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INTEGRATION OF BLOCKCHAIN TECHNOLOGY IN ZAKAT PAYMENT SYSTEM: EFFICIENCY AND TRANSPARENCY

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ABSTRACT

This study examines the integration of blockchain technology in the zakat payment system to improve the efficiency and transparency of zakat management in Indonesia. Using a qualitative approach with a literature study method and descriptive analysis of Indonesian research journals for the period 2016-2024, this research analyses the potential of blockchain in overcoming the fundamental problems of the conventional zakat system. The results show that the implementation of blockchain technology can increase operational efficiency by 70%, reduce the risk of data manipulation by 99%, and increase public trust by 85%. Comparative data shows a reduction in administrative operational costs by 70% and an increase in real-time information access by 95%. Shariah-compliant analysis shows a high level of compliance with the principles of transparency (95%), fairness (88%), and trustworthiness (92%). Blockchain technology provides a comprehensive solution to the problems of efficiency, transparency, data security, and public trust in Zakat management. This research concludes that blockchain integration can be a catalyst for digital transformation of the zakat system in Indonesia, increasing public participation and optimizing the impact of zakat in poverty alleviation. The implementation of this technology requires preparation of technological infrastructure, improvement of digital literacy, and development of a supporting regulatory framework.

Keywords*: Blockchain, Zakat, Efficiency, Transparency, Islamic financial technology*

INTRODUCTION

Zakat, as one of the third pillars of Islam, plays a fundamental role in the Islamic economic system, not only as an instrument of worship but also as a wealth redistribution mechanism that can reduce socio-economic disparities in society. In the context of Indonesia, the country with the largest Muslim population in the world, zakat management has

enormous potential to contribute to national economic development.

According to research by Beik and Arsyianti (2016), which analyzed the impact of zakat distribution on poverty and the income gap, an effective zakat management system can significantly reduce the poverty rate by 2.3% and lower the income gap index. However, the main challenges in modern zakat management are related to transparency, accountability, and efficiency in the collection, distribution, and reporting of zakat funds.

The development of financial technology and digitalization in the Islamic financial sector has opened new opportunities to improve the effectiveness of zakat management through the implementation of blockchain technology. Blockchain technology, with its key characteristics of decentralization, immutability, and transparency, offers an innovative solution to various problems in the conventional zakat payment system.

Research conducted by Rizal and Mitsalina (2019) on the implementation of blockchain technology in Indonesia's Islamic financial industry shows that blockchain can increase public trust in Islamic financial institutions by enhancing transparency and transaction security. This is particularly relevant to zakat management, which requires a high level of trust from the Muslim community as muzakki.

The integration of blockchain technology into the zakat payment system not only has the potential to improve operational efficiency but also strengthens transparency and accountability—critical factors for public trust in zakat management institutions. A study by Fahrurrozi and Fauzi (2020) on the utilization of blockchain technology to enhance transparency in the management of religious social funds demonstrated that blockchain implementation provides donors with easy access to real-time information, allowing them to track the flow of funds from collection to distribution to mustahik.

Therefore, this research is important to explore how the integration of blockchain technology can be optimized in the zakat payment system to achieve higher operational efficiency while adhering to sharia principles, which form the fundamental foundation of zakat management.

METHOD

This research employs a qualitative approach using literature review and descriptive analysis to examine the integration of blockchain technology in the zakat payment system. Data were collected through a literature review of scientific journals, research reports, and

official publications from institutions related to zakat management and blockchain technology for the period 2016–2024. Data analysis was conducted using content analysis techniques to identify patterns, themes, and key findings related to the efficiency and transparency of blockchain systems in the context of zakat payment. In addition, this study adopts a comparative approach to examine conventional zakat payment systems versus blockchain-based systems in terms of operational efficiency, transparency, security, and compliance with sharia principles.

RESULTS AND DISCUSSION

Results

Based on the literature analysis that has been conducted, the implementation of *blockchain* technology in the zakat payment system shows significant potential in improving the operational efficiency of zakat management institutions. Sari and Nugroho's (2021) research on the digitalization of the zakat system through a *blockchain* platform shows that the implementation of this technology can reduce the processing time of zakat transactions by up to 70% compared to the conventional system.

This finding is in line with the results of Putri and Rahman's (2022) study analyzing the effectiveness of smart contracts in zakat management, where it was found that the use of smart contracts can automate the process of verification and distribution of zakat, thereby reduce the administrative burden and minimize human error in the process of managing zakat funds.

The transparency aspect in the *blockchain-based* zakat payment system shows very encouraging results based on the research findings that have been reviewed. The study conducted by Hidayat and Kurniawan (2023) on the application of *blockchain* for transparency of zakat fund management shows that distributed ledger technology allows every zakat transaction to be tracked in real-time by all stakeholders, including muzakki, mustahik, and regulators. This study found that the level of public trust in Zakat Management Institutions increased by 85% when using a *blockchain-based* system compared to the conventional system.

Similar findings were also presented by Maharani and Susanto (2022) in their research on the implementation of blockchain technology to improve the accountability of amil zakat institutions, where it was found that transparency generated through *blockchain*

technology can increase public participation in paying zakat.

From the perspective of data security and integrity, the implementation of *blockchain* in zakat payment system shows significant advantages compared to traditional database system. Firmansyah and Aziz's (2021) research on the security of *blockchain-based* digital zakat payment system revealed that this technology can eliminate the risk of data manipulation up to 99% through decentralized cryptography and consensus mechanism.

The study also found that operational costs for system security can be reduced by 60% as it does not require complex centralized security infrastructure. In addition, the *immutability* aspect of *blockchain* ensures that any recorded zakat transaction cannot be altered or deleted, thus providing high data integrity assurance for all parties involved.

Analysis of the compatibility of *blockchain* technology with sharia principles in zakat management shows positive results with some important notes. Wahyudi and Islamiah's (2023) research on sharia *compliance* analysis on *blockchain* implementation for zakat shows that *blockchain* technology is fundamentally not contradictory to sharia principles, especially in terms of transparency (openness), justice (al-'adl), and trust (amanah).

Nevertheless, this study also identifies some aspects that need special attention, such as the consensus mechanism used and the incentive structure in the blockchain network in order to remain compliant with Shariah principles.in blockchain networks in order to remain compliant with Shariah principles. This study recommends the use of *consensus mechanisms* that do not involve speculation or gambling, as well as the implementation of *smart contracts* that have been verified by the sharia council to ensure compliance with Islamic law.

Based on the literature analysis that has been conducted, the implementation of *blockchain* technology in the zakat payment system shows significant potential in improving the operational efficiency of zakat management institutions. Sari and Nugroho's (2021) research on the digitalization of the Zakat system through a *blockchain* platform shows that the implementation of this technology can reduce the processing time of zakat transactions by up to 70% compared to the conventional system.

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Table 1. Comparison of Conventional vs Blockchain Zakat Payment System Efficiency

Efficiency Aspect	System Conventional	System Blockchain	Improvement (%)
Processing Time Transaction	24-48 hours	5-10 minutes	70%
Operational Cost Administrative	IDR 150/transaction	IDR 45/transaction	70%
Human Error Rate	8.5%	0.8%	91%
Data Verification Time	72 hours	2 hours	97%
Annual Audit Fee	IDR 500 million	IDR 125 million	75%

Source: Adaptation from Sari and Nugroho (2021) and Putri and Rahman (2022)

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Technology allows every zakat transaction to be tracked in real-time by all stakeholders, including muzakki, mustahik, and regulators. This study found that the level of public trust in Zakat Management Institutions increased by 85% when using a *blockchain-based* system compared to the conventional system. Similar findings were also presented by Maharani and Susanto (2022) in their research on the implementation of *blockchain* technology to improve the accountability of amil zakat institutions, where it was found that transparency generated through *blockchain* technology can increase public participation in paying zakat. Details regarding the level of transparency and public trust are presented in Table 2.

Table 2. Level of Transparency and Public Trust in Zakat System

Indicator	Conventional System	Blockchain System	Difference
Level of Public Trust	45%	85%	+40%
Real-time Information Access	15%	95%	+80%

Ease of Fund Tracking	25%	90%	+65%
Active Participation of Muzakki	35%	78%	+43%
Stakeholder Satisfaction Level	52%	88%	+36%

Source: Adaptation from Hidayat and Kurniawan (2023) and Maharani and Susanto (2022).

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The study also found that operational costs for system security can be reduced by 60% as it does not require complex centralized security infrastructure. In addition, the *immutability* aspect of *blockchain* ensures that any recorded zakat transaction cannot be changed or deleted, thus providing high data integrity assurance for all parties involved. The comparison of system security aspects is presented in Table 3.

Table 3. Comparison of Security Aspects of Zakat Payment System

Security Parameter	System Conventional	System Blockchain	Improvement Factor
Risk Manipulation Data	12%	0.12%	99x more secure
Cost Security System	IDR 800 million/year	IDR 320 million/year	60% more efficient
Encryption Level	128-bit	256-bit	2x stronger
Recovery Time (hour)	48-72	1-2	95% faster
Total Point of Failure	15-20	1-2	90% reduced

Source: Adaptation from Firmansyah and Aziz (2021)

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principles, especially in terms of transparency (openness), justice (al-'adl), and trust (amanah).

However, this study also identifies some aspects that need special attention, such as the consensus mechanism used and the incentive structure in the *blockchain* network in order to remain compliant with sharia principles. The study recommends the use of *consensus mechanisms* that do not involve elements of speculation or gambling, as well as the implementation of *smart contracts* that have been verified by the sharia council to ensure compliance with Islamic law. The shariah-compliant evaluation is shown in Table 4.

Table 4. Evaluation of Shariah Principles Conformity in Blockchain System for Zakat

Sharia Principles	Level Conformity	Score Compliance	Notes
Transparency (Openness)	Very compliant	95%	Distributed ledger supports transparency
Justice (Al-'Adl)	Compliant	88%	Democratic consensus reflects justice
Amanah (Trust)	Very suitable	92%	Immutability guarantees trust
Anti-Gharar (Anti Uncertainty)	Compliant	85%	Smart contracts reduce uncertainty
Anti-Riba	Needs Attention	78%	Incentive mechanism needs to be adjusted
Anti-Maysir (Anti-Gambling)	Needs Attention	80%	Consensus mechanism must be chosen with care

Source: Adaptation of Wahyudi and Islamiah (2023)

Discussion

Based on the findings of the research, the researcher argues that blockchain technology provides a comprehensive solution to the fundamental problems that have hindered the optimization of the zakat payment system in Indonesia. The main issues identified in conventional zakat management include low operational efficiency, lack of transparency in fund management, vulnerability to data manipulation, and public doubts about the accountability of zakat management institutions. The research data shows that blockchain implementation can systematically and measurably address each of these

problems, with indicators such as a 70% increase in operational efficiency and an 85% increase in public trust, demonstrating that this technology can overcome the challenges in modernizing the Zakat system.

The researcher's main argument is that the solutions offered by blockchain technology are holistic and mutually reinforcing in creating an optimal zakat management ecosystem. The elimination of data manipulation risk by up to 99% not only resolves the data security issue but also directly contributes to improving transparency and public trust. According to Sari and Nugroho (2021), the immutable characteristics and distributed ledger technology in blockchain create a system that is inherently transparent and verifiable by all parties, eliminating the need for blind trust in zakat management institutions. This provides a direct solution to public skepticism, which has been a major obstacle in increasing national zakat revenue.

Furthermore, the creation of a transparent and independently verifiable system is likely to significantly increase public participation in paying zakat, thereby magnifying the impact of zakat in poverty alleviation and reducing socio-economic disparities. From a practical perspective, the research data shows that blockchain technology offers both theoretical and applicative solutions suitable for the Indonesian context. The reduction of system security operational costs by up to 60% addresses the resource limitations often faced by zakat management institutions, especially small and medium-sized organizations (OPZs).

Hidayat and Kurniawan (2023) reinforce this argument by demonstrating that blockchain implementation enables automation of various administrative processes through smart contracts. This not only reduces operational costs but also minimizes human error and accelerates the distribution of zakat to eligible recipients. Such a solution directly tackles the efficiency and effectiveness issues often criticized in conventional zakat management, where high operational costs can reduce the proportion of funds that reach productive programs for mustahik.

CONCLUSION

Based on the comprehensive analysis conducted, this research concludes that the integration of blockchain technology in the zakat payment system provides a transformative solution to various fundamental problems that have hindered the optimization of zakat management in Indonesia. Blockchain technology has been proven to significantly improve

operational efficiency by reducing transaction processing time by up to 70% and decreasing administrative operational costs by the same proportion.

The transparency aspect, which is a key advantage of blockchain, has successfully increased public trust by 85% and provided access to real-time information by 95%. This directly contributes to higher public participation in paying zakat and strengthens overall confidence in zakat management institutions.

From the perspective of data security and integrity, blockchain implementation shows notable advantages, including the elimination of data manipulation risk by 99% and a 60% reduction in system security costs. The immutability and distributed ledger characteristics of blockchain create a reliable audit trail system, ensuring accountability and transparency—challenges that have long been problematic in conventional zakat management.

Shariah compliance evaluation indicates that blockchain technology is fundamentally aligned with Islamic principles, particularly regarding transparency, fairness, and trustworthiness. However, certain aspects, such as the consensus mechanism and incentive structure, require careful attention to guarantee full compliance with Shariah principles.

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