funds efficiently, without violating sharia principles. In addition, Abubakar et al. (2021) emphasized that the use of blockchain can reduce operational costs and strengthen public trust

in Islamic financial products. However, the issue of sharia compliance for the use of smart contracts is still a challenge that requires special attention from scholars and technology experts.

Smart contracts as the core of blockchain technology enable the automation of contract execution directly without the involvement of third parties. According to Mohd Noor et al. (2020), smart contracts can be adapted to sharia contracts such as murabahah and ijarah to create secure and sharia-compliant transactions. Alharby and van Moorsel (2017) added that in the context of sharia, smart contracts need to have the flexibility to accommodate local fatwas and changes in fiqh law. Meanwhile, Ahmed and Mohd Saad (2022) noted the importance of collaboration between developers and scholars in ensuring legal accuracy in any smart contract. This suggests that the integration of technology with Islamic law is not only possible, but can also provide higher efficiency and trust in financial transactions.

In some countries, the application of blockchain in Islamic financial services has already begun. For example, HelloGold in Malaysia uses blockchain for transparent and efficient sharia-based gold investment (Yusoff et al., 2021). In Dubai, the OneGram project introduced a gold-based cryptocurrency that complies with sharia principles (Sole, 2019). In addition, Sari et al. (2023) pointed out that fintech startups in Indonesia have also started developing blockchain-based payment and financing applications with the supervision of a sharia supervisory board. These studies prove that this technology is not only theoretically relevant, but also has rapidly growing practical applications in the real world.

Despite its great potential, the application of blockchain in Islamic finance also faces various challenges. According to Miraz and Ali (2018), one of the main obstacles is the lack of a regulatory framework that supports blockchain-based innovation. A study by Zainudin et al. (2021) emphasized the need for a specific fatwa regarding the use of smart contracts and cryptocurrencies in Islamic transactions. Meanwhile, Farooq and El Ghoul (2019) mentioned that technological literacy among Islamic finance practitioners is still low, which is a major obstacle to the widespread adoption of this technology. Therefore, it is important to create synergy between regulators, technology developers, and scholars in order to make the application of blockchain in Islamic finance effective and compliant.

From the studies that have been conducted, it appears that blockchain integration in Islamic finance has great potential to improve efficiency, transparency, and financial inclusion. However, there is still a significant gap in terms of the adaptation of smart contracts to the principles of Islamic law as a whole, especially in the aspects of regulation and fatwa standardization. In addition, not many studies have developed an integrative model between blockchain and Islamic contracts in a comprehensive manner. The novelty of this research lies in proposing an integrative framework of blockchain technology with fiqh principles muamalah to form a Shariah-compliant decentralized financial ecosystem. The purpose of this research is to explore the potential, challenges, and design of a blockchain-based financial system that is in line with Islamic economic principles.

B. METHOD

This research uses a Library Research approach with an Integrative Literature Review design. This approach aims to identify, analyze, and synthesize the results of previous research

related to the use of blockchain technology in Islamic finance. This approach allows researchers to thoroughly evaluate the development of theory and practice, as well as identify research gaps (Whittemore & Knafl, 2005). This model is relevant for combining various conceptual and empirical studies to build a comprehensive understanding of the trending variables in the research topic.

Data sources in this study were obtained from reputable journal databases such as Google Scholar, Scopus, Directory of Open Access Journals (DOAJ), and Scispace. The articles reviewed were limited based on the inclusion criteria, namely scientific publications in the 2015 to 2024 timeframe, available in full text, using quantitative, qualitative, or mixed approaches, and relevant to the variables in the research title. The exclusion criteria were articles that were not available in full text, not relevant to the topic of blockchain and Islamic finance, or duplication of data.

The literature search process was conducted systematically using keywords such as "blockchain in Islamic finance", "smart contract Sharia compliance", and "Islamic fintech innovation" combined with Boolean operators (AND, OR). Next, the articles found were screened based on abstract and title, followed by a full content review of eligible articles. This literature selection procedure followed the PRISMA Flow Diagram principle to ensure transparency and systematization in the selection stage (Page et al., 2021).

Data analysis was conducted using the thematic method, which categorizes research findings based on themes or topics relevant to the focus of the study. Each article was reviewed to identify the theories used, research methods, findings, and contributions to scientific development. To ensure validity and reliability, cross-checking between references, evaluation of the methodological quality of each article, and synchronization of review results with references from articles sourced from reputable journals were carried out. Validity was also strengthened by referring to the source triangulation approach and critically synthesizing data.

C. RESULTS AND DISCUSSION

1. The Potential of Blockchain Technology in Transforming Islamic Finance

Blockchain technology has significant potential in transforming the Islamic finance sector. One of the key benefits of this technology is its ability to provide a secure, transparent, and decentralized system, which is in line with Islamic economic principles. According to Djumadi Djumadi (2023), the application of blockchain in the Islamic economy not only increases transparency and accountability in transactions, but also helps ensure compliance with sharia principles, which are the cornerstone of this financial system. In addition, Najibulloh and Rahmalia Najibulloh & Rahmalia (2024) showed that the application of blockchain can address challenges in the Islamic finance industry, such as the lack of transparency and efficiency, as well as increase risk awareness among market participants. In the context of implementation, Djumadi Djumadi (2023) and Najibulloh and Rahmalia Najibulloh & Rahmalia (2024) agree that while there are great opportunities offered by blockchain, there are also challenges that need to be addressed, including regulatory readiness and the expansion of financial literacy among users of Islamic financial services. Blockchain can also integrate the principles of

economic justice that are the essence of Islamic finance, such as the principle of profit sharing in the murabahah contract, as explained by Djumadi (Djumadi, 2024).

Furthermore, Muharam Muharam (2023) states that the future of Islamic finance is increasingly connected to technological innovation, and one of the key enablers of this innovation is fintech, which also interacts with blockchain. Fintech and blockchain together drive financial inclusion as well as facilitate access to various Islamic financial instruments, and provide more efficient solutions for MSMEs and individuals, as described in a study by Muzdalifa et al. (Muzdalifa et al., 2018). This underscores how technological developments in the financial sector can bring significant positive impacts to society, especially in supporting ethical and Shariah-compliant business sustainability.

However, the challenges in integrating these technologies cannot be ignored. Widyastuti et al. Widyastuti et al. (2023) and Srisusilawati and Eprianti Srisusilawati & Eprianti (2017) recommend the need for education and training to improve understanding and acceptance of new technologies, so that users, especially micro and small business actors, can make good use of this opportunity. Furthermore, Islamic financial literacy promoted by various institutions can help increase public awareness of the benefits of this innovation (Istifadhoh et al., 2021).

In conclusion, the potential of blockchain technology in Islamic finance transformation is vast and promising, but its success depends on the synergy between technology, regulation, and human resource capacity building in the Islamic finance sector. By capitalizing on existing innovations and overcoming challenges, the Islamic finance sector can achieve greater sustainability in a global context.

2. Challenges of Blockchain Implementation in the Islamic Ecosystem

The implementation of blockchain technology in the Islamic finance ecosystem offers various challenges and opportunities that need to be faced along with the adoption of this technology. One of the most striking advantages is the increased transparency and accountability that can be achieved through the implementation of this decentralized system. In the context of Islamic finance, blockchain can help ensure that all transactions are conducted in accordance with sharia principles, thus creating a more trustworthy environment for all parties involved (Djumadi, 2023)(Arwani & Priyadi, 2024). For example, the application of blockchain can improve the practice of zakat and waqf, which require transparency in the management and distribution of funds (Arwani & Priyadi, 2024).

However, the main challenges in the application of blockchain in the Islamic finance sector include the lack of adequate regulation and technical infrastructure that is not yet fully prepared. Many studies show that there is still a need to strengthen the regulatory framework governing the use of blockchain to align with sharia principles (Bahanan & Wahyudi, 2023; (Najibulloh & Rahmalia, 2024; . In addition, Djumadi's research mentioned the need for a better understanding of legal security and public acceptance of this new technology (Djumadi, 2023). The availability of human resources skilled in handling this technology is also a determining factor for successful implementation (Lestari, 2025).

Furthermore, the application of new financial products such as Smart Contracts in the Islamic financial system is complex and requires an in-depth understanding of the applicable Shariah provisions (Fitri, 2023; . There is a need to agree on clear standards, ranging from how

sharia contracts are formed and executed in the context of blockchain to the legal challenges that may arise. Fitri in his research stated that cooperation between industry players, regulators, and academics is essential to create solutions that are compliant with sharia principles in the use of blockchain (Fitri, 2023; Subli, 2024).

Overall, blockchain has great potential to revolutionize the Islamic finance ecosystem, but challenges such as immature regulations, strong infrastructure needs, and human resource readiness must be addressed. Only by preparing these aspects, blockchain implementation can be successful and provide real benefits to the Islamic economy (Najibulloh & Rahmalia, 2024; Haryati et al., 2025).

3. Blockchain Integration Strategy Towards an Inclusive and Sustainable Islamic Financial Ecosystem

The integration of blockchain technology within Islamic finance offers promising pathways towards developing an inclusive and sustainable financial ecosystem. Blockchain has shown its efficacy in enhancing transparency, reducing transaction costs, and providing efficient access to financial services, especially tailored to meet the ethical and legal prerequisites of Islamic finance. According to Kunhibava et al. (Kunhibava et al., 2024), blockchain's integration into Islamic social finance facilitates innovative financial solutions, which are pivotal in reinforcing financial inclusion. The qualitative exploration conducted in the study emphasizes understanding the stakeholders' perspectives to fully leverage blockchain's potential within Islamic finance.

Furthermore, the holistic benefits of financial inclusion in advancing sustainable livelihood development should be highlighted. Mahato and Jha Mahato & Jha (2023) established that financial inclusion directly correlates with improvements in living standards through enhanced access to financial products, as access to finance stimulates entrepreneurial activities that enhance quality of life for rural households. This assertion is further supported by Nera (Nera, 2020), which illustrates that increased access to formal financial services significantly promotes sustainable economic growth, specifically referencing the Indonesian context. By integrating financial inclusion strategies, such as those exemplified through blockchain technologies, Islamic financial systems can enhance their outreach to underserved communities, crucial for economic empowerment and sustainable growth.

The role of digital financial literacy must also be emphasized, as it plays a critical part in amplifying the effects of financial inclusion. Hasan et al. Hasan et al. (2022) underscore that building digital literacy, particularly among vulnerable groups and women entrepreneurs, fosters a more inclusive financial environment that supports sustainable economic development. This suggests that alongside technological integration, educational initiatives are essential for ensuring that financial innovations are utilized effectively.

Moreover, integrating blockchain into existing financial frameworks facilitates responsible risk management practices tailored for Islamic financial sectors. As explored by Hendarti et al. (Hendarti et al., 2024), the intersection of blockchain with artificial intelligence presents opportunities to mitigate risks associated with data integrity, thus enhancing the

overall stability of Islamic financial institutions. This is crucial for maintaining consumer trust and fostering a resilient financial ecosystem.

Overall, the strategic integration of blockchain technology presents itself not only as an innovative solution for Islamic finance but also as a catalyst for broader financial inclusion, underpinning sustainable development goals. Collaborative efforts among financial technologists, policymakers, and educational institutions are essential for cultivating an ecosystem that fosters both growth and ethical compliance within the Islamic finance sphere.

D. CONCLUSIONS AND SUGGESTIONS

The integration of blockchain technology in Islamic finance offers great potential to create a more transparent, efficient, and sharia-compliant financial system. This technology can decentralize authority, reduce sharia-compliant practices such as usury and gharar, and expand financial inclusion globally. However, its successful implementation is largely determined by regulatory readiness, the development of a strong technological infrastructure, as well as improving digital literacy and human resource competencies in the Islamic financial sector. Collaboration between regulators, academics, and industry players is key in building a blockchain-based Islamic finance ecosystem that is sustainable and adaptive to changing times.

In-depth studies are needed to explore fully Shariah-compliant smart contract models and blockchain-based Shariah audit mechanisms. In addition, it is important to assess the readiness of Islamic financial institutions to make the digital transition to a decentralized system.

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