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# The Importance of Using Blockchain Technology in Islamic Financial Institutions

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## **Abstract:**

Blockchain is a technology compatible with Islamic law because its contract follows the legal and operational requirements of a contract's components. Islamic banks can benefit from applying smart contracts by using blockchain in many aspects, such as smart credit management, trade financing, control, and auditing, as well as the efficiency of the payments and transfers system. In addition, through smart sukuk, money is collected from investors in exchange for a part of their ownership. Money is automatically distributed to the sukuk holders through the blockchain platform according to the rules of the smart contract in the Islamic economy. Next, through a transparent information base, confidence in the endowment can be restored and its role can be revived. This is because blockchain technology is characterized by credibility, transparency, accuracy and speed of implementation, regulating contractual relations between parties, or counting endowment resources.

**Keywords:** blockchain, Islamic financial, waqf, zakat; sukuk.

**Jel Classification Codes :** E5 ; G2 ; L63.

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## 1. Introduction:

The world has witnessed a major digital revolution, especially in the sector of financial institutions and banks. This new revolution brings great technologies and innovations to the world of technology. “Blockchain” technology is a major example of that revolution, as it allows the issuance of digital currencies. Although initially blockchain was widely used as a supporting infrastructure for trading encrypted assets, notably bitcoin, it has important uses in other fields and sectors such as financial services, the maintenance of medical records, the provision of government services, and other applications.

The blockchain system is the intermediary that is present while service is provided. It replaces the banks in transferring money, the real estate notary in registering properties, the place of traffic departments in registering cars, and the place of brokers in buying and selling operations. These replacements benefit a new intermediary, which is the millions of individuals around the world who use the chain and who benefit from the financial returns that were due to the traditional broker.

Islamic financial institutions need to keep pace with the rapid technological developments taking place in global financial markets by developing their methods and adopting the latest innovations. The ability of these institutions to compete strongly and positively with banks and usurious institutions necessitates them to find new solutions to any challenge facing the Islamic finance, especially in technology. Furthermore, the use of this technology in Islamic finance may lead to the creation better opportunities through the ecosystem. This leads to the activation of Islamic values and increased confidence in Islamic finance. Finally, in light of the previous proposal, we pose the following problem:

### **What is the importance of using blockchain technology in Islamic financial institutions?**

To answer the problem at hand, the research was divided:

- The First Axis: The Theoretical Framework of Blockchain Technology
- The Second Axis: The Reality of Using Blockchain Technology
- The Third Axis: Uses of Blockchain Technology in the Islamic Finance

## **1. The First Axis: The Theoretical Framework of Blockchain Technology:**

### **1.1 The Origins of Blockchain:**

This technology first appeared in 2008 by a group of anonymous individuals bearing the pseudonym "Satoshi Nakamoto". They published a short white paper on an encrypted mailing list entitled "Bitcoin". This paper allows payments to be sent over the Internet directly from one party to another without an intermediary or financial institution. “Bitcoin” is a “Peer-To-Peer” electronic cash system (Michael Crosby, 2015, p. 5). This currency relies heavily on advanced current methods,

especially “Peer-To-Peer” networks. It also relies on digital encryption using the “public-key” to clearly identify all members of the network while hiding their identity, thus identifying each Bitcoin unit.

Bitcoin was designed to bypass the basic elements of the infrastructure of traditional financial services. It is not the first digital currency to be proposed for this purpose. However, it is the first currency that succeeded on a large scale because the solution invented by “Nakamoto” solved the main problem that spoiled all previous digital currencies, such as trust. Additionally, he added a new key element to this mix that made Bitcoin different and more powerful than any previous attempt to create an independent digital currency. It is an innovative technology that uses advanced encryption techniques and smart incentives to ensure independent accountability.

In theory and practice, the blockchain system uses a set of advanced encryption and engineering techniques to create an independent, trustworthy, decentralized network for exchanging “Bitcoins” between anyone interested in joining. The protocol allows for the creation of new Bitcoins in the network at regular intervals.

Blockchain is a record of all transactions made using “Bitcoin” around the world. No central authority maintains this record; rather, it is kept through the collective efforts of any individual who wants to join the network. Moreover, blockchain enables the construction of a fully automated system to maintain a book of transactions. Blockchain enables instant and final automated Bitcoin transactions (Batlin & others, 2016).

Blockchain technology is a combination of several basic technologies that have been in place for at least four decades. Throughout the five years following the creation of Bitcoin and since 2013, blockchain has begun to make a name for itself due to being used in other cryptocurrencies, such as “Ethereum”, and more from the fintech industry (Ganne, 2018).

### **1.1.1 Ethereum Technology:**

It is one of the efficiently developed public platforms characterized by smart contract features, flexibility, and adaptability in many areas. Ethereum serves as a foundational component in building and developing most decentralized applications (Abououbaid, 2020, p. 48).

In 2013, Vitalik Buterin described the concept of Ethereum for the first time. Vitalik was previously a programmer who worked on Bitcoin. He learned about the advantages and disadvantages of its system. He began seeking to create a similar “blockchain” system while adding improvements to it. In the same year, he wrote a document describing the concept. Ethereum. Then he proposed to develop this new platform using a general programming language.

Vitalik announced the Ethereum concept at the North American Bitcoin Conference, held in Miami. He published the Yellow Paper, the first official

document detailing the properties of the Ethereum cryptocurrency, as well as the first cryptographic model of the Ethereum platform. The first Ether currency sale was launched, with an initial conversion rate of 31,591 Bitcoin versus 60,102,216 Ether. The Ether pre-sale in August raised more than \$14 million.

The Ethereum Company witnessed extensive media coverage and broke into public opinion after the decentralized autonomous organizations (DAO) were able to raise more than \$150 million from crowdfunding operations (Highlights in Ethereum's history since its launch, 2018). Ethereum has now surpassed the banking and financial sectors and expanded into other areas, such as the supply chain, retail trade, e-commerce, healthcare, energy, and government sectors. Thus, the Ethereum platform has achieved great success in many business sectors. It works best not only in general cases of using the chain of trust, but also in special cases.

The Ethereum platform has already set the standard for the trust blockchain platforms, as it helps to visualize how to build decentralized applications that are usable with or without the use of Ethereum itself. Thanks to Ethereum, it has become possible to build blockchain applications with minimal knowledge of cryptography, game theory, mathematics, complex coding, or basics of computer science. (Abououbaid, 2020, p. 117)

### 1.1.2 Smart Contracts

The “smart contract” concept embodied by the Ethereum platform was introduced as a digital representation of assets over digital currencies such as Bitcoin. In addition to the speed and efficiency achieved through distributed ledger technology, smart contracts, unlike traditional contracts, provide the ability to execute complex tasks between parties including a self-executing encrypted program (Niforos, 2017, p. 17). In a smart contract, the “code” specifies the terms of the agreement based on “if” and “else” then it automatically enforces these conditions. If the criteria specified in the instructions are met, the code is executed. Additionally, the smart contract can be implemented through blockchain in removing the requirements for a trusted third-party intermediary. Therefore, this contract has the potential to reduce costs in areas that typically rely on an intermediary such as clearing and settlement (Myers, 2019, p. 71). It can be used in many scenarios, including the transfer of equity securities, the settlement of financial derivatives, the payment of royalties, and more. (Niforos, 2017, p. 19).

Every smart contract is based on three basic components. The **first** is the signatories. They are two or more parties who use the smart contract. They agree or disagree on the terms of the agreement using digital signatures. The **second** is the agreement, which can be just a component in the smart contract environment. Instead, smart contracts must have direct access without hindrance to the component. The **third** one is that the smart contract must include specific terms. These terms need to be described in a fully mathematical manner by using a programming language

appropriate to the particular smart contract environment. This includes the requirements expected from all participating parties as well as all rules, rewards, and penalties associated with the mentioned terms.

Additionally, the smart contracts environment needs to support the use of public key cryptography, which enables users to log out of the transaction using unique and specially generated encryption codes. The environment also requires an open and decentralized database that can be completely trusted by all parties to the contract. The entire environment must be decentralized for a smart contract execution. Blockchain networks, especially Ethereum, are the ideal environments for smart contracts. Moreover, the source of the digital data used in the smart contract must be completely documented. This necessitates the use of basic security certificates and other secure communication protocols. (Al-Sawy)

## **1.2 Blockchain Concept:**

The Chinese Academy of Information and Communications Technology defines blockchain as a distributed, public, and decentralized digital ledger, which is jointly maintained by multiple parties. Using cryptography ensures the security of transmission and access, achieves data storage consistency, combats data tampering, and prevents spoofing. Finally, blockchain is also called the Distributed Ledger Technology (DLT) (China Academy, 2018).

Douglas Mille defined blockchain as a wide range of applications in the financial sector and beyond. This technology includes “Peer-To-Peer” networks, energy markets, supply chain certificates, and intellectual property management (Niforos, 2017, p. 9).

## **1.3 Advantages of Blockchain Technology:**

**1.3.1 Decentralization:** Blockchain technology is based on the design of a peer-to-peer network where each participant in the network is equal to others in the chain. This means that no entity can unjustifiably influence the system. The network’s rules and behavior are according to the program protocol. The more the network grows the more the rules are standardized, making it less likely that any entity will change the system’s behavior. (Hewlett Packard Enterprise, 2016).

**1.3.2 Distribution:** Blockchain provides a distributed ledger, which is a distributed information system that is jointly managed by multiple parties. Thus, it breaks the concept of traditional double-entry accounting and becomes a distributed ledger for a “whole network to share”, meaning a distributed accounting (China Academy, 2018).

Furthermore, each node in the network contains a complete copy of the entire ledger, starting from the first created block (the Bitcoin block) to the most recent. A ledger is maintained of every transaction that has been made within all participating nodes over the past seven years. This distributed approach increases the flexibility and security of the system in general. If any node or group of nodes is disconnected

to the Internet, the system will continue to operate through other nodes. For any attempt to cheat the system by changing the ledger, most copies of the ledger would have to be compromised to convince the network

**1.3.3 Distributed Database:** The design contains an innovation that solves the problem of double spending through a mechanism called “Distributed Network Consensus”. This mechanism enables the entire network to reach agreement on which sets of transactions are valid and which are not. This enables the exchange of value from peer-to-peer without involving a trusted third party or intermediary for such compliance.

**1.3.4 Eliminating Financial Fraud:** Every transaction must be digitally signed using the participant’s private encryption key, which is kept only by the site. The authenticity of the digital signature on a transaction can be verified by the site’s “public key”. Thus, data, transactions, or money are transferred through the blockchain confidentially so that No one dealing through the network knows the operation parties through which the money was traded. This is because people in the blockchain system are merely ciphers. Also, public keys are designed and are not shared with anyone, which ensures that a transaction can only be created by the owner of the private key. Once the transaction signature is verified, the transaction is cryptographically linked through a mathematical algorithm called a “hash”. A hash function creates a unique digital fingerprint of the transaction. The transactions are then hashed with other ones in a block. When a block is accepted by the network, it is cryptographically linked to the ledger and distributed to all nodes on the network. (Hewlett Packard Enterprise, 2016)

**1.3.5 Transparency:** Traditional databases contain four classical operations: insertion, deletion, update, and selection. However, blockchain technology does not have options for deletion and updating, leaving only insertion and selection through an interconnected structure of blocks and lists. Moreover, corresponding timestamps to merge the chain that forms authenticated and interconnected data sets is difficult to tamper with (China Academy, 2018). Additionally, the distributed ledger contains a complete record of every transaction, making it possible to trace every asset (crypto or other assets) since its creation. The distributed ledger is openly published to every node on the network, making it easy for any network participant to determine the current and past states of assets within the ledger (Hewlett Packard Enterprise, 2016).

### **1.4 Elements of a Blockchain System:**

Blockchain consists of four basic elements representing the block chain, which are the block, information, hash, and time fingerprint. We will explain these elements in the following: (Khalifa, 2018)

**1.4.1 The Block:** It includes a group of operations and tasks that will be carried out within the chain. For example, there are “blocks” that record data, transfer money,

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and perform other operations. Each block contains a specific number of operations and information, and no more is accepted until all operations within it are completed completely. Then a new block associated with it is created to fight all fake transactions within the block that may cause it to freeze or prevent it from recording and completing transactions.

**1.4.2 Information:** It is a sub-process occurring within a single block, called the “Single Order”.

**1.4.3 Hash:** It represents the DNA of the block chain and is called the “digital signature.” It is a code through an algorithm within the block chain program called the “Hash Function”, which performs four basic functions:

- It distinguishes between the chain and other ones by giving each one its own hash.
- It distinguishes between each block and another within the chain by granting each block its own hash.
- Giving each piece of information within the block a distinct hash.
- Linking blocks to each other within the chain by linking each block to the hash that precedes that follows it.

**1.4.4 Time Fingerprint:** This is the time when operations were performed within the chain.

## **1.5 Blockchain Applications:**

**1.5.1 Registering Property:** One of the functions of the blockchain system is the ability of individuals to register their property, whatever this property may be. It could be real estate and land, jewelry and precious stones, cars and personal property, or patents and intellectual property rights such as songs and poems or even ordinary ideas that did not amount to a human invention or achievement. Property could also be other items that individuals own and wish to announce or register to guarantee their rights. Individuals can then sell them through the blockchain system or conduct transactions on them later.

**1.5.2 Documentation of Transactions:** It means any transaction, whether personal between individuals, within a company, or a governmental or non-governmental institution. Blockchain is an open and distributed digital record, allowing everyone to enter all data into it. This data is governmental procedures, follow-up production lines in a factory, or the itinerary of aircraft or oil carriers. Besides, it could record purchase and sale transactions, transfer ownership, following up on customer service, and record all transactions between any individuals in any field. This assists in discovering loopholes, combating corruption, and monitoring quality.

**1.5.3 Mediation Work:** Blockchain plays the role of an intermediary while providing service. It replaces banks in transferring funds, the real estate register in property registration, traffic departments in car registration, brokers in buying and selling operations, and commercial companies such as Uber in providing services. This

benefits the new intermediary, which is the millions of individuals around the world who use the chain and who benefit from the financial returns that the traditional intermediary used to profit from. Despite the meager return, it fulfills the principle of justice in distributing wealth among individuals. (Khalifa, 2018, p. 4)

**1.5.4 Identifying Customers:** The know your customer (KYC) process usually takes 30 to 50 days to complete. Inconsistent and slow KYC systems around the world cause a financial burden on banks and governmental institutions. Regardless of the delay, blockchain technology can easily solve this problem through its benefits. Storing KYC documents on the blockchain reduces delays and saves money involved in the entire process.

Other banks can also use KYC statements stored on the blockchain without having to ask customers for them again. An example is Mastercard filing a patent that describes a system for using a private or semi-private blockchain to store customer data such as the name, address, and tax identification number (akeo, 2019). Moreover, the UPort in Us has also developed an Ethereum-based digital identity management product to deliver a “self-sovereign identity” targeting both consumers and businesses. (Niforos, 2017, p. 33)

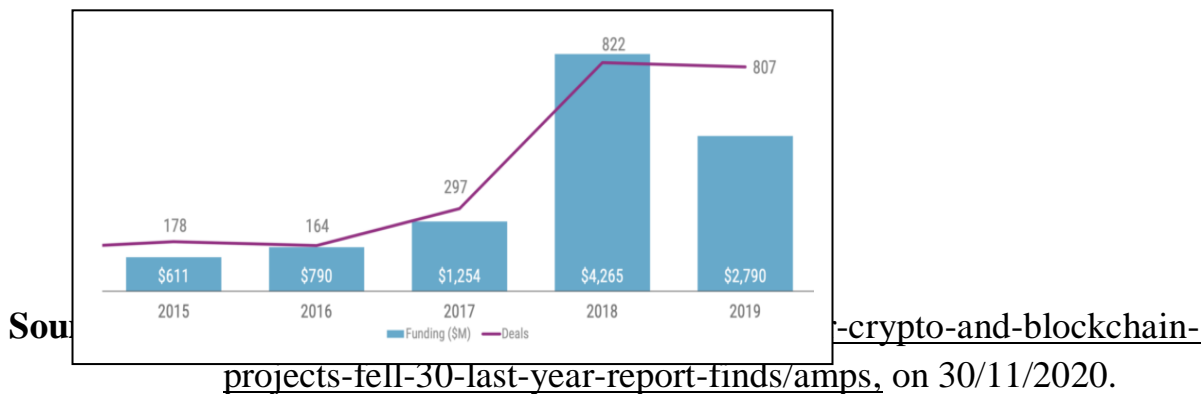
**1.5.5 Proof of Existence:** It is among the cases where blockchain is used. The record is hashed on the blockchain so that anyone can later verify the existence of such a document or transaction at the appropriate time. Here, Vitalik Buterin’s role was inventing the Ethereum platform, which is the second generation of blockchain to facilitate all transactions not just financial ones such as stocks, lands, digital content, vehicles, and many other operations (Abououbaid, 2020, p. 118)

## 2. The Second Axis: The Reality of Using Blockchain Technology

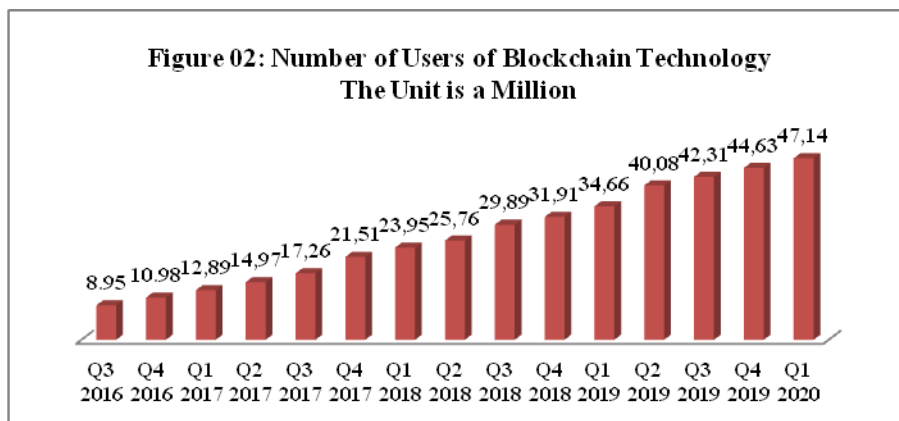
The financial sector is considered the most and the fastest sector to be affected by Blockchain and other financial technologies that has caused radical transformations in the structure and systems of financial services. The decentralization feature of Blockchain is currently being taken advantage of by individuals and institutions. They contribute to instant payment services and the trading of currencies and digital assets directly and securely between individuals and parties without the need to for an intermediary from the financial market or banks.

Additionally, blockchain is used in implementing bank transfers, especially foreign ones, and settlements with banks and financial institutions that correspond instantaneously. This shortens the steps and time required to make transfers and reduces the cost of expenses associated with them (Al-Subaie, 2019). The following figure shows the size and value of the transactions, which were done using blockchain until 2019.

**Figure 01: Volume and Value of Transactions through Blockchain Technology (2015-2019)**



Through Figure 01, we notice an increase in the volume and value of the deals during (2015-2018). In 2018, it reached \$4.265 billion with 822 deals. It multiplied about six times after its value in 2015 was about 611 million with 178 deals. However, the value declined in 2019 amounting to \$2.79 billion, meaning it decreased by half compared to 2018. In contrast, the number of deals concluded by venture capital companies was relatively stable, decreasing by 1.85%. The following figure shows the number of users of blockchain around the world.



**Source:** Prepared by the Two Researchers Using the Following Website Statistics: [www.statista.com/statistics/647374/worldwide-blockchain-wallet-users](http://www.statista.com/statistics/647374/worldwide-blockchain-wallet-users), on 30/11/2020.

Through Figure 02, we notice a steady increase in the number of users, as the number reached more than 47 million users in the first quarter of 2020. Despite the state of stagnation that the global economy has experienced due to the Corona pandemic in recent periods, the use of blockchain technology has increased significantly in that period. This was due to the necessity of using it because of the quarantine and the cessation of movement and travel as a result of the Corona virus.

### 3. The Third Axis: Uses of Blockchain Technology in the Islamic Finance

Islamic finance has a comprehensive set of different formulas that include providing financial resources for economic activity by committing to the Islamic Sharia. It has occupied a large position in the global economy. By the end of 2008, the volume of assets compatible with the Islamic Sharia around the world reached approximately \$639 billion and \$822 billion by the end of 2009 (with an increase of

28.63%). It reaches \$1.267 billion in 2013 (achieving an estimated growth of 8.67% over the previous year) (ALarabiya, 2013) . Next, it reached \$1.893 billion at the end of 2016, rising to \$2.190 billion in 2019. Additionally, Islamic banks constitute the most important and largest part of the Islamic financial system. The assets of these banks occupy 71.7% of the total assets of Islamic finance, followed by Islamic Sukuks at 24.2%, Islamic investment funds at 2.8%, and the Islamic Takaful insurance industry at 1.3%. (BOARD, July 2019, p. 07)

The global Islamic banking industry witnessed a growth of 0.9% in assets, reaching approximately US\$1.57 trillion. This is because of the devaluation of local currencies compared to the dollar, especially in some emerging economies where Islamic banking is widespread. Furthermore, the Takaful industry also recorded an increase of 1%, reaching US\$27.7 billion at the end of 2017 and remaining at this amount in 2018.

### **3.1 The Legitimacy of Applying Blockchain in Islamic Financial Transactions**

The vice chairman of the Sharia Council of the Accounting and Auditing Organization for Islamic Financial Institutions, Dr. Abdul Sattar Abu Ghudda, published a research paper. The paper was presented at the Al Baraka International Symposium on Islamic Economics on the legality of using blockchain and its smart contracts. It was mentioned in Standard 31 regarding global transactions on the Internet in the following clauses: (Abu Ghadda, 2019, pp. 241-242)

**Clause 2/1:** It is permissible to create commercial websites on the Internet provided that they are free from legal prohibitions such as promoting forbidden goods, services, or activities, or to use forbidden tools and means to promote them.

**Clause 2/2:** It is permissible to conclude financial contracts via the Internet. The contracts concluded by financial institutions with their clients through the Internet are subject to the general rules of financial transactions in Islamic Sharia, such as opening accounts, conducting cases, and commercial contracts, etc.

**Clause 1/3:** It is permissible for an Islamic institution to provide network connection service as a joint lease contract between it and the beneficiary of the service. Accordingly, it is subject to the terms and conditions of the lease contract in general and of the lease contract with a joint employee.

**Clause 3/3:** The Islamic institution that provides this service must take all possible precautions and measures to prevent the illegal use of the network by those to whom the service is provided.

**Clause 4/6:** Concluding a contract using a written conversation, an e-mail, or a website considers the contract conditions between absentees, such as in a contract by letter.

**Clause 5/4:** Pressing the acceptance key (icon) when concluding a contract by signing on the network is considered a valid and legitimate acceptance. If the site's system does not require confirmation in a manner specified by the site, acceptance does not occur unless that confirmation is issued.

**Clause 8/4:** The contract can be concluded over the network based on its description, an advanced view of it, or on the model. However, if the delivery is found to be inconsistent with the description, changed from its condition when sighted, or different from the model, the possessor is granted the option of enforcing the desired description. He has the right to annul the contract, sign it, or agree with the other contracting party to remedy the cancellation.

### 3.2 The Application of Blockchain in Islamic Banks

Islamic banks can benefit from applying smart contracts by using blockchain in many aspects. Smart contracts can contribute to the bank's capital upon its establishment and in the processes of electing boards of directors or bodies, etc. They can also be used in sourcing and employing funds

It is possible to create standardized smart contracts that comply with the conditions of the Islamic Sharia. Furthermore, on the platform or within the bank's dealings with its clients, there will be debt and participation contracts that meet the different needs of all parties. (Tahsin, p. 10)

**1. Smart Credit Management:** this is demonstrated by the experience of the Islamic Development Bank Group in the Kingdom of Saudi Arabia. This group sought to develop a smart credit management system based on the blockchain system through a partnership with the blockchain provider supported by Samsung Block. The smart credit management system being developed by E24P and IRTI, which will be based on blockchain technology, is expected to establish an incentive mechanism that encourages timely repayment. It will also automatically contribute fees to insurance pools covering loan defaults. Additionally, the blockchain-based credit system will help Islamic banks and other financial institutions to conduct credit assessments in a safer and more transparent manner, without compromising the privacy of the parties involved (Hassan, 2020)

**2. Trade Finance:** Blockchain technology aims to connect ports with commercial parties such as factories, companies, suppliers, and exporters with the aim of facilitating transactions between them and accelerating the export and import of goods. These platforms, especially ports, enable them to process and track various information about millions of containers and their shipments, prices, invoices, and production dates, etc. The platforms are beneficial in adopting electronic copies of

documents and bills of lading. This eliminates procedural complications and reduces shipping and paper handling costs in addition to increasing security, transparency, and protection against counterfeit goods and price manipulation (Al-Subaie, 2019, p. 10). This is considered a good opportunity for Islamic banks, which must be exploited.

Among the banks that provided this service is Abu Dhabi Islamic Bank, based in the United Arab Emirates, which is the first Islamic bank to successfully implement trade finance distribution transactions using blockchain. Cross-border transactions have been enabled through Abu Dhabi Islamic Bank's partnership with "TradeAssets", an electronic trade finance marketplace powered by blockchain to help digitize the traditional processes of creating and distributing trade assets. Abu Dhabi Islamic Bank has successfully completed a trade finance distribution deal in partnership with TradeAssets (Shawqi, 2020)

**3. Monitoring and Auditing:** Blockchain technology allows transparent records of all transactions, which cannot be modified or tampered with. Accordingly, Islamic financial institutions can benefit from this to build a financial and Sharia-based auditing and monitoring system. They can also issue reports by auditors and reviewers annually and monthly. These benefits enhance the strength and competitiveness of these institutions, and they increase confidence in them as well as the legitimacy of their dealings.

**Efficiency of the Payments and Transfers System:** In the current reality, there are many intermediaries in the payment and money transfer system, but blockchain came to eliminate the need for them. This increases security and lowers costs for banks to process payments between organizations and their customers or between the banks themselves. It also helps transfer money between users in different countries (Tahsin, p. 12)

In March 2020, Abu Dhabi Islamic Bank launched the "ADIB Direct eFX" platform, which allows its customers to secure foreign currency exchange rates via the Internet for transfers and online payments. This platform provides the latest liquidity management solutions, covering all capital needs at the local, regional and global levels. Additionally, this secure and central platform allows customers to view customer account information and conduct transactions instantly from computers and mobile devices. Furthermore, the platform includes solutions for trade finance and Forex, which can be used comfortably and easily from the office, home, or other locations. It also includes the flexibility and adjustability to complete transactions, which are applied virtually to the customer's account so that he can better and securely control the limits of his payments. This platform includes the following advantages:

- Customizable dashboards that provide customers with comprehensive financial information and predictive tools for their accounts with Abu Dhabi Islamic Bank as well as other banks.
- Direct payments that reduce transaction time and cost as well as detailed information on all transactions.
- Sending alerts and notifications via the Internet, mobile phones, and smart watches.
- Digital services and requests for customers and more.
- Products of Cash, trade, and currency exchange solutions across various channels, integrated payment solutions, and specialized business branches.
- Integrating data transfer between banks, and, companies, and the SWIFT code for institutions as well as connecting the customer's systems directly to the bank's systems to enhance efficiency. This allows mass payments to be sent directly to the payment system at Abu Dhabi Islamic Bank.
- Secure channels thanks to digital authentication and encryption, batch payment instructions for unified local and international transfers, flexible reporting tools, audit procedures, and support for a wide range of formats.
- Online banking, dashboard for account tracking and cash flow forecasts, E-Statement quick notifications for secure, integrated, multi-level transactions, paying utility bills and transfer money easily, and managing bulk payments, and phone banking.

### 3.3 Smart Sukuks

The smart sukuk structure is one of the newest and most important structures for future sukuk issuances. In the era of crowdfunding and the enhancement of financial technology, smart sukuks appear to be the future of collecting donations and Islamic funds for developing business infrastructure (Elasrag, 2019, p. 23).

Smart Sukuks in the Islamic economy are a distinctive symbol through which funds are collected from investors in exchange for part of the smart Sukuks ownership. Afterwards, the funds are automatically distributed to smart Sukuks holders through the blockchain platform according to the rules of the smart contract in the Islamic economy without the need for traditional banks or intermediaries (Platform, p. 9).

To clarify further, all contracts that represent the conditions of Islamic Sharia, such as Murabaha, Mudaraba, Musharaka, and other forms, are created by technologists who have steps and mechanisms based on these contracts. After, all properties are addressed in blockchain-based models, which is known as the smart ownership. Blockchain can be used for any form of asset trading and ownership, whether fixed assets or tangible ones (voices, ideas, data, and information). The ownership process takes place through the completion of the payment process for all

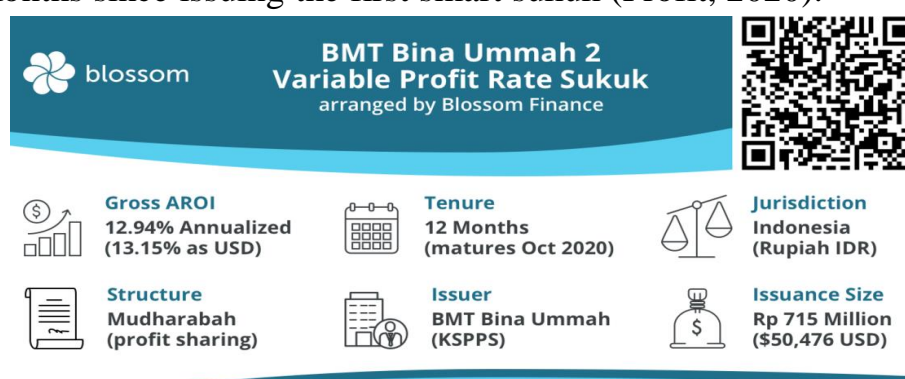
## The Importance of Using Blockchain Technology in Islamic Financial

installments for the owned commodity. Afterward, the ownership contract, created previously, is transferred to the new owner (Tahsin, p. 10).

Conventional sukuk differ from smart ones. Sukuk markets are considered the most convenient in Islamic finance; however, powerful institutions and government agencies usually issue them, which makes sukuk become expensive to issue. In contrast, smart sukuk are a structure based on the use of blockchain. This enhances efficiency and transparency, reduces costs, and enables small and medium-sized companies, projects with a social impact, and associations to issue their own sukuk using the new technology. Moreover, it is significant in standardizing and automating the accounting and legal payments and overhead expenses for traditional sukuk offers. These sukuk are fully backed by a licensed legal entity in the issuing country (Elasrag, 2019, p. 24).

Because of the successful experiences in the field of issuing smart assets, these successes led to smart sukuk projects. Indonesia was the first Islamic country to experiment with these sukuk through Blossom Finance via the SmartSukuk platform, which is based on smart contracts for Ethereum. Additionally, the first issuance of these sukuk was from the Indonesian microfinance institution (BMT Bina Ummah). Through the issued smart sukuk, it collected 710 million Indonesian rupiah (50,000 US dollars), which are speculative sukuk with a maturity date of one year and whose structure is characterized by profit sharing. These collected funds finance local projects (Closes, 2019).

Through Blossom's SmartSukuk platform, the Indonesian Microfinance Cooperative has funded 144 individual entrepreneurs. On January 30, 2020, Blossom Finance announced an annual cumulative total return of 12.94% to investors in the first three months since issuing the first smart sukuk (Profit, 2020).



**Source:** <http://www.blossomfinance.com/press/world-first-blockchain-sukuk-reports-12-94-annualized-profit>

Blossom's smart instruments run on the Ethereum blockchain, which supports smart contracts. The smart contract encodes business rules directly into the blockchain platform and enforces the contract's rules regarding payments and transfer

of ownership. Furthermore, Sukuk smart tokens support industry standards' protocol, called ERC20. The standard allows tokens to be traded globally on a variety of cryptocurrency exchanges. The institution can raise funds by issuing Blossom Smart Sukuks from investors in exchange for Smart Sukuk tokens that represent part of the ownership of the Sukuk. When the institution makes payments, the funds are automatically distributed to the holders of the smart check tokens via blockchain according to the rules of the smart contract and without traditional banks or intermediaries.

In terms of fees, Blossom's smart sukuk product will not impose any fees or upfront costs on institutions or investors as is usual with traditional sukuks. Instead, the issuer or Blossom will take a 20% share of the investor's profits called a carried capital interest. This means that Blossom only makes money if the investors do. Blossom may lose if the investors fail to make any profit in the deal, which follows the Islamic system of sharing profits and losses collectively. (Elasrag, 2019, pp. 24-25).

### **3.4 Applying Blockchain to Manage Zakat Funds:**

Zakat is one of the five pillars of Islam. It is a specific right from money that reaches the quorum for its beneficiaries if one year has passed. It purifies wealth, blesses it, grows profit, and purifies its owner from sins as Allah the Almighty says: "Take from their wealth -O Prophet- charity to purify and bless them with it". Furthermore, zakat is not limited to being a religious obligation that purifies the human soul; rather, it extends beyond that, as it is based on the principle of solidarity. It is also a major element in the economy and the contribution to economic development, as it finances it by providing an enormous or renewable financial resource a year.

It is an obligation assigned to every complete property that is completely owned by a free Muslim who is free of debt whenever the quorum is reached and one year has passed. The conditions for collecting zakat emphasize the abundance of its proceeds and their increase with the progress of society (Aissaoui, 2013). Finally, the quorum in Sharia law is the minimum that a Muslim must reach before he is obliged to pay zakat.

Owning cryptocurrencies, being one of the liquid financial assets, should be subject to zakat as well. Muslims should include their crypto assets when calculating their zakat obligation. They should also track the amount of cryptocurrency they hold for a year, given that the assets held do not include ones kept for less than a year in the calculation.

Blockchain-based operations are traceable, auditable, and immutable. These are essential characteristics for tracking the movement of zakat funds (Elasrag, 2019,

p. 14). Therefore, blockchain-based zakat management is characterized by the following (Adam, 2020, pp. 1-3):

- **Perform Transactions at a Higher Speed:** Transaction speed refers to the rate at which data is transferred from one account to another. It is characterized by its ability to improve transaction speed because the technology cuts many unnecessary intermediaries from the equation. Thus, the blockchain-based zakat system has the ability to exchange value at higher speeds. This can ensure that zakat obligations are met faster than ever before.

- **Reduced Operating Costs:** Since there is no mediation in transactions in theory, operational costs are lower, thus, providing more funds for the organization to improve its structure and support those who need help. This can also significantly reduce the cost of preparing annual reports on the Zakat Foundation's budget and spending, simultaneously, increasing overall transparency. Furthermore, automating processes using smart contracts can reduce administrative costs for charities. Therefore, blockchain can improve the management, monitoring, and identification of problems related to excessive budget allocation or insufficient project allocation to improve its results.

- **Transparency in the Zakat System:** One of the most attractive features of blockchain for Zakat is that the movement of Zakat around the ecosystem will be highly visible and traceable, allowing payers of Zakat funds to track all their payments, from start to finish, and to check where their money is going. Every zakat transaction will be recorded on the blockchain system in near real-time and will be visible to everyone on the network. Such transparency will increase confidence in zakat institutions as well as monitoring the entire sequence of transactions. Moreover, sponsors can know whether their money has reached the desired goal.

- **Improving the Accounting and Management of Zakat Institutions:** The nature of the distributed ledger and the consensus model that governs it ensures that all transactions are secure. Since each transaction is based on the blockchain, there is no way to tamper with it. Zakat payers can be certain that their donations are being used for the intended purpose; thus, they can create smart contracts at the time of paying zakat securely.

- **Security:** Repelling cyberattacks and forced outages are an increasingly relevant feature of blockchain. Not only would hackers need to hack a specific block to change existing information, but they would have to access all previous blocks going back through the entire history of that block chain, across every ledger in the network simultaneously.

The "ZakatTech Blockchain" platform for tracking zakat funds is a collaborative project between ISRA and SysCode. It will allow funds to be tracked throughout the entire life cycle of the process, from donating to distributing funds.

The platform was built on the blockchain environment. It allows various zakat institutions to communicate with it and use it to record and track their transactions. Through ZakatTech, each Zakat organization will be able to participate in, maintain, and connect to its own database management systems. This will facilitate the management of Zakat revenues and connecting Zakat payers and recipients effectively and efficiently. Additionally, it is a pilot project that was expected to be launched by the fourth quarter of 2019, but it was delayed and has not been launched yet (Fintech, 2019).

### **3.5 Applying Blockchain Technology in the Endowment**

A waqf is “withholding money that can be benefited from while keeping it in a permissible bank” (Al-Obaidi, 2009, p. 23) and disbursing its benefits to righteousness to draw closer to Allah the Almighty. There are various factors related to endowment documents in the countries of the Islamic world today. In some cases, those factors include the delay in archiving, communication, and registration systems in the departments concerned with endowments. In other cases, there is the possibility of tampering with, concealing, or forging documents from various parties as well as the effect of the sum of these and other factors on the disappearance of endowments.

“Blockchain” experts list a variety of its advantage such as its credibility, transparency, and accuracy. Other benefits are the speed in implementation and the reduction of expenses whether in terms of preserving and archiving Islamic endowment documents around the world or organizing the contractual relations of the endowment entities with their beneficiaries and various parties. Additionally, it assists in monitoring the growth of Islamic endowments, building an integrated information base, and enhancing transparency in it, which leads to restoring confidence in the endowment (el-hindi, 2018)

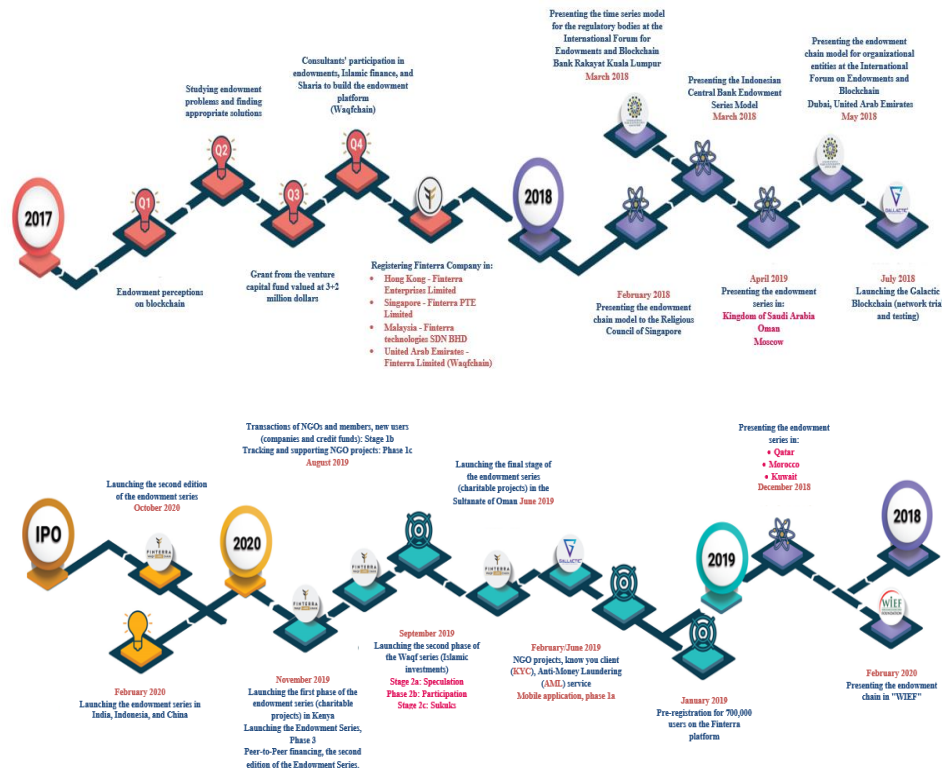
Among the most important models of using blockchain in endowments is the Waqf-chain model of Finterra company in Singapore. Finterra is an Islamic organization that relies on financial technology (FinTech) and focuses its services on blockchain technology. It was founded in October 2017 (Finterra, WAQF Chain – A Blockchain Solution for Organizations to Help Customers Give Traceable Charity, 2019). This company creates smart contracts linked to specific endowment projects and a new payment system through entirely digitalized money. Through this technology, it provides an efficient way to collect funds, manage, and transfer endowment ownership. The Waqf Series also allows participants to create project proposals to develop and revitalize Waqf properties. Others may participate in these project proposals by contributing funds. If the project proposal is accepted, a certain number of endowment tokens are generated and distributed to the participating funders. Stakeholder tokens can be kept and the revenues can be split or transferred

# The Importance of Using Blockchain Technology in Islamic Financial

and exchanged in the broader Finterra ecosystem (and on other networks) through a protocol )Elasrag, 2019, pp. 14-15).

According to statistics on the official Finterra website, the number of Waqf-chain users since its creation in 2017 has reached 8,676 users in 16 countries, with 47 projects. These projects have collected approximately 164,479 ringgit (Finterra, 2020). The following figure displays the roadmap of the Waqf-chain platform:

**Figure 05: WAQF Chain Platform Roadmap**



**Source:** Finterra's official website: <https://mywaqf.com/about-us/?lang=en>

WAQF Chain Platform is an online tool for charitable fundraising using blockchain, endowment, and crowdfunding concepts and technologies. Through this platform, companies and institutions can create charitable campaigns with specific goals and openly disclose the number of donations collected in real time. This makes donors confident that their money will go to the rightful beneficiaries. In addition, all donations made are sent to WAQF Chain platform directly to a credit account with Finterra Partners Bank. Funds will not be transferred to the charity campaign owner unless the specified goal is reached on time; otherwise, the funds will be returned in full to the donors.

Receipts for all donations made are saved on the Finterra blockchain and can be viewed in the "My Smart Contracts" section of the dashboard. The WAQF Chain platform can also be customized to meet the unique needs of NGOs, universities, financial institutions (such as banks), or other organizations that seek to provide online charitable donation services to its customers, maintaining transparency regarding the fundraising and reporting process. Moreover, WAQF Series can be

integrated into any existing online banking platform to allow customers to seamlessly transition from managing their personal finances to making charitable donations without leaving the original site they are using (Finterra, 2019).

### **Conclusion:**

The financial sector is considered the most and fastest sector affected by financial technology, which has brought about radical transformations in the structure and systems of financial services, including blockchain technology. This includes a wide range of applications inside and outside the financial sector.

### **Research Findings:**

- Blockchain technology is the largest distributed and open digital record that allows the transfer of ownership assets from one party to another at the same time without the need for an intermediary. Simultaneously, it achieves a high degree of security for the transfer process against fraud or manipulation attempts. A system Blockchain was first used in 2008, as the main platform for the virtual currency Bitcoin.
- Blockchain is a Sharia-compliant technology because its contract is subject to the legal and operational requirements in a contract's components.
- Islamic banks can benefit from applying smart contracts using blockchain in many aspects: smart credit management, trade financing, supervision and auditing, and efficiency of the payments and remittances system.
- Smart Sukuks in the Islamic economy are a token through which funds are collected from investors in exchange for part of the smart Sukuks ownership. The funds are automatically distributed to smart Sukuk holders through the blockchain platform according to the rules of the smart contract in the Islamic economy without the need for traditional banks or intermediaries.
- Blockchain-based zakat management is characterized by performing transactions at a higher speed, transparency in the zakat system, improving accounting and management of zakat institutions, and security.
- Trust in endowment can be restored and its role revived given the credibility, transparency, accuracy, speed of implementation, and reduction of costs about preserving and archiving endowment documents, organizing contractual relations between parties, or counting endowment resources through a transparent information base.

### **Research Recommendations:**

- Expanding the use of this technology throughout the Islamic world to benefit from a large pool of unexploited Islamic assets.
- Spreading awareness of the importance of this technology and its application in managing and investing Islamic assets.
- Holding conferences and seminars that address emerging issues in Islamic finance

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