

Modernizing WAQF Governance with Blockchain: A Framework for Transparent, Efficient, and Trust-Based Islamic Social Finance

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Abstract

This paper delves into the potential reinvention of "WAQF," a cornerstone of Islamic economic social instruments, through the lens of blockchain technology. The purpose of the research is to investigate the transition of the WAQF principle from its traditional means to a modernized blockchain driven approach, emphasizing trust, transparency, and genuine engagement with this complicated technology. Additionally, the research follows an experimental approach which involves designing and implementing blockchain based architecture for WAQF management. However, the proposed system is tested under various scenarios to evaluate its effectiveness in improving data integrity, transaction transparency, and decentralised process automation. These improvements are expected to enhance stakeholder trust, increase operational efficiency, and ensure better governance of WAQF assets. Consequently, there are highlighted potential challenges which suggest solutions for integrating blockchain with existing WAQF systems. The originality of this paper lies in its experimental approach, combining Islamic finance principles with cutting edge blockchain technology to propose a novel solution for modernizing WAQF.

Keywords: Blockchain, Distributed Ledger Technology (DLT), Smart Contract, Consensus Mechanism, Security Token Offering (STOs), Initial Coin Offering (ICOs), Decentralized Finance (DeFi), Cryptocurrency, WAQF, Islamic Social Economy.

1. Introduction

The convergence of tradition and technology has always been a center for transformation, particularly in financial sectors. In the realm of Islamic finance, the centuries old system of "WAQF" characterized by its charitable endowments committed to societal welfare has been an outwork of communal trust and goodwill (Aziz & Yusof, 2013); (Aziz & Mohamad, 2019). Yet, as with many enduring institutions, "WAQF" has grappled with modern challenges, particularly regarding transparency, efficiency, and management (Abdullah & Rahman, 2015). In the context of, the recent strides in financial technology (FinTech) provide a tantalizing prospect: Can the innovations of today breathe new life into the venerable "WAQF" system of yesteryears?

This paper aims to straighten out the potential synergy between "WAQF" and the emergent token economy facilitated by blockchain technology. At the heart of this exploration lies the concept of smart contracts, self-executing contracts with the terms of agreement directly written into lines of code. Beyond mere technological integration, this paper ventures to

understand if, and how, these FinTech solutions can revive the disintegrating trust in the WAQF system, thereby bridging the time honored principles of Islamic finance with the demands of a modern, interconnected global community.

In an age where digital disruption is the norm, ancient institutions must evolve to ensure relevance and efficacy. The Islamic financial system, with its rich heritage, faces challenges that modern FinTech solutions, particularly blockchain technology and its smart contract application, are well positioned to address (Hassan & Aliyu, 2018). The instrument of WAQF, once a cornerstone of Islamic social welfare, can regain its stature through the innovative concept of a token economy. But how? WAQF is a unique charitable endowment system in Islam where individuals allocate portions of their wealth or property for social or religious causes (Osman & Mohammed, 2019). Historically, it fostered community development, education, and welfare. Yet, in recent times, trust issues, administrative entanglements, and mismanagement have somewhat clouded the system (Rahman & Sabri, 2020).

The integration of blockchain protocol to tokenize the WAQF platform offers a groundbreaking fusion of ancient Islamic philanthropy with cutting edge technological innovation (Zain & Bakar, 2019). In a world where the token economy is increasingly garnering attention among economists for its potential to redefine traditional economic structures, the concept of a WAQF token economy emerges as both revolutionary and timely. By transforming tangible WAQF endowments into digital tokens, we can enhance transparency, accessibility, and efficiency, ensuring that charitable contributions are directed seamlessly for the broader public's benefit and the holistic development of socio-economic structures. Such a digital manifestation of the WAQF not only preserves its time honored principles but also adapts it for the modern age, reimagining and revitalizing the way the Islamic community engages in charitable endeavors (Osman & Mohammed, 2019); (Rashid & Marzuki, 2018). The WAQF token economy, therefore, stands at the intersection of tradition and innovation, holding the promise of reshaping the age timeworn WAQF principle into a dynamic digital instrument for social betterment.

The true potential of blockchain in the WAQF system is unlocked through the application of smart contracts (Esmaeili & Shafiee, 2018). Functioning as automated, self-implementing agreements, the terms of these contracts are encoded directly into their underlying code. Within the WAQF framework, smart contracts provide two crucial functionalities. Firstly, they facilitate automatic distribution, wherein, based on stipulations defined by the donor, the endowed assets or their returns are seamlessly channeled to the intended recipients. Secondly, there's the aspect of Shari'ah Compliance. These digital contracts can be meticulously crafted to resonate with Shari'ah tenets, ensuring every transaction and allocation harmoniously aligns with Islamic doctrines. By weaving together, the robustness of blockchain with the precision of smart contracts, a revitalized, transparent, and trusted WAQF system can be envisioned. Incorporating blockchain and smart contracts into the WAQF system can restore trust in multiple ways (Buterin & Mohamad, 2019); (Esmaeili & Shafiee, 2018):

- A. Decentralization: By eliminating centralized control and potential human mismanagement, the decentralized nature of blockchain ensures that the WAQF's purpose is never derailed.
- B. Community Engagement: Modern FinTech solutions can facilitate community participation, allowing individuals to track, verify, and even contribute, enhancing communal trust.
- C. Regular Audits: With all transactions recorded, audits become easier and more transparent, reinforcing credibility.

The fusion of WAQF with modern FinTech, particularly blockchain's smart contracts, is a testament to the adaptability of ancient institutions in the face of modern challenges. As the Islamic community grapples with the need for transparency and trust in traditional systems, this synergy between the old and the new offers a promising path forward, rejuvenating faith in a centuries old system that has always aimed for the welfare of the community (Alpay & Haneef, 2015).

2. WAQF as a principle to build a social economic framework

The Islamic economic system revolves around principles that promote social justice, inclusivity, and sustainable development. One such pivotal principle is WAQF, a form of charitable endowment deeply rooted in Islamic traditions. It involves dedicating assets, such as land, buildings, or money, for religious, educational, or social purposes, aiming at the perpetual benefit of the community (El-Khatib & Ali, 2018). This study delves into the role of WAQF as a foundational principle in building a social economic framework that fosters a culture of giving, promotes equitable wealth distribution, and stimulates economic development.

- A. **Fostering a Culture of Giving and Social Responsibility:** WAQF promotes the act of giving and social responsibility by encouraging individuals to dedicate a portion of their assets for the welfare of the community. This culture of generosity and social responsibility is crucial for building a strong and cohesive society. It fosters a sense of community, encourages empathy, and promotes mutual support among its members.
- B. **Promoting Equitable Wealth Distribution:** The WAQF system aims to reduce disparities in society by promoting the equitable distribution of wealth. The assets dedicated as WAQF are used to support various social, educational, and economic initiatives, thereby benefiting a broad spectrum of society. This helps in reducing income and wealth disparities, promoting social justice, and ensuring that the less fortunate members of society have access to essential services and opportunities.
- C. **Stimulating Economic Development:** WAQF serves as a sustainable source of funding for various social, educational, and economic initiatives. By providing a steady stream of resources, it helps in stimulating economic activities, creating job opportunities, and promoting entrepreneurship (Obaidullah, 2016). This, in turn, contributes to economic growth and development, reducing dependence on external financial sources, and promoting self-reliance.
- D. **Supporting Sustainable Development:** The WAQF system promotes sustainable development by supporting initiatives that have a long-term positive impact on society. This includes supporting educational institutions, healthcare facilities, and other social services that contribute to the overall well-being and development of the community (Osman & Mohammed, 2019); (World Bank, 2016). Moreover, WAQF assets are managed and invested in a way that ensures their sustainability and growth, thereby ensuring that the benefits derived from them continue to support the community over time (Osman & Mohammed, 2019).

By leveraging the WAQF framework, societies can create enduring institutions that provide continuous support for different living perspective's elements, and poverty alleviation. The reinvigoration of WAQF, particularly through integration with contemporary financial practices and technologies, can enhance its efficacy and reach. The application of blockchain technology, for example, can bring unprecedented levels of transparency, trust, and efficiency to WAQF management, addressing issues of mismanagement and corruption that have plagued traditional systems.

Furthermore, aligning WAQF with broader Islamic finance principles underscores its compatibility with ethical investing and socially responsible financial practices (Farooq, 2022). This alignment can attract a wider array of stakeholders, including private sector investors and international development agencies, fostering a collaborative approach to socio-economic development.

The WAQF principle, when modernized and effectively implemented, offers a comprehensive and sustainable framework for building a socially and economically just society (Abd Jalil & Pitchay, 2016); (World Bank, 2016). Its integration into contemporary economic systems requires thoughtful adaptation and innovation, ensuring that it remains true to its Islamic roots while meeting the needs of today's world. As such, WAQF stands as a timeless and adaptable tool, capable of contributing significantly to the development of an inclusive and equitable socio-economic landscape.

3. Decentralized waqf platform using blockchain technology

There has been a significant surge in literature exploring the integration of blockchain technology within traditional systems to enhance transparency and efficiency (Zain & Bakar, 2019). A pertinent application of this is seen in the revitalization of the WAQF system, a centuries old Islamic endowment mechanism. Historically, WAQF has faced issues of mistrust due to inefficiencies, bureaucratic delays, and concerns of mismanagement (Zaman & Mohamed, 2023). Recent studies highlight the transformative potential of a decentralized WAQF platform anchored in blockchain technology. The decentralized nature of blockchain ensures that transactions and decisions regarding WAQF assets are publicly verifiable, thereby eliminating layers of bureaucracy and promoting responsiveness (Aysan & Al-Saudi, 2023). Moreover, blockchain's inherent transparency and immutability address concerns of misallocation and misuse, thereby fostering trust (Khalil & Asif, 2021). When applied to public community building, this technological innovation promises not just to enhance the efficiency of resource allocation but also to revitalize public trust in the WAQF system as a viable tool for socio-economic development (Laluddin & Rahman, 2021).

The profound impact of blockchain technology on financial ecosystems, especially within the Islamic financial sphere which has been a focal point of recent scholarly endeavors. (Al-Jaroodi & Mohamed, 2019) delve into this intersection, elucidating the transformative potential of blockchain in enhancing the old WAQF system. Emphasizing blockchain's core attributes transparency, immutability, and decentralization the authors argue that these are crucial for revitalizing WAQF platforms, providing a foundation for transparent and efficient management of assets.

Following on this trajectory, (Yusuf & Salman, 2021) offer a modulation perspective, spotlighting specific blockchain features, such as smart contracts and distributed ledgers technology. Their research demonstrates how these attributes can be tailored to counteract perennial challenges faced by traditional WAQF, notably asset mismanagement and eroding trust among beneficiaries. By automating processes and ensuring that transactions are irrevocably recorded, blockchain, as per their findings, stands as a beacon of hope in restructuring WAQF systems to be more accountable, trustworthy, and in tune with modern technological advancements. Collectively, these studies underscore the symbiotic potential of marrying traditional Islamic financial tools with cutting edge blockchain innovations.

4. WAQF problems in modern Islamic finance:

The modern Islamic finance system has revived the importance of the WAQF platform, which plays a pivotal role in social welfare and economic development. However, several trust issues have arisen that are hindering its effectiveness and widespread adoption (Laluddin & Rahman, 2021); (Abdullah & Rahman, 2015):

- A. **Mismanagement of Assets:** One of the most significant trust issues is the mismanagement of assets. In some cases, WAQF properties are not managed efficiently or are misused, leading to a decline in their value or benefits for the intended beneficiaries. This erodes trust among donors and beneficiaries and undermines the credibility of the WAQF platform.
- B. **Lack of Transparency:** There is often a lack of transparency in the land recording, management and operation of WAQF assets. This includes a lack of clear and detailed information about the establishment, management, distribution, and utilization of the assets. This lack of transparency leads to suspicion and mistrust among stakeholders, including donors, beneficiaries, and the broader community.
- C. **Inefficient Distribution:** Inefficiencies in the distribution of benefits derived from WAQF assets can also lead to trust issues. This includes delays in distribution, inequitable distribution, or diversion of benefits to unintended recipients. This erodes trust in the WAQF system and undermines its intended purpose.
- D. **Non-compliance with Shariah Principles:** Compliance with Islamic principles is fundamental to the legitimacy and acceptance of the WAQF platform. However, there have been instances where the management and operation of WAQF assets have not been fully compliant with Shariah principles, leading to mistrust among stakeholders and questioning the legitimacy of the WAQF.
- E. **Legal and Regulatory Challenges:** Legal and regulatory challenges can also lead to trust issues. This includes inconsistencies in the legal and regulatory framework governing the establishment, management, and operation of WAQF in different jurisdictions. This can lead to confusion, mistrust, and challenges in the operation of the WAQF platform.
- F. **Lack of Professionalism:** Lack of professionalism among the administrators and managers of the WAQF can lead to mistrust. This includes a lack of adequate training, expertise, and experience in the management and operation of WAQF assets. This can lead to inefficiencies, mismanagement, and ultimately a loss of trust in the WAQF platform.
- G. **Corruption:** Corruption is a critical issue that undermines trust in the WAQF platform. This includes bribery, embezzlement, or other forms of corruption among the administrators and managers of the WAQF. This erodes trust among all stakeholders and undermines the credibility and effectiveness of the WAQF platform.

Addressing these trust issues is crucial for the effective operation and widespread adoption of the WAQF platform in the modern Islamic finance system. This involves enhancing transparency, improving management and distribution efficiency, ensuring compliance with Shariah principles, addressing legal and regulatory challenges, promoting professionalism, and combating corruption (Aldeen et al., 2020). By addressing these trust issues, the WAQF platform can fulfill its intended purpose of promoting social welfare and economic development in accordance with Islamic principles.

5. Blockchain approach: waqf transformation into a digital economic instrument

Blockchain's role in metamorphosing WAQF into a digital paradigm is profoundly transformative, offering solutions to traditional inefficiencies and opacity (Al-Saudi, 2024). At

its core, the Distributed Ledger Technology (DLT) ensures a decentralized and transparent record keeping system, which inherently boosts accountability and trust among stakeholders. Coupled with this, the application of Cryptographic techniques, particularly through Cryptocurrency, introduces a modern avenue for global donations, streamlining cross border contributions without the hindrance of conventional banking systems (Hassan & Aliyu, 2018). Smart Contracts, programmable codes that execute when certain conditions are met, bring automation and efficiency into WAQF administration, significantly reducing bureaucratic delays and human errors (Muhamad & Salleh, 2019). Lastly, the Consensus Mechanism ensures that every transaction or addition to the ledger is verified by multiple nodes, enhancing security and reducing fraudulent activities. Collectively, these blockchain facets can rejuvenate the WAQF system, making it more transparent, efficient, and globally inclusive, aligning it with the modern digital economy while retaining its foundational ethos.

Additionally, Blockchain technology has rapidly gained trust due to its inherent characteristics of trust, transparency, and security (Hasan & BT. SIRAJ, 2022). The proposed architecture aims to explore the transformation of WAQF into a digital economic instrument and compare the trust issues faced by the traditional WAQF system with the trust built around blockchain technology. The objective is to leverage the trust building features of blockchain technology to address the challenges faced by the traditional WAQF system, thereby maximizing its potential as an economic instrument and promoting social welfare, economic development, and sustainable growth in the Islamic social economic framework.

The adoption of a blockchain based approach presents the opportunity to revolutionize the WAQF system. Firstly, blockchain's decentralized and immutable nature provides a transparent platform for recording and tracking WAQF assets (Bouakkaz, 2022). This eradicates the prevalent issues of corruption and mismanagement, ensuring that the endowed assets are utilized as per the endower's intentions. Furthermore, the integration of a token economy built on top of the blockchain adds another layer of innovation. Tokens can represent fractional ownership or rights in a given WAQF asset, allowing for easier liquidity, transfer, and management of endowed properties. The diagram below illustrates the high availability of blockchain technology implementation of WAQF.

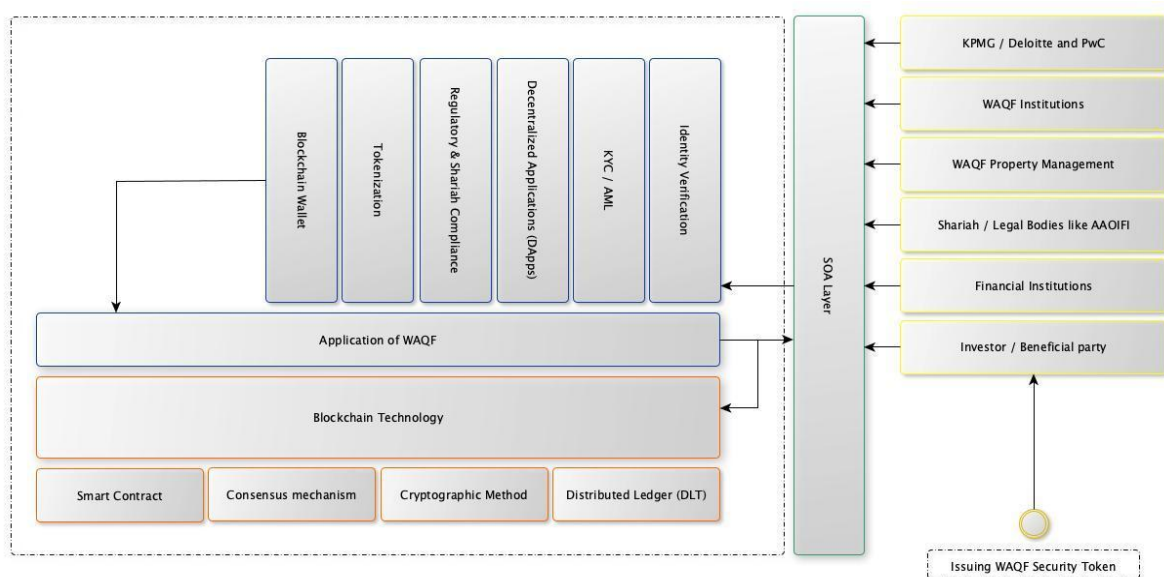


Figure 1. The high availability of blockchain technology implementation of WAQF
Source: (Aysan & Al-Saudi, 2023)

However, the implications of this transformation are profound. The token economy can stimulate broader participation, by permitting micro endowments and creating new avenues for investments, subsequently driving more funds towards social and charitable causes. On the downside, this digital transformation also carries concerns. Misunderstanding or misuse of the technology, regulatory challenges, and potential market volatility are factors that stakeholders need to address meticulously.

In essence, leveraging blockchain for WAQF management and infusing it with a token economy can radically reshape its future, presenting both unprecedented opportunities and unique challenges (Aziz & Mohamad, 2019). This transformation can rejuvenate WAQF as a formidable economic instrument, reinforcing its age-old values with modern technological prowess.

A. Blockchain Architecture Level for Securitizing WAQF Token Economy Using Smart contract:

The proposed blockchain architecture for securitizing the WAQF token economy integrates smart contracts to link each element of the WAQF authority to a decentralized blockchain platform. This multi layered architecture ensures transparency, security, and efficiency in the management and distribution of WAQF assets. The diagram below shows the integration layer of the digital WAQF platform solution:



Figure 2. The integration layer of the digital WAQF platform solution
Source: (Aysan & Al-Saudi, 2023)

1. **Blockchain Layer:** At the foundational level, the blockchain layer serves as the decentralized ledger that records all transactions and asset movements. This layer is responsible for maintaining the integrity and immutability of data, ensuring that all records are tamper proof and transparent. Each WAQF token, representing a unit of

WAQF assets, is recorded on this ledger, providing a clear and auditable trail of ownership and usage.

2. **Smart Contract Layer:** Above the blockchain layer, the smart contract layer automates the execution of WAQF agreements and conditions. Smart contracts are self-executing contracts with the terms of the agreement directly written into code. They automatically enforce the rules and conditions of WAQF donations, ensuring that assets are used in accordance with the donors' intentions. For example, a smart contract could specify that a portion of the WAQF assets be allocated to educational programs quarterly, and this distribution would occur automatically without the need for manual intervention.
3. **WAQF Authority Integration Layer:** This layer links the various elements of the WAQF authority to the blockchain platform. It includes interfaces for WAQF administrators, donors, beneficiaries, and regulatory bodies to interact with the blockchain. Each stakeholder has a specific role and access level within the system:
 - **Administrators:** Manage the overall WAQF operations, oversee smart contract deployments, and ensure compliance with Shariah principles.
 - **Donors:** Can contribute WAQF assets directly through the platform, with their donations being tokenized and recorded on the blockchain.
 - **Beneficiaries:** Receive distributions from the WAQF funds according to the predefined smart contract conditions.
 - **Regulatory Bodies:** Monitor transactions and ensure that the WAQF operations adhere to legal and Shariah regulations.

User Interface Layer: The user interface layer provides a user friendly front end for all stakeholders to interact with the WAQF blockchain platform. This includes dashboards for administrators to monitor asset flows, portals for donors to track their contributions, and interfaces for beneficiaries to receive updates on fund distributions. This layer ensures that all interactions are intuitive and accessible, promoting greater engagement and transparency.

Security and Compliance Layer: Security protocols and compliance mechanisms are embedded throughout the architecture to safeguard the platform. Advanced cryptographic algorithms protect transaction data and ensure secure communication between layers. Compliance mechanisms ensure that all transactions adhere to both local and international regulations, as well as Shariah principles. Regular audits and checks are performed to maintain the integrity and trustworthiness of the system.

Data Analytics and Reporting Layer: This layer provides tools for analyzing transaction data and generating reports. It helps administrators and regulatory bodies monitor the performance and impact of WAQF assets. Data analytics can identify trends, optimize asset allocation, and enhance decision-making processes, ensuring the WAQF funds are utilized effectively and efficiently.

In summary, the proposed blockchain architecture leverages smart contracts to create a secure, transparent, and efficient WAQF token economy. By linking each element of the WAQF authority to the blockchain platform, the system ensures compliance with WAQF principles, enhances trust among stakeholders, and promotes the sustainable management of WAQF assets.

B. The Importance of Token Economy

The token economy has become an integral part of blockchain applications, offering a myriad of benefits and solutions to long standing economic and system design issues by Kazdin (2017). Here's why the token economy is so essential in the context of blockchain:

- a) **Incentivization Mechanism:** Tokens can be used as incentives for participants to behave in particular ways, ensuring the security and functionality of decentralized systems. For example, in proof-of-stake (PoS) consensus algorithms, token holders may be incentivized to "stake" or lock up their tokens in exchange for the right to validate transactions and earn rewards.
- b) **Facilitating Transactions:** Tokens serve as the medium for transactions within a particular blockchain ecosystem. They simplify processes, especially in systems where traditional currencies might be cumbersome or not viable.
- c) **Representation of Value or Assets:** Tokens can represent tangible assets (like real estate) or intangible assets (like digital collectibles or intellectual property). This "tokenization" can democratize access and facilitate fractional ownership, making previously illiquid assets more accessible and tradeable.
- d) **Enabling Programmability:** Tokens can be embedded with smart contracts, allowing for programmable and automated functionalities. This programmability can give rise to decentralized applications (DaPPs) and decentralized autonomous organizations (DAOs) that operate without central control but based on pre-set rules.
- e) **Creating New Economic Models:** Token economies can give birth to novel business models and monetization strategies. Initial Coin Offerings (ICOs), Security Token Offerings (STOs), and Decentralized Finance (DeFi) platforms are examples of innovative economic structures built around tokens.
- f) **Ensuring Interoperability:** Tokens can serve as a bridge between different blockchains or systems, facilitating the exchange of value and information across diverse networks.
- g) **Enhancing User Engagement:** Tokens can be used as rewards or loyalty points, encouraging users to participate more actively in a platform or ecosystem.
- h) **Facilitating Governance:** In decentralized systems, token-based governance allows token holders to vote on key decisions based on their token ownership. This democratizes decision-making processes within the ecosystem.
- i) **Promoting Transparency and Trust:** With every token transaction being recorded on the blockchain, there's an inherent level of transparency. This transparency can boost trust among participants, as they can audit transactions and ensure that there's no foul play.
- j) **Flexibility in Design:** Tokens can be designed to have various functionalities from being a simple medium of exchange to having complex roles in staking, governance, or access rights within a system.

The token economy is not just a byproduct of blockchain innovation; it's a driving force that enhances the versatility and potential of blockchain applications. By understanding the multifaceted roles tokens can play, developers and businesses can better harness blockchain's transformative capabilities.

C. Cryptocurrency and WAQF: A Confluence of Tradition and Modernity

The fusion of WAQF with blockchain and cryptocurrency isn't merely a technological upgrade; it's a vision of a more inclusive, efficient, and transparent future for Islamic philanthropy. As we tread this path, a collaborative approach involving tech experts, Islamic scholars, and WAQF administrators will be imperative. In the confluence of tradition and technology, we find not just the rejuvenation of WAQF but also a promising blueprint for the future of Islamic finance at large.

As financial landscapes evolve with the rapid ascent of digital currencies, there's an urgent question emerging at the crossroads of tradition and innovation: Can the principles of cryptocurrency rejuvenate ancient financial practices like WAQF in the Islamic world?

D. The Genesis of WAQF

To appreciate the potential confluence, it's vital first to understand WAQF. Rooted deeply within Islamic tradition, WAQF as it has been mentioned refers to a charitable endowment where an individual dedicates a portion of their wealth or property for communal welfare or religious purposes. The system aims to provide continuous benefits to the designated beneficiaries. Over the years, however, the management and utilization of WAQF assets have sometimes been clouded with inefficiencies and trust issues.

6. Conclusion

In conclusion, the development of a decentralized WAQF platform presents a transformative approach to fostering an Islamic social economy. By leveraging blockchain technology, the platform ensures transparency, security, and efficiency in the management and distribution of WAQF assets. This decentralized system addresses traditional challenges faced by WAQF institutions, such as mismanagement, lack of transparency, and inefficient resource allocation. The implementation of smart contracts within the platform enables automated, trustless transactions that align with Shariah principles. This not only enhances the credibility and trustworthiness of WAQF operations but also encourages greater participation from the Muslim community. By ensuring that assets are utilized effectively for social welfare, the platform can significantly contribute to poverty alleviation, education, healthcare, and other critical social services.

Furthermore, the decentralized nature of the platform democratizes access to WAQF contributions, allowing individuals from diverse geographical locations to participate and benefit from the system. This inclusivity can drive a more equitable distribution of wealth and resources, thereby fostering social justice and economic development within the Islamic world. In essence, a blockchain based WAQF platform has the potential to revitalize the traditional WAQF system, making it more responsive to contemporary social and economic challenges. It offers a sustainable and innovative solution that can support the development of an Islamic social economy, ultimately contributing to the broader goals of social welfare and economic justice. As we move forward, continued research and development in this area will be crucial to fully realize the potential of this technology and to ensure that it adheres to both technological and ethical standards.

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