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Integrating Blockchain Technology into Zakat Operational Systems: A Framework for Sharia-Compliant Transparency

Sabilsyah Nur Rachman[1*], Faizi[2], Isma Addi Jumbri[3]
[1,2]Universitas Pembangunan Nasional "Veteran" Jakarta, South Jakarta, Indonesia
[3]Universiti Teknikal Malaysia Melaka, Malaysia

*(Corresponding author) e-mail: sabilsyahnurrahman@gmail.com

Abstract

Purpose - Zakat serves an essential function in advancing socio-economic welfare and mitigating poverty in Indonesia. Nonetheless, the actual collection of zakat is considerably below its estimated potential. The efficiency of zakat management is frequently hindered by structural challenges, particularly those pertaining to transparency, accountability, and the comparatively low level of public trust in zakat management institutions. This study aims to address these challenges by delineating and formulating a conceptual framework for the integration of blockchain technology into a sharia-compliant zakat operational system that is also congruent with Indonesia's financial regulations.

Methodology/approach - To achieve this objective, the research adopts a qualitative approach within an interpretive paradigm. Data are collected through a systematic literature review of academic publications, government regulatory documents, and classical and contemporary Islamic jurisprudence (*fiqh*) literature. The collected data are then analysed using thematic analysis in order to construct a comprehensive governance model architecture.

Findings – The findings propose an operational model comprising four integrated schemes: collection, allocation, reporting, and governance. Within this model, blockchain functions exclusively as a decentralised digital ledger for recording transaction trails, while the flow of funds continues to rely on fiat currency (Indonesian Rupiah). Additionally, smart contracts are implemented to automate allocation mechanisms with precision, thereby enhancing efficiency and reducing the likelihood of human error. From the perspective of Islamic commercial jurisprudence (*fiqh muʿāmalah*), this framework inherently fulfils the principle of record-keeping (*al-kitābah*) to ensure justice. It also automates the execution of agency contracts (*wakālah*) and serves as a preventive measure blocking the means (*sadd al-dharīʿah*) against the misappropriation of funds (*ghulūw*), without violating the prohibition of excessive uncertainty in contracts (*gharār*). Overall, this study contributes to the Islamic fintech literature by offering a technology-based zakat governance model that strengthens accountability without replacing conventional banking infrastructure.

Conclusion - Consequently, it is recommended that policymakers and zakat institutions adopt transparency mechanisms based on distributed ledger technology to mitigate operational risks, optimise fund collection, and sustainably restore public trust through appropriate and context-sensitive innovations.

Keywords: Blockchain; Islamic Fintech; Islamic Social Finance; Transparency; Zakat Management.

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Introduction

Zakah constitutes one of the most significant instruments of Islamic social finance, playing a crucial role in promoting socio-economic justice and poverty alleviation, particularly in countries with large Muslim populations such as Indonesia.[1] However, despite a calculated zakat potential reaching IDR 327 trillion (based on BAZNAS 2021 projections), the actual realisation of zakat collection in 2023 was only IDR 33 trillion.[2] This substantial discrepancy highlights structural challenges that hinder optimal zakat mobilisation, primarily issues related to transparency, accountability, and public trust.[3] From an Islamic jurisprudence (*fiqh*) perspective, the management of zakat is heavily predicated on the principles of trust (*amānah*) and meticulous recording (*al-kitābah*) to prevent any misappropriation of public wealth (*al-ghuluw*). Consequently, strengthening institutional transparency has become a critical issue in enhancing the credibility of zakat management systems.

The evolution towards the digitisation of zakat represents a strategic initiative aimed at enhancing efficiency, effectiveness, and public trust through the transition from traditional to digital systems.[4] Digital innovations such as crowdfunding, mobile applications, and blockchain technology, alongside complex instruments like zakat-linked takaful securities, are beginning to transform the philanthropic sector.[5] Empirical evidence indicates that payment digitalisation exhibits a strong and significant correlation (55.9%) with the potential for zakat collection.[6] However, despite advancements in technological integration, many existing systems continue to rely on centralised databases that remain vulnerable to data manipulation and information asymmetry, thus failing to fully meet the stringent accountability standards mandated by Sharia.[7]

Blockchain technology emerges as a promising innovation to address these crises of trust and inefficiency.[8] By automating the recording of transactions directly from source documents into an immutable ledger, blockchain has the potential to significantly enhance the reliability

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[1] Beno Jange, Irwansyah Pendi, and Eko Meiningsih Susilowati, "Peran Teknologi Finansial (Fintech) dalam Transformasi Layanan Keuangan di Indonesia," *Indonesian Research Journal on Education* 4, no. 3 (July 2024): 1199–205, https://doi.org/10.31004/irje.v4i3.1007.

[2] BAZNAS RI, *Potensi Peningkatan Kesejahteraan Mustahik Melalui Skema Istitsmar Dana Zakat* (2023); BAZNAS RI, *Outlook Zakat Indonesia 2024* (2025).

[3] Achi Rinaldi and Yulistia Devi, *Pengaruh Literasi Keuangan Syariah Terhadap Kepercayaan Muzakki Pada Lembaga Pengelola Zakat Dengan Akuntabilitas dan Transparansi Sebagai Variabel Intervening*, 3, no. 1 (2022).

[4] Siti Zubaidah and Afifah Afifah, "Development of Zakat Management Digitalization in Indonesia," *International Conference of Zakat*, December 14, 2020, 459–68, https://doi.org/10.37706/iconz.2020.227; Ivan Rahmat Santoso, "Strategy for Optimizing Zakat Digitalization in Alleviation Poverty in the Era of Industrial Revolution 4.0," *IKONOMIKA* 4, no. 1 (May 2019): 35–52, https://doi.org/10.24042/febi.v4i1.3942.

[5] Sulaika Pulungan, Amirul Listiyantomo Ali, and Muhammad Hasbi Zaenal, *Digital Innovation In Zakat Collection And Distribution: Opportunities And Challenges*, 2024; Patria Yunita, "Developing A Modern Zakat Management Model Digital Technology 4.0 Version," *AZKA International Journal of Zakat & Social Finance*, March 30, 2021, 139–56, https://doi.org/10.51377/azjaf.vol2no1.47.

[6] Pertiwi Utami et al., "The Effect Digitalization Zakat Payment Against Potential of Zakat Acceptance in National Amil Zakat Agency," *IQTISHADIA* 13, no. 2 (September 2020): 216, https://doi.org/10.21043/iqtishadia.v13i2.7809.

[7] Dharmendra Hariyani et al., *A Literature Review on Transformative Impacts of Blockchain Technology on Manufacturing Management and Industrial Engineering Practices*, 2025.

[8] Istiaque Ahmed et al., "Blockchain-Empowered Decentralized Philanthropic Charity for Social Good," *Sustainability* 16, no. 1 (December 2023): 210, https://doi.org/10.3390/su16010210; Monika Singh et al., "Role of Blockchain Technology in Philanthrophy," *International Journal for Research in Applied Science and Engineering Technology* 11, no. 3 (March 2023): 129–32, https://doi.org/10.22214/ijraset.2023.49355.

of accounting information and mitigate human error.[9] A comprehensive survey indicates that blockchain effectively addresses efficiency issues across various fintech segments by reducing transaction costs and eliminating intermediaries,[10] an approach that holds substantial potential for zakat management in Indonesia.[11] Nevertheless, widespread adoption is impeded by technological limitations and the complexities of global financial regulations.[12]

A major barrier to current blockchain zakat models is their reliance on cryptocurrency as a medium of exchange, navigating a highly fragmented global regulatory environment.[13] In Indonesia, the regulatory framework explicitly prohibits cryptocurrencies for payment transactions due to extreme volatility and anti-money laundering (AML) concerns, positioning them strictly as tradable commodities.[14] Although this dualistic regulation provides some legal certainty, it suffers from overlapping jurisdictions and fundamental weaknesses in consumer protection.[15] Consequently, blockchain models mirroring cryptocurrency systems raise serious Sharia compliance and regulatory concerns within the Indonesian context.

To address this gap, technical frameworks must prioritise the institutional context and integrate smart contracts that connect stakeholders while strictly adhering to Sharia principles.[16] A conceptual framework that positions blockchain solely as a transparent recording infrastructure utilising fiat currency, rather than as a medium for cryptocurrency transactions, remains underexplored. Consequently, this study aims to describe and develop a conceptual model for blockchain adoption in zakat operational systems that enhances transparency, efficiency, and accountability. This research contributes to the Islamic fintech literature by proposing a Sharia-compliant, fiat-based governance architecture that seamlessly integrates distributed ledgers without supplanting existing financial infrastructures.

Methodology

A qualitative approach was employed in this study, situated within an interpretive paradigm. This methodology was selected due to its emphasis on achieving an in-depth,

[9] Ting Yu, Zhiwei Lin, and Qingliang Tang, "Blockchain: Introduction and Application in Financial Accounting," *SSRN Electronic Journal*, ahead of print, 2018, https://doi.org/10.2139/ssrn.3258504.

[10] Tara Renduchintala et al., "A Survey of Blockchain Applications in the FinTech Sector," *Journal of Open Innovation: Technology, Market, and Complexity* 8, no. 4 (December 2022): 185, https://doi.org/10.3390/joitmc8040185.

[11] Fajri Mulia Ningsih et al., "Peran Teknologi Blockchain Dalam Meningkatkan Transparansi Dan Akuntabilitas Pengelolaan Zakat," *CITIZEN: Jurnal Ilmiah Multidisiplin Indonesia* 4, no. 2 (2024): 87–94.

[12] Li Zhang et al., "The Challenges and Countermeasures of Blockchain in Finance and Economics," *Systems Research and Behavioral Science* 37, no. 4 (July 2020): 691–98, https://doi.org/10.1002/sres.2710.

[13] M. Chudinovskikh and V. Sevryugin, "Cryptocurrency Regulation in the BriCs Countries and the Eurasian Economic Union," *BRICS Law Journal* 6, no. 1 (February 2019): 63–81, https://doi.org/10.21684/2412-2343-2019-6-1-63-81; Marc Pravdiuk, "International Experience of Cryptocurrency Regulation," *Norwegian Journal of Development of the International Science*, no. 53 (2021): 31–37.

[14] Bambang Leo Handoko, Ari Tihar Marpaung, and Nada Ayuanda, "Development of Cryptocurrency in the Indonesian Economy," *2021 7th International Conference on E-Business and Applications*, February 24, 2021, 54–59, https://doi.org/10.1145/3457640.3457648; Dasih Irma et al., "The Future of Cryptocurrency Legality in Indonesia," *Journal of Economics and Business Letters* 1, no. 1 (June 2021): 20–23, https://doi.org/10.55942/jebl.v1i1.87.

[15] Soonpeel Edgar Chang, "Legal Status of Cryptocurrency in Indonesia and Legal Analysis of the Business Activities in Terms of Cryptocurrency," *Brawijaya Law Journal* 6, no. 1 (April 2019): 76–93, https://doi.org/10.21776/ub.blj.2019.006.01.06; Meiske Lasut and Romi Mesra, "Juridical Analysis of Crypto Currency Regulation in Indonesia and Its Implications for Consumer Protection," *Jurnal Mahkamah Hukum* 1, no. 1 (2024): 35–50.

[16] Zulfikri Zulfikri, Salina Kassim, and Anwar Hassan Abdullah Othman, "A Conceptual Framework of the Blockchain Technology Adoption for Zakat Institution in Indonesia," *European Journal of Islamic Finance*, April 13, 2023, 16-23 Páginas, 16-23 Páginas, https://doi.org/10.13135/2421-2172/7221; Dhiaeddine Rejeb, *Blockchain and Smart Contract Application for Zakat Institution: A Conceptual Study*, 2020.

contextually rich understanding of phenomena through the interpretation of meaning rather than a reliance on numerical data.[17] This paradigm perceives social reality not as singular and objective, but as subjective, complex, and continuously constructed through language and interpretation.[18] Consequently, this study does not test hypotheses; rather, it explores, identifies, and describes in detail the blockchain adoption model for zakat through a comprehensive literature analysis.

The primary source of data for this study is a literature review. Secondary data were obtained from existing sources or third parties that had previously gathered and analysed the information.[19] The data collection process involved the identification, selection, and analysis of documents pertinent to the research topic. These sources encompassed scientific articles from national and international journals, books and book chapters, proceedings from scientific conferences, and other scholarly works, including relevant theses and dissertations. The data collection technique was conducted systematically by determining search keywords in academic databases. The data collected from various sources were analysed using thematic analysis techniques. Thematic analysis is an approach for recognising, interpreting, and presenting the recurrent patterns or concepts found within qualitative information.[20]

To construct the conceptual architecture of the proposed blockchain adoption model, the dataset obtained from the literature review, which comprises scientific journals, regulatory documents, and fatwas, was methodically examined using thematic analysis. Importantly, this thematic analysis is explicitly evaluated through a theoretical framework grounded in Islamic commercial jurisprudence (*fiqh muʿāmalah*). The analytical lens is guided by core Islamic legal principles: the mandate of meticulous recording (*al-kitābah*) to assess accountability,[21] the agency (*al-wakālah*) contract to evaluate institutional mandates,[22] and the preventive principle of blocking the means (*sadd ad-dzarī'ah*) to analyse the system's robustness against the misappropriation of funds (*al-ghuluw*) or embezzlement.[23] This integrated approach ensures that the developed technical schemes are not only technologically feasible but also strictly Sharia-compliant.

Conceptual framework of zakat: a *fiqh* perspective on modernisation

To ensure that the proposed blockchain model is robust, it must be evaluated against the classical foundations of zakat across the four major schools of Islamic jurisprudence. The primary structural and legal benchmark in zakat doctrine is the absolute transfer of ownership (*at-tamlīk*), which dictates that zakat is an act of legal realignment that completely shifts property rights from the zakat payer (*muzakkī*) to the eligible recipient (*mustahīq*). In the Hanafi school, the scholar Abū Bakr Āli al-Dīn al-Kasānī, in his work *Bada'ī al-Shanā'i fī Tartīb al-Sharā'i*, strongly asserts that zakat is legally invalid without this definitive transfer, as its

[17] John W. Creswell, *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, Fifth Edition (Sage Publications, 2017).

[18] Norman K. Denzin and Yvonna S. Lincoln, *The Sage Handbook of Qualitative Research*, Fourth Edition (Sage Publications, 2011).

[19] Creswell, *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*.

[20] Arif Rachman et al., *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*, 1st ed. (CV Saba Jaya Publisher, 2024).

[21] Yusuf Qardawi, *Hukum Zakat*, cet. Ke-XII (Bogor: Pustaka Litera Antarnusa, 2011).

[22] Wahbah Az-Zuhaili and Abdul Hayyie Al-Kattani, *Fiqih Islam Wa Adillatuhu*, 7th Edition (Jakarta: Gema Insani, 2011), https://opac.perpusnas.go.id/detailopac.aspx?Id=118843.

[23] M. Umer Chapra, *Islam and the Economic Challenge* (The Islamic Foundation and The International Institute of Islamic Thought, 1995), https://books.google.co.id/books?id=rhjIRzJvwpgC&printsec=frontcover&hl=id#v=onepage&q&f=false.

ultimate Sharia objective is the structural enrichment and empowerment of the poor.[24] In contemporary centralized management or standard digital payment systems, *at-tamlik* is frequently obscured by lengthy administrative holding periods or information asymmetry, whereby physical funds remain in institutional accounts without real-time tracking, creating operational vulnerabilities. The proposed model elegantly satisfies al-Kasānī's stringent requirement by utilising blockchain technology as a real-time, non-custodial digital shadow ledger. While the physical currency moves through highly regulated banking channels to ensure compliance with legal tender, the blockchain serves as an instantaneous cryptographic verification track. It logistically mirrors the physical fund transfers, ensuring that *at-tamlik* is transparently recorded and contractually verified at the exact moment control shifts, thereby eliminating any hidden administrative lag that could result in misallocation of funds.

The Malikī school, as articulated by Ibn Rushd in *Bidāyah al-Mujtahid*, conceptualises zakat through a dual lens, viewing it as both an act of individual worship (*ʿibādah*) and an instrument of systemic social justice. This dual nature necessitates absolute mathematical precision regarding quantitative thresholds, specifically the minimum taxable wealth (*niṣāb*) and the one-year wealth retention period (*ḥawl*).[25] Ibn Rushd notes that historical disagreements among jurists often stem from operational ambiguities in tracking these temporal and quantitative boundaries across diverse asset classes. Traditional centralised bookkeeping struggles to dynamically monitor individual *ḥawl* horizons on a macro scale, leading to aggregate errors that risk compromising the spiritual validity of the *ʿibādah*. The proposed blockchain framework operationalises these classical constraints by embedding automated tracking algorithms directly within the immutable ledger. Each transaction block is cryptographically timestamped and permanently linked, creating a tamper-proof asset history. This allows for the dynamic and flawless tracking of both *niṣāb* and *ḥawl* for individual accounts, transforming classical juristic variables into programmatic, zero-error certainties that preserve the dual spiritual and socio-economic functions of the fund.

Furthermore, the Shafi'ī school emphasises the role of the zakat collector (*ʿāmil*) as an agent (*wakīl*) of the zakat recipient or the state. An-Nawāwī, in *al-Majmuʿ Sharh al-Muhadhdhab*, explains that the amīl acts as a formal legal agent, representing the *mustahīq* or the sovereign.[26] This means that the *ʿāmil*'s physical receipt of zakat is legally equivalent to the direct receipt by the ultimate beneficiaries themselves (*qabḍ al-ḥukmī*). While this constructive possession instantaneously discharges the *muzakkī*'s religious obligation, it places immense legal and moral liability on the *ʿāmil* to execute the agency (*wakālah*) contract without deviation. Centralised structures inherently fail to insulate this agency from human discretion, where funds are frequently diverted to unauthorised institutional overheads or misallocated across categories. In the developed framework, smart contracts serve as an unalterable digital extension of this *wakālah* mandate. By hardcoding Sharia-compliant distribution parameters directly into the network architecture, the *ʿāmil*'s administrative power is technologically restricted. Once the system registers the constructive possession of funds, the smart contract automatically locks the asset paths, ensuring they are distributed strictly to the designated eligible categories of zakat beneficiaries (*aṣnāf*) categories without any possibility of human intervention, diversion, or institutional neglect (*taqṣīr*).

[24] Abu Bakr Bin Mas'ud Al-Kasani, *Bada'i al-Sana'i Fi Tartib al-Syara'i* (Beirut: Dar al-Kutub al-Ilmiyah, 1986).

[25] Muhammad bin Ahmad Ibn Rushd, *Bidayat Al-Mujtahid Wa Nihayat al-Muqtasid* (Cairo: Dar al-Hadith, 2004).

[26] Abu Zakariya Yahya bin Syaraf An-Nawawi, *Al-Majmu' Syarh al-Muhadhdhab* (Jeddah: Maktabah al-Irsyad, 1995).

From the Hanbali perspective, Ibn Qudāmah in *al-Mughnī* emphasises that the explicit spiritual intention of the donor (*niyyah*) is a non-negotiable prerequisite for the metaphysical and legal validity of zakat.[27] Within large, conventional philanthropic networks, a *muzakkī*'s specific intention, particularly in relation to restricted zakat (*zakat al-muqayyadah*), where funds are earmarked for specific regional crises or designated sub-categories of recipients, is often lost or diluted due to commingled bank accounts and aggregate ledger reporting. The proposed model addresses this spiritual-legal bottleneck by cryptographically binding the *muzakkī*'s intention directly to the transaction metadata. When a donor authorises a transaction using their private key, their specific distribution criteria are permanently anchored to that particular digital asset path. The underlying smart contract serves as an immutable enforcement mechanism, ensuring that the physical money deposited in the bank account cannot be disbursed unless its real-world execution perfectly aligns with the cryptographically preserved intention of the *muzakkī*.

Synthesising these cross-madhhab doctrines demonstrates that the proposed blockchain architecture does not disrupt classical Islamic legal frameworks; rather, it serves as their ultimate modern operationalisation. This digital ledger represents the contemporary technological manifestation of the meticulous recording (*al-kitābah*) principle mandated in Surah Al-Baqarah: 282, which classical exegetes such as Al-Qurtubi identify as the premier legal safeguard for preserving justice (*al-ʿadālah*) and preventing financial disputes. By explicitly separating the "digital shadow" (the immutable ledger record) from the "physical asset" (the regulated fiat money), the model respects the physical requirements of *tamlik* and *qabḍ* across all four major schools while providing an impeccable layer of trust (*amānah*) that eliminates contemporary information asymmetry. Consequently, blockchain integration actively functions as an operational mechanism for blocking the means to evil (*sadd adz-dzarīʿah*), structurally obstructing the avenues where corruption (*ghuluw*) or mismanagement traditionally occurs in centralised institutions, thereby perfectly fulfilling the overarching objective of wealth preservation (*hifz al-māl*) within the framework of Islamic law (*maqāṣid al-sharīʿah*).

Blockchain practices in Islamic finance: trends and empirical evidence

The contemporary paradigm of zakat management in Indonesia has actively embraced digital transformation, primarily through mobile banking applications, crowdfunding platforms, and fintech payment gateways that significantly optimise collection mechanisms.[28] Despite this technological evolution, a severe macro-structural challenge persists: a substantial disparity between zakat potential and actual realisation. While the national zakat potential is projected at IDR 327 trillion, the actual collection in 2023 only reached IDR 33 trillion.[29] This empirical gap is deeply intertwined with an institutional trust deficit rather than a lack of public wealth or access to digital payment systems. The vulnerability of centralised e-Islamic finance platforms lies in their non-transparent "end-to-end" fund allocation, which creates a significant monitoring blind spot. This opacity was illustrated by the major philanthropic fraud scandal uncovered by the Indonesian Financial Transaction Reports and Analysis

[27] Abdullah bin Ahmad Ibn Qudamah al-Maqdisi, *Al-Mughni* (Riyadh: Dar 'Alam al-Kutub, 1997).

[28] Zubaidah and Afifah, "Development of Zakat Management Digitalization in Indonesia."

[29] BAZNAS RI, *Potensi Peningkatan Kesejahteraan Mustahik Melalui Skema Istitsmar Dana Zakat*; BAZNAS RI, *Outlook Zakat Indonesia 2024*.

Centre,[30] involving a prominent charity organisation (Aksi Cepat Tanggap) that misappropriated over 50% of its IDR 1.7 trillion fund turnover for personal businesses and inflated executive compensation.[31] Furthermore, Indonesian Financial Transaction Reports and Analysis Center (PPATK) identified similar anomalous financial indicators in 176 other philanthropic organisations, indicating that systemic vulnerabilities are widespread when distribution metrics remain unchecked.

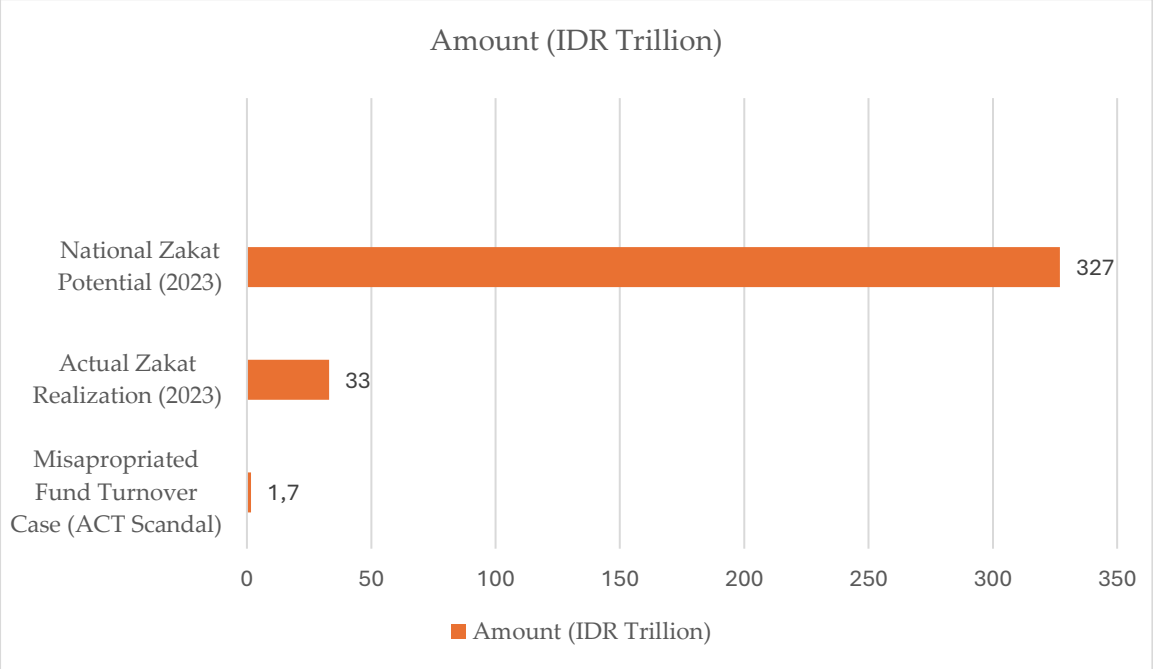

Figure 1. The disparity between zakat potential and realisation, as well as the risk of philanthropy fraud in Indonesia.
Source: BAZNAS RI (2023) and PPATK (2022)

This environment illustrates that while traditional fintech addresses the opportunity for collection convenience, it fails to alleviate the operational challenges associated with transparency and distribution tracking. Consequently, blockchain technology emerges as a necessary trust infrastructure rather than merely an alternative. By establishing a framework for decentralised philanthropy, blockchain offers a permanent, tamper-proof transaction trail that effectively eliminates information asymmetry between *muzakkī*, *ʿāmil*, and *mustahīq*.[32] Quantitative indicators from prior studies reveal a significant positive correlation between the adoption of distributed ledger technology and the revitalisation of public confidence.[33] Therefore, the transition towards an integrated digital ledger serves as a critical safeguard against institutional corruption, ensuring that the potential of e-Islamic finance is not compromised by structural distribution risks.

[30] Pusat Pelaporan dan Analisis Transaksi Keuangan PPATK, *Laporan Hasil Analisis PPATK Terkait Indikasi Penyelewengan Dana Yayasan Filantropi (Aksi Cepat Tanggap)* (Jakarta, 2022), https://www.ppatk.go.id/.

[31] Sarifatul Aini, *Evaluasi Risiko Fraud pada Pengelolaan Dana Zakat: Perspektif Good Governance dan Transparansi*, 6, no. 3 (2025).

[32] Ahmed et al., "Blockchain-Empowered Decentralized Philanthropic Charity for Social Good."

[33] Sabil Mokodenseho et al., "Utilizing Blockchain Technology to Increase Transparency in Zakat Management," *West Science Islamic Studies* 1, no. 01 (October 2023): 01–09, https://doi.org/10.58812/wsiss.v1i01.280.

Synergy between zakat and blockchain: preventing operational fraud

Before delving into the technical integration, it is imperative to address the specific vulnerabilities within conventional zakat operations. Traditional centralised systems are inherently susceptible to information asymmetry and manipulation, where *ʿāmil* may misallocate funds intentionally or unintentionally without immediate detection. The lack of verifiable, real-time audit trails creates a "black box" of distribution, fostering the aforementioned trust deficit and raising fears of embezzlement (*ghuluw*).

To resolve this critical issue, the proposed model establishes a synergy in which blockchain functions as a shadow digital ledger that secures the integrity of the fiat-based financial cycle. The most crucial feature for fraud prevention is the public transparency portal, which grants stakeholders open access to the entire operational cycle, from fund collection to the final distribution to *mustahīq*, complete with verifiable evidence such as transaction timestamps and photographic documentation of the distribution.

- Technical Interaction: In the collection schemes (Figures 1 and 2), the amil performs standard data entry, bolstered by the requirement to upload supporting documents, such as transfer proofs, as a prerequisite for blockchain input.
- Reconciliation and Immutability: To address technical errors or the need for data correction, the system utilises the blockchain's "append-only" nature. Instead of deleting old data, the amil must perform a reconciliation process by submitting a new "correction transaction" that references the previous entry. This ensures a fully transparent history where no data is ever hidden, effectively preventing unauthorised manipulation.[34]

Technical scheme for collecting restricted zakat (zakat muqayyadah) using blockchain

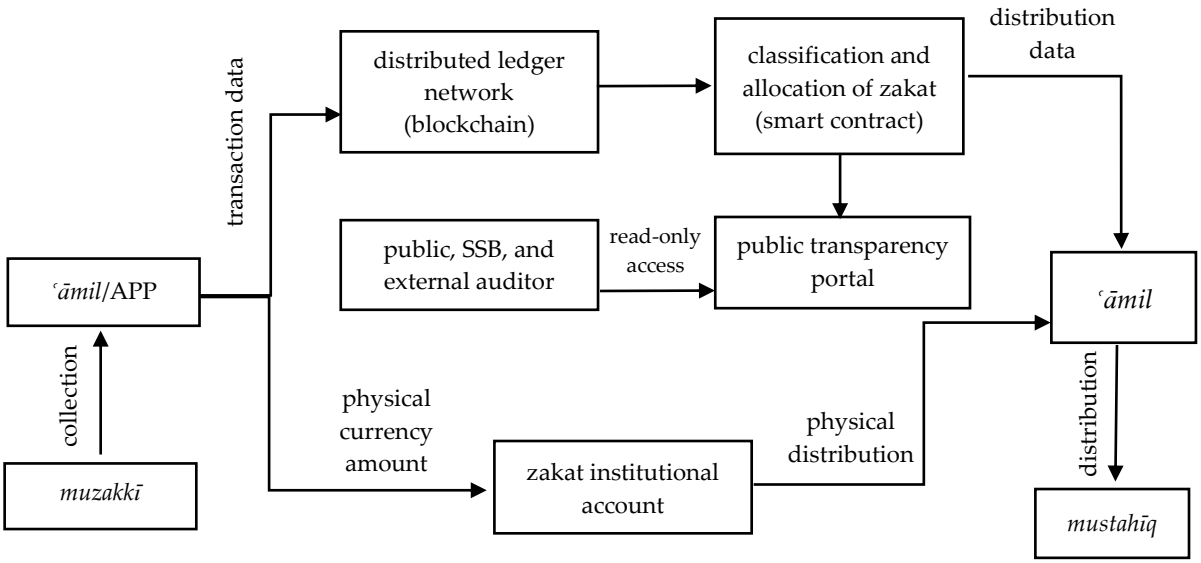

Figure 1. technical scheme for *zakat muqayyadah* fund collection
Source: processed data (2025)

Zakat Muqayyadah constitutes a category of zakat wherein the intended recipients and distribution locations may be adjusted according to the criteria established by the *muzakkī*.

[34] Yu, Lin, and Tang, "Blockchain"; Rejeb, *Blockchain and Smart Contract Application for Zakat Institution: A Conceptual Study*.

Consequently, a zakat collection scheme is required that facilitates the modification of *muzakkī* criteria.[35] In this regard, the utilisation of smart contracts on the blockchain emerges as one of the most appropriate technologies for this scheme.

The *Muqayyadah* zakat collection scheme, which employs blockchain technology, is designed to enhance transparency and accountability without altering the currency in use. This process involves several key entities, namely, the muzakki, the *ʿāmil* or application, the distributed ledger network (blockchain), the zakat institution account (LAZ), the smart contract, the public transparency portal, and parties with read access rights (including the community, the sharia supervisory board (SSB), and external auditors).

The initial stage commences when the *muzakkī* distributes donations, either offline through the amil or online via the application. For offline donations, the *ʿāmil* is responsible for inputting transaction data into the distributed ledger network (blockchain), while donations made through the application are recorded automatically. This transaction data subsequently undergoes a validation process within the blockchain network (further details regarding validation are elucidated in the governance scheme). Upon the completion of this stage, a distinction is established between the recording of digital transaction data on the blockchain and the flow of physical money, as the blockchain serves purely as a digital ledger and not as a repository for funds.

Once validated, the smart contract, which acts as the "brain" of the system, will automatically classify transaction data according to the specific wishes of the *muzakkī* into the appropriate LAZ programme budget items. The outcomes of this digital classification serve as the definitive reference for the *ʿāmil* when requesting physical fund disbursements for distribution, thereby ensuring that the funds are utilised for their intended purpose. All data pertaining to the accumulation of funds per programme can be accessed in real-time by the public, the sharia supervisory board, and external auditors through the public transparency portal, thereby facilitating the operational transparency of the LAZ.

In a separate process, the physical funds derived from donations received by the *ʿāmil* or via the application are deposited into the LAZ account, which functions as a repository for actual funds. Prior to the distribution to *mustahīq*, the *ʿāmil* must request the disbursement of physical funds from this account. The system guarantees that the amount requested for disbursement aligns with the programme balance recorded in the blockchain smart contract. This mechanism ensures that every IDR disbursed physically has been digitally authorised in accordance with the mandate of the *muzakkī*.

[35] Komisi Fatwa Majelis Ulama Indonesia, "Fatwa MUI No. 15 Tahun 2011 Tentang Penarikan, Penyaluran, Dan Pemeliharaan Harta Zakat," 2011.

Technical scheme for the collection of unrestricted zakat (zakat mutlaqah) via blockchain technology

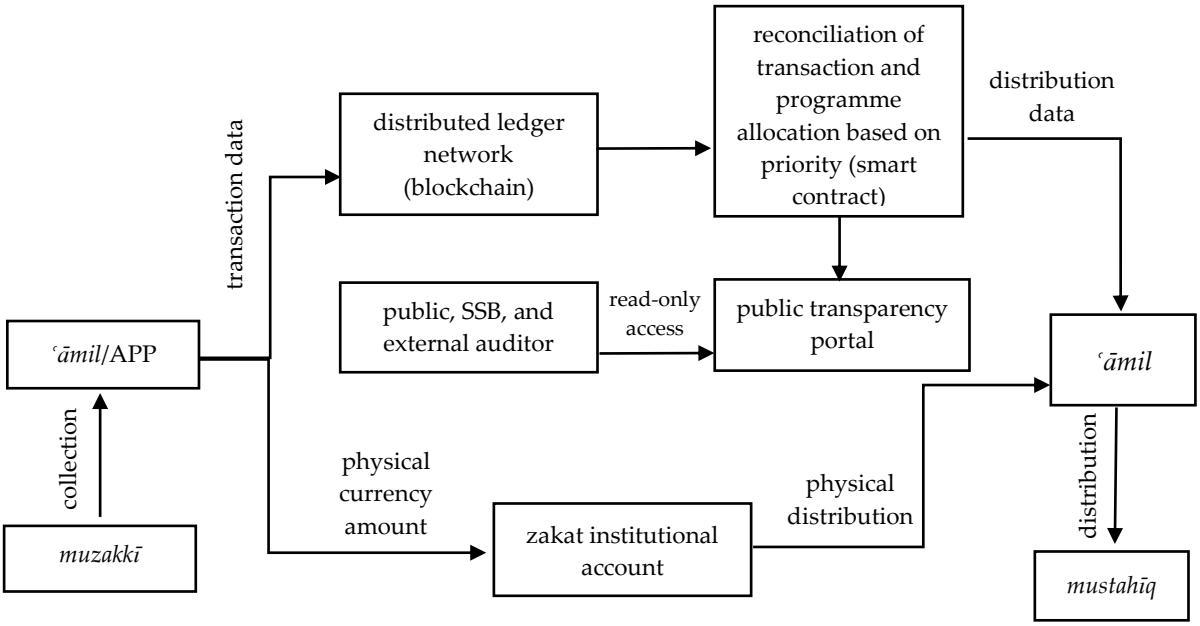

Figure 2. technical scheme for *zakat mutlaqah* fund collection
Source: processed data (2025)

The technical framework for managing *zakat mutlaqah* through the utilisation of blockchain technology is designed to enhance the transparency and accountability of community fund management while maintaining the existing currency. This process entails an integration among *muzakkī*, *ʿāmil* or application, distributed ledger network (blockchain), zakat institution accounts (LAZ), smart contracts, public transparency portals, and stakeholders with read access rights, including the community, the sharia supervisory board (SSB), and external auditors.

The initial stage commences when the *muzakkī* remits their zakat through the *ʿāmil* or application. At this juncture, a critical separation is established between the flow of physical funds and the recording of digital transaction data. The physical funds, represented by the actual currency submitted by the *muzakkī*, will be deposited and managed solely within the LAZ account, while the transaction data—encompassing identity, amount, and time—will be recorded by the amil or application into the distributed ledger network (blockchain). Within this framework, the blockchain serves exclusively as an immutable digital ledger and not as a repository for monetary assets.

Subsequent to the validation of transaction data within the network, the smart contract, which acts as the operational core of the system, processes the data. Due to the *mutlaqah* nature of zakat, the smart contract autonomously reconciles and allocates funds to various zakat programmes according to the priority scale established by the institution (priority algorithm). The outcomes of this digital allocation serve as the definitive reference for the *ʿāmil* in determining the distribution of funds. All data pertaining to the allocation and accumulation of these funds is made accessible in real-time to the public, the sharia supervisory board, and external auditors via the public transparency portal, thereby ensuring data authenticity.

In the concluding stage, the smart contract transmits distribution instructions to the *ʿāmil*, detailing the information regarding *mustahīq* who are entitled to receive the disbursement. In accordance with these digital directives, the amil requests the withdrawal of

physical funds from the LAZ account for distribution to the *mustahīq*. The system guarantees that withdrawals of physical funds can only occur if they align with the allocation instructions documented in the smart contract. This mechanism ensures that every rupiah distributed physically has been digitally authorised and is consistent with sharia principles and institutional prioritisation rules.

Technical framework for zakat reporting utilising blockchain technology

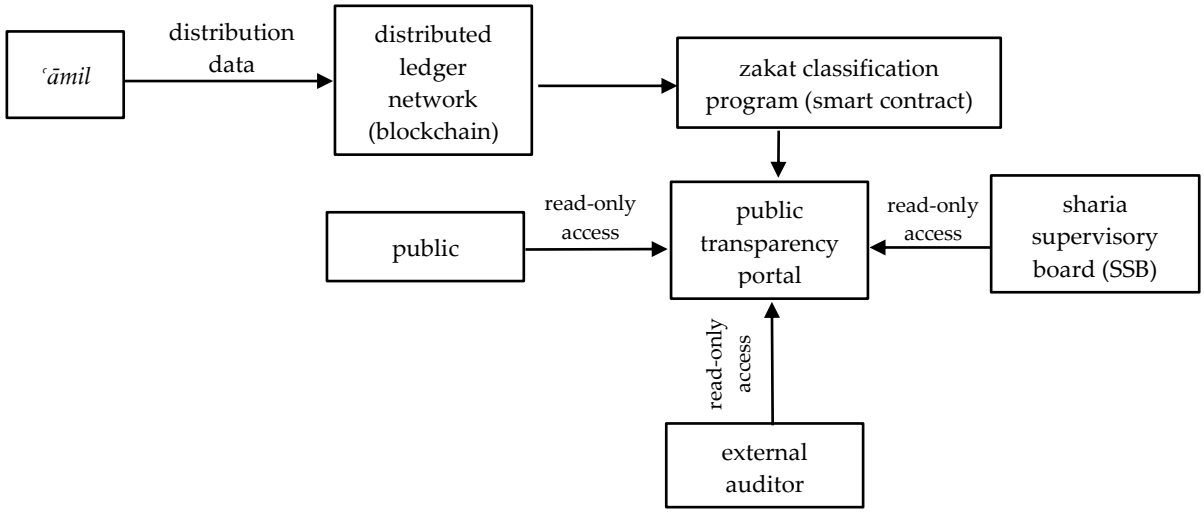

Figure 3. technical scheme for blockchain zakat reporting
Source: processed data (2025)

The technical scheme illustrated in Figure 3 delineates the architecture of the zakat reporting system employing distributed ledger network (blockchain) technology to ensure the transparency and accountability of distribution data. In contrast to the operational scheme for collection, the primary focus of this scheme is the mechanism for recording, classifying, and disseminating distribution data executed by amil to public stakeholders and supervisors.

The reporting process commences with the amil entity, which, following the distribution of zakat funds in the field, is tasked with inputting "distribution data" into the system. This data, encompassing details of the distribution such as the amount, time, location, and category of mustahiq, is subsequently transmitted and permanently recorded within the distributed ledger network (blockchain). At this juncture, the blockchain operates as an immutable "single source of truth," establishing a robust and secure digital audit trail that is resistant to manipulation of distribution history data.

Upon the recording of the distribution data in the network, the smart contract, functioning as a "zakat classification program," automatically processes the data. This programme executes predetermined business logic to classify data into relevant categories based on both *asnāf* and programme types. This automation guarantees consistency and accuracy in the grouping of report data while minimising the risk of human error in the recapitulation process. The validated and classified data are then relayed to the public transparency portal, which serves as an information interface presenting reports in an easily comprehensible format.

The public transparency portal functions as a central access point for three principal supervisory groups: the public, the sharia supervisory board, and external auditors, who are

granted read-only access to verify reports. This mechanism enables the public to monitor aggregate distributions, allows the sharia supervisory board to ensure real-time compliance with sharia principles, and provides external auditors with valid audit evidence directly from the ledger. Collectively, this scheme transforms the paradigm of zakat reporting from a manual, periodic system to a real-time, transparent system, with blockchain serving as the foundation of the trust infrastructure for all parties involved.

Technical framework for zakat governance utilising blockchain technology

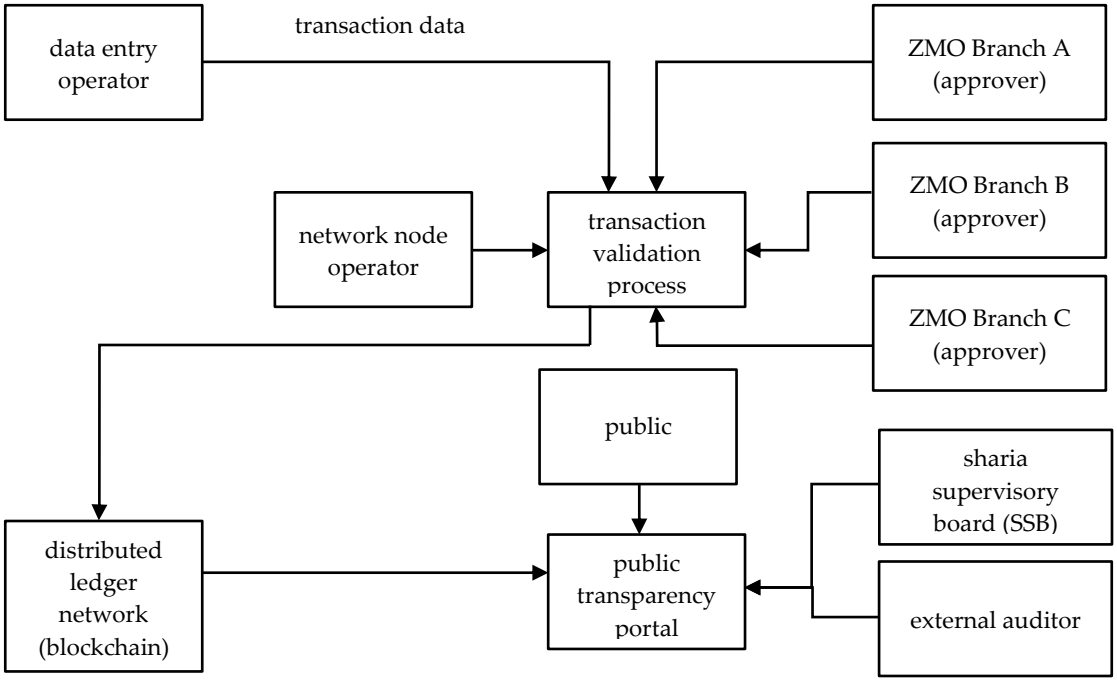

Figure 4. blockchain zakat governance scheme
Source: processed data (2025)

The governance scheme illustrated in Figure 4 delineates the tiered control and validation mechanism implemented within the blockchain network to ensure the integrity, security, and sharia compliance of zakat management data. This process commences with the "data entry operator" entity, which refers to the personnel or system responsible for initiating the initial submission of "transaction data" into the system. At this juncture, the data exists in the form of a transaction proposal and has not yet been permanently recorded in the ledger, pending a rigorous verification process.

Subsequently, the transaction data progresses to the "transaction validation process," which employs a consensus mechanism involving various validators. Internally, the zakat management organization (ZMO) branches A, B, and C serve as approvers who verify the accuracy of the data both administratively and substantively, functioning as a form of organisational checks and balances. Concurrently, node operators, as technical entities, ensure that transactions comply with network protocol requirements and uphold operational security. New transactions are deemed valid and ready for recording only after receiving consensus approval from all validating entities.

Upon validation, transactions are permanently inscribed in the immutable distributed ledger network (blockchain), establishing it as a digital "single source of truth." The data secured within this ledger is subsequently made accessible through a public transparency

portal, which serves as an external monitoring interface. This portal grants read-only access to the public for general oversight, the sharia supervisory board (SSB) for real-time sharia compliance monitoring, and external auditors who utilise the data as valid audit evidence.

In summary, this governance scheme underscores the role of blockchain technology in constructing a robust internal and external control system. By integrating tiered validation among organisational units and facilitating access to verified data for supervisors, an accountable, transparent, and trustworthy zakat management ecosystem has been established.

A critical analysis of the integration of blockchain technology into zakat systems

The operational framework of contemporary zakat management reveals a fundamental dilemma (thesis): the urgent socio-economic imperative to optimise public fund mobilisation is chronically undermined by centralised institutional inefficiencies and high systemic risks of fraud. Centralised administrative models remain structural black boxes that fail to guarantee the absolute transparency needed to bridge the public trust gap.[36] As an empirical and technological antithesis, the integration of blockchain technology introduces a radical alternative that shifts the trust governance paradigm from fallible human oversight to an immutable, decentralised ledger network.[37] This framework does not merely overlay digital tools onto existing processes; it fundamentally restructures the accountability lifecycle of zakat funds by separating physical monetary flows from their digital verification tracks.

A critical synthesis of this model against the bedrock of Islamic commercial jurisprudence (*fiqh muʿāmalah*) reveals that blockchain is not an artificial insertion into Islamic social finance, but rather a profound technological reinforcement of the objectives of Islamic law (*maqāṣid al-sharīah*). In classical law, the validity of zakat is heavily predicated on the valid transfer of ownership (*at-tamlīk*) and physical or constructive possession (*qabḍ*), as underscored by Abū Bakr Āli al-Dīn al-Kasānī, in his work *Bada'ī al-Shanā'i fī Tartīb al-Sharā'i* and Ibn Rushd in *Bidāyah al-Mujtahid*. Previous blockchain models in Islamic finance frequently collapsed into regulatory and sharia non-compliance by utilising highly volatile cryptocurrencies as mediums of exchange, which directly introduced excessive uncertainty (*ghārar*) and gambling (*maysīr*) into philanthropic funds.[38] In contrast, the framework developed in this study maintains high compliance by treating blockchain strictly as a non-monetary recording ledger. The actual movement of capital remains exclusively fiat-based (Indonesian Rupiah) channeled through regulated banking tracks, thereby ensuring that physical ownership and legal constructive possession occur in absolute conformity with both classical jurisprudential schools and Bank Indonesia regulations.[39]

Furthermore, the integration of algorithmic smart contracts directly addresses the historical vulnerabilities of the agency (*wakālah*) contract in zakat administration. As elaborated by an-Nawāwī, in *al-Majmuʿ Sharh al-Muhadhdhab*, the *ʿāmil* acts as a legal agent (*wakīl*) whose possession of funds represents possession by the beneficiaries. However, classical and contemporary experiences demonstrate that human agents are susceptible to

[36] Ahmad Alam, "Permasalahan dan solusi pengelolaan zakat di Indonesia," *Jurnal Manajemen* 3, no. 3 (2023): 128, https://doi.org/10.32832/jm-uika.v9i2.1533.

[37] Zulfikri, Kassim, and Abdullah Othman, "A Conceptual Framework of the Blockchain Technology Adoption for Zakat Institution in Indonesia."

[38] Leo Handoko, Tihar Marpaung, and Ayuanda, "Development of Cryptocurrency in the Indonesian Economy."

[39] Chang, "Legal Status of Cryptocurrency in Indonesia and Legal Analysis of the Business Activities in Terms of Cryptocurrency"; Lasut and Mesra, "Juridical Analysis of Crypto Currency Regulation in Indonesia and Its Implications for Consumer Protection."

negligence (*taqsīr*) or breach of trust (*khiyānah*), leading to the illicit misappropriation of public wealth (*ghuluw*). Within the proposed architecture, smart contracts function as a mathematical extension of the *wakālah* mandate. By hardcoding the *muzakkī*'s specific intention (*niyyah*), which Ibn Qudāmah in *al-Mughnī* identifies as a strict prerequisite for validity, the system automates fund classification for restricted zakat (*zakat al-muqayyadah*) and executes priority algorithms for unrestricted zakat (*zakat al-mutlaqah*). The smart contract acts as an unalterable digital guardian that permits physical fund disbursement from the institutional account only when the transaction matches sharia-approved parameters. Consequently, this model elevates the principle of meticulous record-keeping (*al-kitābah*) from a passive ex-post accounting duty to an active, real-time mechanism of justice (*al-ʿadālah*), fulfilling the legal maxim of blocking the means to evil (*sadd adz-dzarīʾah*) by dynamically sealing operational loopholes before fraud can materialise.

Nevertheless, the practical application of this conceptual model faces complex structural barriers. The foremost impediment is a severe deficit in human capital literacy within zakat institutions, as managing decentralised ledger protocols demands advanced technical competencies that traditional *ʿāmil* forces currently lack. Additionally, the infrastructural ecosystem in Indonesia presents high financial challenges; the lack of domestic enterprise blockchain environments forces reliance on foreign consortium infrastructure, resulting in steep operational costs that risk draining social finance resources.[40] This economic overhead directly threatens the *maqāṣid* principle of the preservation of public wealth (*hifz al-māl*). Finally, the regulatory posture of both the state and the Indonesian Ulema Council (MUI) remains cautious and developmental regarding decentralised architectures in social banking, creating institutional inertia.

This study overcomes these barriers by offering a unique scholarly contribution to the global body of Islamic fintech literature. While previous research primarily discusses blockchain from a speculative transaction speed perspective,[41] this article provides an original, sharia-compliant governance architecture that prioritises risk reduction and jurisprudential integrity. For Indonesia and the wider Muslim world, this study provides a concrete policy roadmap, establishing that technology must be harnessed not to displace classical legal frameworks, but to institutionalise them. By demonstrating that a hybrid fiat-blockchain ledger can operationalise radical transparency, this research provides state regulators and international zakat bodies, such as the national zakat board of Indonesia, with a viable blueprint to structurally eliminate corruption, restore public trust, and maximise the systemic mobilisation of Islamic social wealth.

Conclusion

This study developed a conceptual framework for the integration of blockchain technology into zakat operational systems, aimed at enhancing transparency, efficiency, and accountability within Indonesian zakat institutions. The findings indicate that blockchain functions effectively as an immutable digital ledger for recording transactions and reporting mechanisms, without necessitating the replacement of the existing fiat-based financial infrastructure. By delineating the flow of physical funds from digital transaction records, the proposed model enables blockchain to function as a transparent supervisory system while ensuring strict compliance with current national financial regulations.

[40] Zhang et al., "The Challenges and Countermeasures of Blockchain in Finance and Economics."
[41] Renduchintala et al., "A Survey of Blockchain Applications in the FinTech Sector."

A critical finding of this study is the model's profound alignment with cross-classical Islamic jurisprudence regarding zakat concepts, establishing a strong theoretical connection between medieval jurisprudence and modern technology. By utilising official fiat currency rather than speculative crypto-assets, the framework inherently avoids uncertainty (*gharār*) and speculation (*maysīr*), while successfully facilitating the physical transfer of ownership (*tamlīk*) and possession (*qabḍ*) as mandated by classical jurists. Furthermore, the immutable nature of the blockchain serves as the ultimate modern manifestation of meticulous recording (*al-kitābah*). The integration of smart contracts automates the agency (*wakālah*) contract, aligning the distribution directly with the *muzakki*'s specific intentions and institutional priorities. Coupled with a public transparency portal, this radical transparency serves as a means to prevent potential wrongdoing related to embezzlement, demonstrating that technological decentralisation fundamentally strengthens classical Islamic doctrines of wealth preservation.

Practically, this architecture transforms the paradigm of zakat governance from a conventional periodic auditing system to a real-time accountability model. While this conceptual framework requires future empirical validation through institutional pilot projects, the proposed integration presents a robust, sharia-compliant pathway. Ultimately, it offers a strategic roadmap for policymakers and zakat institutions to restore public trust and optimise the significant socio-economic potential of Islamic social finance ecosystems.

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