

The Newly Developed of Blockchain Architecture on Zakat Collection in Malaysia: A Case in MAIWP-PPZ, Malaysia

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Abstract

Purpose: This study concentrates on the integration of blockchain technology into the existing zakat management framework in Malaysia, specifically within the PPZ-MAIWP context. The introduction of blockchain technology offers a promising avenue for revitalizing zakat institutions. It enables real-time tracking, monitoring, reporting, and verification of zakat fund utilization, facilitating a comprehensive assessment of its impact and promoting strong governance within these institutions.

Design/methodology/approach: The research methodology employed for developing the blockchain architecture for zakat collection within PPZ-MAIWP consists of three distinct stages which are assessing the existing of manual standard operating procedure (SOP) on zakat collection, the interview sessions with officer in PPZ-MAIWP for digitalization of current SOP and the development of zakat collection blockchain architecture.

Findings: The implementation of blockchain technology, in conjunction with smart contracts, empowers zakat institutions to actively contribute to the economic development of Malaysia and the broader Muslim world. While still in its early stages in the Malaysian Islamic social finance sector, blockchain has already demonstrated its potential to reshape the global financial landscape.

Research limitations/implications: The study suggests that integrating blockchain technology into zakat management has far-reaching implications for improving the effectiveness, transparency, and fairness of zakat collection processes, ultimately contributing to the socio-economic development of Muslim communities while promoting the sustainable development goals (SDGs). Additionally, it highlights the transformative potential of blockchain technology in the broader financial domain.

Practical implications: The practical implications of integrating blockchain technology into zakat management are multifaceted. They encompass improved collection and distribution, enhanced donor confidence, fairness in fund allocation, efficient monitoring and reporting, comprehensive impact assessments, strong governance, contributions to economic development, and the potential to reshape global finance. These implications collectively contribute to the revitalization of zakat institutions and the advancement of socio-economic equality within Muslim communities.

Originality/value: The study's originality stems from its innovative approach to zakat management by integrating blockchain and smart contracts, its focus on financial inclusion and equality, its emphasis on real-time tracking and comprehensive impact assessment, and its recognition of the global implications of blockchain adoption in zakat management.

Keywords: Blockchain Architecture; FinTech; Islamic Finance; Zakat; SDG

Introduction

Islamic social finance (ISF) has stood as a foundational pillar of Islam for over 1,440 years, encompassing a range of practices including almsgiving (zakat), endowment (aqwaf), charity (sadaqa), benevolent loans (Qard Hassan), and microfinance. Notably, zakat holds immense potential, exemplified by the Islamic Development Bank Group (IsDB) estimating its annual collection potential to reach as high as US\$1 trillion (Rehman, A., 2019). This substantial resource allocation to zakat has far-reaching implications, impacting sectors such as education, healthcare, social welfare, and public infrastructure, primarily benefiting the marginalized and underserved populations, thus contributing to the Sustainable Development Goals (SDGs), particularly SDG1 (No Poverty), SDG2 (Zero Hunger), SDG3 (Good Health and Wellbeing), SDG4 (Quality Education), SDG5 (Gender Equality), SDG8 (Decent Work and Economic Growth), and SDG17 (Partnerships for the Goals).

The synergy between ISF and the digital economy presents a compelling opportunity for both Muslim and non-Muslim communities. The convergence of interests stems from the shared pursuit of restoring transparency, trust, and confidence within financial systems. While some envision a landscape free from intermediaries, others seek expedited and more streamlined transaction mechanisms. A survey by PwC in 2018 revealed that 84% of surveyed executives from 15 regions reported substantial engagement with blockchain technology due to its potential to enhance transparency and traceability across various business processes. Forecasts suggest that by 2030, upwards of US\$3 trillion—equivalent to 10% to 20% of global economic infrastructure—could be managed through blockchain systems. This trajectory aligns with the findings of Sinha and Chowdhury (2021), highlighting the robust security and interconnectivity of data through Smart Contracts, forming chains of technical elements (Gohil and Thakker, 2021), thus augmenting its applicability across diverse business sectors.

Within the realm of ISF, zakat institutions play a pivotal role in advancing Islamic economic systems. The core objective of zakat is to foster socio-economic equity by redistributing wealth from contributors (zakat payers) to beneficiaries in alignment with Sharia principles. Achieving this objective necessitates the optimization of zakat collection and distribution, thereby emphasizing the importance of efficient zakat management. With the rapid evolution of technology, notably the emergence of blockchain technology, the processes of zakat collection and distribution can be significantly enhanced and monitored (Ahmed & Zakaria, 2021), addressing a spectrum of socio-economic concerns. These span from poverty alleviation, employment generation, and economic disparity reduction to equitable wealth and income distribution, social justice promotion, financial inclusion, and comprehensive human development, all bolstered by the systematic integration of blockchain technology.

Blockchain technology, with its inherent peer-to-peer transaction system based on a fully distributed autonomous process, particularly through the implementation of hyperledger fabric smart contracts (Sheth and Subramanian, 2020), holds specific advantages for zakat institutions. Functioning as a decentralized, tamper-proof ledger system, blockchain ensures transparency and reliability in data exchange and transaction execution. The incorporation of smart contracts within zakat transactions enhances effectiveness, transparency, and trust, subsequently elevating overall zakat collection on regional and national levels (Mohd Nor et al., 2021). As such, hyperledger fabric smart contracts within zakat operations contribute to transparent, trustworthy, traceable transactions—from donors (muzakki) to the State Islamic Religious Council (Majlis Agama Islam Negeri) to beneficiaries (mustahik)—propelling zakat instruments as Sharia-compliant products and services.

Furthermore, this technology permits the integration of contract terms and conditions for both donors and beneficiaries within the blockchain. This integration is facilitated by the newly-developed blockchain architecture on the hyperledger fabric platform. The prevalent reliance on physical documents and accounting software for zakat transactions leads to inefficiencies, delays, errors, and susceptibility to fraudulent activities. This motivated our study to develop a zakat blockchain architecture that champions transparency, accountability, efficiency, and productivity. Current methods, predominantly anchored in physical documents, are susceptible to risks stemming from delays, inefficiencies, and potential mismanagement (Kuanova et al., 2021). Hence, the digital economy offers an avenue for Muslims and non-Muslims to cultivate integrity, trust, and confidence in financial systems (Chong, 2021).

The paper's structure is as follows: the ensuing section reviews prior research pertaining to zakat management in Malaysia and review previous attempts to integrate blockchain technology into charitable giving and financial systems. Subsequently, the research methodology delineates two principal stages, elucidating the results attained from each stage. Finally, the paper concludes by summarizing the research findings and offering recommendations for future exploration.

Literature Review

Zakat Administration in Malaysia

Zakat administration in Malaysia is governed by various institutions and regulations. The Federal Territory Islamic Religious Council (MAIWP) and the State Islamic Religious Councils (SIRCs) are responsible for overseeing the collection, distribution, and management of Zakat funds in the country. These institutions ensure that the process is carried out efficiently and in accordance with Islamic principles. The Zakat Collection Centers (PPZs) established by the religious councils play a pivotal role in collecting Zakat from individuals and businesses, ensuring compliance with Zakat obligations (Ahmad & Alias, 2016). The administration of zakat in Malaysia is guided by the Islamic Religious Administration Enactments, which provide a legal framework for the management of Islamic affairs, including zakat. These enactments outline the eligibility criteria for zakat payers, the calculation of zakat amounts, and the disbursement of zakat funds to eligible recipients. It sets guidelines for the proper utilization and allocation of zakat funds to various categories of beneficiaries, such as the poor, needy, and other deserving individuals (Khatiman et. al., 2021).

Transparency and accountability are key principles in zakat administration in Malaysia. The regulatory bodies and PPZs are required to maintain detailed records and conduct regular audits to ensure that zakat funds are managed appropriately (Ahmad & Alias, 2016). Additionally, efforts are made to educate the public about zakat regulations, its significance, and the impact it can have on the community. This helps to build trust among zakat payers, as they have confidence that their contributions are being utilized in accordance with Islamic principles and for the benefit of those in need.

Challenges and Issues in Zakat Administration

Zakat administration in Malaysia faces numerous challenges and issues, ranging from trust and transparency issues to inconsistency in zakat collection practices across different states and regions, that need to be addressed to ensure effective and efficient collection of zakat funds. This section highlights some of the key challenges faced in zakat administration in Malaysia and discusses the importance of addressing these issues for a robust zakat system.

The issue of trust and transparency has become a significant concern in zakat administration, and there is a growing demand for greater transparency and accountability in zakat collection. The lack of trust and transparency in zakat administration can lead to a decrease in public confidence, which could ultimately undermine the effectiveness of the zakat system. (Ahmed et al., 2019). Ensuring trust and transparency in zakat administration is crucial to maintain the confidence of zakat payers. There have been concerns about the proper utilization and distribution of zakat funds, which may lead to hesitancy among potential contributors. (Khatiman, et. al., 2021). Zakat payers may be concerned about the proper allocation and distribution of their contributions, and without clear mechanisms for tracking the funds, trust may be compromised (Abdullah, S., 2017). Insufficient information disclosure can undermine trust in zakat fund management. Transparency requires clear and accessible information regarding the collection, distribution, and impact of zakat funds. Establishing comprehensive reporting frameworks, regular audits and publicly sharing information on fund utilization, beneficiaries, and projects funded can enhance transparency and strengthen public trust in the system (Khatiman, 2021).

Inconsistency in zakat collection practices across different states and regions in Malaysia is another significant issue in Zakat administration. Inconsistency in zakat collection practices across states and regions in Malaysia creates challenges in achieving equitable distribution and fairness in the administration of zakat (Haron et al., 2019). Variations in collection methodologies, eligibility criteria, and distribution mechanisms contribute to disparities in zakat administration (Alias et al., 2017). This inconsistency is primarily due to the differing interpretations of zakat laws and regulations, and the lack of standardization in zakat collection practices across the country. This has resulted in confusion among zakat payers, leading to a lack of compliance and trust in the zakat system. (Yusoff et al., 2015).

Enhancing the operational efficiency of zakat administration is also an issue that needs to be addressed. The current manual and paper-based system of zakat collection and distribution is time-consuming, inefficient, and prone to errors and corruption. Therefore, there is a need for greater automation and technology adoption in zakat administration to improve efficiency, reduce costs, and increase transparency. (Al-Jamal & Mahmood, 2019). Khatiman et. al, 2021 suggest streamlining administrative processes, utilizing technology solutions, and implementing efficient management systems can help reduce administrative bottlenecks and improve the overall efficiency of zakat administration. Automation and digitization can optimize resource allocation, improve data management, and enhance service quality in zakat administration.

Data management and integration issue in zakat is another concern in zakat administration, where data collection, storage, and management systems are not standardized across different states and regions. The lack of integration and standardization in zakat data management systems leads to data inconsistencies, errors, and duplication, which hampers the efficiency and effectiveness of zakat administration. (Kamaruddin et al., 2018). Addressing these issues requires the implementation of robust data management systems, integration of data across platforms, and ensuring data privacy and security (Jalil et al., 2020). Implementing centralized databases and robust information systems can facilitate better data management and analysis (Ahmad & Alias, 2016).

Ensuring accountability in zakat administration is crucial to prevent mismanagement and corruption. The lack of accountability and monitoring mechanisms in zakat collection and distribution can lead to corruption, embezzlement, and misuse of zakat funds, which can erode public trust in the zakat system. Challenges may also arise from inadequate monitoring and

evaluation mechanisms, lack of proper audit procedures, and limited public reporting (Ali et al., 2020). To strengthen accountability, establishing independent auditing bodies, implementing rigorous internal control mechanisms, and enhancing public reporting practices are crucial (Abdullah et al., 2017). Regular audits, transparent financial reporting, and public access to information promote accountability and enhance public trust in zakat administration. Therefore, there is a need for greater accountability and transparency in zakat administration to ensure the proper use and distribution of zakat funds. (Ahmed et al., 2019).

Effective governance is essential for ensuring transparency, fairness, and efficiency in zakat administration. Challenges such as weak governance structures, insufficient regulatory frameworks, and limited stakeholder involvement can hinder effective governance (Shaharuddin et al., 2021). Lack of proper governance mechanisms can lead to poor decision-making, corruption, and mismanagement of zakat funds. There is a need for clear and transparent governance structures and processes in Zakat administration to ensure effective and efficient use of zakat funds and promote public trust and confidence in the zakat system. (Yusoff et al., 2015). Addressing these issues requires the establishment of clear roles and responsibilities, ensuring the independence of regulatory bodies, and engaging stakeholders in decision-making processes (Ahmad et al., 2016). Strengthening governance frameworks promotes accountability, transparency, and efficient resource management in zakat administration.

In conclusion, zakat administration in Malaysia faces several challenges and issues that need to be addressed to ensure the effective and efficient use of zakat funds. These issues include trust and transparency, inconsistency in zakat collection practices across different states and regions, enhancing operational efficiency, data management and integration, accountability, and governance. Blockchain technology presents a promising solution to overcome these obstacles and enhance the efficiency and effectiveness of zakat administration. The adoption of blockchain technology in zakat administration holds great potential in addressing the challenges. By leveraging the unique features of blockchain, Malaysia can significantly enhance the effectiveness, fairness, and credibility of its zakat system, ultimately ensuring the efficient utilization of zakat funds to support the socio-economic development of the nation.

Blockchain

Blockchain functions as an openly distributed database that executes transactions within a decentralized ledger (Rizal et al., 2017). It constitutes a public digital ledger that operates in a decentralized manner and encompasses all cryptocurrency-related transactions (Tapscott & Tapscott, 2016). This publicly accessible ledger facilitates the tracking of digital currency transactions without reliance on a central repository. To elaborate, this technological framework entails a sequential series of transactions between users, securely stored in blocks. These blocks encapsulate specific data quantities, employing cryptographic hashing for encryption. When users within the established blockchain intend to engage in transactions, they communicate with all network participants to collectively validate the transaction's authenticity. Furthermore, each node, representing a connected computer in the network, automatically acquires a copy of the blockchain (Gohil and Thakker, 2021).

In essence, blockchain is synonymous with distributed ledger technology (DLT) (Vukolić, 2017). Each new transaction is encapsulated as a 'block' and subsequently integrated into the blockchain, constituting a comprehensive ledger of transactions (Yaakob et al., 2019). Consequently, the convergence of Islamic social finance and fintech presents Muslims with a

novel avenue to explore this technology, particularly to ensure that transactions align with Shariah compliance.

Figure 1 presented below provides a visualization of the operational mechanism of blockchain. The illustration succinctly demonstrates the sequential process: when a user instigates a transaction encompassing asset transfer, record modifications, or other data updates, this specific transaction is disseminated across the network associated with the user. Upon receipt, a consortium of validator nodes assumes the responsibility of ascertaining the transaction's validity before embarking on the creation of a new block. Ultimately, this sequence culminates in the successful execution of a blockchain transaction for validated operations. Furthermore, each individual blockchain transaction undergoes a meticulous authentication and validation process, facilitated by the nodes situated within the blockchain network, utilizing encryption methods. Consequently, within the established blockchain, every user possesses an exclusive cryptographic "hash" key, ensuring their partial anonymity (Muhammad Nur Aqmal, et al., 2021). This cryptographic identifier serves as a reference point for the users, preserving their identification for future referencing purposes.

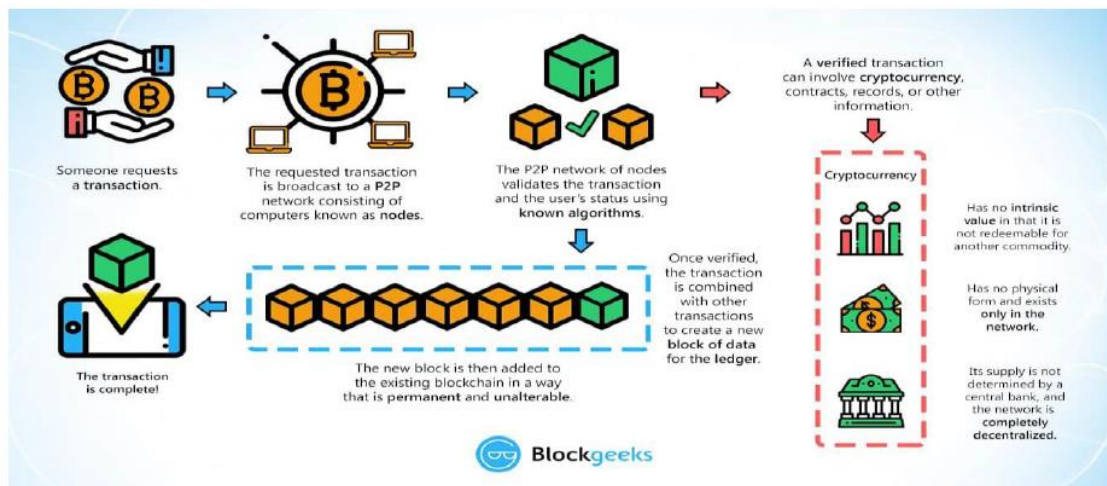


Figure 1: The Operational Mechanism of Blockchain Technology

Smart Contract

Smart contracts possess the capability to authorize permissions, execute designated orders, and adhere to predefined conditions. These contracts function autonomously, are immutable, and can be widely disseminated. Solidity, a programming language, is used to script these smart contracts, functioning as a contract repository akin to the storage of transactions in a blockchain (Rane and Thakker, 2019). A smart contract is essentially a computer program entrenched within the blockchain system, characterized by its inviolability and distribution. Once a smart contract is formulated and stored within the blockchain, altering the contract code becomes arduous. Every participant in the chain sanctions the outcome of executed transactions. Notably, the features of smart contract in the blockchain framework confer the capability to program the blockchain for transaction management among participants, decision-making, and data generation (Banerjee et al., 2018).

Furthermore, smart contracts possess self-governing and self-executing attributes, facilitating self-sustained payment operations. They can establish function libraries and possess the capacity to endorse actions. The credibility of process execution is guaranteed by embedding business operations into smart contracts, which establish a dependable rapport between

untrusted parties, alongside reliance on information drawn from agreements with business partners who opt for service transactions within various business processes (Xu and Viriyasitavat, 2019). These smart contracts hold the ability to determine business logic, functioning coherently through three key facets: a) regulations for storage, b) rules for authorization, and c) rules executed independently.

The integration of blockchain technology within smart contracts offers the potential for delivery platforms and payment systems to operate cohesively throughout entire organizations, unifying logistic providers and other chain participants. Notably, the standout feature of blockchain within smart contracts is the ability to facilitate "trustless" transactions. Smart contracts proficiently oversee implementation, management, accomplishment, and remuneration. Acting as digital agreements within a network, smart contracts substantially diminish time and costs associated with manual contract management. They also extend their application to scenarios encompassing probabilities, pre-contract automatic access systems, and a spectrum spanning from e-commerce to autonomous transactional mechanisms (Sulkowski, 2019). The fusion of smart contracts and blockchain is set to redefine numerous industries and business operations by enabling automated electronic transactions, thereby reducing human intervention (Stefansson, 2002).

Furthermore, a smart contract, operationalized electronically through algorithms, is an agreement or regulation stored within the blockchain that triggers automatic execution for select transactions (Manav, 2017). Diverse types of blockchain enable computational programs to enact transactions upon fulfillment of conditions stipulated in smart contracts. The overarching objective of smart contracts remains fostering trust and streamlining transaction processing (Manav, 2017).

In addition, smart contracts facilitate registration for various product types within ledgers, effectively certifying ownership of all products or components. This practice engenders trust among chain members. Critical investment contracts of organizations, including terms, fund agreements, collaborative documents, production records, and cooperative accords, find direct storage within the blockchain server via smart contracts. These crucial documents are encrypted and made accessible to relevant parties through blockchain in a secure manner. The traditional method of physically managing and storing contracts can be seamlessly resolved through the amalgamation of smart contracts and blockchain (Reyna et al., 2018). Digitized smart contracts, operating autonomously, assist organizations in reducing costs associated with legal teams. Organizations can curtail expenditures on wages for personnel responsible for contract renewal, approval, tax audits, and compliance monitoring. With appropriate utilization of blockchain and smart contracts, corporations can mitigate legal penalties, late tax payment deductions, and minimize instances of forgery and fraud.

Zakat institutions stand to benefit from blockchain technology, as it furnishes a peer-to-peer transaction system supported by wholly distributed autonomous processes, chiefly through the implementation of smart contracts. Additionally, the end-to-end transaction features encompass data distribution and act as gatekeepers for automated data access, particularly when employing the smart contract method (Sheth and Subramanian, 2020). This resonates well with the need to foster trust in zakat transactions, offering a more transparent, dependable, and credible approach, ultimately driving an upsurge in zakat collection.

Integration Blockchain Technology into Charitable Giving and Financial Systems

Blockchain technology has emerged as a transformative force with the potential to reshape various sectors, including charitable giving and financial systems. Its decentralized and transparent nature offers new avenues for improving accountability, security, and efficiency.

Blockchain in Charitable Giving: Blockchain's application in charitable giving has attracted significant attention due to its capacity to enhance transparency and trust between donors and recipients. A prominent example is the GiveTrack platform developed by the BitGive Foundation. This platform utilizes blockchain to provide real-time tracking of donations, allowing donors to monitor their contributions and verify fund allocation (BitGive Foundation, 2020). GiveTrack not only bolsters transparency but also instills donor confidence, as contributions are immutably recorded and traceable.

Blockchain in Financial Systems: Blockchain's potential in financial systems extends to areas like remittances and cross-border transactions. Ripple, for instance, has developed a blockchain-based platform aimed at streamlining international payments through its cryptocurrency, XRP. By eliminating intermediaries and reducing settlement times, Ripple addresses long-standing inefficiencies in cross-border transactions (Yermack, 2017).

Islamic Finance and Blockchain: Blockchain's alignment with principles of transparency and trust makes it particularly appealing in the context of Islamic finance. Alharthi (2021) underscores the potential of blockchain to enhance transparency in waqf (endowment) management, ensuring the proper utilization of endowment assets. Furthermore, the integration of blockchain into Islamic banking offers opportunities for Sharia-compliant financial transactions (Unal and Aysan, 2022).

While the integration of blockchain into charitable giving and financial systems offers promising benefits, challenges such as scalability and regulatory frameworks persist. Ensuring interoperability between various blockchain platforms is also crucial for realizing its potential in complex financial ecosystems (Belchior et al., 2020). The integration of blockchain technology into charitable giving and financial systems has been explored in diverse contexts. Previous initiatives highlight its potential to enhance transparency, efficiency, and accountability. However, there remains a need for further empirical research to assess the actual impact and challenges faced when applying blockchain technology to Islamic social finance, particularly within the zakat collection processes.

Method

The research methodology employed for developing the blockchain architecture for zakat collection within PPZ-MAIWP consists of three distinct stages outlined as follows:

Assessing the existing of manual standard operating procedures (SOP) on zakat collection:

In the initial phase of this research, an examination of the manual SOP within PPZ-MAIWP pertaining to zakat collection activities will be conducted. The manual SOP serves as a critical component in ensuring that the forthcoming system aligns with the current rules and processes in place. As such, it will serve as the primary reference standard for the system under development.

Interviewing PPZ-MAIWP Officials for Standard Operating Procedure (SOP):

At the outset of this research endeavor, our primary focus is to observe and understand the manual SOP governing zakat collection within PPZ-MAIWP. These manual SOPs hold paramount importance as they serve as the cornerstone for ensuring that the forthcoming system adheres to the existing rules and processes. Hence, these manual SOPs constitute the primary frame of reference for our system development efforts.

This phase plays a pivotal role in providing a profound comprehension of the current zakat collection procedures and systems. It serves as a critical steppingstone before transitioning to digital references for the development of the zakat collection blockchain system. To facilitate the digitalization process effectively, it must encompass the following five key parameters:

- a) System Ownership
- b) A power on the command of order chain of zakat collection
- c) Level of approval for every chain of zakat collection
- d) Flow of approval for every chain of zakat collection
- e) Closed loop process / Open loop process

The identification of whether a process follows a "closed loop" or "open loop" structure holds profound significance in our endeavor to digitize the zakat collection process, steering it away from manual practices towards a blockchain-based system. During this stage, it is imperative to discern the final processes where manual operations are no longer prioritized, thereby ensuring the successful establishment of the blockchain system. Consequently, the approval process, primarily governed by PPZ-MAIWP as the system owner, assumes a pivotal role. Upon the identification of all manual SOPs and the closure of all procedural loops, this phase culminates in achieving the objective of Digitalization of SOP.

The Development of Zakat Collection Blockchain Architecture:

Prior to embarking on the creation of the blockchain system prototype, the groundwork laid in the Digitalization of SOP phase provides a comprehensive insight into the collection and distribution of zakat operations within the Islamic Religious Council and, more specifically, within PPZ-MAIWP. However, it is important to clarify that not every operational facet requires transformation into blockchain design and development.

Blockchain systems are typically developed by incorporating adaptable operational flows, allowing for changes while maintaining strict access controls. This approach is essential to safeguard the confidentiality of PPZ and, in particular, the zakat collection process. The activities undertaken during this phase lay the foundation for creating a Design Requirement Specification (DRS). The DRS undergoes comprehensive research and gains consensus from all project stakeholders. Subsequently, it only necessitates a limited amount of technical development for integration into the blockchain demo system, which will be constructed at a later stage. Specific technical requirements and timelines will be established during the subsequent stages of the methodology. The DRS stands as the definitive design reference for the entire project. Any alterations requiring modifications will be subjected to a "Change Request" process, contingent upon approval from all participating parties.

Findings

The research generates two primary outcomes in accordance with the established research methodology:

To define the role of blockchain technology within the zakat collection system at PPZ-MAIWP

In pursuit of this objective, the initial phase of the research involves an examination of the existing manual SOP employed by PPZ-MAIWP for zakat collection activities. Given the constraints posed by the Movement Control Order (MCO) during the research period, interviews were conducted via voice calls to gather pertinent information. PPZ-MAIWP employs various platforms for zakat payments. However, for the purpose of developing the zakat collection blockchain system at PPZ-MAIWP, a consensus has been reached to focus on one particular platform, specifically, the over-the-counter payment method. A flowchart depicting this process is presented below for reference:

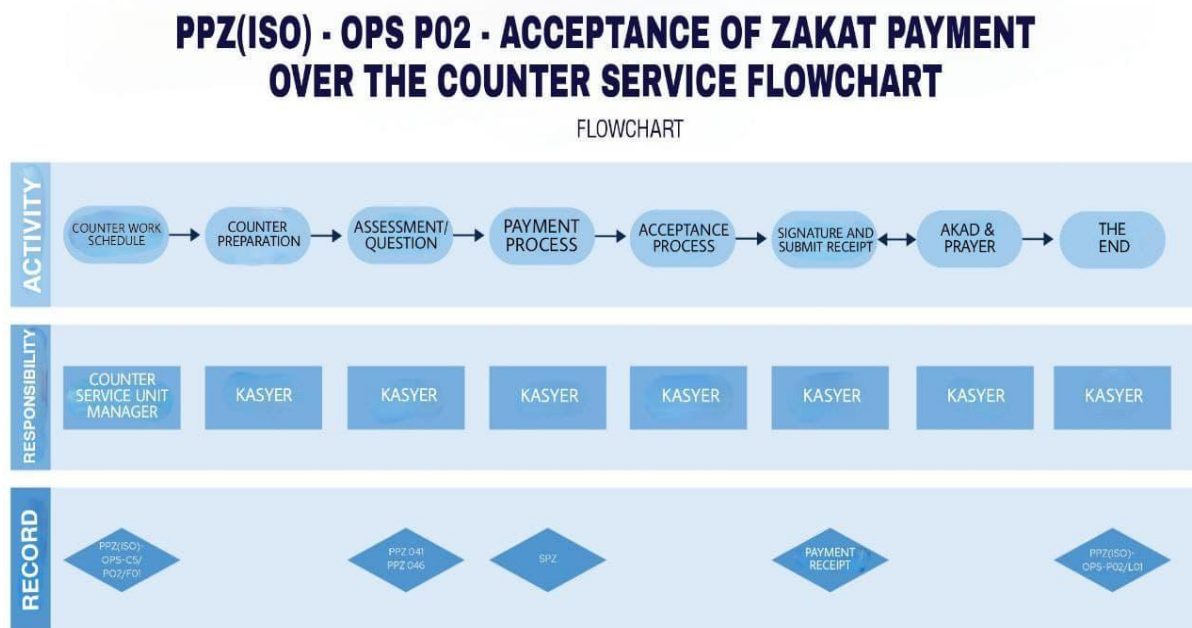


Figure 2: Acceptance of Zakat Payment Over the Counter Service Flowchart

To plan and develop a Blockchain-Based Zakat Collection architecture using Distributed Hyperledger Technology.

Before embarking on the comprehensive development of the zakat collection blockchain system, the digitalization of SOP undertaken in the initial stages offers a tangible insight into the operational facets of zakat collection within PPZ-MAIWP. However, it is imperative to clarify that not all operational aspects need to undergo transformation into blockchain design and development. Blockchain systems are typically designed to encompass operational flows that can be adjusted by the involved institution, while also maintaining a low level of access security. This measure is crucial to safeguard the confidentiality of PPZ-MAIWP's private data, especially with regard to the zakat collection system.

From these initial activities, a Design Requirement Specification (DRS) is meticulously formulated. The DRS requires unanimous agreement from all stakeholders involved in the blockchain system. This DRS serves as the guiding design document for the entire project. Any subsequent modifications necessitate formal application via a "Change Request" process, contingent upon approval from all relevant parties.

Figure 3 below illustrates the architecture for the zakat collection blockchain system at PPZ-MAIWP. This diagram distinctly depicts the blockchain's initiation following the successful completion and recording of the zakat payment process. To ensure that every zakat payment transaction is duly recorded within the zakat collection blockchain, a "blockchain API" is employed to establish a connection between the payment approval system and the emerging zakat blockchain. Subsequently, a validation process is executed, resulting in the creation of a new block within the zakat collection blockchain. This block securely stores the transaction information's hash and obtains a storage address within the zakat collection blockchain. To enhance data security, this saved data is stored alongside the information preserved within the blockchain, housed within the zakat database.

This study also introduces two private nodes within the zakat collection blockchain: one dedicated to identity management and the other to smart contract agreements. The identity management nodes are established during zakat payments made by muzakki, achievable through the front-end blockchain system using the existing PPZ-MAIWP system or a newly developed mobile application. On the other hand, the nodes for smart contract agreements come into existence during zakat payments. This is a critical aspect where all relevant contracts pertaining to zakat payments must be integrated into the blockchain system. Consequently, it fosters increased trust, data-driven decision-making, and transparency in zakat activities, ultimately contributing to the significant potential for community development on a large scale.

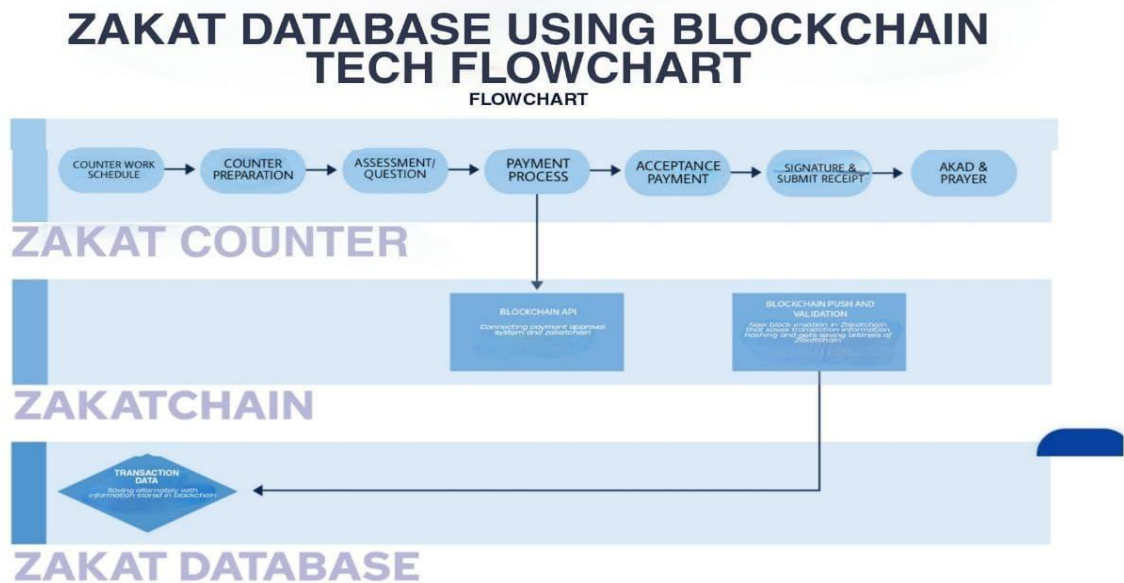


Figure 3: Proposed of Zakat Collection Blockchain Architecture for PPZ-MAIWP

Discussion and Conclusion

In recent decades, technology has played a pivotal role in reshaping the global economic and financial landscape. One significant technological innovation with vast potential, especially within the realm of Islamic social finance, is blockchain technology. Blockchain offers several enticing features, including creating a transparent environment, enhancing transaction trustworthiness and efficiency, and elevating the level of trust in corporate institutions. As we navigate the era of the Fourth Industrial Revolution (IR 4.0), blockchain technology is poised to maintain its substantial influence across various industrial sectors.

The study's primary outcome entails the development of a zakat collection blockchain architecture that can seamlessly integrate into the existing zakat practices at PPZ-MAIWP. This

integration holds the promise of augmenting the transparency and traceability of zakat transactions, benefitting both corporate entities and individuals. Additionally, the introduction of this blockchain system is expected to instill confidence among muzakki, who will have real-time visibility into all transactions to mustahik. Furthermore, it is anticipated that this system will elevate the transparency and trust among all participants engaged in zakat activities, offering real-time end-to-end transaction traceability.

Furthermore, the incorporation of smart contracts into zakat activities has the potential to significantly enhance the performance and efficacy of national-level zakat institutions, encompassing both collection and distribution processes. The integration of smart contracts may also reduce operational costs while concurrently bolstering security and adherence to zakat stipulations. These groundbreaking initiatives serve to solidify the ethical and social dimensions of Islamic social finance. Moreover, they have the capacity to raise public awareness and acceptance of zakat activities on a grand scale, fostering professionalism within zakat management.

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