

# Revolutionizing Financial Inclusion: A Blockchain-AI Model for Zakat and Waqf Management in Malaysia and Beyond.

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## Abstract

*This paper proposes a conceptual framework integrating blockchain and Artificial Intelligence (AI) to modernize the management of Zakat and Waqf, two foundational instruments of Islamic social finance. These mechanisms aim to address wealth redistribution, poverty alleviation, and socio-economic sustainability, but traditional management practices are hindered by inefficiencies, including lack of transparency, governance challenges, and resource misallocation. By leveraging blockchain's immutable records and traceability alongside AI's predictive modelling and resource optimization, this paper introduces a theoretical model that enhances accountability, operational efficiency, and socio-economic impact. Grounded in Islamic finance principles, particularly Maqasid al-Shariah, this framework seeks to promote ethical, equitable practices through innovative technologies. The proposed model, with its potential for piloting in Malaysia, known for its leadership in Islamic finance offers a starting point for theoretical exploration into how blockchain and AI can be integrated into Zakat and Waqf systems. By addressing key challenges such as delayed disbursements, underutilized Waqf assets, and donor mistrust, this conceptual framework provides a theoretical solution that aims to improve governance, operational efficiency, and resource allocation. Aligned with the principles of social justice, transparency, and financial inclusion, this framework also complements key Sustainable Development Goals (SDGs), including No Poverty (SDG 1), Quality Education (SDG 4), and Reduced Inequalities (SDG 10). The framework's scalability to other Muslim-majority countries, especially those with centralized governance models like Brunei, further establishes its potential as a replicable model for modernizing Islamic social finance globally. This research offers a theoretical approach to advancing Islamic social finance, with an emphasis on innovation, financial inclusion, and sustainable development.*

## Keywords

*Blockchain, Artificial Intelligence, Islamic Finance, Zakat, Waqf, Islamic Social Finance*

## **Introduction**

Islamic social finance plays a critical role in addressing socio-economic challenges such as poverty alleviation, wealth redistribution, and financial inclusion. Zakat and Waqf, two cornerstone instruments of Islamic finance, hold significant potential to drive sustainable development. However, their traditional management systems often face inefficiencies, including a lack of transparency, governance challenges, and resource misallocation (Razak, 2020; Salaudeen, 2024). These issues hinder their ability to effectively deliver socio-economic interventions. This paper proposes a conceptual framework integrating blockchain and Artificial Intelligence (AI) to modernize Zakat and Waqf management. Blockchain's immutable records and traceability ensure transparency, while AI optimizes resource allocation through real-time beneficiary profiling and predictive analytics. Rooted in Islamic finance principles, particularly Maqasid al-Shariah, the framework seeks to promote ethical and equitable practices through the application of innovative technologies.

Piloting this framework in Malaysia, a country known for its leadership in Islamic finance, provides an ideal starting point for this conceptual research, exploring the potential of blockchain and AI in modernizing Zakat and Waqf management. The country's initiatives, such as the National Waqf Blueprint (2020) and MyDIGITAL Blueprint (2021), underscore its commitment to innovation and sustainability. The proposed framework aims to address critical challenges, including delayed disbursements, underutilized Waqf assets, and donor mistrust, with the goal of improving governance, operational efficiency, and socio-economic impact. This conceptual model not only offers incremental improvements for Malaysia but also provides a scalable framework for other Muslim-majority countries, particularly those with centralized governance systems like Brunei. By integrating blockchain and AI, the framework positions Islamic social finance as a driver of financial inclusion and sustainable development on a global scale.

## **Research Background**

Zakat and Waqf are core instruments of Islamic social finance, deeply rooted in Maqasid al-Shariah, aiming to promote wealth redistribution, socio-economic justice, and sustainability (Razak, 2020; Bilo & Machado, 2020). These instruments address vital socio-economic issues such as poverty alleviation, financial inclusion, and community development. However, traditional management practices are often hindered by inefficiencies in governance, lack of transparency,

and suboptimal resource allocation, limiting their full potential (Salaudeen, 2024; Gamon & Tagoranao, 2018).

Malaysia has become a global leader in Islamic finance, supported by robust regulatory frameworks and digital transformation initiatives like the National Waqf Blueprint and MyDIGITAL Blueprint. Despite this strong foundation, Zakat and Waqf systems continue to face challenges, such as delayed fund disbursement and underutilized assets, which persistently hinder their socio-economic impact (Hisham & Muwazir, 2022; Razak, 2020). Addressing these issues is crucial to enhancing governance and improving resource utilization in alignment with national and global objectives. Blockchain and Artificial Intelligence (AI) offer innovative solutions to these challenges. Blockchain's decentralized ledger enhances transparency by providing verifiable records of fund allocation and usage (Lee et al., 2018; Zainudin et al., 2023). Concurrently, AI improves operational efficiency by enabling real-time beneficiary profiling and predictive analytics, optimizing resource allocation (Herianingrum et al., 2022; Rahman et al., 2022). Together, these technologies provide a theoretical framework for addressing the inefficiencies inherent in traditional Zakat and Waqf management.

Malaysia's leadership in Islamic finance, coupled with its advanced digital infrastructure, makes it an ideal setting for piloting this Blockchain-AI framework. This research explores the potential of this framework to improve transparency, accelerate disbursements, and optimize resource utilization, thereby enhancing the socio-economic impact of Zakat and Waqf. Moreover, the framework's scalability to other Muslim-majority countries, especially those with centralized governance models like Brunei, demonstrates its potential for regional expansion. Collaborative efforts between Malaysia and Brunei can establish a benchmark for adapting this model to other countries. Globally, there is growing interest in leveraging technology for social finance. The Islamic Development Bank (IsDB) advocates for innovative solutions to address socio-economic disparities in Muslim-majority nations. By piloting this model in Malaysia and expanding it to Brunei, the Blockchain-AI framework provides a scalable and ethical solution for modernizing Islamic social finance, contributing to the achievement of key Sustainable Development Goals (SDGs), such as No Poverty (SDG 1), Reduced Inequalities (SDG 10), and Decent Work and Economic Growth (SDG 8).

## Literature review

### Blockchain in Islamic Finance

Blockchain technology has emerged as a transformative tool in Islamic finance, addressing key challenges related to transparency, trust, and operational inefficiencies, particularly in the management of Zakat and Waqf. By leveraging its decentralized, immutable ledger, blockchain ensures secure and traceable transaction records, fostering trust among donors, beneficiaries, and managing institutions. For instance, blockchain-based platforms for Zakat enable donors to track the allocation and utilization of funds in real-time, mitigating concerns about fund mismanagement (Lee et al., 2018). Similarly, in Waqf management, blockchain digitizes property ownership records, monitors income generation, and ensures Shariah compliance, enhancing accountability and reducing administrative costs. One notable example is the World Food Programme's (WFP) Building Blocks project, which employs blockchain to process over 1 million transactions in humanitarian aid to Syrian refugees. This initiative significantly reduces fraud, duplication, and operational costs while ensuring transparency in the distribution of food assistance. It highlights blockchain's scalability and potential to transform Zakat systems globally by offering efficient, transparent, and secure resource allocation.

Incorporating smart contracts, a key feature of blockchain, can further optimize financial processes. These self-executing contracts ensure that transactions only occur under predefined, Shariah-compliant conditions. In Waqf management, for example, smart contracts can automate fund disbursement based on milestones achieved in infrastructure or education projects. Similarly, in Zakat systems, smart contracts ensure that funds are distributed only to eligible recipients, streamlining operations and minimizing administrative delays (Menne et al., 2023; Reinsberg, 2018). Moreover, blockchain's capacity to eliminate intermediaries reduces costs, benefiting underfunded Islamic social finance initiatives. However, the widespread adoption of blockchain in Islamic finance faces several challenges. Regulatory uncertainty and varying interpretations of Shariah compliance across jurisdictions hinder its large-scale implementation. Additionally, technical expertise gaps and infrastructure development costs pose significant barriers, particularly for smaller institutions (Menne et al., 2023). Privacy concerns also arise due to blockchain's inherent transparency, which may conflict with the need to protect sensitive donor or recipient data. Overcoming these challenges will require harmonized regulatory frameworks, capacity-building initiatives, and technological advancements in blockchain (Herianingrum et al., 2022).

### **Artificial Intelligence in Islamic Finance**

While blockchain addresses transparency and governance, Artificial Intelligence (AI) complements these efforts by optimizing resource allocation and decision-making. AI's capability to process large volumes of socio-economic data enables real-time beneficiary profiling, ensuring that resources are distributed equitably and efficiently. AI's predictive analytics allow for more accurate targeting of Zakat and Waqf beneficiaries, facilitating efficient distribution (Herianingrum et al., 2022). AI also enhances governance by integrating with blockchain to create transparent, immutable transaction records. This combination improves accountability, addressing long-standing issues in Zakat and Waqf management. In Waqf management, AI-driven predictive analytics optimize asset performance by analyzing trends, which helps prioritize maintenance and investment decisions. Decision support systems (DSS) powered by AI identify cost-effective solutions for managing Waqf assets, ensuring compliance with budget constraints while maximizing social impact (Ali et al., 2021).

AI's effectiveness in resource optimization was evident during the COVID-19 pandemic, where predictive analytics played a key role in managing healthcare shortages. For instance, AI tools were used by the Cleveland Clinic to forecast patient caseloads and optimize ICU bed allocation, while Johns Hopkins utilized AI for ventilator triage, ensuring high-risk patients received immediate care. Such AI applications highlight its potential for dynamic resource allocation, which is directly applicable to Zakat and Waqf systems facing similar resource distribution challenges (Rahman et al., 2022). Conceptually, AI can significantly enhance Waqf donation platforms by analyzing socio-economic data and prioritizing recipients based on need. For instance, during a natural disaster, AI could analyze regional data to prioritize fund allocation for affected communities, ensuring immediate relief while providing real-time updates to donors. However, the integration of AI in Islamic finance must address ethical and operational challenges such as algorithmic biases and data privacy concerns. AI systems must be designed to ensure Shariah compliance and equitable resource distribution (Kamila & Jasrotia, 2023).

### **Synergy of Blockchain and AI**

The integration of blockchain and AI offers a holistic solution to inefficiencies in Islamic social finance. Blockchain ensures transparency and accountability through immutable records, while AI provides data-driven insights to optimize resource allocation and decision-making. The synergy of these technologies creates an efficient, transparent, and equitable system for managing Zakat

and Waqf, aligning with Shariah principles and broader goals of Islamic finance (Elsden et al., 2019). For example, integrating AI-driven predictive analytics with blockchain platforms could help prioritize Zakat fund allocation based on real-time needs, ensuring that funds reach the most deserving individuals quickly and efficiently. In Waqf management, AI can be used to assess asset performance and forecast future returns, while blockchain ensures that all transactions are recorded transparently and securely. This combination can significantly reduce the risk of fund mismanagement and inefficiencies that are prevalent in traditional systems.

However, the integration of these technologies faces challenges related to regulatory compliance, technical scalability, and ethical governance. Inconsistent interpretations of Shariah compliance and technical expertise gaps are significant barriers to widespread adoption. Furthermore, the transparency of blockchain may raise concerns about the privacy of sensitive data, necessitating the development of privacy-enhancing technologies and regulatory measures to protect donor and beneficiary information (Bidwell et al., 2021). Despite these challenges, the combined application of blockchain and AI holds significant potential to transform Zakat and Waqf systems. By ensuring transparent tracking of donations and optimizing resource allocation, this integration could enhance the effectiveness of Islamic social finance, contributing to global sustainable development. The proposed conceptual framework aims to address the current gaps in Zakat and Waqf management, offering a scalable and ethical solution to modern socio-economic challenges (Herianingrum et al., 2022).

## **Conclusion**

This literature review highlights the transformative potential of blockchain and AI in Islamic social finance. While blockchain enhances transparency and accountability, AI optimizes resource allocation and decision-making, addressing key inefficiencies in the management of Zakat and Waqf. The integration of these technologies provides a promising approach to modernizing Islamic finance systems, ensuring equitable resource distribution and promoting socio-economic development. However, challenges related to regulatory compliance, data privacy, and technical scalability must be addressed to realize the full potential of this synergy. The integration of blockchain and AI offers a robust and scalable solution for addressing critical inefficiencies in Islamic finance. By aligning with Shariah principles and addressing global socio-economic challenges, this framework has the potential to contribute significantly to the modernization of Islamic social finance systems worldwide.

## **DISCUSSION**

### **Proposed Blockchain-AI Model**

The proposed Blockchain-AI model offers a transformative approach to modernizing Zakat and Waqf management, integrating blockchain for transparency and traceability with AI for real-time resource optimization. This model addresses several inefficiencies commonly found in traditional systems, including governance challenges, delayed fund disbursement, and low donor confidence. Crucially, it promotes financial inclusion by ensuring that Zakat and Waqf resources are directed to marginalized and underserved communities that are often excluded from traditional financial systems. Through AI-driven profiling, the model identifies socio-economic needs, prioritizing resource allocation to the most vulnerable. For example, AI analyzes data on income levels, family size, and geographic location to ensure equitable distribution. This method mirrors the approach used by the World Food Programme's Building Blocks project, which effectively utilized blockchain technology to reduce transaction processing times and expedite aid distribution to over 100,000 Syrian refugees in Jordan. Similarly, this model ensures that resources are allocated efficiently, fairly, and in line with Maqasid al-Shariah principles, particularly Hifz al-Mal (preservation of wealth) and Adl (justice).

The model operates on two primary inputs: Zakat contributions and Waqf asset income. Blockchain ensures all transactions are securely recorded on an immutable ledger, fostering trust and transparency. This is akin to the Alice social funding platform, which tracks donations and releases funds only when predefined goals are met, building donor confidence and engagement. By adopting this functionality, Malaysia's Zakat and Waqf systems can enhance trust, encourage recurring contributions, and ensure that resources are distributed according to principles of justice and inclusivity. In Waqf management, blockchain enhances accountability by providing a comprehensive and unalterable record of income and expenditures. AI complements this by analyzing historical data and market trends to predict asset performance, thus enabling more strategic planning for reinvestments. For instance, predictive analytics can forecast income streams and asset appreciation, allowing for smarter investment decisions and long-term sustainability of Waqf assets. Smart contracts automate fund disbursement, ensuring that funds are released only when certain milestones are achieved, reducing delays, eliminating errors, and ensuring Shariah compliance in the governance process (Abdullah & Saad, 2022; Ahmed et al., 2024).

Moreover, AI processes socio-economic data to dynamically profile and rank beneficiaries based on urgency and need. This has been demonstrated in other sectors, such as disaster relief and healthcare, where AI-driven analytics optimize resource distribution (Rahman et al., 2022). By integrating such capabilities into Waqf management, the model ensures that no group is left behind and maximizes the social impact of the funds. This real-time, data-driven approach upholds the values of justice and inclusivity central to Islamic finance, ensuring fair and efficient resource allocation (Latiff et al., 2022).

As shown in Figure 1, the model integrates both blockchain and AI to optimize transparency, efficiency, and resource allocation. Blockchain ensures the traceability and security of all Zakat and Waqf transactions, while AI-driven profiling dynamically adjusts beneficiary priorities based on real-time data. The framework introduces four key innovations:

1. AI-driven real-time optimization for dynamic beneficiary profiling.
2. Blockchain-backed smart contracts to ensure transparent and automated disbursements.
3. Streamlined cross-border compliance for global Zakat contributions.
4. Reinvestment mechanisms to optimize the utilization of underperforming Waqf assets.

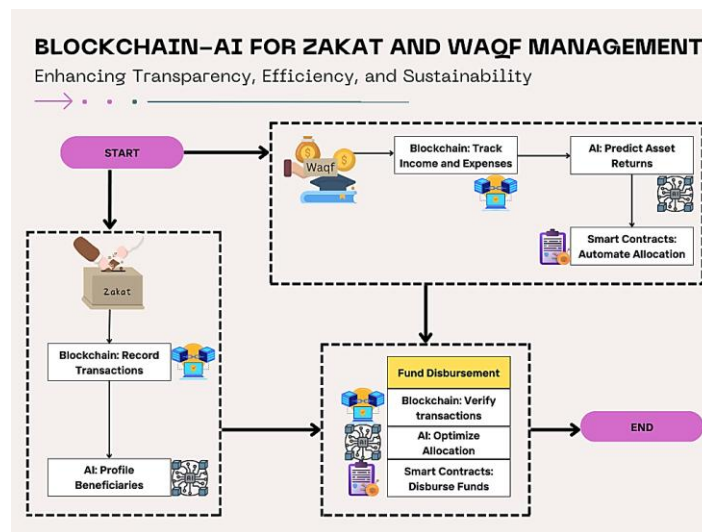


Figure 2: Illustration of the Proposed Blockchain-AI system

### **Conceptual Example in Real Life**

The following conceptual examples illustrate how the Blockchain-AI framework can be applied in real-life Zakat and Waqf scenarios.

#### ***Zakat Management Example***

Ali, a generous donor, decides to contribute RM1,000 in Zakat through a blockchain-enabled platform. In traditional Zakat systems, Ali would typically visit a local Islamic center or mosque to make his contribution. The funds would then be manually processed, and recipients would be selected based on their circumstances. While this method has served communities for centuries, it often results in delays due to manual processes. Furthermore, donors like Ali typically lack visibility into how their contributions are allocated, leading to uncertainty regarding the effective use of funds. In contrast, under the Blockchain-AI framework, Ali's contribution is immediately recorded on an immutable blockchain ledger, ensuring full transparency and traceability. He receives a unique transaction ID, allowing him to monitor his funds in real-time. This feature, which is often absent in traditional systems, provides Ali with confidence that his contribution is handled responsibly and reaches those in need promptly (Lee et al., 2018).

The system then employs AI to identify eligible beneficiaries based on real-time socio-economic data. Traditional Zakat systems often rely on manual selection methods, which can be slow and inefficient. In comparison, the AI-powered system processes large datasets, analyzing factors such as income levels, family size, and geographic location, to prioritize the most deserving individuals, such as a single mother with three children in Kuala Lumpur's B40 community. This ensures that Ali's funds are directed to those most in need, improving both the accuracy and timeliness of fund allocation (Rahman et al., 2022). Once beneficiaries are identified, the blockchain securely verifies their eligibility, ensuring that all transactions are recorded and traceable. Ali receives anonymized, aggregated data, allowing him to see the specific impact of his contribution. This level of transparency, often lacking in traditional systems, builds donor trust. Finally, smart contracts automate the disbursement of Ali's Zakat. From his RM1,000 contribution, RM600 is distributed among four families, each receiving RM150 for food and utility expenses. The remaining RM300 is allocated to a Waqf-funded school for purchasing school supplies. Unlike traditional systems, where fund distribution is delayed due to manual processing and administrative bottlenecks, smart contracts release funds automatically when predefined conditions are met, ensuring timely and efficient distribution (Reinsberg, 2018).

By integrating blockchain and AI into Zakat management, the Blockchain-AI framework addresses key inefficiencies of traditional systems, providing greater transparency, faster disbursements, and improved resource allocation. These innovations enhance Zakat's effectiveness, building donor trust and confidence.

### **Waqf Management Example**

Fatimah, a philanthropist, wishes to contribute RM50,000 to a Waqf project aimed at building a community healthcare clinic. In traditional Waqf management, her contribution would likely be pooled into a general fund and managed by administrators who may not have the tools to track income and expenses efficiently. Traditional systems often struggle with underutilized assets and inefficiencies due to outdated record-keeping methods. As a result, Fatimah may not have real-time visibility into how her funds are spent, potentially diminishing her confidence in the system (Mohaiyadin et al., 2021).

Under the Blockchain-AI framework, Fatimah's RM50,000 is recorded on the blockchain, providing an immutable, transparent record of her donation. She can monitor the progress of the healthcare clinic project in real-time, with detailed insights into how her funds are used. This level of transparency, which traditional systems struggle to offer, is a key advantage of the Blockchain-AI framework (Herianingrum et al., 2022). The Waqf platform uses AI to optimize resource allocation. For example, AI analyzes the income generated from Waqf assets, such as rental properties, and predicts potential returns. In traditional systems, asset utilization is often less efficient due to the lack of real-time data and advanced analytics. The AI-powered system, however, can predict that the clinic's adjacent pharmacy will generate RM10,000 per month, which will be reinvested to ensure the long-term sustainability of the Waqf project. By providing real-time data and predictive insights, the AI ensures that assets are utilized most effectively, maximizing the impact of Fatimah's donation (Herianingrum et al., 2022).

As the clinic is being built, smart contracts automate the release of funds, ensuring that payments to contractors are made only when specific milestones are achieved. For instance, once the clinic's foundation is completed and verified by a certified engineer, RM20,000 is released automatically. In traditional systems, milestone-based payments are often delayed due to manual verification processes, which can slow down the project's progress. The use of smart contracts

eliminates these delays, ensuring timely payments and accountability (Menne et al., 2023). Once the clinic is operational, AI tools monitor its financial performance, tracking patient visits, operational costs, and income generated by the clinic's services. The AI recommends reinvestments to expand the clinic's capacity or introduce specialized services based on real-time data and predictive analytics. This ensures that the Waqf project remains financially stable and continues to serve the community effectively. Blockchain guarantees that all income generated is transparently recorded, and reinvestments align with Fatimah's original intent, preserving the integrity of her donation (Rahman et al., 2022).

In summary, the Blockchain-AI framework enhances traditional Waqf management by ensuring greater transparency, efficiency, and sustainability. It complements existing practices while addressing challenges such as underutilized assets and administrative inefficiencies, offering a modern solution that aligns with Maqasid al-Shariah principles.

### Potential Impact of the Blockchain-AI Model in Zakat and Waqf Management

Figure 1 and the conceptual examples provided earlier demonstrate the effectiveness of the Blockchain-AI model in modernizing Zakat and Waqf management when compared to traditional systems. Table 1 highlights the proposed model's key advantages in transparency, speed, resource allocation, and donor confidence (Ostern et al., 2023).

**Table 1: Comparison of Current Systems vs. Proposed Blockchain-AI Model**

Aspect	Current Model	Proposed Model
<b>Transparency</b>	Limited traceability	Full traceability with blockchain
<b>Disbursement Speed</b>	Manual processes causing delays	Automated disbursement with smart contracts
<b>Resource Allocation</b>	Inefficient and ad-hoc	AI-optimized resource allocation
<b>Donor Confidence</b>	Low due to mismanagement concerns	High due to immutable records and transparency

The Blockchain-AI model is projected to achieve significant improvements in Zakat and Waqf management. For Zakat, the framework is expected to reduce disbursement delays, with blockchain applications in financial systems like cryptocurrency transactions demonstrating efficiency improvements of 40-70% (Elad, 2024). This reduction ensures that socio-economic relief

reaches beneficiaries in a timely manner. Additionally, donors can track their contributions in real-time, fostering trust and encouraging ongoing engagement. For Waqf, the model enhances asset sustainability and returns by leveraging data-driven investment strategies. Optimized returns can be reinvested into impactful projects in infrastructure, education, and healthcare, creating long-term socio-economic benefits (Yusoff et al., 2021). Furthermore, the transparency provided by blockchain technology is expected to increase donor participation, with studies showing that transparent charity platforms see a 20-50% increase in donor engagement (Doe et al., 2019; Nairi et al., 2023). These advancements align with global trends that emphasize trust as a key driver in donor behavior.

Malaysia serves as an ideal location to pilot the Blockchain-AI framework, given its leadership in Islamic finance and digital transformation initiatives. The National Waqf Blueprint (2020) and MyDIGITAL Blueprint (2021) provide a strong foundation for testing innovative solutions to improve Zakat and Waqf governance. Selangor, with its advanced infrastructure and diverse socio-economic landscape, is strategically positioned as a pilot location. This pilot will focus on enhancing transparency by leveraging blockchain technology for real-time visibility into Zakat contributions. It will also streamline operations with smart contract automation and optimize resource allocation using AI-driven profiling. These efforts will ensure equitable distribution to the most vulnerable beneficiaries, increase donor confidence, and mitigate concerns about mismanagement.

The scalability of this model extends beyond Malaysia, with potential applications in Brunei Darussalam and other ASEAN countries. Brunei's centralized governance model provides a conducive environment for adopting the Blockchain-AI framework, with local mosques and community leaders ensuring smooth implementation. Policy adaptations will align the framework with Brunei's socio-economic goals, while partnerships with regional bodies like the Islamic Development Bank (IsDB) will amplify the model's impact on a global scale. The modular design of the framework makes it adaptable to different governance systems, positioning it as a blueprint for other Muslim-majority nations.

### **Challenges and Proposed Solutions**

While the Blockchain-AI model offers significant potential to transform Zakat and Waqf management, several challenges need to be addressed for effective implementation, including resistance to new technologies, privacy concerns, and implementation costs. Resistance from traditional Islamic institutions, unfamiliar with blockchain and AI, is a key challenge. This can be mitigated through awareness campaigns that highlight the model's benefits, coupled with training programs to build confidence. Collaborations with technology providers, such as the Malaysia Digital Economy Corporation (MDEC), can also ensure the necessary technical capacity.

Privacy and data security concerns are critical, particularly regarding the handling of sensitive socio-economic data. To address this, encryption protocols can anonymize data while maintaining transparency. Additionally, Shariah-compliant data governance policies should be developed to ensure ethical and secure handling of personal and financial data. Financial inclusion strategies must be implemented to ensure marginalized communities are not excluded, especially in regions with limited access to digital technologies. Finally, the cost of implementation could pose a challenge, particularly for smaller institutions. This can be alleviated through public-private partnerships (PPPs) and financial support from initiatives like the MyDIGITAL Blueprint and the Islamic Development Bank (IsDB).

The Blockchain-AI framework addresses inefficiencies in transparency, disbursement speed, resource allocation, and donor confidence. By overcoming these challenges, it can set new benchmarks for global Zakat and Waqf management, contributing to the modernization of Islamic social finance.

### **Policy Implications and Scalability**

The Blockchain-AI model presents a significant opportunity to modernize Zakat and Waqf management in Malaysia, addressing key inefficiencies in governance and resource allocation. Policymakers must prioritize developing a robust regulatory framework that ensures transparency and accountability in Islamic social finance. Blockchain's immutable records provide the foundation for transparent reporting standards, fostering trust among donors and stakeholders. Moreover, the institutionalization of AI-driven beneficiary profiling is crucial to optimizing resource distribution, ensuring that aid reaches those most in need, and further advancing financial

inclusion. These steps align with the principles of Maqasid al-Shariah, promoting justice, wealth preservation, and inclusive growth in Malaysia's Islamic finance systems.

The MyDIGITAL Blueprint serves as a strategic foundation for scaling blockchain and AI technologies in Malaysia's Islamic finance sector. Policymakers should leverage this initiative to integrate blockchain-based reporting and AI-powered profiling mechanisms across Zakat and Waqf institutions. Furthermore, regulatory guidelines should address the deployment of smart contracts and ensure data privacy compliance, all while maintaining adherence to Shariah principles and fostering innovation. By positioning Malaysia as a hub for Islamic digital finance, this framework can set global benchmarks for other Muslim-majority countries.

Collaboration across sectors is critical to the successful implementation of the Blockchain-AI model. Public-private partnerships among Islamic finance institutions, technology providers, and academic researchers can drive the development of tailored blockchain-based solutions for Islamic social finance. Additionally, capacity-building programs should be introduced to equip stakeholders with the necessary technical and operational skills to manage blockchain and AI systems effectively. This ensures that financial inclusion remains central to the scaling of the model. By strengthening Malaysia's ecosystem for Islamic finance, the country can ensure the long-term sustainability of advanced technologies, ultimately benefiting underbanked and underserved populations.

### **Challenges to Scalability and Proposed Solutions**

As the Blockchain-AI framework scales from Malaysia to other Muslim-majority countries, several challenges must be addressed to ensure its effective implementation. One of the key challenges is regulatory and Shariah compliance. To scale successfully, the model must align with both national regulations and Shariah principles. Addressing this requires collaboration with Islamic scholars and regulatory bodies to co-develop comprehensive guidelines that ensure the framework's compliance while fostering technological innovation. In Malaysia, the establishment of a Regulatory Sandbox can facilitate the refinement of the model before its full-scale deployment in other countries, such as Brunei.

Brunei's centralized governance model presents a conducive environment for the framework's adoption. The country's Majlis Ugama Islam Brunei (MUIB), which oversees Islamic affairs, ensures

streamlined decision-making and policy implementation. This aligns well with the Blockchain-AI model's goals, especially regarding Shariah compliance. By leveraging Brunei's existing digital infrastructure, particularly its 5G network and e-government services, the framework can be implemented seamlessly. This technological foundation will enable efficient scaling with minimal friction, offering a strong model for other countries to follow.

Another challenge involves technological infrastructure, particularly in regions with less-developed digital capabilities. This challenge can be mitigated by utilizing Malaysia's advanced 5G infrastructure and offering technical assistance to neighbouring ASEAN countries through regional technology hubs. Such initiatives will prepare countries like Brunei for effective Blockchain-AI integration, while fostering cross-border collaboration via organizations like the Islamic Development Bank (IsDB). Brunei, with its efficient e-government services, could serve as a pilot location for further scaling within the ASEAN region.

In addition to these, aligning the framework with global Sustainable Development Goals (SDGs) will significantly amplify its impact. Policymakers can leverage the Blockchain-AI model to address SDG 1: No Poverty by ensuring equitable and timely Zakat distribution. AI-driven profiling supports SDG 10: Reduced Inequalities, and reinvesting optimized Waqf returns into education, healthcare, and infrastructure will contribute to SDG 8: Decent Work and Economic Growth (Yusoff et al., 2021).

While these challenges are substantial, they are not insurmountable. Proactive efforts such as awareness campaigns, regulatory collaboration, and capacity-building initiatives are crucial for scaling the Blockchain-AI model. By addressing these barriers, the model can be a transformative solution for Islamic social finance, benefiting Malaysia and other Muslim-majority countries, including Brunei, and extending its reach to the broader ASEAN region. This framework's adaptability to both centralized and decentralized governance systems underscores its scalability and versatility, making it a model for global adoption.

### **Generalized Framework for Scalability**

The proposed Blockchain-AI framework for Zakat and Waqf management is designed to be scalable, adaptable, and replicable across diverse regions and governance models. To ensure successful implementation in other Muslim-majority countries, the following framework steps as in

Figure 2 serve as a guideline for adaptation. Each step addresses specific aspects necessary for achieving seamless integration and long-term sustainability of the model, while remaining aligned with Islamic principles and regional contexts.

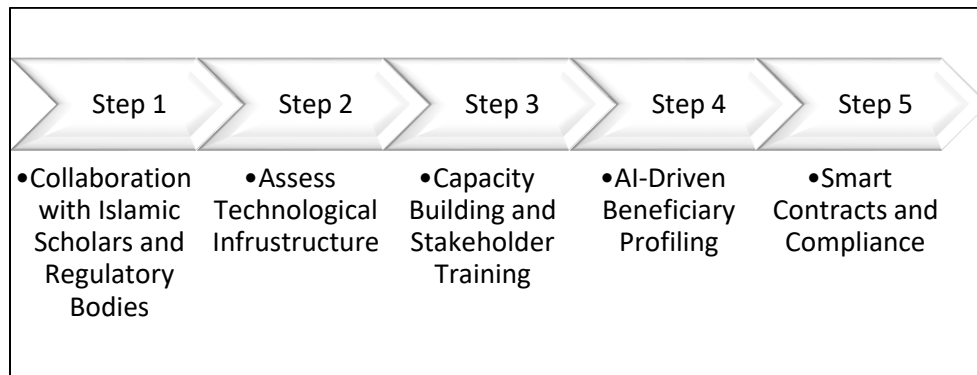


Figure 3: Generalized Framework for Blockchain-AI System

Figure 2 above can be further elaborated as follows:

#### Step 1: Collaboration with Islamic Scholars and Regulatory Bodies

A key step in scaling the Blockchain-AI framework is to collaborate with Islamic scholars and regulatory bodies within the target country. These partnerships are essential to ensure that the framework complies with Shariah principles, which are central to the integrity of Islamic finance systems. By co-developing guidelines with Islamic scholars and regulators, the framework can maintain alignment with Islamic legal standards while incorporating technological innovations. Additionally, creating a Regulatory Sandbox in the early stages of implementation allows for controlled testing and adjustment, ensuring the model is ready for full-scale deployment. This collaborative approach also promotes a balance between regulatory oversight and technological advancement.

#### Step 2: Assess Technological Infrastructure

The next step is to assess the technological infrastructure of the country where the framework will be implemented. This involves evaluating the availability of necessary technological resources such as internet connectivity, data storage capacity, and the digitalization of financial services. Countries with advanced infrastructures can deploy the framework more easily, while others with less-developed infrastructure may need to focus on capacity-building initiatives. To address infrastructure gaps, regional partnerships and collaborations with technology providers can help

bridge the digital divide. Leveraging existing initiatives, such as Malaysia's MyDIGITAL Blueprint, can further support the integration of Blockchain and AI technologies in the target region.

### Step 3: Capacity Building and Stakeholder Training

Training stakeholders is crucial for the successful implementation of the Blockchain-AI framework. This step involves building the capacity of Islamic finance institutions, technology providers, and government bodies to effectively use Blockchain and AI technologies. Public-private partnerships (PPPs) can be instrumental in providing training programs and workshops to ensure that all parties are equipped with the knowledge and skills required to manage and operate the new systems. Countries looking to scale this framework should focus on establishing training initiatives that enhance both technical expertise and operational understanding, ensuring that all stakeholders are prepared to adopt the model effectively.

### Step 4: AI-Driven Beneficiary Profiling

AI plays a pivotal role in optimizing resource allocation in Zakat and Waqf systems. By processing socio-economic data in real-time, AI can dynamically profile beneficiaries, ensuring that resources are distributed to those who are most in need. This data-driven approach allows for accurate identification of eligible recipients based on factors such as income level, family size, and geographic location. Integrating AI into Zakat and Waqf management enhances transparency and fairness, ensuring that financial resources are allocated equitably. This step aligns with the core principles of Maqasid al-Shariah, particularly Adl (justice) and Maslahah (public welfare), ensuring that funds are distributed in a manner that promotes social equity.

### Step 5: Smart Contracts and Compliance

The final step involves integrating smart contracts into the framework to automate fund disbursement and ensure compliance with Shariah principles. Smart contracts enable funds to be released only when specific predefined conditions are met, thereby minimizing administrative delays and reducing the risk of errors or fraud. Blockchain's transparency ensures that each transaction is immutable and traceable, reinforcing trust among donors and beneficiaries. *Moreover, smart contracts streamline the cross-border disbursement of Zakat, ensuring that the funds are compliant with regional regulations and meet international standards of Islamic finance.* This process further enhances efficiency and accountability in the management of Islamic social finance resources.

The Blockchain-AI framework is designed to be adaptable and scalable across various governance systems, whether centralized, like Brunei, or decentralized, like Malaysia. By following these key steps above, countries can modernize their Zakat and Waqf systems while ensuring they remain compliant with Shariah principles. This scalable approach offers a pathway to greater financial inclusion, social equity, and sustainable development in Muslim-majority countries. By adhering to this structured approach, nations can successfully adopt the Blockchain-AI model, improving transparency, efficiency, and trust in their Zakat and Waqf systems, while also contributing to global Sustainable Development Goals (SDGs) such as No Poverty (SDG 1) and Reduced Inequalities (SDG 10).

## **Conclusion**

This paper underscores the transformative potential of integrating blockchain and AI into Zakat and Waqf management systems, addressing persistent challenges such as transparency gaps, inefficiencies, and underutilized assets. The proposed Blockchain-AI Zakat and Waqf Management System offers an innovative conceptual framework to enhance transparency, optimize resource allocation, and ensure Shariah compliance. Rooted in the principles of Maqasid al-Shariah, this framework aligns with Malaysia's leadership in Islamic finance innovation and its robust digital infrastructure, positioning the country as an ideal testing ground for this transformative approach.

By leveraging Malaysia's advanced initiatives, such as the National Waqf Blueprint and MyDIGITAL Blueprint, this model has the potential to deliver measurable outcomes. Proven applications like the World Food Programme's Building Blocks project highlight blockchain's ability to significantly reduce transaction times and enhance operational efficiency, while platforms like Alice Platform demonstrate that transparency fosters donor trust and sustained contributions. These precedents validate the potential of the proposed framework to modernize Malaysia's Zakat and Waqf systems, establishing a benchmark for regional and global scalability. Additionally, financial inclusion is embedded in the model, ensuring equitable access to resources for marginalized and underserved communities.

While Malaysia serves as the focal point, the framework's adaptable design ensures its applicability to other Muslim-majority countries, particularly those with centralized governance structures like Brunei. By addressing governance inefficiencies and improving resource allocation,

this model offers a scalable and replicable solution for nations seeking to modernize their Islamic social finance systems. Future collaborations with regional bodies such as ASEAN and global institutions like the Islamic Development Bank (IsDB) could facilitate broader adoption, further positioning Malaysia as a pioneer in digital Islamic finance innovation.

Looking ahead, future research should focus on validating the proposed framework through simulation studies, pilot programs, and stakeholder-driven designs. Exploring complementary technologies such as decentralized finance (DeFi) could further enhance the model's functionality, especially in areas like Waqf reinvestments and global Zakat fund management. Additionally, developing ethical AI algorithms and Shariah-compliant governance models will be critical to ensuring that the framework aligns with Islamic principles while addressing modern socio-economic challenges. Aligning the framework with global *Sustainable Development Goals (SDGs)* could amplify its impact, advancing financial inclusion and promoting equitable socio-economic development.

Practical implementation of this model will require overcoming challenges such as disparities in technological infrastructure, regulatory alignment, and Shariah compliance. Addressing these barriers through public awareness campaigns, capacity-building initiatives, and innovation incentives such as grants and public-private partnerships will be essential. Success metrics, including reduced disbursement delays, increased donor confidence, and optimized asset utilization, will provide benchmarks to measure the pilot program's impact and guide its scalability. By integrating cutting-edge technologies with ethical governance, the Blockchain-AI Zakat and Waqf Management System offers a scalable and transformative blueprint for Islamic social finance. Policymakers, technologists, and Islamic finance leaders must now take the lead in turning this vision into reality, ensuring meaningful and lasting socio-economic impact for communities locally, regionally, and globally.

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