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What Blockchain Technology Can Do to Contribute to Waqf

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Abstract
This article supports decision-makers for the use of blockchain technology in academies and industry in Indonesia, considering its advantages and disadvantages. Like the current Covid 19 pandemic, it is necessary to obtain accurate data in various economic sectors. Islamic economic instruments such as waqf are an important sector, proven to have played a significant role in socio-economy throughout history, as a philanthropic tool and contribute to Islamic civilization. If developed, managed and utilized properly, it can create sustainability for the community. A method that relies on previous literature, this qualitative paper aims to contribute to encouraging the government to use blockchain for waqf. We outline terms and concepts related to how blockchain works and theoretical trust to investigate how blockchain affects the role of trust in waqf transactions. The results using the SWOT framework, we discuss what emerges from blockchain technology in waqf. The conclusion of this study discusses how blockchain can contribute to waqf instruments based on a conceptual framework. We hope to stimulate interest in theory and practice to encourage discussion in this area.

Keywords: waqf, blockchain, building information management, government policy, and sustainability.

Introduction

A few years ago the emergence of cryptocurrencies was met with great reluctance and the blockchain system was considered by many to be a disruptive core technology. Although many researchers have realized the importance of blockchain, blockchain research is still in its infancy.[1] Blockchain is a pure electronic peer-to-peer version that allows online payments to be sent directly from one party to another without going through financial institutions.[2] Blockchain is a kind of distributed ledger maintained by network nodes, which records transactions executed between nodes (i.e., messages sent from one node to another). Information entered into the blockchain is public, and cannot be modified or deleted.[3] However, blockchain is not yet enabling a digital business revolution across the entire business ecosystem and perhaps not until at least 2028, the Gartner study expects blockchain to become fully technically and operationally scalable. By 2023[4], the blockchain platform will be scalable, interoperable, and will support smart contract portability and cross-chain functionality will also support transactions trusted personal with the necessary data confidentiality.

A blockchain is a machine for creating a trust (Berkeley, 2015). Overall, these technological advances will be closer to the blockchain mainstream and decentralized web, also known as Web 3.0.[5] This means that blockchain is expected to revolutionize computing in several areas, especially where centralization is unnatural and privacy is important.[6] Where the internet is the second communication revolution, a form of democratization of electronic communication and has invited more people into the knowledge process.[7]

Waqf institution is one of the redistributive institutions that played a significant socio-economic role throughout Islamic history, from the time of the Prophet (SAW) to the end of the nineteenth century.[8] Historically, waqf institutions played a large role in financing almost all services needed in the Islamic world, such as the agricultural and industrial sectors, the education and health sector, basic infrastructure and transportation facilities, in addition to increasing business activities by creating self-employed and those that contribute to sustainable development.[9] As described in the maqasid in Islamic finance,

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[1] Xu, Chen, and Kou, 'A Systematic Review of Blockchain'.
[2] Noorsanti, Yulianton, and Hadiono, 'Blockchain - Teknologi Mata Uang Kripto (Crypto Currency)'; Saberhagen, 'CryptoNote v 2.0'.
[3] Swan, *Blockchain*.
[4] Gartner, 'Analysts to Discuss Technologies and Trends Shaping the Future of IT and Business at Gartner IT Symposium/Xpo 2019'.
[5] Gartner; Xu, Chen, and Kou, 'A Systematic Review of Blockchain'.
[6] Davidson, De Filippi, and Potts, 'Blockchains and the Economic Institutions of Capitalism'; Turk and Klinc, 'Potentials of Blockchain Technology for Construction Management'.
[7] Bagchi, 'Factors Contributing to Global Digital Divide'; McGivern, 'Media and Technology'; OECD, 'Policy Roundtables'; Turk, 'Communication Revolutions – How They Changed It All'; van Dijk and Hacker, 'Digital Democracy'; Wekke, *Demokrasi di Era Digital*.
[8] Hasanah, 'Laporan Akhir Tim Pengkajian Tentang Aspek Hukum Wakaf Uang'; Kementerian Hukum dan HAM 2019, 'buku DPHN Final 2019'.
[9] Ali, Hassan, and Ali, *Revitalization of Waqf for Socio-Economic Development, Volume II*; Mohsin et al., *Financing the Development of Old Waqf Properties*.

namely circulating wealth, fair and transparent financial practices and justice at the micro and macro levels. To achieve this goal, sharia provides means (wasa'il) such as facilitating financial contracts, setting values and standards and institutionalizing social responsibility.[10] Expansion of the object and subject of waqf (waqf) increases the value of waqf, this is where an integrated, reliable technology system is needed, both in security and data collection (input-output). Inefficient distribution of asset utilization, inefficient waqf management, lack of governance and accountability and the liquidity nature of land assets can limit waqf[11], therefore, blockchain has the potential to overcome some of these problems that hinder the industry from using BIM (building information management) such as confidentiality, origin tracking, disintermediation, non-repudiation, multiparty aggregation, inter-organization traceability of records, change tracking, data ownership, etc.[12]

Blockchain has shown promising application prospects. From early cryptocurrencies to today's smart contracts, blockchain has been implemented in many fields.[13] Blockchain has many benefits such as decentralization, persistence, anonymity and auditability. There are lots of blockchain applications ranging from cryptocurrency, financial services, risk management, the internet of things (IoT) to public and social services [14], such as research that has been carried out by the banking sector [15], studies on banking in Korea[16] and India[17]; fintech[18]. A study of blockchain-based insurance[19] that peer-to-peer insurance, blockchain and smart contracts could be key technologies to enable a shift to full decentralization, for example, supporting automated management of self-insured group funds, insurance has the advantage of tracking the sender of transactions and all previous transactions, reducing the risk of data disruption, increasing automation of existing tasks, public blockchain can be useful for managed (automated) payments with existing cryptocurrencies, or when there is a need to provide trust. Blockchain studies from the viewpoint of waqf management regarding movable and immovable assets can serve as a new model for management waqf.[20]

This article also offers blockchain-based waqf management. The author decided to focus on waqf because, in this sector, blockchain technology can have a significant and relevant impact. In particular, combining IoT (Internet of things) in blockchain-based solutions and blockchain deployment levels to validate individual and asset identities.[21] The government has considered waqf as part of economic progress by increasing participation in certain well-established projects to boost the economy, such as the waqf link sukuk and the waqf link sukuk. The hope is that the waqf blockchain can provide efficiency, transparency,

[10] Akram Laldin and Furqani, 'Developing Islamic Finance in the Framework of *Maqasid al-Shari'ah*'.
[11] Sukmana, 'Peluang dan Tantangan Penggunaan Blockchain dalam Perwakafan Nasional'.
[12] Turk and Klinc, 'Potentials of Blockchain Technology for Construction Management'.
[13] Li et al., 'A Survey on the Security of Blockchain Systems'.
[14] Wang et al., 'Blockchain Challenges and Opportunities'.
[15] Garg et al., 'Measuring the Perceived Benefits of Implementing Blockchain Technology in the Banking Sector'.
[16] Yoo, 'Blockchain Based Financial Case Analysis and Its Implications'.
[17] Patki and Sople, 'Indian Banking Sector'.
[18] Chang et al., 'How Blockchain Can Impact Financial Services – the Overview, Challenges and Recommendations from Expert Interviewees'.
[19] Gatteschi et al., 'Blockchain and Smart Contracts for Insurance'.
[20] Zulaikha and Arif Rusmita, 'Blockchain for Waqf Management'.
[21] Kshetri, 'Blockchain's Roles in Meeting Key Supply Chain Management Objectives'.

security and consistency, can provide real-time personal social matrix analytics, can perform transaction tracing through smart contracts, has audit capabilities that are recorded sequentially and indefinitely [22] provide benefits for all parties. Nonetheless, more so than that government involvement signifies a stricter bureaucracy for compliance as a legal umbrella. The main purpose of this article is to stimulate reflection and discussion on the topic of waqf, leaving the reader for the final judgment on the actual benefits that can come from the adoption of the technology considered in a particular scenario. The writer uses SWOT analysis in a broader context to analyze outside the waqf domain.

Results

A cryptocurrency (or crypto or cryptocurrency for short) is a digital asset designed to work as a medium of exchange whereby individual coin ownership records are stored in an existing ledger in the form of a computerized database that uses strong cryptography for secure transaction records, coin generation controls addition, and to verify the transfer of coin ownership. These usually do not exist in physical form (such as banknotes) and are not usually issued by a central authority. Cryptocurrencies generally use decentralized controls as opposed to centralized digital currencies and central banking systems. When cryptocurrencies are minted or created before they are issued or issued by a single publisher, they are generally considered centralized. When implemented with decentralized control, each cryptocurrency works via distributed ledger technology, usually blockchain, which functions as a database of public finance transactions.

In Indonesia itself, cryptocurrency regulations have been regulated by Bappebti. Through Bappebti Regulation No. 5 of 2019, cryptocurrency assets are recognized as commodities that can be traded on a futures exchange. This regulation makes the cryptocurrency industry already have a clear legal umbrella and is increasingly developing in Indonesia. This regulation makes the cryptocurrency industry have a clear legal umbrella and is increasingly developing in Indonesia. Research results[23] indicate that blockchain technology can be regulated based on Book III of the Civil Code and ITE Law as well as the application of smart contracts can also be regulated based on Book III of the Civil Code and the ITE Law. Smart contracts are different from standard contracts stipulated in the Consumer Protection Law.

Cryptocurrency or cryptocurrency has now become one of the favourite investment instruments in Indonesia. Not only that, but cryptocurrencies are also rapidly developing into alternatives to cashless transactions, such as remittances and cross-border transactions. This is in line with the Indonesian people who begin to become financially literate and the latest technological developments. Cryptocurrency uses blockchain technology that is decentralized, transparent, and global. Transactions using cryptocurrency on a blockchain network are believed to be a solution to various problems facing the conventional financial system. Blockchain is considered to be a potential driver of the digital economy. Blockchain technology exceeds the challenges associated with traditional transaction businesses that are regulated and regulated by trusted third parties.[24]

[22] Sukmana, 'Peluang dan Tantangan Penggunaan Blockchain dalam Perwakafan Nasional'.
[23] Serfiyani and Serfiyani, *Kajian Hukum Tehnologi Blockchain dan Kontak Pintar di Industri Jasa Keuangan*.
[24] Upadhyay, 'Demystifying Blockchain'.

How Blockchain Works

Blockchain is called blockchain research scenario introduced[25] to transfer online payments from one party to another, without relying on intermediaries, where the blockchain acts as a ledger that underlies the recording of transfers and ensures trust in a way cryptographic operations, authentication and denial of payment. Since 2008 more than 5400 cryptocurrencies have been created[26] which are used as exchange tokens in many blockchain-based applications. The core concepts behind blockchain technology are as follows:[27]

1) Transaction: every digital currency transfer from one subject to another currency is represented as a transaction from A to B. Cryptocurrency is neither a physical object nor software, but the results of incoming and outgoing transactions. For this reason, blockchain keeps track of all transactions occurring since its inception.
2) Block: transactions are grouped into blocks. Each block collects all transactions that occur within a given time frame and stores a reference to the previous block (that's where the "chain" concept comes from).
3) Nodes: instead of being stored in a centralized database, blockchains are spread over a network of computers ("nodes"), each containing a local copy of the entire blockchain.
4) Majority consensus: since central authority does not exist, decisions on the network are made according to majority consensus. Each node modifies a local copy of the blockchain to create it reflects the status of the majority of network nodes.
5) Mining: nodes can passively store a copy of the blockchain, or actively take part in maintaining the blockchain, in a process called "mining". During mining, nodes check previous transactions to verify whether the subject is entitled to spend a certain amount of cryptocurrency and, whenever a block has to be added to the chain, solve a complex computational-intensive math problem. This issue is specifically designed to limit the possibility of malicious entities manipulating the blockchain by faking transactions. The attack probability is very low because adding new (malicious) blocks or modifying previously added blocks to the chain would require control of the majority of network nodes (to make them agree to the modifications).
6) Wallets: people transfer cryptocurrency using wallets. Cryptocurrency cannot be kept in physical memory; instead, it is the result of a previous transaction. Hence, the wallet only stores credentials (a complex and immutable combination of automatically assigned numbers and letters), which allows blockchain users to transfer the cryptocurrency they own. Each wallet is associated with one (or more) unique addresses. If a user wants to send a certain amount of cryptocurrency to a peer, he must specify the recipient's address and the desired amount, and use the credentials to validate the transaction. This aspect is especially important because, in the case of losing credentials, the cryptocurrency owned by the user will not "disappear", but the user will no longer be able to spend it. Moreover, the fact that the user validates a transaction with credentials stating that he is the real initiator of the transaction.

In this sense it allows readers to become more familiar with the main characteristics of blockchain, which makes it a disruptive technology:[28]

[25] Nakamoto, 'Bitcoin: A Peer-to-Peer Electronic Cash System'; Nath, 'Bitcoin Technology: A Peer-to-Peer Digital Cash Transaction'.
[26] CoinMarketCap, 'Top 100 Cryptocurrencies by Market Capitalization'.
[27] Gatteschi et al., 'Blockchain and Smart Contracts for Insurance'.
[28] Gatteschi et al.

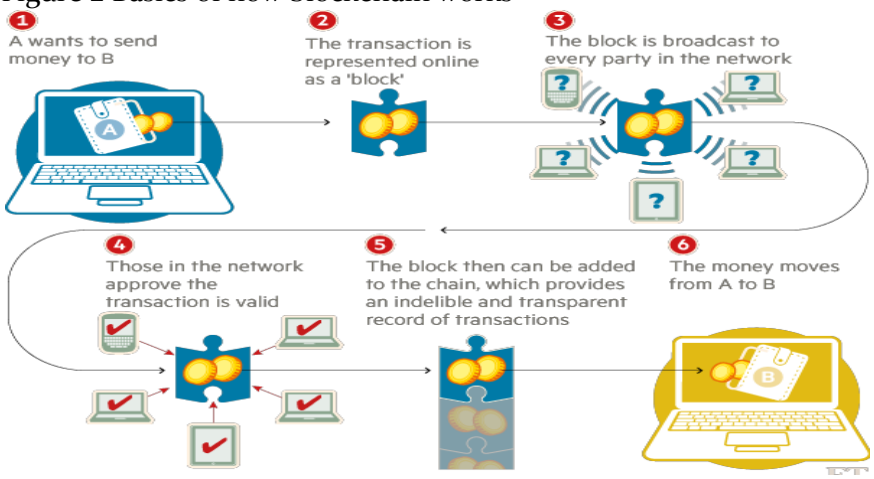
1) Data redundancy: each network node has a local copy of the blockchain, which prevents data loss;
2) Data immutability: data stored on the blockchain cannot be modified or deleted;
3) Trust: cryptography enables trust between parties because transactions that have been validated using user credentials cannot be rejected;
4) Transparency: everyone can read the blockchain and the transactions stored on it.

Other characteristics of blockchain:[29]

5) Decentralized. Blockchain uses a distributed network model with a consensus algorithm to maintain data consistency in its network.
6) Be persistent. It is almost impossible to delete or rollback transactions that have occurred on the blockchain network. Blocks containing invalid transactions can be found immediately.
7) Anonymous. Each user can interact on the blockchain with the generated address, which does not reveal the user's real identity. This is a characteristic of the blockchain, although user anonymity is not always maintained due to intrinsic limitations.
8) Can be audited. Transactions on the blockchain can be easily verified and tracked. Bitcoin, as an example of using blockchain, stores user data in the Unspent Transaction Output (UTXO) model. Each transaction must refer to previous transactions that have not been used.

Given the above about cryptocurrency transfers, the possibilities for blockchain applications are not limited to monetary assets but can cover a wide variety of use cases. Among the early application scenarios explored for blockchain, it is necessary to keep in mind the context of the writing. Because the blockchain is immutable and publicly available, researchers are advised to use it for keeping public records and endorsements.[30] Another domain where blockchain has been recognized to bring significant benefits is intellectual property protection. In this context, blockchain technology can be used to prove/state the existence of documents at a certain time.[31]

Figure 2 Basics of how blockchain works[32]



[29] Arief and Sundara, 'Studi Atas Pemanfaatan Blockchain Bagi Internet of Things (IoT)'; Wang et al., 'Blockchain Challenges and Opportunities'.
[30] Swan, *Blockchain*.
[31] Rosa et al., *A Survey of Blockchain Technologies for Open Innovation*.
[32] Wild, Arnold, and Stafford, 'Technology: Banks Seek the Key to Blockchain'.

Looking at the above concept, the researcher realized that blockchain could also be used to store other types of assets, including code snippets. It was the birth of "smart contracts", ie small programs that are stored on the blockchain and programmed to behave independently in certain ways when several conditions are met. The idea of smart contracts has been known since the 90s[33] but only with blockchain technology and, in particular, with the Ethereum blockchain[34] (perhaps the most famous blockchain after bitcoin), smart contracts are capable of releasing their full potential.[35] With smart contracts, a person can, for example, encode his wishes on the blockchain on the internet in the form of a set of rules.

In the case of waqf based on sharia insurance, for example, due to insurance customer lapse or death, the smart contract can then automatically inform the termination of wakif in the system because the contract agreement ends. Examiners can also provide additional constraints in the waqf system to obtain real-time information. Since smart contracts are based on data stored on the blockchain, they need to rely on external services, which take data from the "real" world (for example, from death records) and push it to the blockchain (or vice versa), these services are referred to as "oracles"[36], taking into account the example of a tester, an oracle could examine the insurance customer's lapse records/insurance customer's death to identify whether the person defaulted/died. If so, it can write this information on the blockchain (eg by changing the boolean value of the variable indicating whether the person is alive or not). The smart contract, then, will trigger a conditional statement (based on the variable value), and run the code block that initiates the stop/money transfer. Recently, more complex applications of smart contracts and prophecy have been proposed, related to the concept of Decentralized Autonomous Organizations, or DAOs.[37] In this context, smart contracts are used to encode the rules for governing an organization, for example how decisions are taken on the vote weight of each member, etc. The advantage is that no external party is required to verify that the organization is well managed, and the underlying rules can be verified by the wider community, ensuring transparency and trust.

Blockchain application for Waqf

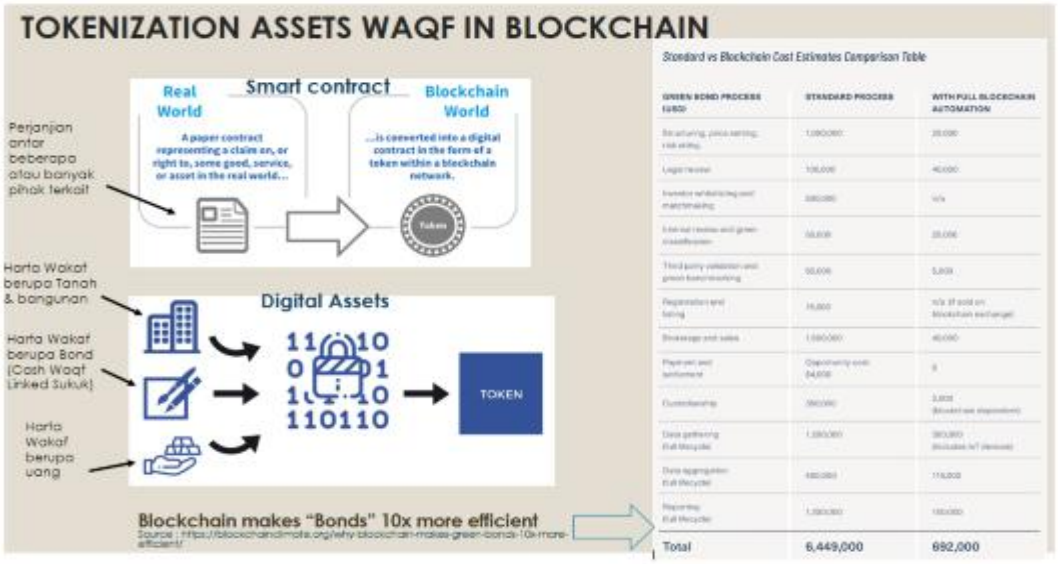
The dynamics of waqf development in Indonesia are increasingly diverse, starting with conventional waqf in the form of land that has been partially recorded in BWI (KUA at the regional level)[38] where the potential for waqf in Indonesia is asset waqf Rp. 2,000 trillion / year and cash waqf of Rp. 188 trillion/year, the realization of Rp. 400 billion. Another waqf asset developed is cash waqf in collaboration with professional nadzir such as bank and non-

[33] Szabo, 'Smart Contracts'; Szabo, 'Smart Contracts: 12 Use Cases for Business & Beyond'.
[34] Baird et al., 'The Economics of Smart Contracts'; Beck et al., *Blockchain – the Gateway to Trust-Free Cryptographic Transactions*.
[35] Sillaber et al., 'Laying the Foundation for Smart Contract Development: An Integrated Engineering Process Model'.
[36] fintech, 'Oracle Exec: 50% Perusahaan Akan Menggunakan Teknologi Blockchain dalam Tiga Tahun Selanjutnya'; Mou, 'Penjelasan Mengenai Oracle Blockchain Bagikan'; Swanson, 'Consensus-as-a-Service: A Brief Report on the Emergence of Permissioned, Distributed Ledger Systems'.
[37] Academic, 'DAO'; Beck et al., *Blockchain – the Gateway to Trust-Free Cryptographic Transactions*; CW.Club, 'There's Now a DAO for Deciding Which Blockchains to Stake On'.
[38] BWI, 'Data Tanah Wakaf Bersertifikat di Indonesia'.

bank financial institutions. Even waqf can directly contribute to development through share waqf (sukuk link waqf/wakaf link sukuk). Optimization of data collection that is still around individual nadzir and professional nadzir is still not optimal because each nadzir makes recording not integrated. There are still waqf lands that are disputed and ultimately cannot be managed for the public interest. There is also a need for imperative action on the data collection of individual nadzirs as well as professional/institutional nadzirs, both productive waqf and cash waqf. And many other waqf problems can be anticipated with blockchain so that the flow of waqf from the start to its realization can be seen as transparent, reliable and real-time for mauquf ālaih and sustainability of development. The following is an overview of waqf in Indonesia:[39]

Seeing the above description, blockchain must centralize real-time national waqf data, for transparency of transactions in land/property waqf and cash waqf; avoiding corruption, money laundering; integrated property development easy to trace; crowdfunding for property development; liquidity in land assets. Through the tokenization system[40] for waqf in the blockchain is described as follows:[41]

[39] Anggraito, 'Blockchain Waqf, Usecase: Telkom Blockchain Wakaf (Kerjasama Telkom & BWI)'.
[40] Davidson, De Filippi, and Potts, 'Blockchains and the Economic Institutions of Capitalism'; Rosa et al., *A Survey of Blockchain Technologies for Open Innovation*; Swanson, 'Consensus-as-a-Service: A Brief Report on the Emergence of Permissioned, Distributed Ledger Systems'.
[41] Anggraito, 'Blockchain Waqf, Usecase: Telkom Blockchain Wakaf (Kerjasama Telkom & BWI)'.



The description above indicates that waqf as part of an optimally managed socio-economy can bring benefits other than self and the ummah. Awakif's concern for waqf through nadzir both individuals and professional nadzir (institutions) which is managed transparently from data collection to distribution, produces maximum benefits for wakif and the ummah because the purpose of waqf is actually for the benefit which is channelled to the real sector and the social sector.

SWOT analysis

From the data and discussion above, it appears that there is great potential for waqf in Indonesia which is well managed using blockchain technology. Objectively, from the above explanation which is the waqf domain, it is analyzed as a strategic planning method.

The strength of blockchain from the explanation above is related to the technological aspects presented, it can eliminate intermediaries, faster access, no bank transfer fees, no commission/fees in the transaction process because cryptocurrency is immediately transferred to the intended party. Blockchain offers a high level of automation. Transparency is guaranteed good because the blockchain can be accessed worldwide. Also, because everyone has the potential to write on a ledger, blockchain can be a repository of large amounts of information, which can be used for data analysis in various sectors (waqf, other economies such as zakat, insurance, finance, medicine, education, etc.). The underlying cryptographic mechanism ensures that data is not modified and transactions cannot be rejected. Finally, blockchain replication on each network node ensures that the blockchain will be safe from unforeseen events/abuse.

The most relevant drawbacks of blockchain technology are related to scalability, energy consumption and performance. Currently, the number of transactions that can be handled per second is very low when compared to traditional systems (mainly because of the computation power required for that, new block validation). If at present, blockchain-based transactions are faster than traditional bank transfers (on average it takes seconds to

minutes instead of 1-2 days), for instant payments and other types of applications, performance should not be sufficient for the needs. In this regard, it should be underlined that some blockchain platforms are changing the process from validating blocks, reducing the complexity of the mathematical problems to be solved and limiting the possibility of mining to only a portion of the trusted nodes. Regardless of the time, space is also a problem, because data is replicated at each network node. Human resources that are less professional, it still takes time for sufficient literacy [42]. There is no specific legal umbrella regarding blockchain for waqf. For Islamic insurance-based waqf, it is necessary to consider a long premium tenor, it is feared that the waqf fund will not occur at the end of the agreement; or when the unit-linked investment funds for waqf have not developed as agreed.

Waqf blockchain opportunities, competitive advantage (if efforts to reduce/hide the complexity behind the blockchain are successful, or in the case of IoT diffusion); the possibility to overcome and potential new markets (for example, to deliver services, currently blockchain waqf has the potential to collaborate with the sharia fintech ecosystem, especially payment fintech providers, to make it easier for waqif users of fintech payment services to channel their waqf funds); the availability of large amounts of heterogeneous data, driven on the blockchain by different actors, animates other economic systems.

Threat (may be perceived as insecure/unreliable) low adoption of external factors means lack of information; governments may consider blockchain and smart contracts "dangerous"; medium-long term investment; not suitable for all existing processes; Wakif still considers interactions due to lack of literacy; the abuse of blockchain technology by hackers because everything is done computation, still requires manual recording.

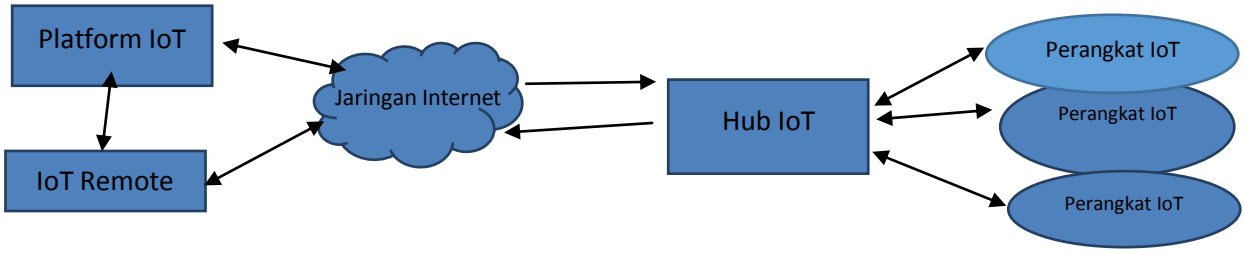
Discussion

The Internet of Things (IoT) has made it possible for a variety of devices to connect to existing Internet networks and be controlled remotely like any other virtual information asset. Various potentials can be developed with this technology, but at the same time, it also presents new threats to the security of devices connected to the internet. Internet of Things (IoT) is a global infrastructure for the information society, which allows various devices (devices), both physical and virtual, to connect. What is meant by objects (things) are objects of physical objects and the world of information (virtual) that can be identified and integrated into a communication network. IoT allows objects to be sensed and controlled remotely through an existing network infrastructure. This provides an opportunity for direct integration of physical objects into computer-based systems. Each object can be uniquely identified through an embedded computer system (embedded computing system) and capable of interoperating in existing Internet infrastructure.[43]

[42] Anggraito.

[43] Lopez et al., 'Evolving Privacy'; Perumal and Manohar, 'A Survey on Internet of Things'; Samaniego and Deters, 'Management and Internet of Things'.

Figure 1. IoT Ecosystem [44]



In the IoT ecosystem (see Figure 1), various IoT devices will be connected through a hub (IoT hub). This hub is connected to the internet network and exchanges data in that network. This allows the IoT platform to control these devices remotely.

A cryptocurrency (or cryptocurrency) is a digital asset designed to work as a medium of exchange using cryptography to secure transactions and to control the creation of additional units of currency[45]. Cryptocurrency is classified as part of digital currency and is also classified as part of alternative currency and virtual currency. Bitcoin, which is considered to be one of the most populous cryptocurrencies, was created in 2009 as the first decentralized[46] cryptocurrency. Since then, many other cryptocurrencies have been created. They are often referred to as "altcoins" as a mixed alternative to bitcoin. Bitcoin and its derivatives use decentralized control as opposed to a centralized electronic money/centralized banking system [47]. The decentralized control is concerned with the use of the bitcoin blockchain transaction database in the distributed ledger role.

The term cryptocurrency is in practice often misused in a very broad sense. As will be shown below, these should be distinguished from tokens and crypto securities[48]. First, cryptocurrencies must be distinguished from cryptographic "tokens", which offer functionality apart from and outside the general purpose medium of exchange. Tokens are issued in the context of an Initial Token Offering or "ITO"[49] to raise funds for a specific project or company. They are a new class of crypto assets (i.e. digital assets recorded on distributed ledgers, secured by cryptography [50] that embody a kind of claim against an entity (or against cash flows, assets, residual value, future goods or services). ahead, ...) that emerged from the use of blockchain technology [51]. Some tokens resemble traditional instruments such as stocks or bonds and are commonly referred to as "security tokens" or "investment tokens". Other tokens provide access to (future) holders to a particular product or service and are commonly referred to as "utility tokens". They can be used to acquire certain products or services, however, they are not a general-purpose medium of exchange, simply because they generally can only be used on the token platform itself. Second,

[44] Arief and Sundara, 'Studi Atas Pemanfaatan Blockchain Bagi Internet of Things (IoT)'.
[45] Greenberg, 'Crypto Currency'.
[46] Campbell-Verduyn, *Bitcoin and Beyond*.
[47] Houben and Snyers, 'Cryptocurrencies and Blockchain'.
[48] Houben and Snyers.
[49] Rohr and Wright, 'Blockchain-Based Token Sales, Initial Coin Offerings, and the Democratization of Public Capital Markets'.
[50] Daniel and Green, 'Ifrs: Accounting for Crypto-Assets'.
[51] Karl and Alexander, 'Icos in Belgium: Initial Considerations on Financial, Accounting and Tax Law Implications'.

cryptocurrencies must also be distinguished from recent concepts. In short, it has been suggested that blockchain technology can also be used to register, issue and transfer common stock and other company securities so that a company's capitalization table is always there. accurate and up to date referred to as "crypto-security". Since these technological processes are to be cryptographically secured, it has been suggested that these securities be defined as crypto securities. The only connection between this newly developed concept of "cryptosecurity" and cryptocurrency, is that they both take advantage of blockchain technology.

Cryptocurrencies and blockchain have become hot topics in recent years. Although the two are often referred to in the same sentence and related to one another, one should not mistake one for the other. Blockchain is a type of distributed ledger technology that forms the backbone of the crypto market. This is the technology behind the wide variety of cryptocurrencies currently in circulation. However, the scope and areas of application are not limited to that. As explained above, blockchain can be implemented in various sectors and can have a wide variety of applications. It is important to draw a clear line between this application and cryptocurrency, which is one specific application of blockchain technology. Against this backdrop, regulators need not be afraid of stifling innovation when dealing with cryptocurrency issues.

Blockchain[52] where peer-to-peer networks use proof of work to log public transaction histories which quickly becomes computationally impractical for attackers to change if honest nodes control a large proportion of CPU power, with the potential for blockchain technology for management[53] which can overcome several problems that prevent the industry from using BIM (building information management) such as confidentiality, origin tracking, disintermediation, non-repudiation, multiparty aggregation, traceability between - recording organization, change tracking, ownership of data, etc.[54] The blockchain is a distributed database used to maintain a growing list of records, which are called blocks. Each block contains a timestamp and a link to the previous block. Generally, blockchains are managed by peer-to-peer networks that collectively adhere to certain protocols to validate new blocks[55]. This distributed ledger technology can become a framework that enables radical innovation in many fields.[56] The blockchain is a distributed data structure that is replicated and shared among its network members. Blockchain, was originally introduced as a solution to double spending on bitcoin. As a result of the way nodes on the bitcoin network (called miners) are validated, and agree on the transactions that take place on them. The blockchain in bitcoin provides a platform for authoritative transaction ledgers that determine who owns the transactions. Even so, blockchain can stand on its own, without needing to be tied to cryptocurrencies. Blockchain can be described as a log whose records are batched with a block that is given a timestamp. Each block is tagged with a cryptographic hash. Each block refers to the hash of the previous block. This creates a link between the blocks, thus creating a chain of blocks (chain). Each node that is connected to the block list that is connected to and linked to the previous block (backlinked) can read

[52] Hong-Ning Dai, Zheng, and Zhang, 'Blockchain for Internet of Things: A Survey'; Nakamoto, 'Bitcoin: A Peer-to-Peer Electronic Cash System'.
[53] Turk and Klinc, 'Potentials of Blockchain Technology for Construction Management'.
[54] Friedlmaier, Tumasjan, and Welpe, 'Disrupting Industries with Blockchain: The Industry, Venture Capital Funding, and Regional Distribution of Blockchain Ventures'.
[55] Loebbecke, Lueneborg, and Niederle, 'Blockchain Technology Impacting Trust'.
[56] Beck and Müller-Bloch, 'Blockchain as Radical Innovation'.

and get an overview of the current state of the world of data being exchanged on the network. An overview of how blockchain works can be obtained by understanding how blockchain networks work. It is a set of nodes (clients) operating on the same blockchain through the copies that each node has. A node, in general, can act as an entry point for different users on the blockchain, but for simplicity, each user is considered to be transacting on the blockchain through their node.

Blockchain is a collection of distrusted authors who share a database without a trusted intermediary. To prevent chaos from occurring in this distributed environment, and to reach a global consensus, every blockchain network needs to implement a set of rules that every database transaction must adhere to. These rules are programmed on each blockchain client, who will then use these rules to check whether a transaction is valid or not and, as a consequence, whether the transaction will be relayed to the network or not. Blockchain can be divided into: (1). Public, (2). Private, and (3). Consortium.[57]

To take advantage of Blockchain in the IoT ecosystem, applications developed can take advantage of several available mechanisms. In the application development above, blockchain is made easier by the existence of a smart contract. The purpose of smart contracts is to support the complete cycle management of smart legal contracts. This includes the creation of templates for standard legal documents and the use of these templates in negotiations and agreements by the parties involved. This allows for automated performance of contracts, and in case of disputes, can provide direct links to relevant legal documents. These templates and agreements can ignore their automated methods. These smart contracts can potentially be implemented as a software agent on a variety of technology platforms, including distributed ledger platforms such as AxCore, Corda, Digital Asset Platform, Ethereum, and Fabric.[58] Smart contracts, in essence, are transparent and make commercial efficiency, reduce transaction and legal costs, and allow anonymous transactions.[59]

While a common problem people have with giving out charity, in the traditional sense is that when you put your money in the donation box, you never know where it will go later. In the fast-paced, highly digital world we live in today, the services we choose are based on simplicity and trust. Ease comes from a smooth user experience and trust (Sun et al., 2016) comes from the level of transparency and clarity gave about how funds are used, so blockchain is an effective and efficient solution to handle it. Blockchain is a new technology that is considered a breakthrough, as a unique innovation, because of its cost-lowering nature of transactions, it requires cooperation not only at intra-organization but also at the inter-organizational level to fully utilize technology.[60]

Here, in this qualitative paper, we aim to contribute to encouraging the government to use blockchain for waqf. We outline terms and concepts related to how blockchain works and theoretical trust to investigate how blockchain affects the role of trust in waqf transactions. Reading materials from various articles, online seminars, books on the views of waqf experts, waqf management and blockchain. Information is obtained by reading and

[57] Zheng et al., 'An Overview of Blockchain Technology'.
[58] Clack, Bakshi, and Braine, 'Smart Contract Templates'.
[59] Giancaspro, 'Is a "Smart Contract" Really a Smart Idea?'
[60] Batubara, Ubacht, and Janssen, 'Challenges of Blockchain Technology Adoption for E-Government'; Beck and Müller-Bloch, 'Blockchain as Radical Innovation'; Khoshavi et al., 'A Survey on Blockchain Security'.

asking questions during an online seminar so that the research findings of this study can provide comprehensive and realistic input on the potential of the waqf blockchain.

Conclusion

Blockchain is a growing concern from research and is considered as a breakthrough in waqf management. The objective evaluation is carried out by blockchain in waqf for optimization of its sources and distribution. Government support is needed to regulate regulations for security if you decide to use the waqf blockchain. For consideration of reducing risk in this paper, the authors present an overview of the potential applications and use cases of blockchain and smart contracts in the waqf sector, analyzing the more general SWOT of blockchain, which can potentially be applied to various other sectors, apart from waqf.

This article focuses on waqf where blockchain has not been fully explored and where it can have a relevant impact on several processes and application scenarios. Therefore, use cases in this sector can help in identifying the advantages and disadvantages of the technology itself. Finally, in the scenario identified last, namely, peer-to-peer waqf, blockchain and smart contracts could be key technologies to enable a shift to full decentralization, for example, supporting automated management of self-managed group funds.

Regarding scalability, the lightning network (for bitcoin)[61] and the Raiden network (for Ethereum)[62]. Both solutions are investigating how to mix online and offline transactions, reducing costs and time. Regarding the easing of interactions with blockchain, several applications that allow users to easily interact with blockchain-based applications using a browser or mobile are under development.[63] Regarding smart contract security using Hacken provides a variety of cybersecurity services, involving security experts from around the world and providing solutions specifically designed for SMEs, enterprises, startups and ICOs.[64] After the above initiatives are successful, blockchain technology can be gradually incorporated into everyday life.

Blockchain is bringing about a digital revolution, a radical transformation to the way we act and think, and we all need to be ready for change. This prototype is very efficient in helping the management of waqf to be more optimal for welfare and sustainability, especially in emergency times such as the current pandemic, where sources of funds other than government financial sources, one of the sources of funds from the public through Muslim financial sources is waqf.

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[62] Raiden, 'Fast, Cheap, Scalable Token Transfers for Ethereum'.
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