Blockchain Technology Applications in the Islamic Financial Industry -The Smart Sukuk of Blossom Finance's Platform in Indonesia Model-

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Abstract:

This research aimed to identify the applications of Blockchain in the Islamic financial industry, with a case study of smart sukuk issued through the platform of Blossom Finance in Indonesia.

The study concluded that there are many advantages and areas for Blockchain applications in Islamic finance, especially through the use of smart contracts, cloud data storage, Zakat collection, Waqf management, Takaful and smart sukuk, which leads to increase transparency and effectiveness of Islamic finance. Smart Sukuk issued through Blossom Finance platform in Indonesia is one of the first technological innovations in this field, as it had an important role in financing microfinance cooperatives in Indonesia.

Keywords: Blockchain; Islamic Finance; Smart Sukuk; Blossom Finance Platform.
Jel Classification Codes: O_{33}, G_{21}

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1. INTRODUCTION

Blockchain technology is a modern digital technology, invented to solve the problem of lack of confidence when conducting transactions between different parties without the need for an intermediary. It is a modern technological revolution that promises radical changes in many areas, particularly in the financial sphere, as it is based on the principle of automating processes and encrypting data without human intervention. The Islamic financial industry is among the areas that must keep pace with this development and adopt this technology -knowing that this technology is not tainted by a legitimate prohibition according to many scholars- in order to increase transparency and activate the process of monitoring, security and updating information, especially through the use of smart contracts in the field of Islamic banking, Takaful, zakat collection, waqf management, and smart sukuks, leading to more efficient Islamic finance. The smart sukuk platform of Blossom Finance in Indonesia is one of the first global initiatives and innovations in this field, which have had many advantages, especially in the field of financing microfinance cooperatives in Indonesia.

Based on what is mentioned above, the problem of this research has been formulated in the following main question:

What are the various applications of blockchain technology in the Islamic financial industry?

The main question has the following sub-questions:

1- What are the basics of blockchain technology?
2- What are the advantages of applying blockchain technology in Islamic finance?
3- How are smart contracts used in Islamic finance?
4. What are the other areas that use blockchain as a mechanism to increase the effectiveness of Islamic finance?
5- What is smart sukuk? What is the structure and benefits of Blossom Smart Sukuk?

To answer the main question and sub-questions, the following hypothesis was adopted:

There are many applications of blockchain technology in the Islamic financial industry, which increase the effectiveness of Islamic finance.

Research Importance: The topic is very important, as it is one of the topics that has become the focus of many researchers, where blockchain technology is one of the most important innovations of financial technology in the present era, many areas seek to exploit this technology because of its advantages. The Islamic financial industry is among the areas that must use this technology to increase its effectiveness, overcome the doctrinal problems related to it, and try to correct what is against to the principles of Islamic sharia.

Research Objectives: This research paper aims to achieve the following points:

1- Knowing the theoretical aspect related to blockchain technology;

2- Knowing the advantages of applying blockchain technology in the field of Islamic finance.

3- Realizing the importance of using smart contracts in Islamic finance, especially in the field of oversight;

4- Realizing how blockchain technology is used to increase the efficiency of data storage, zakat collection, waqf management and takaful;

5- Learning about the concept of smart sukuk, the advantages of dealing in smart sukuk for the Blossom platform, and how it works.

Research methodology: To study this topic, an analytical descriptive method that relies on data collection has been adopted for study and analysis, with a view to studying the topic in all its aspects. In order to achieve this objective, many references that were closely related to the topic were adopted in the interest of scientific objectivity.

Literature of previous studies: Among the previous studies we mention the following:

1- Study of منير ماهر الشاطر (2018) entitled_"تقنية البلوكشين وتحديات المالية الإسلامية: ورقة نقاشية": This study addressed the basics of blockchain, the motives of its innovation, its mechanism of action, its reality at the global level and the areas of blockchain application in the field of Islamic finance (cryptocurrencies, smart contracts, payments, settlements, account opening, electronic identity management, cloud data storage, product tracking and supply chain management), the study also addressed various problems facing this technology such as the problem of network control, the problem of division, supporting platforms, piracy, high operating costs and governance challenges. (الشاطر، 2018)

2- *Study of زاهرة بني عامر وآلاء تحسين **(2018)** entitled "استكشاف تقنية البلوكشين وتطبيقاتها في المالية الإسلامية"*: The study addressed the identification of blockchain technology, its origins and mechanism of action, in addition to the applications of this technology in the field of Islamic finance through smart contracts, trade finance, fraud reduction, efficiency of the payment system, remittances, control and auditing, as well as addressed various challenges facing this technology in the financial sector, such as technical environmental challenges, transformation and integration, legal and environmental challenges. (بني عامر و تحسين، 2018)

3- ***Richard-Marc Lacasse & others*** *(2018) study entitled "**Islamic Banking- Towards a Blockchain Monitoring Process**"*, this explorative article has studied how smart contracts and blockchain technology can support and enhance the transparency feature that is a fundamental principle for all Islamic financial transactions, especially in Agency Theory framework that brings together the bank (the agent) and stakeholders (contributors, beneficiaries, Sharia Supervisory Boards and governmental regulators). (Lacasse, Lambert, & Khan, 2018)

4- ***Hussein Elasrag*** *(2019) study entitled "**Blockchains for Islamic finance: Obstacles & Challenges**"*: This paper aimed to study and analyze blockchain technology as an innovative technology, the possibility of applying this technology in Islamic finance, and how it changed the field, where the paper discussed various Blockchain applications in the field of Islamic finance that can bring various benefits such as smart contracts, cloud storage, virtual

currencies, zakat collection, waqf management, takaful, supply chain and smart sukuk. The paper also highlighted various challenges facing the application of this technology such as the lack of infrastructure, laws, human resources and scalability....etc. (Elasrag, 2019)

Research plan: This research consists of three main axes:

The first axis: the theoretical framework related to blockchain technology was studied.

The second axis: is devoted to study the advantages and areas of applying blockchain technology in the field of Islamic financial industry;

The third axis: It touched up on the concept of smart sukuk, the advantages and mechanism of making smart sukuk for Blossom platform as a model of blockchain applications in the field of Islamic finance.

2. Blockchain Technology: Theoretical Background

Blockchain technology is one of the finest types of technology in the present era, has many uses in many areas, and it has evolved in recent years, especially in developed countries. To know this technology the following points will be addressed:

2.1. Blockchain: definition, history and elements:

2.1.1. Definition of blockchain technology:

Blockchain can be defined as follows:

- "Blockchain is a peer-to-peer public ledger maintained by a distributed network of computers that requires no central authority or third party intermediaries. It consists of three key components: a transaction, a transaction record and a system that verifies and stores the transaction. The blocks are generated through open-source software and record the information about when and in what sequence the transaction took place. This "block" chronologically stores information of all the transactions that have taken place in the chain." (Mohamed, The Blockchain and Islamic Finance, 2016)
- "Blockchain technology enables the creation of a decentralized environment, where the cryptographically validated transactions and data are not under the control of any third party organization. Any transaction ever completed is recorded in an immutable ledger in a verifiable, secure, transparent and permanent way, with a timestamp and other details**.**" (Holoteseu, 2018)
- "Blockchain is a database of immutable time-stamped information of every transaction that is replicated on servers across the globe. This technology is the foundation of cryptocurrencies such as the bitcoin." (Mohamed, The Blockchain and Islamic Finance, 2016)
- "An open source decentralized database, which relies on mathematical equations and cryptography to record any transaction, deal, or information such as cash transactions, cargo transport, general information, or even electoral votes." (النمر، 2017)

Blockchain can be defined as:

Advanced technological engineering, based on completing transactions without any mediation (peer-to-peer) using distributed ledger technology and cryptography, which increases confidence and transparency of transactions**.**

2.1.2. History and development of blockchain technology:

The basic ideas of blockchain technology date back to the late 1980s and early 1990s, when ***Leslie Lamport*** developed in 1989 what is known as the Paxos Protocol, to be published later in 1998, and seeks to find a consensus model to reach an agreement on a single result between a group of participants in a network of computers; (Yaga, Mell, Roby, & Scarfone, 2018)

In 1991 a series of signed information was used as an electronic book to digitally sign documents, so that they cannot be nullified or tampered with; (Yaga, Mell, Roby, & Scarfone, 2018)

In 2008, ***Satoshi Nakamoto*** published an article titled: ***Bitcoin: A Peer-to-Peer Electronic Cash System***", in which he describes how the Bitcoin is one of the most popular blockchain applications. (Nakamoto, no date)

Thus, the first major innovation of the blockchain was the cryptocurrency "Bitcoin", to be followed later by the development of this technology, where it took place: (تاريخ موجز عنBlockchain, 2018)

- The separation of the blockchain from the cryptocurrency, and the possibility of using it in all areas that occur between the various financial institutions, especially financial ones;

- Creating what is known as the Smart Contract, which is embodied in the second generation blockchain system known as Ethereum;

- Creating what is known as the "Proof of Stake", which is the most recent innovation, the second generation of the Blockchain is protected by the "Proof of Work", by a group of miners in exchange for payments from the cryptocurrency;

- Creating what is known as "blockchain scaling". In the blockchain world, every computer on the network processes every transaction, leading to slowness, and the scaled blockchain speeds up this process without sacrificing security, by knowing the number of computers that are necessary to verify every transaction and divide the work between computers efficiently. This is achieved without compromising the degree of safety and durability of the blockchain.

2.1.3. Blockchain system elements:

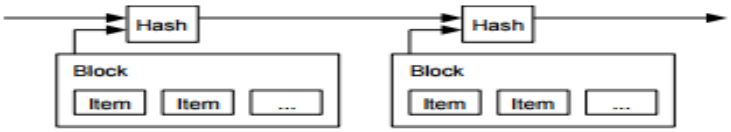
The blockchain system consists of four main components: (خليفة، 2018)

a- <u>The block</u>: represents the unit of building the chain, which is a group of operations or tasks to be performed or executed within the chain, such as transferring money or recording data or following up on a case and others. Each block usually absorbs a specific amount of operations and transactions, as it does not accept more than it until it is finally completed, in order to create a new block attached to it. The main goal is to prevent fake transactions within the block that cause the chain to freeze or prevent it from recording and ending transactions.

b- <u>Information</u>: It is the sub-process that takes place inside a single block, or is a "single order" that is inside a block, with other commands it represents the block itself.

c- <u>Hash</u>: known as digital signature, a code produced through an algorithm inside the block chain program, called the "Hash Function", it performs the following functions:

- Distinguishing the chain from other chains, with each chain receiving a unique hash;
- Defining, knowing and distinguishing each block from the others within the chain, where each block takes its own hash;
- Marking each piece of information inside the same block with a distinct hash;
- Connect the blocks together.



d- <u>Time stamp</u>: The timing of any operation in the chain.

2.2. Basics, types and areas of blockchain work:

2.2.1. Basics of blockchain work:

The blockchain system is based on a set of things that form the basis of the work of this system, represented in: (خليفة، 2018)

a- Open Ledger: All information inside the blockchain system is available to everyone, so that they can know each other's property, while retaining the inability to know their true identity, because the chain allows individuals to use unreal name (Nike Name);

b- Distributed database: This principle aims to eliminate the idea of centralization, where there is not a single entity or one server or one device that controls the chain, but is distributed to all participants in the world, as anyone can download, view, and participate in the series;

c- Mining: Where millions of devices participate across the world to ensure the accuracy of the transaction before completing it, and if an individual wants to transfer a cash amount to another through the chain, the transaction does not take place even if the person actually owns this money until the mining process occurs.

2.2.2. Blockchains types:

The following types of blockchains can be distinguished: (Sultan, Ruhi, & Lakhani, 2018)

a- Public: The public blockchain does not have a single owner, it is visible to anyone, as it is considered an open network for everyone to participate in the consensus process. Bitcoin is considered one of the most popular public blockchain;

b- Private: Also known as permissioned, the private blockchain uses the feature of controlling who can read and write in the blockchain, and consensus algorithms and mining are not required, because there is one entity (single entity) owns and controls the creation of the block.

c- Mixed (Hybrid): Also known as consortium, this block is considered general for a specific and distinct group, where the compatibility process is controlled by well-known and distinguished servers using a set of rules agreed by all parties, copies of the blockchain are distributed to the participants, thus, the network is partly decentralized.

The most important differences between blockchain types can be summarized in the following table.

Table 1. Differences between the types of blockchains

	Public Blockchain	Private Blockchain	Mixed Blockchain
Centralisation	Decentralization	Decentralization	Multi-centralisation
Participants	anyone	A central authority that controls the numbers that can enter	Limited numbers of authorized persons
Credit Mechanism	Proof of work	Self -endorsement	Collective endorsement
Bookkeeper	all participants	Self-determined	Participants decide in negotiation
Incentive mechanism	Needed	Not needed	Optional
Prominent advantage	Self-established credit	Transparency and traceability	Efficiency and cost optimization
Typical application scenario	Bitcoin	Audits	Clearing
Load capacity	3-20 times / sec	----------	1000-10000 times/sec

Source: Ye Guo & Chen Liang, Blockchain application and outlook in the banking industry, Financial Innovation, Springer, Heidelberg, Vol 2, 2016, p.9.

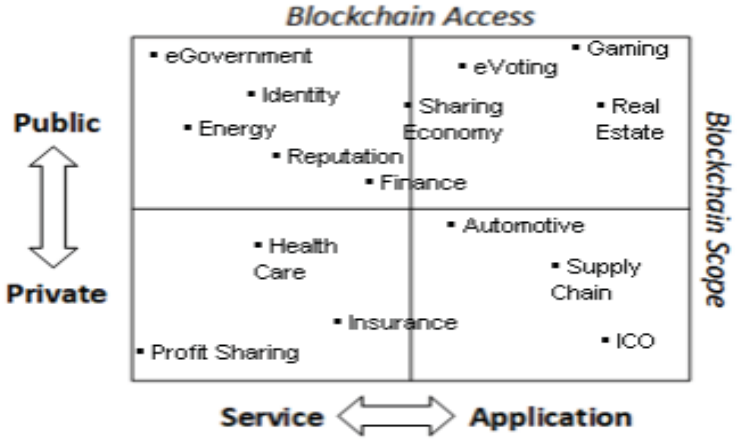
2.2.3. Blockchain application areas:

There are many areas for applying the blockchain technology; some of them will be mentioned in the following: (Elasrag, 2019)

a- **Payments**: Through the management of ownership and conversion of digital currencies.
b- **Cryptocurrencies**: Management of ownership and creation of digital payment methods independently from any government, central bank or other central institution;
c- **Micro Payments**: By transferring small amounts of money that are very expensive in the case of using traditional methods of transfer;
d- **Digital Assets**: Managing creation, ownership and transfer of digital elements that have value in themselves or represent valuable goods in the real world.
e- **Digital Identity**: Proof and validate the identity based on unique digital elements.
f- **Notary Services**: Digitizing, storing, verifying documents and proving ownership or transfer;
g- **Compliance & Audit**: auditing and reviewing the commercial activities of persons or institutions in the organized industries as part of the audit process;
h- **Tax**: Tax calculation and collection on the basis of transactions or ownership, tax avoidance and double taxation;
i - **Voting**: Creating, distributing and counting digital ballot papers;
j- **Record Management**: by creating and storing private medical records.

Karim Sultan and others summarized the blockchain applications in the following matrix:

Fig.1. Blockchain Matrix: Access vs. Scope



Source: Karim Sultan & Others, Conceptualizing Blockchain: Characteristics & Applications, 11th IADAS International Conference Information Systems, April 2018, p.56. From the site:
https://arxiv.org/ftp/arxiv/papers/1806/1806.03693.pdf

According to ***Karim Sultan and others***, access to the blockchain is either as a service or as an application, as the service refers to just "data transmission or applications", whereas the application is a program designed to perform a function or set of functions related to the benefit to the last user. (Sultan, Ruhi, & Lakhani, 2018, p. 55)

In order to draw the previous map, two criteria were adopted: (Sultan, Ruhi, & Lakhani, 2018, p. 56)

• **Access**: Is the primary function is to transform data, in the sense of an application, or simply to present data, that is, a service?

- **Scope**: Is the use of the global blockchain unrestricted (public) or specific to a particular category?

To understand the matrix, we take an example of health care and real estate, as the health care industry seeks to facilitate the safe passage of patient records through the blockchain, so access is "service", and the scope remains for health care partners. In contrast, the real estate industry has shown interest in the blockchain to investigate land registry records, and this application aims to be open and transparent to all.

3.The advantages and areas of blockchain technology application in the Islamic finance industry

The application of blockchain technology in the Islamic finance will achieve many advantages, as it will be used in many areas and processes, which increase the effectiveness of Islamic finance, and to identify these matters the following points will be addressed:

3.1. Advantages of applying blockchain technology in Islamic finance

The application of the blockchain system in the Islamic finance will achieve the following: (Damak & Roy, 2020)

a- **Ease and speed of transaction**: This applies in particular to payment and money transfer services, where players in the Islamic finance industry can take advantage of the capabilities provided by financial technology in general and blockchain in particular to enhance their services and increase their attractiveness. It can also reduce costs, which allows staff to be redeployed to value-added operations;

b- **Traceability of transaction**: Blockchain use helps to reduce risks related to transaction security or identity theft. The blockchain network provides the provenance, i.e. the origin of the transaction, the traceability and transparency of transactions, as ***Nida Khan*** *says:* ***"Blockchain is a technological evolution that can support and enhance the transparency feature, which is the core underlying principle of all transactions in the Islamic Finance industry."*** (Lacasse, Lambert, & Khan, 2018, p. 41)

c- **Greater access to Islamic finance services**: The blockchain system can help the Islamic financial industry expands its services to broad segments of clients, especially financially excluded, such as providing products like crowdfunding for affordable housing, or for small and medium enterprises;

d- **Improving Governance:** Blockchain can help the Islamic finance industry with more powerful tools to achieve compliance with Islamic sharia regulations and requirements, it can also reduce reputational risks related to a potential violation of sharia requirements, and liberate sharia scholars to focus on innovation;

e- **Blockchain technology includes security** that includes public key encryption, and the adoption of a decentralized network instead of a single server to record and verify transactions. Blockchain in its concept and content consists of mathematical applications without prohibited elements, in addition to that it eliminates prohibited elements such as garar, so the verification process is strong and transparent for all network participants; (Zubaidi & Abdullah, 2017)

f- **The use of blockchain in Islamic banks** and financial institutions will make its work more productive so it can manage various funds and other related services easily. It will reduce fraud and risks, and high costs are minimized. A practical experience has shown that the cost of processing Islamic financial products is higher compared to their conventional counterparts, so blockchain is an effective cost-cutting tool. (Elasrag, 2019, p. 83)

3.2. Smart Contract:

3.2.1. Definition of smart contracts:

A smart contract is defined as: “an agreement between two parties, which is stored in the blockchain, and such agreements can be concluded between two people P2P, in other words or from one person to the organization (Person-To-Organization P2O), or Person-To-Machine (P2M), and therefore it can be determined that once a certain condition is met (such as the sale of commodity “1” on the stock exchange “2”) the contract is executed automatically, and the assets (Like paper money, digital currency, title deed, data) is

exchanged between contracting parties, then the transaction is copied and validated on the blockchain." (The Blockchain (R)evolution –, 2017)

The concept of smart contracts was first proposed in 1994 by American computer scientist ***Nick Szabo***, the latter who was credited with inventing virtual *gold Bit Gold* in 1998. (البلوشي، 2019) The purpose of smart contracts is: (غدة، 2019)

- Facilitating the exchange of properties and everything of value, and this is reflected in the global financial markets;
- Reducing the costs of trade;
- Avoid the many documents and costs of correspondence and communications;
- Elimination of intermediaries and emerging parties and their costs;
- Solve the problem of trust.

3.2.2. Using smart contracts in the field of trade and Islamic finance:

Contractual agreements are key enablers of commercial financial transactions. Concerning this the Islamic religion orders writing contracts for fairness and accountability. Having written records is vital to efficient and transparent trade. With the development of the world, the use of technology has become a good thing to activate the purposes of Islamic Sharia, where Islamic economic actors can be adept in more efficient and less risky ways in doing business, as relying on physical documents leads to delay, inefficiency and increased exposure to errors and fraud, and relying on financial intermediaries leads to imposing unnecessary costs, while relying on the smart contract leads to more efficiency and productivity in the financial and commercial field; (Mohamed, Smart Contracts in Islamic Economic Transactions, 2017)

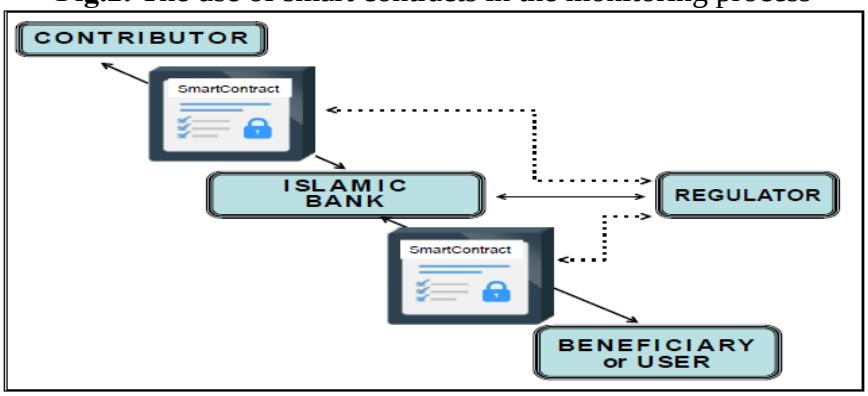
It should be noted that Islamic financial institutions must overcome the challenges of innovation and smart contracts, through establishing strategic partnerships with experts in the field, it is important for Islamic financial institutions to develop their understanding of the world of smart contracts, they can also focus on visualizing new products and services contracts supported by smart contracts. The best results are likely to arise from collaborative initiatives between accelerators, innovation labs and incubators, or with startups with smart contracts in innovation efforts. (Mohamed, Smart Contracts in Islamic Economic Transactions, 2017)

3.2.3. Activate banking monitoring through blockchain and smart contracts:

The process of activating banking supervision through blockchain technology is manifested in: (Lacasse, Lambert, & Khan, 2018, pp. 40-41)

- Blockchain helps in monitoring the various complex relationships between the agent (Islamic bank managers) and the main stakeholders (contributors, beneficiaries, Sharia Supervisory Boards and governmental regulators);
- The Islamic financial industry can benefit greatly from smart contracts to provide Sharia compliant services, where Contributors can provide funds to the bank (the agent) through the use of smart contracts, and the bank can in turn fulfill its responsibilities towards Contributors and beneficiaries by using smart contracts;
- The bank can also obtain user comments about the level and quality of service provision, including beneficiaries who receive services and who have the right to make decisions, therefore their participation may provide management with valuable knowledge about the effectiveness of service provision;
- Islamic banks are obliged to comply with government legislation, which often includes reports to a private regulatory body, and Islamic banks must issue annual reports and other information, in addition to being subject to further investigation if the regulatory body deems it necessary. The following chart shows this.

Fig.2. The use of smart contracts in the monitoring process



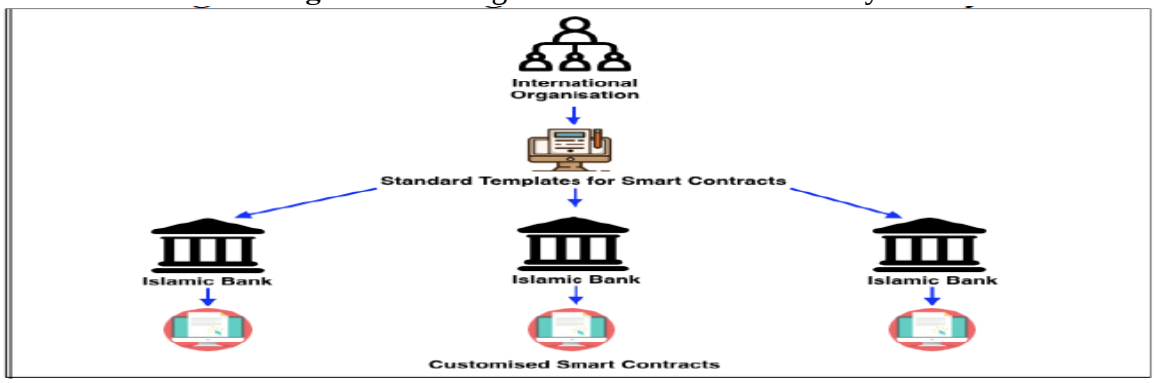
Source: Richard-Marc Lacasse & others, Islamic Banking-Towards a Blockchain in Monitoring Process, Journal of Business & Economics, Vol 06, N^{O} 01, 2018, p. 40.

Smart contracts are usable for all financial transactions between agents and stakeholders, as these contracts provide a mechanism to enforce compliance with Islamic Sharia and an auditable record of all financial transactions that are made through the smart contract, where the regulation and monitoring process will be reduced to simply writing a smart contract that is implemented with it is in line with the desired principles, and verifiable annual reports can be issued at any stage of the banking process or at any time of the year. Furthermore; any form of investigation can easily be undertaken by reviewing the ledger on the blockchain network. (Lacasse, Lambert, & Khan, 2018, p. 41)

However, some problems related to smart contracts must be addressed in order to be a revolution and innovation in the banking industry, to provide users with reliable products and services that are compatible with Islamic Sharia. Among the most important problems we mention: (Lacasse, Lambert, & Khan, 2018, pp. 42-43)

- Legal recognition, as these are contracts that are not currently legally binding;
- The agents or stakeholders do not understand the code of the smart contract, and both depend on the interpretation of the programmers, but this blind dependence on the programmer is not wise for either party;
- The validity of the smart contract in all areas of transactions. The bank can have different branches in multiple regions. It can have one smart contract that reflects the laws of the country in question instead of having multiple branches in that country, which leads to a reduction in office space and a number workers, electricity consumption… etc. In order to solve the issue of disputes between contractual agreements in the Islamic finance industry, an international organization can be created to provide Standard Templates for smart contracts that meet the provisions of contracts in Islamic Sharia. The following chart shows that.

Fig.3. Monitoring the Islamic Finance Industry



Source: Richard-Marc Lacasse & others, Islamic Banking-Towards a Blockchain in Monitoring Process, Journal of Business & Economics, Vol 06, N^{O} 01, 2018, p. 43.

3.3. Other fields of blockchain applications in the Islamic financial industry:

3.3.1. Could Storage:

Cloud storage is a model for storing on the Internet, where data is stored on multiple virtual servers instead of hosting it on a specific server, and it is usually provided by a third party, such as major companies that have advanced data centers. They are renting cloud storage spaces to their customers in accordance with their needs. The most popular providers of this service are DropBox, Amazon S3, Google Drive ... etc. (تخزين سحابي، 2018)

Cloud storage is one of the biggest factors attracting Islamic finance to deal on the blockchain network, as Islamic financial institutions will be able to store their data and information in a cloud. This will reduce conflicts and help customers maintain their partnerships, as the encrypted mathematical algorithms provide access to all information. It stores all the important data that can be accessed by banks and clients to avoid any problems. (Elasrag, 2019, p. 12)

Despite the importance of cloud storage for Islamic financial institutions, they face many challenges in this area: (Elasrag, 2019, pp. 12-13)

- Due to the lack of a database in the company's buildings, security becomes more challenging, as the company that owns the data no longer fully controls the security procedures, it must also rely on the Cloud Service Provider to secure the database, and you must implicitly trust the service provider;
- Access to the database requires a direct connection to the internet, unlike structures where the database is on the company's internal network;
- The company that owns the data must rely on the cloud storage provider to obtain a fixed uptime, as the company is no longer responsible for ensuring access to the database, but rather it is the responsibility of a third party.

3.3.2. The Collection of Zakat:

Institutionalization of Zakat has been institutionalized in many Islamic countries, where religious authorities undertake the promotion, collection, and distribution of Zakat in accordance with the requirements of Islamic Sharia even there are a number of challenges in this area, such as non-inefficiency and lack of transparency in terms of collection, management, distribution and the different of opinions of Muslim scholars on how to deal with it. In addition to this broad bureaucracy. (Noordin, 2018)

The use of the blockchain system makes the process of collecting and distributing zakat an auditable and immutable process. There are many Muslims who wish to use their encrypted currencies in the field of religious payments. (Elasrag, 2019, p. 14)

3.3.3. Waqf management:

The waqf is based on the principle of permanence and growth, as it is imprisonment of the original and a means of benefit, but the endowment of the waqf sees their extinction throughout history, so there must be ways to preserve them, by documenting Islamic waqf around the world through the latest technical, which contributes to save it. (الهندي، 2018، صفحة 35)

The blockchain system can contribute to managing the waqf effectively. When reflecting on the various factors related to waqf documents in the countries of the Islamic world from the delay in the archiving, communication and registration systems in the departments concerned with waqf, and the possibility of tampering or forgery of documents. In view of the credibility, transparency, accuracy, speed and safety of blockchain technology, it can help to archive waqf documents, raise their data and approve them in their dealings, organize contractual relations for waqf with their beneficiaries and various parties,

monitor the growth of Islamic waqf, build an integrated information base, and enhance transparency. (الهندي، 2018، صفحة 36)

The Finterra platform is considered one of the most important platforms working in the field of waqf, where the company has established what is called the Finterra Waqfchain, a project that aims to use technology in the field of waqf, which would benefit from a wide range of assets other than exploited in all parts of the Islamic world, where Fintera has developed a crowdfunding platform that uses blockchain technology to create smart contracts linked to specific waqf projects through providing a more effective way to raise funds, manage and transfer ownership of the waqf, by receiving donations from Muslims to run social projects such as mosques, schools, and programs social welfare ... etc. (ساسي، 2019)

3.3.4. In the field of Islamic insurance (Takaful):

Transferring insurance contracts to the blockchain ledger will eliminate the sources of fraud in the insurance industry, as the joint ledger and insurance policies implemented through smart contracts can improve the efficiency of property and accident insurance. It is also possible through blockchain to secure medical records and their coding among health service providers, which increases interoperability in the health ecosystem; (Elasrag, 2019, p. 22)

The implementation and completion of blockchain insurance contracts through smart contracts simplifies the flow of information and payments between insurance companies and reinsurance companies.

Blockchain can be applied in Islamic insurance by: (Elasrag, 2019, p. 23)

- Automated claims processing in the area of commercial and auto insurance;
- Smart contracts between insurance contract parties will bring them to one platform, resulting in efficient operations and reduce claim processing time and costs;
- Availability of new products, such as P2P.
- Smart contracts across the blockchain will provide customers and takaful companies with a system for managing claims in a transparent, fast and unquestionable manner, as takaful policies can be registered along with their terms and claims on the blockchain and verified by the network, which ensures that the right claims are secured and false claims are rejected. For example, blockchain will reject several claims for a single accident, because the network will know that a claim has already been filed. Moreover smart contracts will efficiently process claims by automatically processing payments when certain conditions are met and validated to more effectively detect identity fraud, injury reports, false damage…etc.

4. Smart Sukuk and its application via Blossom Finance platform in Indonesia:

Smart Sukuk is considered one of the finest blockchain applications in the field of Islamic finance. Smart Sukuks issued through the platform of Blossom Finance in Indonesia are among the first innovations in this field. To learn about the concept of smart sukuk and the mechanism of issuing them through blossom finance platform the axis is sectioned to the following points:

4.1. Smart sukuk: Theoretical Background

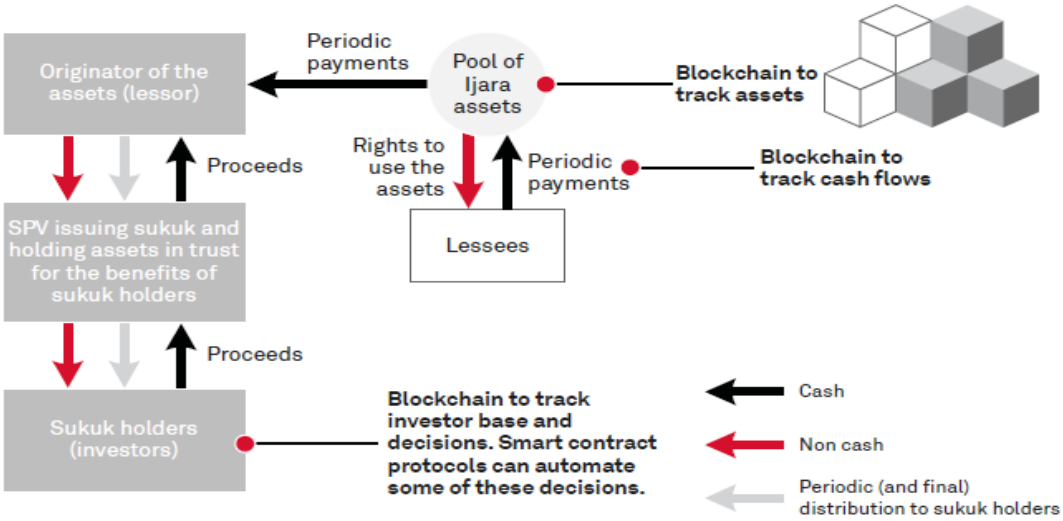
4.1.1. Definition, structure and advantages of smart sukuk:

Smart Sukuk is the latest and most important structure for Sukuk issuance. Its smart structure seeks to use blockchain technology to enhance efficiency and transparency, reduce cost, enable small and medium-sized companies and social impact projects and associations to issue their own Sukuk using technology. The main importance of smart Sukuk is to

standardize and automate accounting and legal payments and overheads for traditional Sukuk offers. (Elasrag, 2019, p. 24)

To understand the structure of smart sukuk, we propose the following chart related to the structure of a smart Sukuk contract (Ijara).

Fig.3. Smart sukuk Structure (Ijara)



Source: Mohamed Damak & Dhruv Roy, Islamic Finance Finance 2019-2020: One Industry, Three Accelerators, Islamic Finance Outlook, S&P Global Ratings, 2020, p. 11.

Through the above scheme, it is clear that the use of smart sukuk through blockchain technology will help to simplify the process of issuing and trading sukuk and improve regulatory oversight, where the legal and accounting aspects are unified and automated and the expenses related to the structure of sukuk issuance and payments are made. Through the use of smart sukuk, the following challenges will be overcome: (Bedoui, 2019, p. 109)

- Identification of assets and structure.
- Negotiation (Sharia and Law);
- Documentation.

This can be illustrated by: (Bedoui, 2019, pp. 109-110)

- Blockchain can be used to receive, manage and offset the capital raised by the sukuk holders, likewise the profit resulting from an asset and / or project, and accordingly the returns are automatically paid to and from the sukuk holders without the need for intermediaries;
- Blockchain technology helps to break down the structure of sukuk by skipping many players. Moreover, this technology does not charge any kind of fees, which leads to lower costs;
- Avoid unconfirmed and lengthy legal procedures, which will increase the efficiency of the transaction. The smart sukuk also helps to streamline back office operations, simplifies payments and shortens settlement times, in addition to the possibility of automatic contract execution, which will allow cancellation of indirect expenses associated with the issuance, settlement and termination of traditional sukuk;
- Increase the transparency of the sukuk, cash flows and basic assets. It helps also the Sukuk holders by providing correct information that can be consulted and analyzed during the decision-making, so the blockchain technology will solve the challenge related to disconnection with assets, with knowledge, full understanding of the assets owned and its performance, where investors can exercise their rights as owners of the sukuk. Moreover the

blockchain will provide a real-time record of the sukuk holders, as a new block documents every transaction in the chain and provides accurate data in real time;
- It is an effective tool for communication between the investor and the originator, as the latter is able to notify the investors of the occurrence of events or request their approval or seek advice regarding corrective instructions and procedures in a timely manner through knowledge and understanding of the underlying assets and / or projects and their performance, it is possible that this technology motivates investors to change the investment strategy in purchase and contract, thereby benefiting from the secondary market, which encourages them to be more liquid;
- The ability of exporters to access global capital by diversifying the category of investors and attracting a larger group of investors who are also interested in the social impact of the sukuk. Investors can also be tracked with smart contract protocols, quick solutions can be found - even outside the courts - of sukuk disputes. (Damak & Roy, 2020, p. 11)

4.1.2. How smart sukuk work:

The mechanism for making smart sukuk can be summarized in the following: (محمود، 2019)
- Smart sukuk work through the Ethereum cryptocurrency through what is known as smart contracts, where these contracts are based on a set of coded rules that are linked to a sophisticated electronic system. This system works automatically after receiving the orders to apply the terms of the contract with regard to payments and transfer of ownership;
- Institutions that wish to obtain cash liquidity can issue smart sukuk, whereby financial amounts are collected from investors in exchange for obtaining a smart sukuk for each investor against the amount paid. After the end of the specified period, the institution pays dues and distributes them automatically to investors through a system blockchain, in accordance with the smart contract that was issued between the issuer and the investors;
- The process of distributing the dues does not need banks or financial intermediation institutions. Smart sukuk also gives a new opportunity to support the trading of cryptocurrencies on global exchanges according to clear legal and regulatory standards

4.2. Smart sukuk issued through the Blossom platform:

4.2.1. Blossom Finance Company Profile:

Blossom Labs, Inc is an American company in Delaware, headquartered in Jakarta, founded in 2014, and aims to increase the availability of Islamic financial services using technology. (World's First Primary Sukuk Issuance on Blockchain Closes, 2019)

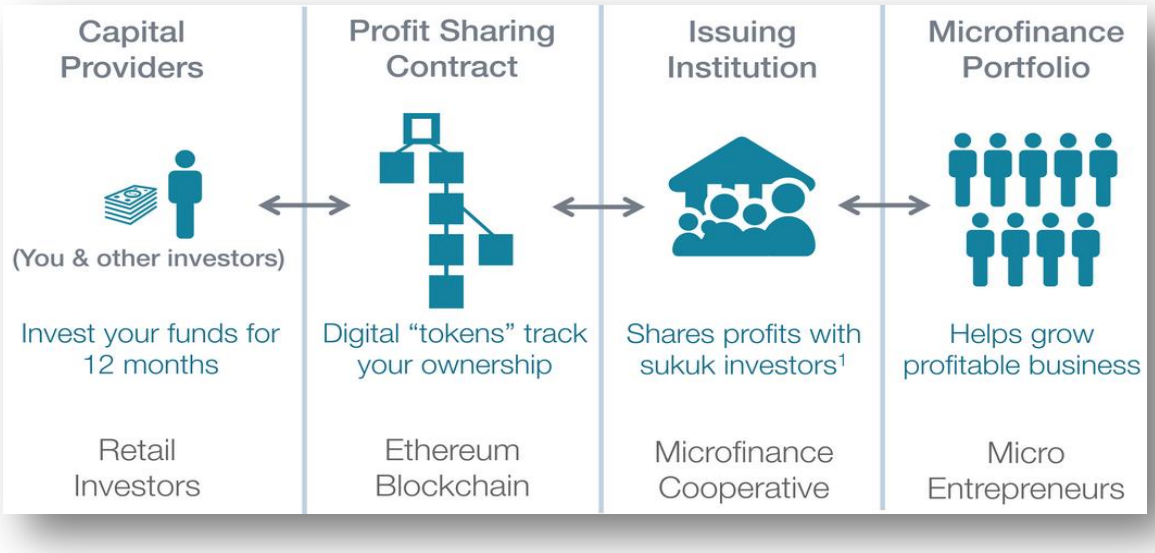
Since 2015, Blossom has been helping Indonesia's MFIs raise funds from international investors to finance small businesses that aim to reduce poverty, as they use blockchain to provide crowdfunding in lucrative microfinance in emerging markets. The smart sukuk issued through the platform of Blossom Finance, the first global innovation in this field, although Hilal Bank was the first Islamic bank in the world to complete a sukuk deal on the blockchain, but Blossom Finance has taken the implementation of sukuk to a new level using smart contracts. (Perdaryenko, 2019)

The Blossom Finance network includes: (J.Martin, no date, p. 23)
- 370,000 customers and members: holders of BMT microfinance cooperatives and those who obtain financing;
- 900 branch offices: providing banking facilities to local communities;
- 6 326 organizations: BMT cooperative microfinance organizations.

4.2.2. Smart Sukuk issuance by BMT via Blossom platform:

BMT Benna Umma, a Yogiakarta based Islamic microfinance cooperative, managed to raise 715 million Indonesian Rupiah by issuing smart sukuk via the Blossom Smart Sukuk platform, and this was done through the loyal scheme and schedule.

Fig. 4. Issuing smart sukuks through Blossom Finance



Source: Mathew J.Martin, Blossom: Halal & Ethical Investments Using Sukuk, Good returns, Great impact, p.18. from the site: https://docsend.com/view/j7jczhp

Tab.2. Issuing smart sukuks through Blossom Finance

Realized annual return	**Number of beneficiaries of financing**	**The purpose**	**Duration**	**Formula**	**The network**	**Platform**	**Source**	**The value**	**Exported tool**
12.94% annually	144 entrepreneurs	Microfinance	12 months	Speculation	Blockchain Ethereum	Blossom Finance	BMT Benna Umma	715 million R = US $ 50,476	Smart sukuk

Source: Prepared by the researcher.

Blossom's smart sukuk operates on the Ethereum Blockchain series, but is denominated in the local currency - the Indonesian Rupiah -, the Ethereum block supports smart sukuk, a smart computer program that operates in the blockchain, and with the use smart contracts technology the accounts related to sukuk such as property management, distribution profit payments and return of principal upon maturity are all digitally automated and traceable. Smart Blockchain supports a high level of audibility. Therefore; it is well suited to different types of digitally managed securities. (Ethereum Blockchain Based Platform for Islamic Finance Wins Microfinance Award at Kuala Lumpur Islamic Finance Forum, 2019)

Since the platform was announced in May 2018, Blossom's smart sukuk has focused on financing Islamic Cooperative MFIs (BMT) in Indonesia, using a speculative structure based on profit and loss sharing. Or investors as in traditional sukuk, instead the source or Blossom only earns money if investors make money, and Blossom may lose if investors lose. (Perdaryenko, 2019, p. 175)

4.2.2. Advantages of dealing with Blossom's smart sukuk:

Investing in traditional sukuk requires many things, including: (J.Martin, no date, p. 14)

A- **Minimum investment**: The investment in traditional sukuk requires 1.25 million US $ as a minimum to invest in most types of sukuk available for public purchase;

B- **Inaccessibility**: Institutions that invest in sukuk usually do not respond to ordinary investors, instead they focus on the rich only;

C- **Geographical barriers**: Most of the investors live outside the countries where the sukuk markets are active, therefore they do not have opportunities to invest in them.

d- **Intermediaries**: Traditional sukuk require a lot of intermediaries such as trustee, delegate, payment agent, transfer agent, account agent, custodian ... etc.

As for dealing in smart sukuk through the Blossom platform, it provides the following: (J.Martin, no date, pp. 18-19)

A - **Access to emerging markets globally**: Using the Blossom platform, investors can access unique and exciting projects in emerging markets that focus on sustainable development;

B- **Legal and fully regulated contracts**: Each investment includes a legally enforceable contract;

C- **Flexible investment options**: Investment can be made using the cryptocurrency or using traditional bank transfer;

D- **Socially responsible and having a positive impact**: Projects are evaluated not only on the basis of credit worthiness, but also on the basis of impact on local communities;

E- **Profit sharing model**: No pre-existing administrative or service fees, Blossom earns a share of the profits

F- **Sharia-compliant financing structure*:*** By relying on a legitimate financing structure that is entirely dependent on profit sharing.

5. CONCLUSION

Blockchain technology is an advanced technology based on the principle of peer-to-peer without the presence of any medium, characterized by certain characteristics and has many applications in many areas. Through this research the following results have been reached:

- The use of blockchain technology in the field of Islamic finance will achieve many advantages such as ease, speed and traceability of transactions, in addition to safety, improving governance, productivity of Islamic financial institutions and achieving financial inclusion, especially for those who are financially excluded;
- The use of smart contracts leads to achieving efficient business and financial activities, and activating the process of monitoring in the field of Islamic banking, but the various challenges and problems related to smart contracts must be overcome;
- The Islamic financial industry can benefit from blockchain applications by storing cloud data and information, activating the process of collecting zakat and managing waqf, improving the efficiency of takaful insurance and eliminating sources of fraud in this industry;
- Smart Sukuk is considered one of the finest blockchain applications in the field of Islamic finance, as it unifies and automates accounting and legal payments and all traditional sukuk operations, which leads to achieving many advantages;
- Smart Sukuk issued by BMT Benna Umma in Indonesia through the Blossom Finance platform, one of the first global initiatives in the use of blockchain technology in issuing sukuk. Smart Sukuk has had many advantages in Indonesia especially in the field of reducing costs, procedures and financing of small entrepreneurs.

-Research proposals: Despite the development of technology and the use of blockchain technology in many areas, its use in the field of Islamic finance is still limited due to a number of challenges, so it must be overcome by:

- The formation of human frameworks that combine financial, legal and technological aspects;
- Finding the appropriate infrastructure to adopt this technology in the field of Islamic financial industry;
- Overcoming legal problems, especially those related to smart contracts.

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