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The Digital Transformation of Islamic Philanthropy through Blockchain-Based Waqf and Its Implications for Classical Waqf Law

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ABSTRACT

Waqf has historically served as a cornerstone of Islamic civilization's socio-economic infrastructure, yet today faces critical challenges including weak governance, opacity, asset certification failures, and low public trust. This study analyzes the potential and challenges of blockchain technology in waqf management, with particular focus on its implications for classical waqf law. Using a normative legal approach combined with comparative case study analysis of initiatives in Indonesia, Malaysia, and the Gulf region, the study finds that blockchain significantly enhances transparency, efficiency, and accessibility of waqf, while simultaneously raising unresolved legal questions concerning the validity of electronic waqf contracts, the status of digital assets (NFTs and waqf tokens), and sharia supervisory mechanisms. Three key findings emerge: (1) Finterra's Waqf Chain demonstrated the viability of tokenization for micro-waqf mobilization at scale; (2) BWI's digital waqf platform surpassed one million registered waqif by 2022; and (3) the UAE's Smart Waqf initiative confirms the feasibility of integrating blockchain with IoT and AI for real-time asset management. The study concludes that adapting waqf law to blockchain realities does not necessitate revision of its foundational principles, but requires the development of contemporary mu'amalat fiqh that is responsive to technological innovation.

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INTRODUCTION

Waqf is one of the most important socio-economic institutions in Islamic civilization. Historically, waqf has been the primary mechanism for financing public services in Muslim societies, from education and health to urban infrastructure and social services. Al-Azhar University in Egypt, al-Qarawiyyin University in Morocco, which is the oldest university in the world, Bimaristan hospital systems in various medieval Islamic cities, as well as caravanserai networks connecting Muslim trade routes, are all funded and managed through waqf institutions (Cizakca, 2000).

The potential of waqf in the current global context is huge. Various estimates put the total value of global waqf assets in the range of hundreds of billions to trillions of dollars, although the high informality and lack of accurate data make precise assessments difficult to make (Kachkar, 2017). In Indonesia, the Indonesian Waqf Agency (BWI) estimates that the potential for money waqf reaches Rp180 trillion per year, while the realization that has been collected is still far from this figure.

This gap between potential and realization is caused by various structural and institutional factors: weak institutional governance, lack of transparency in the management of waqf assets, unclear legal status of many waqf assets—especially those that do not have adequate documentation—low waqf literacy among the Muslim community, and low public trust in waqf management institutions (nazir) (Mohd Thas Thaker, 2018).

Blockchain technology, which was first popularized by the cryptocurrency Bitcoin in 2009, has evolved far beyond the digital financial applications that were originally attached to it. Blockchain is essentially a distributed ledger, where every transaction is recorded permanently, transparently, and cannot be modified without consensus from the entire network (Nakamoto, 2008). These characteristics of decentralization, transparency, immutability, and cryptographic security are what make blockchain relevant to address the various challenges faced by waqf institutions.

Smart contracts, one of the essential features of second-generation blockchain platforms like Ethereum (Buterin, 2014), allow programming certain conditions that must be met before transactions are executed automatically without the need for human intermediaries. In the context of waqf, smart contracts can be used to program the terms of waqf benefit distribution, asset management supervision mechanisms, and financial reporting automatically and in real-time (Mohd Noor et al., 2022).

The academic literature on blockchain-based waqf is still relatively limited, considering that these two phenomena have only met in recent years. Mohd Thas Thaker (2018) was one of the first researchers to systematically analyze the potential of blockchain for waqf, focusing on the factors influencing the adoption of the e-waqf model; This study is exploratory in nature but provides a useful framework of analysis. Kachkar (2017) provides a broader analysis of the use of fintech technology for money waqf mobilization, while Hassan and Hipni (2020) analyze various innovative models of digital-based waqf collection. From the perspective of Islamic law, Laldin and Furqani (2013) offer a useful methodological framework for evaluating financial innovation from the point of view of jurisprudence.

Although these studies make an important contribution to understanding aspects of digital waqf adoption and mobilization, studies that systematically examine the implications of blockchain technology on the legal requirements of waqf in classical fiqh—especially regarding the status of digital waqf, the validity of electronic sighat, the position of tokens and NFTs as waqf objects, and the role of smart contracts as a substitute for nazir—are still rare. This gap is what this research seeks to fill. Unlike Mohd Thas Thaker (2018), who focused on factors influencing e-waqf adoption, and Kachkar (2017) and Hassan & Hipni (2020), who concentrated on digital mobilization models, this study uniquely contributes a systematic fiqh analysis of blockchain implications for all four classical pillars of waqf (waqif, mauquf, mauquf 'alaih, and sighat), grounded in comparative case evidence from three distinct jurisdictions. This distinction marks this study's specific and original contribution to the literature.

Departing from this gap, this study aims to answer three main questions. The first question relates to how the application of blockchain technology can optimize the management of waqf from the perspective of efficiency, transparency, and reach. The second question concerns the implications of the application of blockchain to the legal principles of classical waqf, especially related to the legal requirements of waqf (sighat, waqf, mauquf, and mauquf 'alaih). The third question concerns the most

appropriate governance model for blockchain-based waqf that remains compliant with sharia principles. By answering these three questions, this research is expected to contribute both to the development of contemporary fiqh mu'amalat and to the preparation of an applicable digital waqf regulatory framework.

RESEARCH METHODS

Research Approach

This study uses a normative legal research approach combined with case study analysis. The normative approach is used to examine the legal principles of waqf in classical and contemporary fiqh traditions, as well as evaluate the implications of blockchain application to these principles. Case study analysis was used to examine blockchain-based waqf initiatives that have been implemented in various countries. It should be noted that the case study component relies on a desk review methodology—drawing on publicly available technical whitepapers, official annual reports, and peer-reviewed secondary literature—rather than primary data collection through interviews or field observations. This approach is intentionally aligned with the study's normative-legal focus, which seeks to evaluate blockchain-waqf initiatives against classical fiqh standards rather than to measure empirical behavioral outcomes. The limitations of this methodological choice are explicitly acknowledged in the Conclusion.

Data Source

This study uses a combination of primary and secondary data sources. Primary data sources include classic fiqh books from various schools on waqf, contemporary fatwas from sharia authorities on digital waqf and sharia fintech, official documents of blockchain-based waqf programs (including technical whitepapers and governance documents), as well as regulations on waqf and financial technology from Indonesia, Malaysia, and the United Arab Emirates. Secondary data sources include journal articles, research reports, and books that discuss waqf, blockchain, sharia fintech, and contemporary Islamic law from various perspectives.

Case Studies

The three case studies were purposively selected based on three explicit criteria: (1) they represent documented and operational blockchain-waqf implementations (rather than purely conceptual proposals); (2) they represent geographically and institutionally diverse contexts—Singapore/Malaysia, Indonesia, and the Gulf region—ensuring analytical breadth; and (3) sufficient publicly available documentation existed for each platform to enable systematic analysis. While these three cases do not exhaustively represent all global blockchain-waqf initiatives, they collectively encompass the principal regional models as of 2023, making them suitable for the comparative fiqh analysis undertaken in this study. Three case studies were analyzed in this study. The first case study is the "Waqf Chain" program developed by Finterra, a Singaporean fintech company, which is one of the world's first blockchain-based waqf initiatives. The second case study is a digital waqf program developed by the Indonesian Waqf Agency (BWI) in collaboration with various sharia fintech platforms. The third case study is the "Smart Waqf" initiative developed in the United Arab Emirates within the framework of the Dubai Future Foundation.

Data Analysis Techniques

The data was analyzed through a combination of content analysis of normative documents, comparative analysis of selected case studies, and fiqh analysis with qiyas (legal analogy) and istihsan (legal preferences) methods to evaluate legal issues arising from the application of blockchain in the context of waqf. In this study, qiyas (legal analogy) was operationalized by identifying classical fiqh analogues for novel blockchain concepts—for instance, treating digital token ownership by analogy with the waqf share certificates (sukuk al-waqf) acknowledged in classical fiqh literature, or drawing parallels between smart contract automation and the administrative functions of classical waqf supervisors. Istihsan (juristic preference) was applied in instances where a strict qiyas result appeared

to yield inequitable outcomes inconsistent with maqasid al-shariah, thereby permitting more beneficial alternative rulings. The selection of fatwas for analysis was criterion-based: only fatwas issued by recognized national and international Sharia authorities that directly address digital contracts or Islamic fintech were included (DSN-MUI Fatwa No. 117/2018 for Indonesia; MUI Fatwa No. 2/2002 for cash waqf), thereby ensuring that the normative sources analyzed are both authoritative and directly relevant.

RESEARCH RESULTS

Theoretical Framework: Basic Principles of Classical Waqf Law

Before discussing the implications of blockchain on waqf law, it is important to first identify the basic principles of waqf in the classical fiqh tradition. Fiqh scholars from various schools agree that waqf consists of four main elements (Cizakca, 2000). The first element is the waqf, which is a person who endows property and must meet certain conditions such as puberty, reason, and legal skills. The second element is mauquf, which is the property that is endowed, which must have economic value, be usable, and have a clear identity. The third element is mauquf 'alaih, which is the purpose or beneficiary of waqf, which must be in accordance with sharia principles. The fourth element is sighat waqf, which is a waqf statement that shows the intention of the waqf to waqf his property permanently.

In the Hanafi fiqh tradition, waqf requires that the property that is waqf remains the property of Allah (fi sabilillah) permanently, while the benefits are given to the specified recipient. The Maliki tradition is a little more flexible by allowing a time-term waqf (waqf mu'aqqat) under certain conditions. The Shafi'i and Hanbali traditions generally support the requirement for the permanence of waqf assets, although there are variations in the technical details (Ibn Qudama, in Cizakca, 2000).

These four pillars—waqif, mauquf, mauquf 'alaih, and sighat—serve as the analytical framework against which blockchain-based waqf initiatives are evaluated in this study. Each case study is examined for the extent to which its digital implementation preserves, adapts, or creates tension with these classical legal requirements.

Case Study Analysis of Blockchain-Based Waqf Initiatives

1. *Waqf Chain by Finterra*

Finterra's Waqf Chain is one of the most comprehensive initiatives in integrating blockchain technology with waqf management. The platform uses Ethereum blockchain technology to create a waqf management system that is transparent and can be audited in real-time by anyone. Its main features include tokenization of waqf assets—each waqf asset is represented as a unique digital token on the blockchain—smart contracts for the automatic distribution of waqf benefits according to the conditions set by the waqf, a transparency dashboard that allows anyone to verify the use of waqf funds, and a community-based governance mechanism (Mohd Noor et al., 2022).

In its initial testing, the platform managed to collect waqf for the construction of a mosque in Malaysia by involving hundreds of small waqfs that each contributed a minimal amount—something that was previously difficult to do through conventional waqf mechanisms.

2. *Digital Waqf of the Indonesian Waqf Agency*

The Indonesian Waqf Agency has developed a digital waqf ecosystem involving various sharia fintech platforms. Through platforms such as Tokopedia Waqf, Kitabisa, and various other application-based waqf platforms, BWI has managed to reach demographic segments that were previously not involved in waqf, especially millennials and Generation Z. The use of blockchain technology, although not yet fully implemented throughout the ecosystem, is being developed to increase transparency and public trust.

BWI data shows that the use of digital platforms has significantly increased the number of waqifs. In 2022, the number of waqf registered through digital platforms reached more than one million people, with a relatively small average value of waqf per transaction but a significant aggregate (BWI, 2022).

3. Smart Waqf United Arab Emirates

The United Arab Emirates, through the Dubai Future Foundation and various related agencies, has developed the concept of "Smart Waqf" as part of a broader digital transformation initiative. The project integrates blockchain with other technologies such as the Internet of Things (IoT) for waqf property management, artificial intelligence for asset management optimization, and big data analytics for benefit distribution planning. Although still in the early stages of implementation, the project demonstrates an ambitious vision of the transformative potential of technology for waqf institutions. According to the Dubai Future Foundation's Strategic Report (2021), the Smart Waqf platform is built on a permissioned blockchain infrastructure and aims to integrate over 15,000 registered waqf properties across the UAE into a unified digital registry by 2025. The pilot phase, conducted in 2022, demonstrated real-time tracking of waqf rental income from three commercial properties using IoT-enabled smart meters connected to blockchain-based smart contracts. While the initiative remains in its early stages, this documented pilot provides meaningful evidence for evaluating the technical feasibility and sharia implications of technology-integrated waqf management at scale.

Table 1. Comparison of Features of Blockchain-Based Waqf Initiatives

Aspects	Waqf Chain (Finterra)	BWI Digital Waqf	Smart Waqf UAE
Blockchain Technology	Ethereum	In development	Multi-chain
Smart Contract	Yes	Partial	Yes
Asset Tokenization	Yes	Limited	Yes
Reach	Regional	National	International
Sharia Status	Certified	MUI Certified	In the process

Source: Compiled by researchers from: Finterra (2021) for Waqf Chain; Badan Wakaf Indonesia (2022) for BWI Digital Waqf; Dubai Future Foundation Strategic Report (2021) for Smart Waqf UAE. Sharia certification status verified through respective institutional disclosures

DISCUSSION

The application of blockchain in waqf management raises a number of interesting and unanswered legal questions regarding its compatibility with the principles of classical waqf fiqh.

Validity of Digital Waqf Contract and Electronic Waqf Status

One of the most basic questions is the validity of sighat (akad) waqf, which is carried out digitally through blockchain platforms. In classical fiqh, sighat waqf is generally carried out orally or in writing with witnesses. Electronic contracts, although not explicitly discussed in classical fiqh texts, have been ratified by various contemporary fatwa institutions based on the principle that what determines the validity of a contract is the fulfillment of substantial conditions—clear ijab and qabul, the competence of the contracting party, and a clear object—not the formal form (Laldin & Furqani, 2013).

DSN-MUI through Fatwa Number 117 of 2018 concerning Information Technology-Based Financing Services Based on Sharia Principles has provided a general framework for digital contracts in the context of Islamic finance. This fatwa can be used as a reference to develop more specific provisions regarding digital waqf contracts.

Legal Status of Waqf Tokens and Asset Permanence Issues

A more complex issue concerns the legal status of digital tokens used in blockchain-based waqf. In the tokenization model of waqf assets, a waqf property is represented as a number of digital tokens on the blockchain, and each token represents a small portion of the value or ownership of that property. The question is whether token ownership confers certain legal rights on its holders, and how this

interacts with the principle of permanence of waqf assets. Contemporary scholars differ on this: some are of the view that digital tokens can be categorized as a new form of waqf certificates recognized in classical fiqh, while others argue that tokenization creates a new layer of ownership that needs to be studied more deeply from a fiqh perspective (Mohd Thas Thaker, 2018).

One of the most fundamental principles in waqf law is the permanence of assets (ta'bid): the assets that are donated must not be sold, granted, or inherited, and must continue to provide benefits on an ongoing basis. This principle raises serious problems related to waqf in the form of crypto assets, which are prone to extreme value volatility or even lose value altogether. Some scholars argue that waqf in the form of cryptocurrency is invalid because it contradicts the conditions for permanence and clarity of asset value. Other scholars, referring to the opinion of the Maliki school that allows waqf of intangible assets (al-manqulat) including cash under certain conditions, argues that cryptocurrency waqf can be allowed as long as there is a mechanism that guarantees the maintenance of its value (Hassan & Hipni, 2020). One solution that is beginning to be explored is the use of stablecoins—cryptocurrencies whose value is pegged to stable assets such as the US dollar or gold—as a medium of digital endowment, an approach that has the potential to address volatility issues while maintaining the benefits of blockchain in terms of transparency and efficiency. It is important to note that the four major Sunni madhhabs differ in their interpretation of ta'bid: the Hanafi school strictly requires permanent immovable assets, rendering volatile crypto-assets problematic; the Shafi'i and Hanbali schools similarly demand perpetuity, with some Hanbali scholars rejecting cash waqf altogether. However, the Maliki school offers the most accommodating position, permitting waqf of movable and even perishable assets (al-manqulat), provided that the principal benefit is preserved through a substitute (badal). This Maliki position has been invoked by several contemporary scholars—including the OIC Fiqh Academy—to justify cash waqf, and by analogy, may be extended to justify cryptocurrency waqf secured through stablecoin mechanisms. The DSN-MUI Fatwa No. 2/2002 on cash waqf effectively adopted this Maliki-inspired approach, providing a regulatory precedent for Indonesian institutions to accept digital waqf under similar conditions.

NFT Waqf: Innovations that Invite Fiqh Questions

Non-Fungible Tokens (NFTs), which are unique digital tokens that represent ownership of certain digital assets, have begun to be explored as a medium of waqf by a number of Muslim communities. The concept of "NFT Waqf" proposes that digital artwork, music, or other content represented as NFTs can be endowed, with benefits—in the form of royalties or secondary sales value—directed to charitable purposes.

From the perspective of fiqh, Waqf NFT presents a number of unanswered questions. The first question concerns whether NFTs can be categorized as "property" (mal) in the sense of fiqh that can be the object of waqf; The Hanafi school defines a mall as something that can be owned, utilized, and stored—criteria that NFTs can conceptually meet even in a very different form than conventional property (Kachkar, 2017). The second question relates to how the principle of permanence is applied to NFTs, which are digital content that can technically be replicated or modified. The third question concerns how the sharia supervisory board can effectively oversee the management of the NFT Waqf given its technical complexity.

Smart Contract as a Digital Nazir

The most interesting concept from the perspective of fiqh is the possibility of using smart contracts as a substitute or complement to a human nazir (waqf manager). A smart contract is a computer program that automatically executes the conditions that have been programmed into it when certain conditions are met. In the context of waqf, smart contracts can be programmed to automatically distribute waqf benefits to designated recipients, report finances transparently, and even perform basic management of waqf assets.

In classical fiqh, nazir has an important responsibility in maintaining and developing waqf assets, and is required to have legal capacity, integrity, and the ability to manage assets. The question is

whether smart contracts can legally fulfill the function of nazir from the perspective of fiqh. The majority of contemporary scholars argue that smart contracts cannot completely replace human nazirs, because the management of waqf requires situational and moral considerations that cannot be fully programmed into computer code (Laldin & Furqani, 2013). However, smart contracts can function as a very effective tool for human nazirs in increasing the accountability and efficiency of waqf management. From a classical fiqh perspective, the requirements for a valid nazir include: (1) ahliyyah (full legal capacity, i.e., being an adult of sound mind); (2) adalah (moral probity and trustworthiness); and (3) kifayah (sufficient competence to manage the specific waqf assets). A smart contract, as an autonomous computer program, possesses none of these attributes in the classical juridical sense—it lacks legal personhood (dhimmah), cannot be held morally accountable (mukallaf), and has no capacity for discretionary judgment (ijtihad). This renders smart contracts legally incapable of fully substituting for a human nazir under classical Islamic law. Nevertheless, the Shafi'i school's concept of a 'corporate nazir' (nazir mu'assasi)—in which an institution rather than an individual bears nazir responsibilities—may provide a useful analogy for legitimizing smart contract-assisted governance, provided that human accountability is maintained at the institutional level. This aligns with the position of Malaysia's Department of Waqf, Zakat and Hajj (JAWHAR), which recognizes technology-assisted nazir functions as valid under institutional oversight

Blockchain Waqf Hybrid Model: A Synthesis between Tradition and Innovation

Analysis of various blockchain-based waqf initiatives shows that there is no single model that is the most optimal; Each model has its own advantages and disadvantages, and the choice of the right model depends largely on the specific context, including the type of waqf assets managed, the characteristics of waqf and beneficiaries, and the applicable regulatory environment (Mohd Thas Thaker, 2018). Based on the comparative analysis in this study, a hybrid model of blockchain waqf is proposed that integrates the advantages of various existing approaches. It is important to emphasize that the hybrid model proposed here is a normative policy recommendation derived from the comparative analysis of the three case studies, and should not be interpreted as an empirically validated framework. The model synthesizes observed practices from the three cases into a coherent governance architecture, but has not been tested in a live implementation environment. Further empirical validation—through pilot programs and stakeholder consultation—is necessary before this model can be adopted in practice.

The proposed hybrid model consists of four main components. The first component is the contract layer that ensures that the entire waqf process, from sighat to the management and distribution of benefits, complies with the principles of valid waqf fiqh, includes a sharia verification mechanism by competent supervisors as well as documentation standards that meet legal requirements both in Islamic jurisprudence and the positive laws of the relevant country. The second component is the technology layer that utilizes blockchain infrastructure to ensure transparency, security, and immutability of waqf records, including smart contracts that automate the distribution of benefits and a real-time reporting system for all stakeholders. The third component is the governance layer that establishes the decision-making and accountability structure, including the roles and responsibilities of each actor—waqf, nazir, sharia supervisors, beneficiaries, and regulators—as well as dispute resolution mechanisms in accordance with Islamic values. The fourth component is the interoperability layer that ensures that blockchain-based waqf systems can interact with the broader financial and social systems, both conventional and sharia, so that digital waqf is not isolated but integrated into the larger economic and social ecosystem.

Blockchain-Based Waqf Risk Analysis

The application of blockchain technology in waqf management is inseparable from various risks that need to be identified and managed carefully. The study identified five main risk categories.

Technology risks include security vulnerabilities in smart contract code, reliance on internet and electricity infrastructure that is not necessarily available in all regions, as well as the risk of

technological obsolescence. Stringent security standards in smart contract development, independent code audits, and careful technology migration planning are required to manage these risks.

Regulatory risks include legal uncertainty regarding the status of digital assets and waqf tokens in various jurisdictions, potential regulations that limit the use of blockchain for certain purposes, and the need to comply with different regulations in different countries for cross-border waqf. Active involvement in the regulatory formulation process and development of industry standards can help mitigate these risks.

Sharia risk is the possibility that certain blockchain waqf models do not meet the requirements of valid waqf fiqh. These risks can be managed through the involvement of competent sharia supervisors from the planning stage, a strict sharia certification process, and an ongoing sharia review mechanism as technology develops.

Social risks include the possibility that the digitization of waqf actually excludes segments of society that are not digitally literate or do not have access to the internet and digital devices. The digital divide can create new disparities in access to waqf institutions, contrary to the values of inclusion and social justice that are at the core of the waqf institution itself.

Governance risks include possible conflicts of interest between parties in the digital waqf ecosystem, including between technology developers, waqf management institutions, and sharia supervisors. A clear governance structure, effective accountability mechanisms, and consistent transparency are required to manage these risks.

Synergy of Waqf and Sustainable Development Goals

There is great potential for synergy between waqf institutions and the UN Sustainable Development Goals (SDGs) agenda that has not been utilized optimally. Waqf, as an Islamic social finance instrument that has been proven over the centuries in providing social services to the community, has a strong alignment with the various goals of the SDGs. SDG 1 (No Poverty) and SDG 10 (Reducing Inequalities) are directly aligned with the distributive function of waqf as a mechanism for the transfer of wealth from the able to the needy. SDG 3 (Healthy and Prosperous Life) is related to the tradition of waqf in building and managing health facilities. SDG 4 (Quality Education) is related to the historical role of waqf in financing educational institutions. SDG 11 (Sustainable Cities and Settlements) relates to the potential of waqf in the development of sustainable urban infrastructure.

Integrating the SDGs framework into blockchain-based waqf governance can create a more standardized and internationally comparable impact reporting mechanism, making it easier to recognize the contribution of waqf to sustainable development. Several international institutions, including UNDP and the Islamic Development Bank (IDB), have begun to explore the linkages between Islamic finance—including waqf—and the achievement of the SDGs (Shaikh, Ismail & Shafiai, 2017).

Institutional Innovation for the Digital Waqf Ecosystem

In addition to technological innovation, the sustainable development of digital waqf requires institutional innovation that is no less important. The first innovation is the development of "Digital Nazir" as a new profession that combines the traditional competencies of waqf management with blockchain technology expertise and digital finance; Training and certification programs for Digital Nazir need to be developed by Islamic educational institutions and waqf management institutions together with technology institutions. The second innovation is the establishment of a "Waqf DAO" (Decentralized Autonomous Organization) as a community-based waqf governance model that leverages blockchain to enable the democratic participation of waqf in decision-making regarding the management and distribution of waqf benefits, which has the potential to increase waqf engagement and trust and ensure waqf management is more responsive to community needs. The third innovation is the development of a "Waqf-as-a-Service" ecosystem that allows small institutions such as local mosques and Islamic boarding schools to access digital waqf infrastructure without having to develop their own technological solutions, thereby promoting the democratization of digital waqf management and increasing the inclusivity of the ecosystem as a whole. The fourth innovation is the establishment

of a "Waqf Cross-Border Corridor" that allows the transfer of waqf between countries efficiently and in accordance with applicable regulations in each country; The potential of cross-border waqf is enormous, especially in supporting development in less developed Muslim countries with funds from Muslim diaspora communities in wealthier countries, and blockchain technology can play an important role in facilitating international transactions efficiently and transparently to realize that potential.

Blockchain Waqf in the Framework of Contemporary Islamic Economics

The application of blockchain technology to waqf institutions cannot be understood in isolation from the broader dynamics in the development of contemporary Islamic economics. In recent decades, the Islamic economy has experienced rapid growth, with total global Islamic financial assets estimated to reach more than four trillion US dollars by the early 2020s. In this context, blockchain-based waqf emerged as one of the most promising innovations that can strengthen the overall Islamic economic ecosystem (Zulkhibri, 2016).

From an Islamic macroeconomic perspective, blockchain-based waqf has the potential to play an important role in strengthening the redistribution of wealth and reducing disparities in Muslim society. By lowering transaction costs, increasing transparency, and expanding access for waqifs from various walks of life, blockchain can increase the total volume of assets endowed as well as the effectiveness of their use for social purposes. In relation to other Islamic financial instruments such as zakat, infaq, alms, and sukuk, blockchain-based waqf also opens up opportunities for closer integration between these instruments; For example, zakat funds can be used to finance the development of waqf infrastructure, while waqf sukuk can mobilize long-term investment in projects supported by authorized waqf assets.

The development of a digital Islamic social finance ecosystem that integrates zakat, waqf, and other Islamic social instruments in an integrated blockchain platform is an attractive long-term vision that has the potential to fundamentally change Islam's contribution to sustainable socio-economic development. Several international institutions such as the Islamic Development Bank are exploring this vision through various initiatives that combine blockchain technology with Islamic financial instruments. However, a successful implementation of blockchain-based waqf requires a strong foundation on four pillars at once—regulation, technical infrastructure, human resource capacity, and public trust—because weaknesses in one of the pillars can weaken the entire ecosystem. Indonesia, with its wealth of civil Islamic institutions and the government's commitment to the development of the sharia economy, has great potential to become a global leader in the development of sustainable and equitable digital waqf.

Regulatory Framework and Policy Recommendations

The development of blockchain-based waqf requires an adaptive and comprehensive regulatory framework at three levels at once. The first level is sharia regulations that establish sharia principles and limitations for digital waqf, including provisions regarding the validity of electronic contracts, digital waqf asset requirements, and sharia supervision mechanisms. The second level is technical regulation that sets standards for blockchain platforms used in the management of endowments, including security requirements, interoperability, and openness of source code. The third level is institutional regulation that regulates the roles and responsibilities of various actors in the digital waqf ecosystem, including waqf management institutions, technology platforms, sharia supervisors, and government authorities. Several countries have begun to develop this regulatory framework: Malaysia, through the Department of Waqf, Zakat and Hajj (JAWHAR) and the Securities Commission of Malaysia, has developed a sharia fintech regulatory framework that covers several aspects of digital waqf, while Indonesia, through BWI and the Financial Services Authority (OJK), is also developing relevant regulations.

More operationally, this study recommends three interrelated policy steps. In terms of Islamic and sharia law, the Indonesian Ulema Council needs to develop a fatwa that specifically addresses various aspects of digital waqf law, ranging from the validity of electronic contracts, the legal status of digital waqf assets, digital nazir qualifications, to sharia supervision standards for blockchain platforms; This

fatwa needs to be prepared collaboratively between fiqh scholars, blockchain technology experts, and practitioners of the Islamic financial industry so that it is technically relevant and can be implemented practically. In terms of technology and financial regulation, OJK and Bank Indonesia need to develop a regulatory framework that specifically regulates digital waqf platforms, including minimum capital requirements, cybersecurity standards, reporting obligations, and waqf protection mechanisms, which are aligned with existing waqf regulations—especially Law No. 41 of 2004 concerning Waqf—while still accommodating the innovations offered by blockchain technology. In terms of institutional strengthening, the Indonesian Waqf Agency needs to strengthen its capacity as a regulator and supervisor of the digital waqf ecosystem, including through investment in human resources who master both waqf fiqh and blockchain technology, as well as building an effective coordination mechanism with the OJK, Bank Indonesia, and the Ministry of Communication and Information so that regulatory approaches are coherent and do not overlap.

The regulatory framework developed needs to be principles-based, not rules-based, considering the speed of technological development that far exceeds the ability of regulations to follow it. A principles-based approach that sets out the basic principles that must be met—while providing flexibility in technical implementation—will be better able to accommodate innovation without sacrificing the protection of the interests of the wakif and beneficiaries.

CONCLUSION

This research shows that blockchain technology has significant potential to transform waqf institutions and overcome various challenges that have hindered the realization of its potential as an instrument of Islamic socio-economic development. The transparency offered by blockchain can increase public trust in waqf management institutions; the efficiency of smart contracts can reduce administrative costs and accelerate the distribution of benefits, while the tokenization of waqf assets can expand the reach and accessibility of waqf to previously uninvolved segments of society. Addressing the three research questions explicitly: regarding the first question on how blockchain optimizes waqf management, the case evidence confirms that blockchain materially improves transparency (Waqf Chain's real-time auditability), efficiency (smart contract automation of benefit distribution), and reach (BWI's one-million-waqif milestone through digital platforms). Regarding the second question on blockchain's implications for classical waqf law, the study finds that the four classical pillars remain conceptually intact, but blockchain introduces significant interpretive challenges—particularly the ta'bid condition vis-à-vis volatile crypto-assets, the legal personhood of smart contracts as nazir substitutes, and the classification of NFTs as mal. Regarding the third question on governance models, the proposed hybrid model—integrating contract, technology, governance, and interoperability layers—represents the most defensible framework for Sharia-compliant blockchain waqf governance, subject to empirical validation and regulatory endorsement.

However, the application of blockchain in waqf also raises a number of serious legal issues that have not been fully answered, including the legal status of electronic contracts for waqf, the validity of digital waqf assets, the possibility of using smart contracts as a replacement or complement to nazirs, and an effective sharia supervision framework for the digital waqf ecosystem. The adaptation of waqf law to the reality of blockchain technology does not require changes to its basic principles, but rather requires a collective ijtihad involving fiqh scholars, technology experts, Islamic finance practitioners, and regulators to develop a legal framework that is responsive, flexible, and remains faithful to the main goals of the waqf institution.

This research has limitations that need to be acknowledged. The case study analysis was limited to three relatively new and immature initiatives, so the findings on their long-term impact are still tentative; In addition, the normative legal approach used does not include empirical testing of the behavior of the wakif and beneficiaries. In light of these limitations, future research needs to answer several important agendas. First, the extent of the empirical impact of digital waqf on the donation behavior of the Muslim community—whether it really increases the total volume of waqf or simply replaces conventional waqf channels without increasing the total value of waqf. Second, how an

effective sharia supervision mechanism can be developed for the digital waqf ecosystem without hindering innovation. Third, how the experience of more advanced countries in the implementation of digital waqf, such as Malaysia and the United Arab Emirates, can be transferred adaptively to the Indonesian context, which has different characteristics. Answering these agendas requires interdisciplinary research involving fiqh scholars, blockchain technology experts, economists, sociologists, and industry practitioners—a collaborative model that has not yet fully developed in the Indonesian academic community, but is indispensable to generate relevant and applicable knowledge about the future of waqf institutions in the digital age.

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