JOURNAL OF CULTURAL ANALYSIS AND SOCIAL CHANGE

Journal of Cultural Analysis and Social Change,
2025, 10(2), 770-781
ISSN: 2589-1316

Governance in the Digital Era: The Role of Blockchain Technology in Enhancing Accountability

Amirah Bahaaudeen[1]*

[1] *Business Analytics and Management Information Systems Department, University of Business and Technology, Jeddah,* SAUDI ARABIA, ORICD: 0009-0002-8304-5142

***Corresponding Author:** amira@ubt.edu.sa

Citation: Bahaaudeen, A. (2025). Governance in the Digital Era: The Role of Blockchain Technology in Enhancing Accountability, *Journal of Cultural Analysis and Social Change*, 10(2), 770-781. https://doi.org/10.64753/jcasc.v10i2.1680

Published: November 12, 2025

ABSTRACT

Technological transformation has contributed to governance by presenting great opportunities to enhance efficiency, transparency, and accountability. This shift allowed governments to manage administrative processes, share information instantly, and allowing auditing management processes. In the current context, emerging technologies like artificial intelligence, blockchain, and big data analytics are reshaping governance. Traditionally Zakat, which is payment made annually under Islamic law on certain kinds of property and used for charitable and religious purposes and it is one of the Five Pillars of Islam, has been collected and distributed by government institutions, charitable organizations or individuals. However, this process can be inefficient and prone to errors. One of the biggest challenges for Zakat institutions as well as charities in the general context is their inability to prove their transparency and reliability and thus gain donor's trust. Moreover, as the world becomes more digitally connected, there has been a growing interest in the digitalisation of Zakat and use of smart contracts. Smart contracts are essentially programs stored on a blockchain that run when predetermined conditions are met. This approach offers several potential benefits, including increased transparency, efficiency in Zakat distribution, low transaction costs and greater efficiency in terms of the time required to execute such contracts. The digitalization of Zakat and the use of smart contracts is relatively new and emerging, although potential benefits exist some challenges persist. The purpose of this article is to propose a flowchart for the logical steps to transfer Zakat payment from the Zakat payer's account to the beneficiary's account linking all stakeholders involved to facilitate collection and payment of Zakat.

Keywords: Governance, Digital Era, Role of Blockchain Technology

INTRODUCTION

Globally, digital transformation contributed to enhance governance. The progression of technologies like cloud computing, big data analytics, artificial intelligence, and blockchain has revolutionized how institutions manage information, ensure conformance, and engage with stakeholders. The spread of digital technologies has expanded the opportunities for data and knowledge exchange, yet it also presents new challenges for governance. Hanish et al., (2023) argued that digital exchanges, such as platform-based transactions and online communities, frequently occur in large networks with numerous simultaneous interactions, pushing digital governance mechanisms such as contracts and relational norms to their limits. In the digital world, trust is a cornerstone and describes the expectation that one party will not take advantage and misbehave, even when the affected party has limited abilities to detect such behaviour. Trust can be built between partners that engage with each other repeatedly, where each delivers the outcomes expected of the other, and where each entity behaves responsibly toward the other, which can ultimately build trust in competence and goodwill. In automated contexts, trust resides in the algorithmic

system itself and is not dependent on personal relationships. In this vein (Ibid 2023, p. 1) stated "Digital governance touches on fundamental issues of organizing, e.g., enhancing task programmability to improve process control, automating task division and allocation to facilitate coordination, conditioning incentives through dynamic inputs, and creating the transactional transparency required for trust. For example, digital governance can create verification mechanisms for transactions, e.g., oracles and consensus protocols, which are used in blockchain networks".

The integration of blockchain-powered smart contracts can significantly enhance the efficiency and transparency of Zakat management systems. Smart contracts, which operate as self-executing agreements encoded directly into blockchain infrastructure, offer a robust mechanism for automating Zakat transactions while minimizing human intervention (Mohiuddin and Abolola, 2025). This decentralized approach mitigates the risks of manipulation and ensures conformance with predefined protocols, thereby strengthening accountability in fund distribution (Abdullah and Bahloul, 2021). However, vulnerabilities remain, as human interference could still be leveraged to exploit the system for personal gain. To uphold transparency and trust, these limitations must be addressed by enforcing immutable blockchain records that track Zakat transactions from collection to distribution, ensuring that funds reach eligible beneficiaries in accordance with Shariah law.

The integration of blockchain-enabled smart contracts within Zakat management systems enhances efficiency by automating the collection and distribution of funds, reducing reliance on intermediaries while ensuring accuracy and security (Rabbani et al., 2020). Zakatable are assessed based on a minimum threshold (Nisab) and ownership duration, with a 2.5% rate applied. Blockchain-based digital ledgers provide transparency and minimize the risk of data manipulation. To remain Shariah-conformant, Zakat payments must be voluntary, directly reaching beneficiaries without unnecessary intermediaries. Distribution should be fair, respecting beneficiaries' dignity, and allocated to eligible groups such as the poor, the indebted, and those in need. Zakat can be disbursed through direct cash transfers, interest-free loans for economic empowerment, or funding for charitable and community projects. Ultimately, Zakat spending should align with Islamic principles, prioritizing sincerity and social welfare over personal recognition or gain.

The aim of this study is to analyse how blockchain's decentralized, transparent, and immutable characteristics contribute to improved oversight, reduced corruption, and enhanced trust in governmental and institutional of Zakat decision-making processes.

Therefore, this study establishes the following research objectives:

RO 1: Critically examine the extent to which blockchain contributes to enhanced regulatory oversight, the mitigation of corruption, and the cultivation of trust within governmental and institutional Zakat decision-making frameworks.

RO 2: Develop a structured flowchart that systematically delineates the logical steps involved in the digitalizing Zakat payment through smart contracts management information system, ensuring transparency, efficiency, and conformance.

The remainder of this paper is organized as follows: Section 2 provides a critical review of the extant literature concerning blockchain-based smart contracts and their application in Zakat digitalization, alongside scholarly discourse on accountability mechanisms within e-government systems. Section 3 outlines the research methodology adopted for this study. Section 4 explains the conceptual framework underpinning the digitalization of Zakat payments. Section 5 presents the analytical interpretation and discussion of the developed logical flowchart. Section 6 concludes the paper by summarizing key findings, identifying while section 7 provide research limitations and direction for future research.

LITERATURE REVIEW

Digitalizing Zakat using Blockchain-enabled Smart Contract

Smart contracts, which autonomously execute agreements by embedding contractual terms within coded instructions, have been recognized as a promising mechanism for digitalizing Zakat. In this approach, Zakat payments are automatically collected and distributed using smart contracts, which can reduce the need for intermediaries and increase the speed and accuracy of Zakat distribution. The literature on the digitalisation of Zakat and the use of smart contracts is relatively new and emerging. However, there have been several studies and reports that have explored the potential benefits and drawbacks of this approach. A study by Rejeb (2019) examines the use of blockchain technology and smart contracts in Zakat distribution. The study proposes a framework for digitalising Zakat that utilizes blockchain technology and smart contracts to automate the process of Zakat collection and distribution. The framework includes a smart contract that automatically collects Zakat payments and distributes them to eligible beneficiaries. The study suggests that this approach could increase the transparency and efficiency of zakat distribution, as well as reduce the potential for fraud and corruption. However, no flowchart

was presented for the logical steps to transfer the Zakat payment from the Zakat payer's account to the beneficiary's account. Mohiuddin and Abolola (2025) argued that integrating blockchain technology with Zakat management systems in digital India could help prevent fund mismanagement, given the India increasing reliance on internet-based financial transactions. They review also examines how such integration could facilitate the financing of microbusinesses through Zakat funds, helping to overcome the socio-economic challenges facing India's Muslim population and mitigating the suffering from high poverty rates.

Mokodenseho et al., (2023) explores the impact of blockchain technology on the transparency of Zakat management in Indonesia. The study includes a sample of 350 participants from various institutions. Participants generally perceive Zakat management processes as a complicated issue that lacks transparency. The study identified issues with management of Zakat process such as the absence of certain accountability indicators, inefficient use of websites, ineffective use of social media, and the absence of an internal audit unit. Findings reveal a positive trend in blockchain adoption especially with larger organizations to integrate the technology. Alzaidan (2024) in the context of Saudi Arabia argued that technological advancement in the areas of revenue collection processes, encompassing Zakat, tax, and government administration, has emerged as a significant initiative in Saudi Arabia's proceeding for modernization and direction of 2030 vision to enhance efficiency. He highlighted the role of the Saudi Zakat Tax and Customs Authority (ZATCA) which is responsible of handling a variety of tax declarations from individuals, governmental bodies, financial institutions, corporations, and different entities. These digital submissions contain pertinent financial data pertaining to the activities of taxpayers. Also, ZATCA compiles third-party data sourced from multiple governmental agencies to form a comprehensive taxpayer profile and cross-verify their financial declarations. Numerous scholars have endeavoured to conceptualize and develop models and frameworks for Zakat management systems. For instance, Khatiman et al., (2021) proposed a blockchain-based Zakat collection application, leveraging smart contracts as its foundational mechanism and deploying the system on the Ethereum platform. Similarly, Nazeri et al., (2023) introduced a blockchain-enabled Zakat management model designed for seamless integration with existing institutional infrastructures in Malaysia. Concurrently, Ismail et al., (2023) proposed an architectural framework leveraging smart contract technology to improve the operational efficiency of Zakat management within the Malaysian context. Building upon this foundation, the present study aims to construct a structured logical flowchart that systematically articulates the procedural stages involved in the digitalization of Zakat payments via a smart contract–enabled management information system, with a focus on ensuring transparency, operational efficiency, and Shariah-conformant governance.

Accountability in E-Government

A critical challenge confronting Zakat fund management is the pervasive lack of donor trust in both public and private Zakat institutions. Hoque et al., (2015) identified internal organizational deficiencies—particularly in transparency and accountability—as key contributors to this issue. Widespread public scepticism regarding the operational integrity and efficacy of Zakat organizations continues to erode donor confidence, thereby discouraging contributions through formal institutional channels. Consequently, concerns over potential fund mismanagement and fraudulent practices have intensified, further deterring individuals from fulfilling their Zakat obligations via these entities (Hashim et al., 2024).

To enhance trust in Zakat institutions, Zulfikri et al., (2023) proposed a conceptual framework for blockchain technology acceptance, specifically contextualized within institutional Zakat management. The study investigates how blockchain's technical attributes influence user acceptance, drawing on the Technology Acceptance Model (TAM) to structure its analysis. Departing from prior research that primarily focuses on individual users, (Ibid, 2023) position Zakat institutions as the principal adopters, emphasizing the roles of perceived usefulness and perceived ease of use—core TAM constructs—as well as trust, regulatory support, and Shariah conformance as critical determinants of adoption. Understanding these influencing factors is expected to inform institutional and governmental decision-makers, ultimately facilitating the deployment of blockchain-enabled Zakat management systems.

Yang et al., (2024) investigate the influence of digital transformation on governmental efficiency, offering significant contributions through the introduction and application of the Production Network Model in the public sector. This model provides a novel framework for analysing the impact of digital advancements on the operational effectiveness of various government entities. Their findings indicate that digital evolution affects government unit performance to varying degrees. The advancement in information technology facilitates the application of e-government. The development in information technologies provided additional tools that facilitate the application of e-government. Transactions can be processed faster, easier, as well as greater transparency for government operations which promotes accountability. Accountability in public administration can be seen as the requirement to provide information about their performance and responsibility in fulfilling their duties. Accountability can be classified by type such as legal, political, financial, and administrative accountability or to whom accountability is

executed whether internally to public organization administration or externally to other stakeholders. Wong and Welch (2004) argued that the effect of e-government in enhancing accountability is not straightforward idea. They conducted empirical research for fourteen countries to explore whether e-government can lead to a more accountable government. While the implementation of e-government reflects a global trend toward administrative unification, variations in national contexts, organizational structures, and the nature of public bureaucracies across countries contribute to divergent outcomes and approaches. It is necessary in their opinion to have institutional and organization reform. In contrast, Kumar (2003, p.1) states that "E-government enables greater participation of citizens in policy and decision making, which was nearly impossible in the past. Participation enables greater understanding between Government and people and between people and people. It also helps in creating a sense of responsibility and the government becomes a true representative of the people's aspirations and will. This is greater transparency and accountability".

Aman et al., (2013) argued that the technology of e-government minimize the communication gap between government and people and allow for more interaction and enhance control over public administration as well as reduce corruption and allows for more transparency in offering service to public. They perceive e-government initiatives aimed at enhancing accountability as an emerging development. Accountability is a cornerstone for good governance. Although they highlighted the success elements of e-government such as leadership support, organizations size, internal audit, collaboration, and IT strategic planning, they did not focus on the mechanisms for accountability of e-government despite highlighting some dimensions of accountability such as transparency, responsibility, responsiveness and liability. The implementation of e-government systems presents numerous challenges, particularly in establishing the necessary infrastructure. Additionally, key concerns include availability, computer literacy, trust, accessibility, authentication, usability, and accountability, all of which significantly impact the effectiveness and adoption of e-government initiatives (Basamh et al., 2014). Barata et al., (2001) were trying to provide a means of improving government financial accountability by strengthening accounting records systems. Financial records should be viewed as a strategic resource to enhance accountability of governments. They focused on African countries and developed case study on Namibia by analysing accounting records and financial accountability. They were trying to establish good practice for managing financial records and provide tools to assess the effectiveness of record keeping systems. They argued that governments are allocating substantial resources to the development of modern financial management systems to enhance accountability and managerial efficiency. These initiatives often involve the digitization and integration of financial processes, encompassing budgeting, expenditure tracking, and auditing. However, numerous efforts to strengthen financial controls face challenges, resulting in implementation failures. Understanding the factors contributing to these setbacks is essential for stakeholders to improve the success rates of such projects.

METHODOLOGY

This study adopts a qualitative, conceptual research design, grounded in a systematic literature review approach. The objective is to develop a conceptual logical flowchart that synthesizes and organizes key concepts, processes, and relationships identified in existing academic literature. This methodology is appropriate for theory development and model proposition, particularly when empirical data collection is not the primary focus (Astalin, 2013).

A systematic literature review (SLR) was conducted to ensure a rigorous and transparent synthesis of relevant studies. The review process followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, which support reproducibility and methodological rigor (Tranfield et al., 2018).

A comprehensive search was carried out across multiple academic databases, including Scopus, research gate, Google Scholar, IEEE Xplore, using a combination of keywords related to "Zakat", "blockchain", "smart contract", "governance", "accountability". In evaluating the relevance of studies, the inclusion criteria were peer-reviewed journal articles, studies focused on blockchain technology, smart contract, accountability in e-government, studies that present models, frameworks, or theoretical constructs. A thematic analysis was then conducted to identify recurring themes and patterns. These themes informed the structure of the proposed logical flow chart, ensuring it reflects commonly recognized theoretical and practical relationships within the literature.

Research Conceptual Framework

Based on the synthesized findings, a conceptual logical flowchart is developed to represent the relationships and process flow among key concepts; mainly the Zakat collection and distribution using smart contract. The swimlane flowchart was iteratively refined for clarity, logical coherence, and alignment with the literature.

Using a swimlane flowchart for this Zakat management system is especially beneficial because it clearly delineates responsibilities across institutional actors—such as the Zakat payer, beneficiary, governance body, and

smart contract logic—while preserving the sequential integrity of the process. By organizing the flow into distinct lanes, it becomes easier to trace how data, decisions, and validations move between entities, which is critical for systems that enforce Shariah conformance, digital identity verification, and post-transfer spending governance. This structure not only enhances transparency and auditability but also supports modular development, allowing each lane to correspond to a discrete smart contract module or institutional role. For stakeholders ranging from regulators to technical architects, the swimlane format offers an intuitive and rigorous way to visualize accountability, detect bottlenecks, and ensure that ethical and operational safeguards are embedded throughout the Zakat lifecycle.

Operational Logic and Conformance Architecture of the Zakat Smart Contract

The Zakat payment flowchart outlines a structured sequence of operations designed to ensure secure, conformant, and efficient collection and disbursement of Zakat funds via a blockchain-based smart contract system. The proposed Zakat smart contract is designed to facilitate the distribution of Islamic charitable contributions exclusively to eligible beneficiaries. The process begins with the initiation of a payment request by a Zakat payer, who submits key inputs including their mobile number, national ID, Zakat category, wallet address, and payment amount.

Each input undergoes modular validation:

- The mobile number and national ID are verified against national databases to ensure authenticity and eligibility.
- The Zakat category is semantically mapped to recognized beneficiary classifications to confirm religious validity.
- The wallet address is checked for format integrity and prior registration.
- The payment amount is validated against regulatory thresholds (e.g., 2.5% of the total account balance)

Upon successful validation, the system invokes a Shariah conformance verification function, which assesses the transaction against predefined religious criteria. If conformant, a conformance token is issued and attached to the transaction metadata.

The smart contract then proceeds to execute the Zakat transfer, emitting a Zakat Payment Transferred event that includes a timestamp, transaction hash, and digital signature. This event is logged on the blockchain, creating an immutable audit trail.

If any validation step fails, the flowchart terminates the process with a rejection status, specifying the reason (e.g., unverified payer, invalid category). No funds are transferred in such cases, and the transaction is recorded as failed.

Throughout the process, security protocols such as multi-factor authentication (e.g., OTP or biometric verification) are enforced to prevent unauthorized access. The final state of each transaction—whether successful or rejected—is logged for governance and audit purposes.

Following the successful execution of the Zakat transfer, the system initiates a post-disbursement verification process to ensure that the beneficiary's use of funds remains conformant with Islamic legal and ethical standards. This process reinforces the integrity of the Zakat lifecycle by embedding spending governance into the smart contract framework.

The process begins with the retrieval of the beneficiary's profile, including their assigned beneficiary category, which determines the permissible scope of spending. The system then evaluates the beneficiary's intended use of the funds through a spending intent validation function. This function checks whether the proposed expenditure aligns with the beneficiary's classification (e.g., poor, indebted, wayfarer) and adheres to Shariah constraints. After verifying the spending intent, the beneficiary submits a spending declaration, which is recorded as metadata for audit purposes.

If the spending intent is deemed non-conformant to Shariah, the process terminates with a rejection status, and the transaction is flagged for governance review. If conformant, the system issues a Spending Token, which authorizes the beneficiary to utilize the funds for the declared purpose. This token is logged alongside the transaction metadata and shared with the governance dashboard for monitoring.

Subsequently, the system enters a utilization monitoring phase, where the beneficiary is required to submit proof of spending (e.g., receipts, service confirmations). The governance body reviews this data to verify conformance. If anomalies or misuse are detected, a Conformance Review is triggered, and the irregularity is recorded.

Upon successful verification of fund utilization, the system proceeds to finalize the audit trail. This includes updating the beneficiary's ledger, emitting a Spending Verified event on-chain, and archiving the transaction for future audits. This final stage ensures full traceability and supports transparent reporting to institutional stakeholders, regulators, and religious authorities.

The following textual flowchart delineates the sequential logic governing the transfer of Zakat funds from the Zakat payer's account to the beneficiary's account, followed by the post-disbursement verification process designed to ensure that all expenditures adhere strictly to the permissible uses defined by Islamic Shariah principles.

1. Initiate Process
- Trigger logic upon payer's request
- Generate TransactionSessionID for traceability

2. Input Parameters
- Required:
  - payerMobileNumber
  - beneficiaryMobileNumber
  - amount
  - category
  - payerNationalID, beneficiaryWalletID, authMethod (e.g. biometric, OTP)

3. Verify Payer Authentication
- Steps:
  - Validate payerMobileNumber format
  - Cross-check with linked NationalID or DigitalIdentityRegistry
  - Verify through selected authMethod (e.g. biometric match, OTP to mobile/email)
- Result:
  - All checks passed → Proceed
  - Fail → Terminate

4. Verify Beneficiary Authentication
- Steps:
  - Validate beneficiaryMobileNumber
  - Confirm identity via verified beneficiaryWalletID or social registry
  - Evaluate Zakat eligibility via EligibilityProofToken
- Result:
  - Valid & Eligible → Proceed
  - Fail → Terminate

5. Validate Payment Parameters
- Amount
  - amount > 0
  - Optional: Limit amount to predefined thresholds (e.g. amount=2.5% of total balance)
- Result:
  - Valid → Proceed
  - Invalid → Terminate

6. Validate Category Eligibility
- Check if category ∈ [0–7]
- Optional: Include semantic mapping to beneficiary category registry (linked to governance rules)
- Result:
  - Valid → Proceed
  - Invalid → Terminate

7. Verify Shariah Conformance
- Invoke verifyShariahConformance()
  - Evaluate transaction structure, beneficiary status, and payer status
  - Generate ShariahConformanceToken
- Result:
  - Token issued → Proceed
  - Non-compliant → Terminate

8. Log Audit Trail
- Actions:
- Record transaction in ZakatAuditLedger
- Include the following information:
  - Timestamp
  - SessionID
  - ConformanceToken
  - Payer/Beneficiary hashes

- Digital signatures

9. Execute Transfer

- Conditions:
  - Smart contract validates all credentials
  - Transfer amount from payerAccount to beneficiaryAccount
- Emit: Event ZakatPaymentTransferred

10. Initiate Spending Verification

- Triggered post-transfer
- Beneficiary submits SpendingDeclaration

11. Validate Spending Intent

- Retrieve beneficiary profile and assigned beneficiary category
- Invoke verifySpendingIntent()
  - Evaluate intended use aligns with beneficiary's category
  - Spending adheres to Shariah constraints
- Result:
- Conformant → Proceed
- Non-conformant → Terminate

12. Authorize Disbursement

- Issue SpendingToken bound to verified purpose
- Log:
  - Beneficiary ID
  - Category
  - Declared purpose
- Notify:
- Governance dashboard for oversight

13. Monitor Utilization

- Beneficiary submits proof (e.g. receipts, confirmations)
- Governance body reviews for compliance
- Flag anomalies or misuse

14. Finalize Audit Trail

- Record spending verification
- Update beneficiary ledger
- Emit: Event SpendingVerified
- Archive transaction for institutional audit

Logical Flowchart of blockchain-enabled Smart Contract of Zakat Distribution

Building upon the preceding logical steps, the proposed logical flowchart is designed to visually represent the sequential process (Fig. 1).

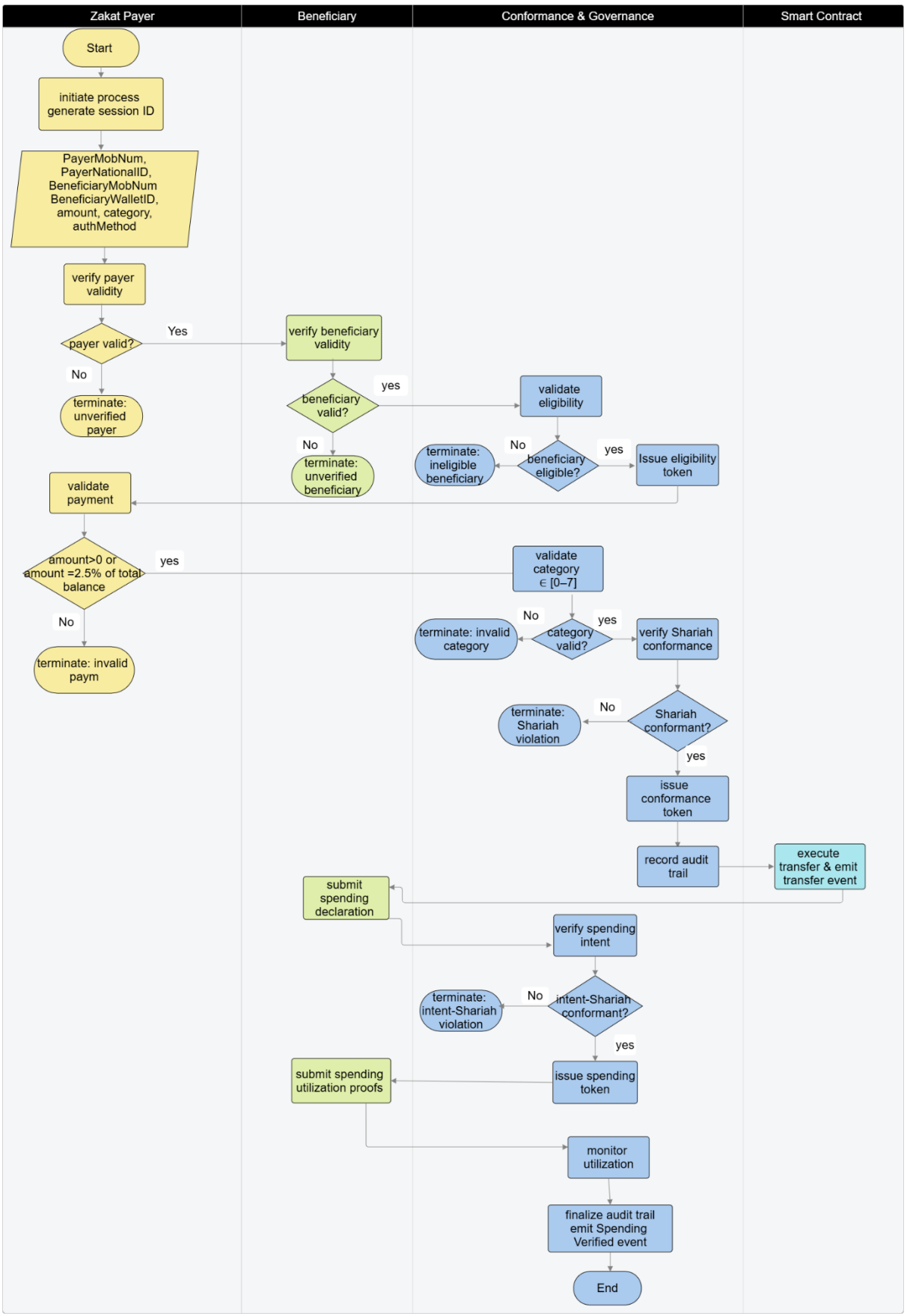

Fig. 1: Flowchart of blockchain-enabled Smart Contract of Zakat

Layered Architecture of the Zakat Payment System

The proposed Zakat management system is structured into five interdependent layers, each corresponding to a distinct phase in the payment flowchart. Together, these layers ensure secure, Shariah-conformant, and institutionally accountable Zakat distribution.

Identity and Authentication Layer

This foundational layer initiates the flow by validating the identities of both the Zakat payers and beneficiaries through mobile number verification, national ID cross-checks, and multi-factor authentication (e.g., biometric or OTP). These mechanisms correspond to the flowchart's "Verify Payer Validity and Verify Beneficiary Validity" phases, mitigating fraud, enforcing eligibility, and establishing trust in digital identity frameworks prior to any disbursement or spending authorization.

Eligibility and Conformance Layer

Building on authenticated identities, this layer applies Shariah conformance checks via the verify Shariah Conformance function. It semantically maps the selected Zakat category to one of the eight beneficiary groups identified by Shariah and issues a Conformance Token upon successful validation. This aligns with the flowchart's "Verify Shariah Conformance" phase, ensuring that intended expenditures are jurisprudentially sound and category-specific constraints are respected before disbursement.

Transaction Execution Layer

This layer governs the core payment logic, including validation of amount, enforcement of categorical constraints, and execution of fund transfers via smart contract functions. It mirrors the flowchart's "Execute Transfer" phase, embedding automation, error handling, and accountability into the transaction lifecycle. Upon approval, a Spending Token is issued to the beneficiary, enabling traceable and purpose-bound utilization.

Governance and Oversight Layer

Operating above the transactional logic, this layer aligns operational decisions with Islamic legal principles and regional regulatory standards. It defines the roles of governance bodies, dispute resolution protocols, and conformance thresholds. In the flowchart, this layer is reflected in the "Monitor Utilization" phase, where governance entities review submitted proofs, flag anomalies, and intervene in cases of misuse or non-conformance.

Audit and Feedback Layer

The final layer ensures post-transaction transparency through immutable audit trails, event emissions (e.g., Zakat payment Transferred, Spending Verified), and conformance alerts. These outputs correspond to the flowchart's "Finalize Audit Trail" phase, supporting institutional oversight, regulator engagement, and continuous system refinement. This layer guarantees traceability, non-repudiation, and the ethical closure of each Zakat transaction.

ANALYSIS AND DISCUSSION

The model operationalizes Zakat collection and disbursement via smart contracts, embedding Shariah agreement as a regulatory layer. The flowchart outlines a multi-step verification process that governs Zakat payer and beneficiary validity, transaction amount, category, and conformance—all prior to fund transfer. This reflects a procedural rigor congruent with Islamic jurisprudence and digital trust frameworks.

This model aims to add value and benefits to the key elements of the blockchain zakat collection and distribution governance. The key elements are accuracy and efficiency, accountability and transparency, legal and regulatory conformance and finally security and transaction finality.

Accuracy and Efficiency

The flowchart demonstrates a high degree of procedural precision through modular validation logic, which independently verifies inputs such as mobile number, national ID, and Zakat category. The integration of mobile identity with verified Zakat accounts enhances both accessibility and transactional traceability, particularly within

underserved populations. Simultaneously, the system establishes a scalable framework for decentralized identity management. Furthermore, a categorical filtering mechanism restricts transactions to valid categories ensuring appropriate allocation and minimizing potential misclassification. These categories correspond to the eight beneficiary groups explicitly delineated under Islamic Shariah. Blockchain technology offers substantial potential to enhance the efficiency of Zakat administration by leveraging smart contracts to automate the distribution of funds in accordance with predefined conditions. This automation mitigates the need for manual intervention, thereby improving efficiency and reducing the likelihood of human error (Alam et al., 2019). Additionally, the integration of automated Shariah conformance checks via tokenization streamlines religious vetting, reducing manual overhead and improving operational scalability. These features collectively enhance data integrity, reduce latency, and support scalability in high-volume Zakat systems.

Accountability and Transparency

The flowchart embeds mechanisms for traceability and stakeholder visibility. Audit trails include session identifiers, timestamps, and cryptographic hashes, enabling forensic-level tracking. The emission of smart contract events (e.g., Zakat Payment Transferred) provides real-time observability for external stakeholders. Explicit rejection paths are labelled and terminate with clear status, facilitating error accountability and system diagnostics. The incorporation of blockchain technology substantially enhances accountability and transparency by facilitating tamper-resistant documentation of financial transactions, including the inflow, outflow, and distribution of Zakat funds. These immutable audit trails enable robust oversight and regulatory conformance. Furthermore, the system supports real-time monitoring of Zakat disbursements, allowing donors to track the allocation and utilization of their contributions, which fosters participatory governance and strengthens institutional trust. Such transparency not only assures donors of accurate fund deployment but also cultivates deeper engagement and may incentivize higher levels of giving (Sabri et al., 2025). These elements foster institutional trust, enable real-time monitoring, and support post-hoc audits and governance reporting.

Legal and Regulatory Conformance

Guided by Islamic Shariah governance principles, the model integrates a smart verification layer—implemented through a Shariah Conformant function—as an embedded regulatory mechanism to uphold religious accountability and institutional trust. This layer operationalizes the core pillars of Shariah governance: oversight, transparency, and conformance. Transactions that fail to meet predefined Shariah criteria are automatically excluded through a transparent logic flow, reinforcing system integrity and replicating the screening functions typically performed by Shariah supervisory boards. The model verifies the beneficiary's spending intent to ensure that Zakat disbursement adheres strictly to Shariah rules. Modular embedding of Shariah parameters enables contextual adaptability across regulatory environments, while actively preventing allocation of Zakat to prohibited activities such as interest-bearing loans and speculative transactions (Abdallah and Bahloul, 2021). Optional threshold checks on transaction amounts further enhance regulatory oversight. The issuance of a Shariah Conformance Token formalizes religious vetting, serving as a digital attestation of compliance. Collectively, these controls facilitate regulatory coherence and mitigate legal risk.

Security and Transaction Finality

The integration of smart contracts within zakat fund management offers a transformative mechanism for improving administrative efficiency and procedural equity. By automating conformance with Shariah-aligned disbursement protocols, smart contracts reduce manual intervention and mitigate potential delays. Simultaneously, blockchain technology provides a cryptographically secured and decentralized infrastructure wherein each transaction is authenticated, immutably recorded, and synchronized across distributed network nodes. This design fosters transparency, enhances auditability, and safeguards against unauthorized access (Faccia and Mosteanu, 2019). As Rabbani et al., (2020) emphasize, blockchain's immutable architecture ensures high transactional accuracy, with records becoming tamper-proof once validated. Building on this foundation, Farooq et al. (2020) recommend incorporating cryptocurrency as a cross-border medium of exchange to bolster financial inclusion and operational scalability. Platforms such as Bitcoin allow real-time tracking of zakat disbursements (Saleh et al., 2019), providing donors with greater visibility into fund allocation processes and beneficiary engagement, thereby reinforcing institutional accountability and trust. Security is reinforced through multi-factor authentication mechanisms, including biometric and OTP verification, which mitigate identity spoofing and unauthorized access. Immutable ledger logging ensures tamper-proof audit trails. The atomic execution of smart contracts guarantees transaction finality, preventing rollback or double-spending. These features strengthen cybersecurity posture, guarantee non-repudiation, and enhance system resilience against fraud and compromise.

Table 5.1 summarizes governance alignment with the flowchart features highlighting their impact.

Governance Pillar	Flowchart Features	Impact
Accuracy and Efficiency	Modular validation, semantic mapping, automated conformance checks	High precision, low latency, scalable architecture
Accountability and Transparency	Audit trail, event emission, explicit rejection states	Institutional trust, traceability, stakeholder visibility
Legal and Regulatory Conformance	Category validation, regulatory thresholds, Shariah conformance token	regulatory alignment, reduced legal risk, cross-border readiness
Security and Transaction Finality	Multi-factor auth, immutable logs, atomic smart contract execution	Strong security, non-refutation, fraud resistance

Table 5.1 Summary of Governance Alignment

CONCLUSION

This study contributes to the evolving discourse on digital governance by demonstrating how blockchain-enabled smart contracts can transform Zakat management systems through enhanced efficiency, transparency, and Shariah-conformant oversight. By critically analysing existing governance challenges within traditional Zakat distribution framework, this study underscores the value of decentralized technologies in mitigating corruption and reinforcing institutional trust. The integration of blockchain-powered smart contracts can significantly enhance the efficiency and transparency of Zakat management systems. Smart contracts can automate the collection and distribution of Zakat according to set criteria, without the need for a third-party involvement. The structured flowchart developed herein delineates the procedural logic required for the secure and conformant transfer of Zakat payments, effectively integrating stakeholders through an auditable and automated system. These contributions not only advance technical innovation in Islamic financial governance but also provide a replicable model for broader e-governance applications in faith-based charitable systems.

Limitations

While the digitalization of Zakat through smart contracts presents transformative potential—modernizing a traditionally manual and fragmented system—the current flowchart does not include smart contract logic for post-Zakat disbursement governance. This omission is because effective post-disbursement verification and ethical compliance require integration with third-party institutions that will accept the Zakat payments and that must be onboarded into the blockchain platform. Without their participation, automated enforcement of spending constraints and audit trails beyond the initial transfer remains technically unfeasible.

Despite this, blockchain's decentralized architecture offers immutable, transparent records of Zakat transactions, enhancing trust and traceability at the point of payment. The broader success of such systems depends on sustained interdisciplinary research, cross-sector collaboration, and alignment with governance frameworks like the Sustainable Development Goals (SDGs). Therefore, future research should prioritize ethical data practices to protect beneficiary dignity and institutional integrity and Cross-border Zakat governance models. These directions will be essential to evolve blockchain-enabled Zakat platforms into resilient, auditable, and ethically robust infrastructures.

REFERENCES

Alam, N., Gupta, L., and Zameni, A., (2019)., Smart contract and Islamic finance. In Fintech and Islamic Finance: Digitalization, Development and Disruption (pp. 119-135). Cham: Springer International Publishing.

Alzaidan. O., (2024)., Technological Transformation for the Collection of Zakat, Tax and Custom in Saudi Arabia. International Journal of Integrated Science and Technology, 2(2), 121-134.

Aman, A., Al-Shbail, T., and Mohammed, Z., (2013), Enhancing Public Organizations Accountability through E-Government Systems. International Journal of Conceptions on Management and Social Sciences. 1(1), pp.15-21.

Astalin, P. K. (2013)., Qualitative research designs: A conceptual framework. International journal of social science & interdisciplinary research, 2(1), pp.118-124.

Barata, K., Bennett, R., Cain, P. and Routledge, D., (2001)., From Accounting to Accountability: Managing Financial Records as a Strategic Resource Namibia: A Case Study, International Records Management Trust Rights and Records Institute, World Bank info DEV Programme, London, UK.

Basamh, S., Qudaih, H., and Suhaimi, M., (2014)., E-Government Implementation in the Kingdom of Saudi Arabia: An Exploratory Study on Current Practices, Obstacles & Challenges. International Journal of Humanities and Social Science, 4(2), pp. 296-300.

Abdallah, M., and Bahloul, S. (2021)., Disclosure, Shariah governance and financial performance in Islamic banks. Asian Journal of Economics and Banking, 5(3), pp. 234-254.

Khatiman, M. N. A., Bin Ismail, M. S., and Yahya, N. (2021)., Blockchain-based Zakat collection to overcome the trust issues of Zakat payers. International Journal on Perceptive and Cognitive Computing, 7(1), pp. 53-58.

Faccia, A., and Mosteanu, N. R. (2019)., Accounting and blockchain technology: from double-entry to triple-entry. The Business & Management Review, 10(2), pp. 108-116.

Farooq, M. S., Khan, M., and Abid, A., (2020). A framework to make charity collection transparent and auditable using blockchain technology. Computers & Electrical Engineering, 83, 106588.

Hanisch, M., Goldsby, C., Fabian a, N., and Jana Oehmichen., (2023), Digital governance: A conceptual framework and research agenda. Journal of Business Research, 162, pp. 1-13.

Hashim, N., Azri Bhari, I. A., Ashrof, M., Yaakob, Z., Yusof, M. F. M., Rosli, N., and Nurrachmi, I. (2024), Issues and Challenges in Zakat Management in Malaysian Public Higher Educational Institution.

Hoque, N., Khan, M. A., and Mohammad, K. D. (2015)., Poverty alleviation by Zakah in a transitional economy: a small business entrepreneurial framework. Journal of Global Entrepreneurship Research, 5(1), 7, pp.1-20.

Ismail, N. L., Ismail, Z., Musa, O., and Loy, C. K. (2023)., Malaysia zakat smart contract architectural framework design. International Journal of Academic Research in Business and Social Sciences, 13(5), pp. 2653-2678.

Kumar, A., (2003)., E-Government and Efficiency, Accountability, and Transparency. The Electronic Journal of Information systems in developing Countries, pp.1-5.

Mohiuddin, A., and Abolola, I. (2025)., Blockchain Technology for Efficient Zakat Management in India: An Exploratory Study. JKAU: Islamic Econ., 38(1), pp. 95-120.

Mokodenseho, S., Syafri, M., Hasrullah, H., and Judijanto, L. (2023)., Utilizing Blockchain Technology to Increase Transparency in Zakat Management. West Science Islamic Studies, 1(01), pp. 1-9.

Nazeri, A. N. N., Nor, S. M., Rahman, A. A., Majid, M. A., Hamid, A., and Ngayesah, S. (2023)., Exploration of a new zakat management system empowered by blockchain technology in Malaysia. ISRA international journal of islamic finance, 15(4), pp. 127-147.

Rabbani, M. R., Khan, S., and Thalassinos, E. I. (2020). FinTech, blockchain and Islamic finance: An extensive literature review. Journal of Economics and Business Administration, 8(2), pp. 65-86

Rejeb, D., (2020)., Blockchain and Smart Contract Application for Zakat Institution: A Conceptual Study. International Journal of Zakat, Vol. 5(3), pp. 20-29.

Tranfield, D., Denyer, D., and Smart, P. (2003)., Towards a methodology for developing evidence - informed management knowledge by means of systematic review. British journal of management, 14(3), pp. 207-222.

Sabri, A. S. M., Saquib, M. N., Anwar, A., Hazlan, A. S., and Zeki, A. M. (2025)., The Future of Zakat in Blockchain Era: Opportunities and Implementation Challenges. International Journal on Islamic Applications in Computer Science and Technology, 13(1)

Saleh, M., Sulistiyo, A. B., Hisamuddin, N., and Roziq, A. (2019)., Reconstruction of profit-sharing scheme and cooperation model between sharia rural bank and zakat management organization for micro enterprises financing in Indonesia. International Journal of Scientific & Technology Research, 8(10), pp. 732-737.

Wong, W., and Welch, E., (2004)., Does E-Government Promote Accountability? A Comparative Analysis of Website Openness and Government Accountability, Governance. An International Journal of Policy, Administration, and Institutions, 17(2), pp. 275–297.

Yang, C., Gu, M., and Albitar, K. (2024)., Government in the digital age: Exploring the impact of digital transformation on governmental efficiency. Technological Forecasting and Social Change, 208, 123722.

Zulfikri, Z., Kassim, S., and Othman, A. H. (2023)., A conceptual framework of the blockchain technology adoption for Zakat institution in Indonesia. European Journal of Islamic Finance, 10 (1), pp. 16-23.

