

TRANSFORMATION OF DIGITAL ZAKAT AND WAKAF: A SYSTEMATIC REVIEW OF INNOVATION MODELS**TRANSFORMASI ZAKAT DAN WAKAF DIGITAL: TINJAUAN SISTEMATIS MODEL INOVASI****Cholid Fadil**

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ABSTRACT

The global Islamic philanthropy landscape is undergoing a fundamental paradigm shift due to massive digital disruption, transforming traditional zakat and waqf management into integrated, data-driven systems. Despite the vast potential of zakat and waqf, the realization in Indonesia remains below 7% for zakat and 1% for cash waqf, indicating a systemic failure to convert this potential into tangible economic impact. Using a systematic narrative review of literature from Scopus, Web of Science, and Google Scholar databases for the 2014-2024 period, this study synthesizes digital innovation models within a "Digital Shariah Governance" (DSG) framework. Findings indicate that the integration of blockchain technology, smart contracts, and artificial intelligence (AI) can automate Shariah compliance and ensure radical transparency through immutable and traceable transaction records. This transformation not only enhances operational efficiency but also strengthens religious legitimacy through integrated digital audit mechanisms, ultimately mitigating the public trust deficit within the Islamic social finance ecosystem.

Keywords: Digital Zakat, Blockchain Waqf, Islamic Fintech Innovation, Digital Shariah Governance, Islamic Philanthropy

ABSTRAK

Lanskap filantropi Islam global tengah mengalami pergeseran paradigma fundamental akibat disrupsi teknologi digital yang mengubah mekanisme tradisional pengelolaan zakat dan wakaf menjadi sistem yang terintegrasi dan berbasis data. Meskipun potensi zakat dan wakaf sangat besar, realisasinya di Indonesia masih berada di bawah 7% untuk zakat dan 1% untuk wakaf uang, yang mengindikasikan adanya kegagalan sistemik dalam mengonversi potensi tersebut menjadi dampak ekonomi nyata. Melalui pendekatan narrative review sistematis terhadap literatur dari basis data Scopus, Web of Science, dan Google Scholar periode 2014-2024, studi ini mensintesis model inovasi digital dalam kerangka kerja "Digital Shariah Governance" (DSG). Temuan menunjukkan bahwa integrasi teknologi blockchain, smart contracts, dan kecerdasan buatan (AI) mampu mengotomatisasi kepatuhan syariah serta menjamin transparansi radikal melalui pencatatan transaksi yang immutable dan traceable. Transformasi ini tidak hanya meningkatkan efisiensi operasional, tetapi juga memperkuat legitimasi religius melalui mekanisme audit digital yang terintegrasi, yang pada akhirnya memitigasi defisit kepercayaan publik dalam ekosistem keuangan sosial Islam.

Kata Kunci: Zakat Digital, Blockchain Wakaf, Inovasi Fintech Islam, Tata Kelola Syariah Digital, Filantropi Islam

1. INTRODUCTION

The global Islamic philanthropy landscape is undergoing a fundamental paradigm shift due to massive digital technology disruption. This transformation, often referred to as Islamic Fintech, has transformed traditional mechanisms for managing zakat and waqf into a more integrated, faster, and data-driven system. The use of crowdfunding platforms, digital wallets, and blockchain technology not only increases accessibility for zakat payers and waqif but also offers solutions to efficiency challenges in raising religious social funds. Globally, the value of fintech transactions reached USD 8.49 trillion in 2022, reflecting the accelerated adoption of

digital financial technology (Statista, 2023), while the global financial inclusion rate has reached 76% of the adult population (World Bank, 2021). This phenomenon marks a new era in which Islamic social finance instruments are beginning to be positioned as strategic pillars in achieving the Sustainable Development Goals (SDGs) through inclusive digitalization (UNDP, 2022).

However, this enormous potential has not been matched by optimal zakat and waqf collection performance. Globally, zakat potential is estimated at USD 200–1,000 billion per year, but collection realization remains below 20% (UNDP, 2022). A similar situation also occurs in Indonesia, where zakat potential reaches IDR 327 trillion, but only around IDR 22 trillion, or less than 7%, has been collected (BAZNAS, 2023). Meanwhile, the potential for national cash waqf is estimated at IDR 180 trillion per year, but realization remains below 1% (BWI, 2023). This disparity indicates a systemic failure to translate the enormous potential of Islamic social finance into tangible economic impact, even though digital technology penetration and financial inclusion in Indonesia have reached over 85% (OJK, 2023).

Furthermore, the acceleration of technological innovation has triggered a dialectical tension between the need for operational efficiency and the obligation to maintain rigid Sharia compliance standards. On the one hand, digitalization demands flexibility, transaction speed, and system scalability. On the other hand, Sharia principles require the validity of contracts, clarity of waqf objects, and accurate distribution to zakat recipients, which require a rigorous verification process. This challenge is exacerbated by the low level of transparency in the management of philanthropic funds. Globally, approximately 42% of donors express a lack of trust in the transparency of philanthropic institutions (World Economic Forum, 2022), while the adoption of blockchain-based technology to increase transparency remains below 10% globally (OECD, 2021). In Indonesia, public trust in zakat institutions remains moderate, indicating a trust deficit in the digital zakat management ecosystem (BAZNAS, 2022).

Furthermore, other structural challenges arise in the form of fragmented digital zakat and waqf platforms and low Islamic financial literacy. Globally, more than 300 digital philanthropy platforms operate without clear interoperability standards (OECD, 2022), while in Indonesia, various digital zakat platforms operate partially without national system integration. This situation leads to inefficiency, program duplication, and limitations in managing Islamic philanthropic big data. Furthermore, the global financial literacy rate remains around 33% (Standard & Poor's, 2021), while Islamic financial literacy in Indonesia is even lower, at only 9.14% (OJK, 2022). This limited literacy directly hampers the adoption of digital technology in zakat and waqf.

Given this complexity, this article aims to conduct a systematic review of recent literature exploring the intersection of good corporate governance (GCG) and Sharia compliance in various digital innovation models for zakat and waqf. This approach is crucial given that digital transformation demands not only technical efficiency but also normative legitimacy within the Islamic legal framework. Using a narrative review approach, this study will synthesize various technological frameworks implemented in various Muslim countries to evaluate how digital instruments can function as integrated control, audit, and transparency mechanisms.

The novelty of this research lies in its attempt to offer a conceptual framework for "Digital Shariah Governance" as a hybrid model that integrates digital efficiency with religious integrity. This model positions technologies such as blockchain, smart contracts, and artificial intelligence not merely as automation tools but as embedded governance mechanisms capable of strengthening the principles of Maqasid al-Shari'ah through transparency, accountability, and systematic distributive justice. Thus, this research is expected to provide theoretical and practical contributions to building a sustainable and globally competitive digital Islamic philanthropy ecosystem.

2. METHODS

This research uses an approach narrative review A comprehensive search to synthesize global literature related to digital transformation in the zakat and waqf sector. The literature search strategy was conducted systematically through three major, highly reputable bibliographic databases: Scopus, Web of Science (WoS), and Google Scholar. The use of these databases aims to ensure broad coverage of articles, ranging from journals with impact factors (impact factor) high to relevant contemporary case studies. Keywords used in the search included combinations of terms such as "Digital Zakat", "Blockchain Waqf", "Islamic Fintech Innovation", "Shariah Compliance in Digital Era", And "Good Corporate Governance in Islamic Philanthropy" This process ensures that the literature collected has strong thematic relevance to the focus of integrating governance and sharia compliance.

Inclusion criteria were strictly established to maintain the quality and topicality of academic discussions. The selected articles were original research journal articles and review articles (review articles) published within the last ten years (2014–2024). This timeframe was chosen to capture the dynamics of the rapid evolution of Islamic financial technology following the emergence of the global digital economy phenomenon. Furthermore, the selection criteria only included English and Indonesian articles that have gone through the process peer-review, to ensure the methodological validity of each finding synthesized in this article. Literature that does not explicitly focus on digitalization or that only discusses Islamic philanthropy conventionally was excluded from this analysis.

The data analysis technique applied is **narrative synthesis (narrative synthesis)**, which focuses on identifying and grouping key themes that emerge from the selected literature. This process begins with in-depth reading (in-depth reading) to extract key concepts regarding digital innovation models, GCG mechanisms, and sharia compliance parameters. The data was then thematically categorized to answer the research questions (RQs), specifically regarding how technology acts as a bridge between digital efficiency and the integrity of Islamic law. This approach allows the authors to critically interpret and construct logical arguments regarding the future direction of zakat and waqf governance in the digital era, going beyond a mere descriptive summary of existing articles.

3. RESULTS AND DISCUSSIONS

3.1. The Digital Innovation Landscape: From Fintech to Blockchain

Blockchain technology, or distributed ledger technology (DLT), has consistently been identified as a key infrastructure for the digital transformation of zakat and waqf. Its characteristics, which enable real-time, transparent, and tamper-evident transaction recording, make it a strategic instrument for enhancing accountability in the management of Islamic social funds. Various studies confirm that blockchain can increase transparency and traceability in the zakat collection and distribution process, while reducing reliance on intermediaries (Wahyudi et al., 2024; Tamanni et al., 2022; Mohamed et al., 2023; Alshater et al., 2022). Furthermore, the use of smart contracts allows for the coding of distribution rules, eligibility criteria for mustahiq (recipients of wealth), and the automation of fund disbursement in accordance with Sharia-compliant principles. This mechanism not only improves operational efficiency but also minimizes the potential for moral hazard and fund leakage (Wahyudi et al., 2024; Mohamed et al., 2023; Susanto et al., 2024). Thus, blockchain serves not only as a technological tool, but as a governance infrastructure foundation that strengthens trust in the Islamic social finance ecosystem.

On the other hand, the integration of artificial intelligence and big data analytics plays a crucial role in increasing the effectiveness of zakat distribution through a data-driven approach. The literature shows that AI can be used to more accurately profile mustahiq (recipients of zakat) by analyzing socioeconomic data, predicting needs, and dynamically optimizing fund allocation according to real-world conditions (Wahyudi et al., 2024; Rabbani et

al., 2020; Dirie et al., 2023). The use of predictive analytics enables zakat institutions to anticipate changing beneficiary needs in real time, making distribution more adaptive and responsive. Furthermore, big data analytics, such as text analytics and social analytics, enable mapping of donation patterns, identification of vulnerable groups, and data-driven strategic planning (Hudaefi et al., 2022; Fajri et al., 2023; Ishak & Mohamed, 2023; Susanto et al., 2024). However, the literature also highlights the risk of algorithmic bias and the need for strict oversight mechanisms to ensure fairness in the targeting process (Wahyudi et al., 2024; Kasim et al., 2023).

The convergence of fintech with digital platforms such as e-commerce and mobile applications is accelerating the transformation of zakat and waqf into an integrated ecosystem. This development demonstrates a shift from simply digitizing payments to a comprehensive fintech system, encompassing fund collection, management, and transparent reporting. Studies show that fintech integration in Islamic social finance can improve financial inclusion, operational efficiency, and compliance with Sharia principles (Rabbani et al., 2020; Aziz et al., 2023; Ishak & Mohamed, 2023; Rusydiana et al., 2022). Practical implementation is evident in the use of crowdfunding platforms, digital zakat calculators, and mobile-based distribution, expanding the reach of Islamic philanthropic services (Bintarto et al., 2022; Solihin & Latifah, 2021; Adinugraha et al., 2023). This demonstrates that digital fundraising is a crucial instrument in increasing the effectiveness and scalability of social fundraising.

Nevertheless, the adoption of technology in zakat and waqf cannot be separated from the Maqasid al-Shariah framework as a primary normative principle. The literature emphasizes that technological innovation must uphold the values of justice, transparency, inclusiveness, and protection of the interests of mustahiq (receiver). Risks such as algorithmic bias, digital exclusion, and cybersecurity threats are major concerns that require comprehensive governance (Wahyudi et al., 2024; Kasim et al., 2023; Rabbani et al., 2020; Dirie et al., 2023). Therefore, technology implementation must be accompanied by oversight mechanisms, sharia audits, and an adaptive regulatory framework. Furthermore, cybersecurity aspects such as data encryption, digital audit systems, and privacy protection are crucial components in maintaining system integrity (Wahyudi et al., 2024; Kasim et al., 2023).

In the context of model development, the literature identifies various integration approaches between Islamic social finance and modern financial systems, at the institutional, operational, and governance levels. These models demonstrate how zakat and waqf can be integrated with digital financial systems to support financial inclusion and achieve the Sustainable Development Goals (SDGs) (Dirie et al., 2023; Tamanni et al., 2022; Napitupulu et al., 2024). Systematic reviews and bibliometric analyses also confirm the convergence of fintech, blockchain, AI, and Islamic finance as key clusters in contemporary research (Fajri et al., 2023; Ishak & Mohamed, 2023; Susanto et al., 2024; Alshater et al., 2022; Rusydiana et al., 2022). However, significant challenges remain regarding standardization, system interoperability, and impact measurement, requiring further exploration.

Conceptually, the architecture of the emerging digital Islamic philanthropy ecosystem can be understood as an integrated multi-layered system. Blockchain and smart contracts serve as the backbone, ensuring transparency, security, and reliability in recording zakat and waqf transactions. This layer is strengthened by AI and big data analytics, enabling data-driven decision-making, particularly in mapping mustahiq (recipients of charity) and optimizing fund distribution. Meanwhile, fintech platforms such as mobile platforms and digital wallets play a role in increasing accessibility, inclusion, and operational efficiency. This entire system must be supported by a governance framework based on Maqasid al-Shariah (the principles of obedience to God), risk management, and data security to ensure a balance between technological innovation and religious integrity (Wahyudi et al., 2024; Susanto et al., 2024; Tamanni et al., 2022; Alshater et al., 2022; Rusydiana et al., 2022; Solihin & Latifah, 2021; Adinugraha et al., 2023).

The implications of these findings suggest that regulators need to develop a policy framework that supports the standardization of digital zakat and waqf platforms, including smart contract regulations, data protection, and cybersecurity while ensuring compliance with Sharia principles (Wahyudi et al., 2024; Rabbani et al., 2020; Dirie et al., 2023; Tamanni et al., 2022). Practically, Islamic financial institutions and philanthropic organizations are encouraged to implement blockchain-based models integrated with AI, while maintaining human oversight to avoid bias and exclusion (Wahyudi et al., 2024; Kasim et al., 2023). Meanwhile, future research agendas need to focus on cross-country comparative studies, developing digital governance models, and empirically testing the effectiveness of technology in increasing the transparency and efficiency of zakat and waqf (Fajri et al., 2023; Ishak & Mohamed, 2023; Susanto et al., 2024; Napitupulu et al., 2024; Alshater et al., 2022; Rusydiana et al., 2022; Adinugraha et al., 2023).

3.2. GCG Integration in the Digital Ecosystem

The literature demonstrates that digital platforms have the capacity to foster radical transparency through real-time tracking of fund flows in zakat and waqf management. A synthesis of various studies indicates that although the explicit implementation of public dashboards remains largely discussed in conceptual and practice-based literature, the trend toward real-time digital-based reporting systems is gaining momentum. This transformation is positioned as an evolution from conventional reporting practices to a more dynamic disclosure mechanism, where information on fund collection and distribution can be openly accessed by stakeholders almost simultaneously. Thus, digitalization not only improves operational efficiency but also shifts the accountability paradigm toward a continuous disclosure system.

In the context of accountability, the use of public dashboards and real-time impact reporting systems is seen as a strategic instrument in strengthening donor trust. Transparency is no longer limited to annual reports, but has evolved into an ongoing monitoring mechanism that allows donors to directly evaluate the use of funds. Several studies emphasize that transparency serves as a governance mechanism that significantly influences donor behavior and the level of trust in philanthropic institutions (Rejosumarto & Bulut, 2024; Sukri et al., 2024). Furthermore, accountable and structured reporting practices in the context of Indonesian philanthropy have also been shown to contribute to increased institutional legitimacy (Musa, 2024; Abidin & Cahyadi, 2023). This perspective is reinforced by the finding that the quality of reporting and governance is directly related to the level of public trust in philanthropic institutions (Hamdar, 2018). Taken together, these findings indicate that digital dashboards have the potential to be a more effective accountability mechanism than traditional reporting systems.

Furthermore, governance principles such as transparency, independence, accountability, and responsiveness are the main foundations for developing digital-based Islamic social finance. Digitalization enables the internalization of Good Corporate Governance (GCG) principles into the system through automation of reporting, monitoring, and performance evaluation processes. In this regard, transparency is not only informative but also operational, as the system automatically provides an audit trail that can be verified by various parties. Independence is reflected in reduced reliance on manual intervention, while responsiveness is increased through the system's ability to respond quickly and data-driven to changing needs.

The convergence of digital fundraising, ZISWAF (Zakat, Infaq, Sedekah, and Waqf) platforms, and fintech technology further strengthens end-to-end transparency in the Islamic philanthropic ecosystem. Studies show that the use of financial technology in waqf and zakat management not only improves sustainability but also strengthens transparency throughout

the fund management cycle (Faisal et al., 2022). The integration of blended finance models also indicates the need for digital systems capable of managing fund flows in an integrated and transparent manner (Jatmiko et al., 2025). Furthermore, digital fundraising platforms have been shown to increase donor trust by increasing transparency and information accessibility (Rejosumarto & Bulut, 2024; Sukri et al., 2024). This implementation reflects a shift towards a philanthropic system that is not only based on normative trust but also on digital verification.

However, the implementation of digital technology in zakat and waqf continues to face challenges related to regulatory aspects, Maqasid al-Shariah-based governance, and cybersecurity. The literature emphasizes that technology adoption must be accompanied by an adequate regulatory framework to ensure compliance with Sharia principles and protect against operational risks. Furthermore, cybersecurity is crucial for maintaining data integrity and fund security, particularly in digitally based and widely connected systems. In this context, technologies such as blockchain are also positioned as enablers capable of strengthening transparency and governance through immutable and auditable transaction recording.

Overall, the literature synthesis shows that the integration of digital platforms, transparency dashboards, and supporting technologies such as fintech and blockchain forms a new governance architecture in Islamic social finance. This system enables real-time transparency, continuous accountability, and increased public trust through stronger verification mechanisms. Thus, digitalization serves not only as an efficiency tool but also as an instrument for fundamental governance transformation in zakat and waqf management.

3.3. Maintaining Shariah Compliance in the Algorithmic Era

The literature shows that blockchain-based smart contracts have significant potential as a Sharia-compliant automation mechanism for managing zakat and waqf. Smart contracts enable explicit coding of Sharia rules, including mustahiq eligibility criteria, distribution provisions, and contract validation prior to transaction execution. Thus, funds will only be disbursed if all predetermined conditions are met, minimizing the potential for irregularities and leakage. Several studies confirm that this mechanism not only improves operational efficiency but also strengthens transparency and accountability in Islamic social finance (Wahyudi et al., 2024; Mohamed et al., 2023; Widiastuti et al., 2022). However, the literature also emphasizes that the complexity of Sharia law interpretation in certain cases still requires human oversight, particularly in addressing ambiguities that cannot be fully accommodated by algorithmic logic (Wahyudi et al., 2024; Widiastuti et al., 2022).

Furthermore, data-driven approaches such as the e-Asnaf system and objective poverty scoring are crucial tools for improving the accuracy of zakat recipient targeting. The use of socioeconomic data and analytical algorithms allows for more precise identification of those eligible for zakat, enabling zakat distribution to better align with sharia objectives in assisting truly deserving groups. The literature shows that the use of data-driven profiling can reduce mistargeting, increase distribution efficiency, and strengthen compliance with the principles of Maqasid al-Shariah (Wahyudi et al., 2024; Timur et al., 2023; Dewi & Zaenurrosyid, 2023; Widiastuti et al., 2022). However, the implementation of this system poses challenges related to potential algorithmic bias, data integrity, and the legitimacy of the criteria used, thus requiring a strong governance framework to maintain fairness and sharia compliance (Wahyudi et al., 2024; Timur et al., 2023; Dewi & Zaenurrosyid, 2023).

Within the governance framework, the concept of Digital Sharia Audit emerged as a technology-based oversight mechanism integrated directly into the system. This concept refers to the integration of Sharia compliance checks into the program code, allowing the system to automatically detect and prevent non-compliant transactions before the validation process is carried out. Although the term "Digital Sharia Audit" has not been used uniformly in the literature, this principle of embedded compliance is implicitly recognized as part of the design of blockchain-based systems for managing zakat and waqf (Wahyudi et al., 2024; Widiastuti et al., 2022). However, several studies emphasize that digital audit mechanisms need to be

complemented by the role of external Sharia auditors or human-in-the-loop to ensure the validity of Islamic law interpretations, especially in complex and dynamic contexts (Wahyudi et al., 2024; Widiastuti et al., 2022).

Furthermore, the adoption of technology in zakat and waqf must be based on the principles of Maqasid al-Shariah which emphasize justice, transparency, property protection and social welfare. The literature emphasizes that digital transformation must not be solely oriented towards efficiency, but must be accompanied by strong governance, comprehensive risk management, and protection against cyber security threats. Risks such as data leaks, cyber attacks and misuse of information are critical issues in the digital ecosystem, requiring an integrated security approach (Wahyudi et al., 2024; Rabbani et al., 2020; Dirie et al., 2023; Widiastuti et al., 2022). On the other hand, there is debate in the literature regarding the level of flexibility allowed in technology implementation, with some researchers encouraging a conservative approach based on risk mitigation, while others support more progressive innovation as long as it remains within the corridor of sharia (Wahyudi et al., 2024; Rabbani et al., 2020; Dirie et al., 2023; Widiastuti et al., 2022).

In the broader governance context, the literature also emphasizes the importance of a comprehensive governance and auditing framework to support the sustainability of digital zakat and waqf platforms. This includes the use of transparency dashboards, real-time reporting, and independent audits as mechanisms to ensure accountability and enhance public trust. Digital-based reporting systems enable continuous monitoring of fund flows and distribution impacts, thereby strengthening institutional legitimacy within the Islamic social finance ecosystem (Wahyudi et al., 2024; Rabbani et al., 2020; Dirie et al., 2023; Widiastuti et al., 2022). However, the level of maturity of this technology implementation varies, with most studies still at the conceptual or pilot project stage.

Finally, cybersecurity and data privacy are integral components of digital-based zakat and waqf management. The literature confirms that protecting donor and beneficiary data, as well as the security of managed funds, are key prerequisites for maintaining public trust. Therefore, a risk management framework is needed that is not only technology-based but also aligns with Sharia principles in maintaining trust and distributive justice (Wahyudi et al., 2024; Rabbani et al., 2020; Dirie et al., 2023; Widiastuti et al., 2022). Overall, these findings indicate that the success of the digital transformation of zakat and waqf depends heavily on the ability to integrate technological innovation with strong and sustainable Sharia governance.

3.4. Model Synthesis: The "Digital Shariah Governance" Framework

The concept of Digital Shariah Governance (DSG) emphasizes that digital technology, particularly blockchain, does not diminish Sharia compliance but rather strengthens it through traceability and immutability mechanisms. Within this framework, the principles of Good Corporate Governance (GCG) and Sharia compliance operate as an integrated system within an algorithm-based "digital circuit." The literature consistently demonstrates that blockchain characteristics such as transparency, traceability, and immutable nature enable enhanced accountability and control over Sharia-compliant financial flows and contracts. This integration is further enhanced through smart contracts, which automate compliance verification and fund distribution in accordance with codified regulations, including the provisions on asnaf (charity) in zakat. Several studies confirm that this technology provides a governance foundation that is auditable, reliable, and requires minimal human intervention, thereby reducing the potential for errors and moral hazard in the management of Islamic social funds (Mohamed et al., 2023; Ikhsan, 2023; Asante et al., 2023; Zou et al., 2025; Rijanto, 2024; Zebari & Musalhi, 2025; Munasinghe & Halgamuge, 2023; Lv et al., 2023; Alkhatib et al., 2024; Takeuchi et al., 2023; Lin et al., 2022; Çelik et al., 2024; Jadon et al., 2024; Septiana & Sanjayawati, 2021).

In an implementation context, the use of blockchain in zakat and Islamic philanthropy enables end-to-end tracking of fund flows, from the zakat payer to the mustahiq. Studies show that blockchain-based systems can increase distribution transparency and ensure that funds are distributed in accordance with established governance rules. Ikhsan (2023) emphasized that a blockchain-based zakat system can increase public trust through unmanipulated transaction recording, while Jadoon and Hasan (2023) demonstrated that this technology enables direct transparency to beneficiaries. These findings strengthen the argument that DSG is capable of creating a transparent, accountable, and sharia-compliant distribution system through smart contract-based automation mechanisms.

More broadly, the traceability and tamper-proof characteristics of blockchain are also relevant in the context of cross-sector governance, including issues of sustainability and regulatory compliance. The literature suggests that Sharia-based rules can be encoded in smart contracts to verify each transaction before execution. Gulyamov (2024) demonstrates that the integration of blockchain, artificial intelligence, and rule-based systems enables automated compliance monitoring, while other studies highlight how blockchain-based systems can be used to validate events and transactions in real time. This supports the claim that DSG operates as a form of “algorithm-based governance” capable of automating Sharia compliance verification in various contexts.

Furthermore, data integrity, privacy, and encryption are fundamental elements in supporting Sharia-compliant governance in digital systems. The literature emphasizes that the use of cryptographic techniques such as hash functions, digital signatures, and encryption plays a crucial role in ensuring data security and authenticity in blockchains. Zebari and Musalhi (2025) highlight the importance of security mechanisms to prevent system vulnerabilities, while Wang and Zhu (2023) discuss privacy protection through cryptographic approaches such as zero-knowledge proofs. Another study also demonstrates the application of multi-signature and encryption algorithms in digital philanthropy platforms to ensure transaction authenticity and data protection (Chen et al., 2024). These findings indicate that a cryptographic foundation is a key prerequisite for building a secure and Sharia-compliant DSG system, particularly in maintaining public trust and confidence.

The role of smart contracts in DSG is also crucial as a mechanism for automating Sharia-compliant distribution. The literature shows that smart contracts can encode zakat distribution rules strictly according to the categories of zakat recipients (*asnaf*), thus ensuring that funds are distributed only to those entitled to them. Studies by Ikhsan (2023), Jadoon and Hasan (2023), and Lv et al. (2023) demonstrate that blockchain-based systems can transparently track fund flows while automatically enforcing distribution rules. Furthermore, research in other fields, such as supply chain and financial infrastructure, also demonstrates that smart contracts can be used to systematically enforce governance and compliance rules (Asante et al., 2023; Zou et al., 2025; Rijanto, 2024; Jadon et al., 2024; Mane & Jadhav, 2024; Septiana & Sanjayawati, 2021). This demonstrates that the DSG concept has a strong methodological foundation in various cross-sector applications.

Conceptually, DSG represents an integrated, algorithm-based governance ecosystem, where the entire process—from recording and verification to distribution—is managed through an interconnected digital system. Literature on blockchain governance in various sectors shows that the combination of immutable ledgers, smart contracts, and automated audit systems can create efficient and transparent governance mechanisms. Studies in the supply chain, education, and finance sectors indicate that this technology enables the automation of audit and verification processes without compromising system accuracy and reliability (Asante et al., 2023; Zebari & Musalhi, 2025; Alkhatib et al., 2024). Thus, DSG can be understood as the integration of GCG principles and Sharia compliance within an algorithm-based digital system.

Furthermore, several conceptual models in the literature reinforce the narrative of DSG as a practically implementable governance system. Gulyamov (2024), for example, proposed a

Sharia-compliant blockchain platform that integrates artificial intelligence and smart contracts to automatically monitor compliance. Another study demonstrated how Sharia rules could be encoded into the system to ensure that each transaction meets predetermined criteria before being executed. These models demonstrate that the implementation of DSG is not merely conceptual but also has high applicability potential in the context of zakat and waqf management.

In the Web3 context, digital identity, access control, and governance are becoming increasingly important in supporting the implementation of DSG. Literature shows that decentralized identity systems and cryptographic signatures enable secure and transparent identity verification in blockchain environments (Takeuchi et al., 2023; Lin et al., 2022). This is crucial in ensuring that all parties involved in the zakat and waqf ecosystem can be accurately verified, thereby reducing the risk of fraud and increasing system trust.

However, the literature also identifies several challenges that need to be addressed in the implementation of DSG. Data privacy and security issues are a major concern, especially in transparent blockchain systems. Several studies emphasize the importance of using privacy-preserving technology to protect sensitive information without compromising system transparency (Wang & Zhu, 2023; Zebari & Musalhi, 2025). Furthermore, challenges related to implementation costs, system scalability, and governance design between public and private blockchains are also factors that need to be considered (Rijanto, 2024; Asante et al., 2023; Jadon et al., 2024). Thus, the successful implementation of DSG depends heavily on the ability to integrate technological innovation with appropriate institutional and regulatory design.

4. CONCLUSION

This study confirms that digital transformation in the zakat and waqf sector represents a structural shift from a conventional approach to an ecosystem. Digital Shariah Governance (DSG). This transformation is not limited to the adoption of technology as an operational tool, but rather reflects a fundamental reconfiguration in the governance system of Islamic philanthropy. Key findings indicate that the integration of blockchain technology and smart contracts are able to strengthen transparency and accountability through mechanisms of traceability and immutability, thereby significantly mitigating the risk/moral hazard in the management of religious social funds. At the same time, the utilization of Artificial Intelligence (AI) and big data analytics increases precision in targeting mustahiq through a data-driven approach, which contributes directly to the realization of the principles Shariah Objectives, particularly in terms of distributive justice and efficient resource allocation. This integration of digital efficiency and religious integrity forms a hybrid governance system capable of transforming the vast potential of Islamic philanthropy into measurable and sustainable economic impact.

From a policy perspective, this research indicates the need for systemic reform in zakat and waqf management, particularly through strengthening the standardization and interoperability of digital platforms. Developing an integrated national system is crucial to addressing data fragmentation and improving management efficiency. big data philanthropy. In addition, the implementation of the mechanism/embedded compliance through the concept Digital Sharia Audit enables the internalization of sharia rules into the architecture of the system based on smart contracts, so that compliance can be verified automatically and in real time. On the other hand, strengthening cybersecurity and data protection is a key prerequisite for maintaining public trust, given the increasing complexity of risks in the digital ecosystem. Therefore, a comprehensive regulatory framework is needed that integrates these aspects. data governance, privacy, and system security within a framework that aligns with sharia principles.

However, this study has limitations related to the approach used, namely a systematic narrative review dominated by conceptual synthesis and literature review. The implementation

of advanced technologies such as blockchain and AI in the context of zakat and waqf is still in its infancy, resulting in limited comprehensive empirical evidence regarding their effectiveness. These limitations open up opportunities for further, more empirical and data-driven research.

Future research agendas should focus on developing quantitative studies to empirically test the impact of digital technology adoption on increasing the collection and effectiveness of zakat and waqf fund distribution. Furthermore, cross-country comparative studies are needed to evaluate variations in regulatory frameworks. Islamic Fintech and its implications for the performance of Islamic philanthropy systems in various jurisdictions. Furthermore, an in-depth exploration of potential algorithmic bias in AI systems is crucial to ensuring that automation in targeting and distributing funds upholds the principles of justice, inclusivity, and humanitarian values that are at the heart of Islamic philanthropy. Shariah Objectives.

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