Journal of Studies in Economics and Management
ISSN: 2602-6570
Volume 4 Number 1 – June 2021

Sukuk Tokenization: Successful Experiences

Benalkama Malika
University Setif 1, Laboratory: Evaluation of Algerian Capital Markets in the Light of Globalization, alakmamalika@yahoo.fr

Date of receipt: 02/05/2021 Date of acceptation:10/6/2021

Abstract:
This research paper aims to clarify the importance of using blockchain technology in the islamic sukuk industry, as the latter ranks first among the most successful and fastest growing financial instruments in the Islamic financial industry. Blockchain technology can help reduce the costs incurred and intermediaries involved in structuring sukuk tokenization process.
Through this research, it was concluded that blockchain applications in the sukuk industry would standardize this type of process and reduce the difficult and challenges it faces, and the experience of the Blossom Finance platform and the Wethaq platform, Addition to the HCL smart sukuk platform experience is one of the first technological innovations in this field. By implementing new technologies based on smart contracts and protocols.
Keywords: Blockchain, smart sukuk, tokenization, platforms.
Jel Classification Codes: O33 ،G21.

1. INTRODUCTION

Islamic financial institutions need to keep pace with the rapid technological developments taking place in the global financial markets by developing their methods and adopting new innovations. Among these innovations we have blockchain sukuk or smart sukuk that are based on blockchain technology which is among the most important technologies that have been introduced recently. Although young, it has become today the cornerstone of many successful innovations in the financial sector.

The smart sukuk operate through the cryptocurrency known as the Ethereum Blockchain through what is known as smart contracts, as these contracts are based on a set of encrypted rules that are linked to an advanced electronic system, and after receiving orders, this system automatically applies the terms of the contract regarding payments and transfer of ownership.

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

What is meant by the sukuk tokenization?

The main question has the following sub-questions:

- What means by blockchain technology and smart contract?
- How does blockchain technologies affected the islamic sukuk industry?
- What meant by sukuk tokenization? And how is structured?
- what are the different successful experiences in this area?

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

- **The applications of blockchain technology in sukuk tokenization has simplified its structure;**
- **The use of blockchain in sukuk tokenization has reduced the number of intermediaries**

Research importance: The topic is very important, as it is one of the topics that has become the focus of many researchers, as it is one of the emerging topics in islamic finance industry which is among the areas that must use blockchain technology to increase its effectiveness specially in sukukization operations. With its emphasis on accountability and transparency, blockchain technology and tokenization shares surprising commonalities with Islamic finance.

Research objectives: This research aims to achieve the following points:

- Knowing the theoretical aspect related to blockchain technology and smart contracts;
- Knowing the advantages of applying blockchain technology in the field of Islamic sukuk industry;
- Realizing the effects of blockchain technology and smart contract on islamic sukuk industry;
- Learning about the concept of smart sukuk, the advantages of dealing in smart sukuk for the Blossom, Wethaq, HCL smart sukuk platforms.

Research methodology: To study this topic, a descriptive and analytical approach was adopted, by collecting and analyzing data and information on the subject of the study. For this purpose, many relevant references have been relied upon, in addition to the websites of the various platforms under study.

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

1- **Sherin Kunhibava & others** (2021) study entitled "***Sukuk on blockchain: a legal, regulatory and Shariah review***": The purpose of this study is to explore issues arising from sukuk on blockchain, including Shariah and legal matters by using a qualitative methodology. It was concluded that digitization and issuance of sukuk via blockchain increases transparency and reduces costs;

Nida Khan & others (2020) study entitled "***Tokenization of sukuk: Ethereum case study*"**:** This research seeks to introduces a novel exploratory analysis of sukuk tokenization based on a case study by implementing a basic smart contract for Sukuk al-Murabaha on Ethereum;

2- **Osama Hamza** (2020) study entitled "***Smart Sukuk Structure from Sharia Perspective and Financing Benefits: Proposed Application of Smart Sukuk through Blockchain Technology in Islamic Banks within Turkey***": This research has studied the fundamentals of blockchain sukuk, and proposed also a model for structuring blockchain sukuk in the largest Islamic bank in Turkey. It was concluded that smart sukuk offer many advantages by using a descriptive and analytical approach;

3- **Houssem eddine Bedoui** (2019) study entitled "***Contribution of Blockchain Technology to the Sukuk Industry***": Through this article, the researcher touched on the importance of blockchain and smart contracts in the smart sukuk industry, where he reviewed the most important advantages in their use and the possibility of reducing the risks and challenges facing the Islamic sukuk industry by using a descriptive and analytical approach.

Research plan: This research consists of three main axes:

The first axis the theoretical framework related to blockchain technology and smart contract;

The second axis: is devoted to study Blockchain sukuk and their structure.

The third axis: Through it, the mechanism of smart sukuk and its advantages were addressed through a case study of the Blossom platform, the Wethaq platform and the HCL smart sukuk platform, all of which are successful examples of blockchain applications in the field of Islamic finance.

2. A background about Blockchain Technology and smart contract: Blockchain and smart contract can be defined as follows:

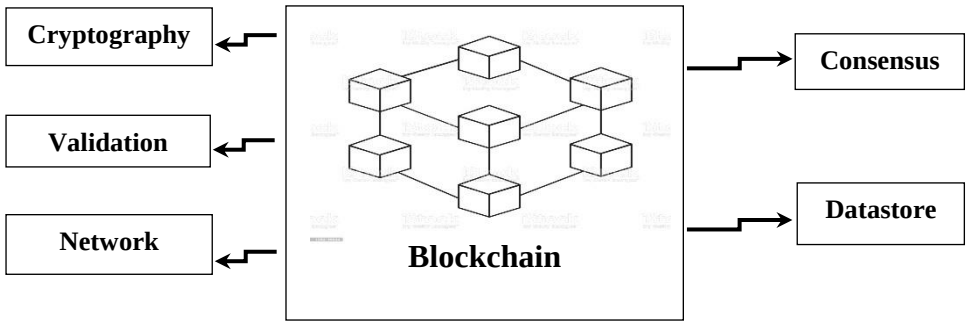
2.1. Blockchain is: "The technology that allows the storage and exchange of data between several parties by adopting the principle of peer-to-peer. Technically, blockchain technology allows users to view data, share it with other parties. And protect them, all thanks to consensus algorithms. These algorithms are used in a decentralized manner and allow to get rid of the mediating role that banking institutions were playing". (خالد البلوشي، 2019، صفحة 172);

2.2."It is a shared and distributed transaction ledger that records all transactions. For transactions that are on the ledger, a majority of nodes running the Blockchain have to concur about the transaction's validity (Subramanian, 2019, p. 2)

Accordingly, and through the above blockchain can be defined as: "a platform whereby peers can exchange values using transactions without the need for a central trusted arbitrator".

The following figure illustrates the basic elements of a blockchain system:

Fig.1. The basic elements of a blockchain systems



Source: (السبيعي ، 2019، صفحة 9)

2.3. Blockchain application areas: there are many of these applications, but generally they can be divided into four main groups, the most important of which are: (Elasrag, 2019)

2.3.1. Smart contract applications: such as guarantees and digital rights;

2.3.2. Digital currency applications: such as electronic commerce, global payments, remittances, direct lending and microfinance;

2.3.3. Applications of collateral such as private markets, debt, crowdfunding and derivatives;

2.3.4. Record-keeping applications such as health care, address records, property, voting, intellectual property, and others.

2.4. Blockchain's characteristics: it is enabled by four key characteristics described below: (Yaga & others, 2018)

2.4.1. Ledger: the technology uses an append only ledger to provide full transactional history;

2.4.2. Secure: blockchains are cryptographically secure, and this is one of its advantages, so once information is recorded on it, it cannot be tampered with or altered;

2.4.3. Shared: Unlike normal encryption methods that completely block information, blockchain technology is distinguished by that the information in it can be viewed at any time and any place and is available to everyone to ensure a framework of transparency;

2.4.4 Distributed: It depends in storing data on distribution, so the data is stored in many devices on a distributed network of nodes, and each node makes a copy of the data, so disconnecting any node will not cause any

failure in the database and at the same time it will maintain security and protect it from attacks.

2.5. Smart contract definitions: Among these definitions can be mentioned:

2.5.1. Smart contracts are also called self-executing contracts, which are "protocols for coded (encrypted) methods through software capable of sending contracts from a person's account to other accounts by registering on (blockchain) platforms, without the intervention of a third party such as a notary, a broker, or any central authority". (Lacasse, Lambert, & Khan, 2018, p. 41);

2.5.2. Smart contract is "currently supported by technology called Blockchain which is a specific type of distributed ledger technology that organizes data into blocks that are chained together chronologically by cryptographic hash function and confirmed by a consensus mechanism" (Lambert & others, 2020, p. 7)

Accordingly, and through the above smart contracts can be defined as: "They are stand-alone programs or instructions that automatically implement the terms and conditions of the contract without the need for human intervention."

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.

2.6. The purpose of smart contracts is: (غدة، 2019، صفحة 215)

2.6.1 Facilitating the exchange of properties and everything of value;

2.6.2 Reducing the costs of trade;

2.6.3 Avoid the many documents and costs of correspondence and communications;

2.6.4 Elimination of intermediaries and emerging parties and their costs;

2.6.5 Solve the problem of trust;

2.6.6 Smart contracts are "an application of blockchain technology, except that it can use them without resorting to the blockchain technology itself.

2.7. Smart contracts sections: each smart contract has four different sections which are: contractual rules of engagement (rules), actionable events (events), execution of the contract (executables), and settlement among the participants in the contract (settlement).

These sections are shown in the following figure:

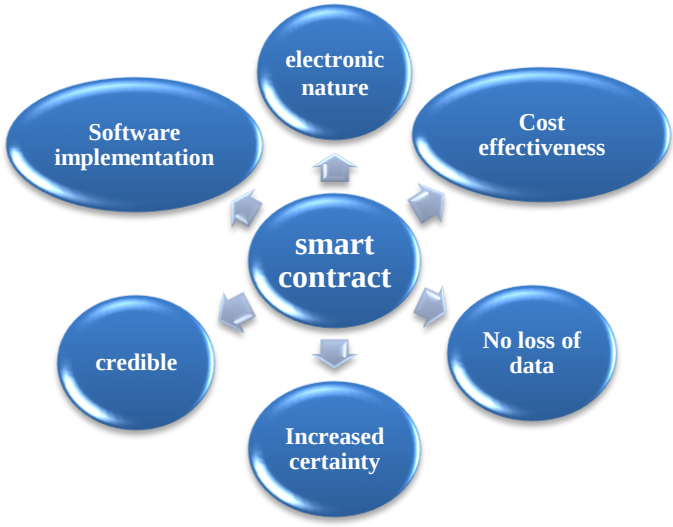
Fig.2. Smart contract sections

Source : (Subramanian, 2019, p. 4)

Smart contracts can be developed and diffused in different blockchain platforms (e.g., Ethereum, Bitcoin and NXT). Different platforms offer distinctive features for developing smart contracts. (Alharby & van Moorsel, 2017, p. 136)

2.8. Characteristics of Smart Contract: It is necessary to enlist the following ones shown in the next figure:

Fig.3. Characteristics of Smart Contract



Source: (Sheikh & others, 2019, p. 322)

3. Features of blockchain that make it beneficial for the islamic financial industry: the features of blockchain that make it beneficial for the islamic financial industry are thus the following: (Khan & others, 2020, p. 5)

3.1. Transparency;

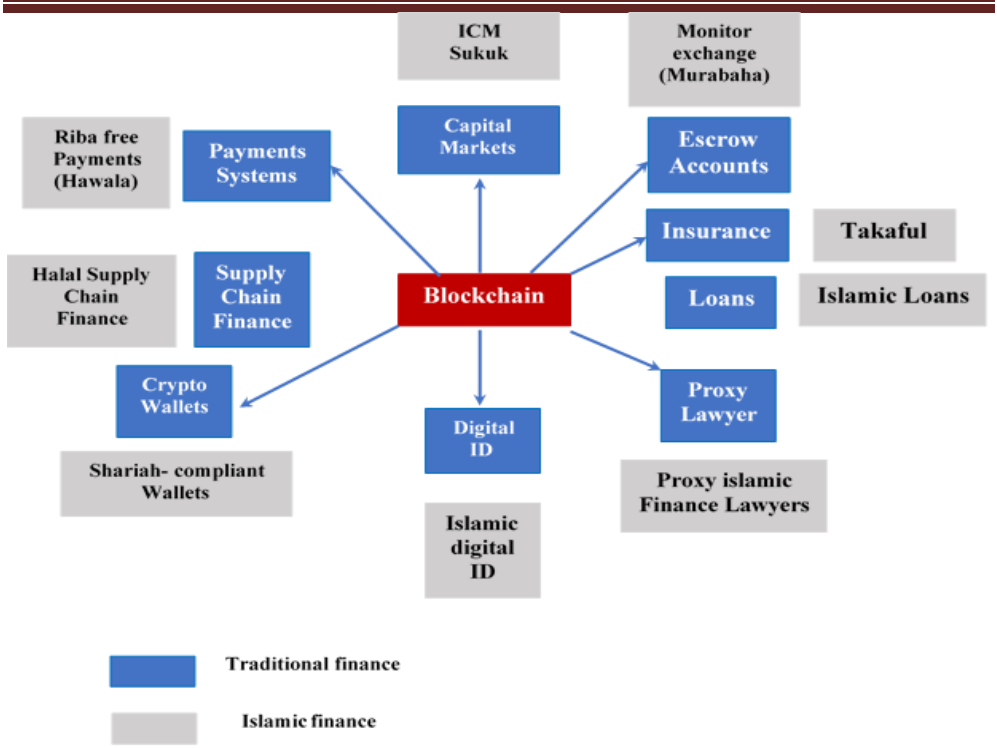
3.2. Immutable data and absolving the need for intermediaries;

3.3. Smart contracts and decentralized transaction settlement;

3.4. No single point of failure.

The next figure shows the different applications of blockchain between conventional and islamic finance in many areas:

Fig.4.different applications of blockchain in traditional and islamic finance



Source: (Khan & others, 2020, p. 5)

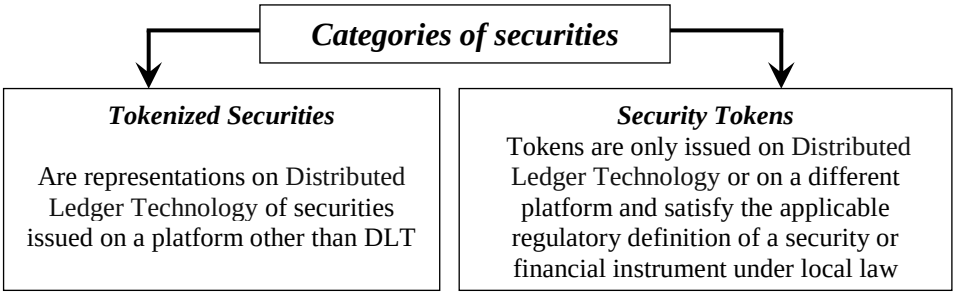
4. Smart Contract and Islamic Law of Contract: A smart contract is closer to the concept of a contract in Islamic jurisprudence, particularly with regard to spot contracts for specific assets (نذير، 2019، صفحة 188).

So, a smart contract is closer to Islamic contract and in compliance with Shariah objective to ensure transparency in business dealings or transactions such as asset definition, payment terms, enforcement and following the principle of trust.

5. Sukuk Security Token (SST): First, a security token can be defined as: "The security token is a real investment or pure financial asset, for its owner, more or less long-term profit goals. In other words, the security token represents the digital equivalent of taking a share of capital in a company". (Price & others, 2020, p. 5)

Generally, there are two categories of securities that can be represented on blockchain which can be illustrated by the following simplified figure:

Fig.5. Two categories of securities that can be represented on Blockchain



Source: (Price & others, 2020, p. 5).

Asset-backed tokens or Sukuk Security Token such as sukuk structures and include trading an asset or a share of an asset. In conclusion, tokens possess an innovative method of raising capital and can be Sharia-compliant if properly organized. (Faraz Adam, 2018, p. 2)

6. Relationship between Sukuk and Smart Contract: There is a lot of research and analysis showing that the behavior of sukuk is similar compared to the principle of smart contracts. The only difference between them is the automation processes. Smart contracts are automated while the instruments are manual. (Maghdeed, 2019)

6.1. Smart Token Sukuk

There is an enduring relationship between smart contracts and sukuk, both of them represent the asset's value in the current capital market and are viable as a financing tool. However, there are some issues, for example the ability to digitize the value of sukuk certificates in Blockchain technology and how smart contracts can be beneficial for sukuk. The various ways to structure and create a standard for Islamic finance, following any of the smart contract standards, such as ERC 20 (Maghdeed, 2019)

To find solutions to these issues, there needs to be a clear understanding blockchain structure and the approaches to be followed for implementing the sukuk principle using smart contracts. Therefore, a new approach will be introduced, using the principle of security token as a digital asset component to digitalize the entire asset market; especially for sukuk.

Today, Islamic finance institutions are in charge of issuing Sukuk, in alignment with certain standards issued by different institutions, to address this divergence, the concept of SukukChain has been introduced as a platform to

run a programmable security token or smart contract within a pool of network participants, operated by blockchain. (S&P, 2020, p. 11)

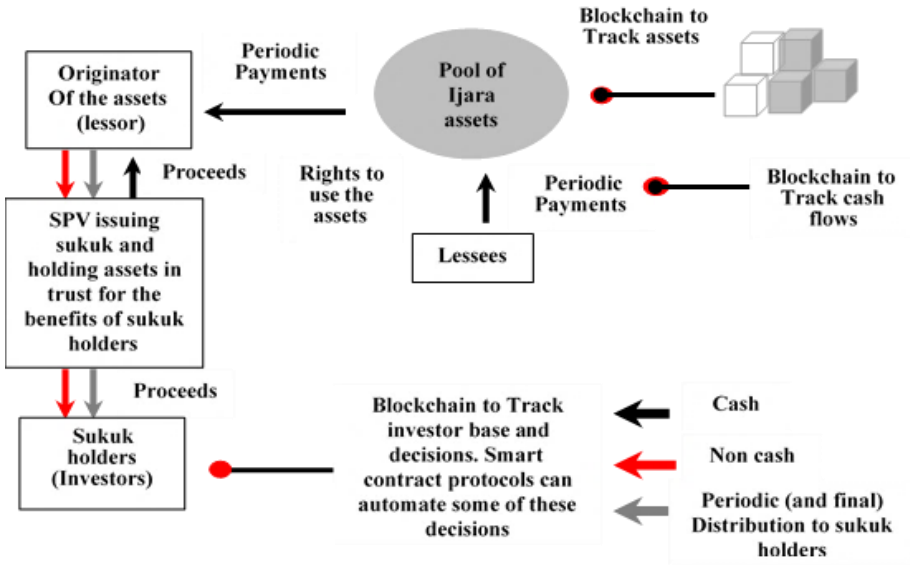
The four main components of the SukukChain architecture consist of digital account, digital sukuk, digital assets and Sharia unit automation within a legal framework (Maghdeed, 2019).

6.2. Role of blockchain and smart contracts in the Sukuk industry: the adoption and implementation of blockchain technology would help to simplify the Sukuk issuance and trading processes by identifying the asset and structure and negotiating and finalizing the documents. The Shariah compliance challenge is in identifying the perimeter of permissible innovation that would permit access to the new technology on a Shariah-compliant basis. (Oseni & Ali, 2019, p. 9)

7. Smart sukuk: The world first innovation in smart Sukuk introduced by blossom finance, the facility endeavored to change the conventional ways of Sukuk issuance using the Blockchain. (HAMZA, 2020, p. 4)

7.1. To comprehend the structure of smart sukuk, the following chart related to the structure of a smart Sukuk contract (Ijara) explain this.

Fig.6. Smart sukuk Structure (Ijara)



Source: (Damak & Roy, 2020, p. 11)

From the previous figure, the following can be illustrated:

7.1.1. Blockchain can be used to receive, manage and repayment the capital raised by the sukuk holders, and the profit generated from an asset or project according to the rules of the smart contract;

7.1.2. Through the blockchain, funds are transferred and transactions are completed in real time, and with low operational costs;

7.1.4. Ethereum blockchain would give issuers access to global capital by diversifying the investors class and attracting a larger pool of retail investors

7.2. Issuing process of smart sukuk: The Special Purpose Vehicle (SPV) announces the issuance of blockchain sukuk for sale to all investors through the platform. The process is done as follows: (Hamza, 2020, p. 4)

7.2.1. Sukuk Issuance Announcement by the special purpose vehicle;

7.2.2. Smart Sukuk Purchase Requests: investors can purchase blockchain sukuk from the bank's branches by different ways;

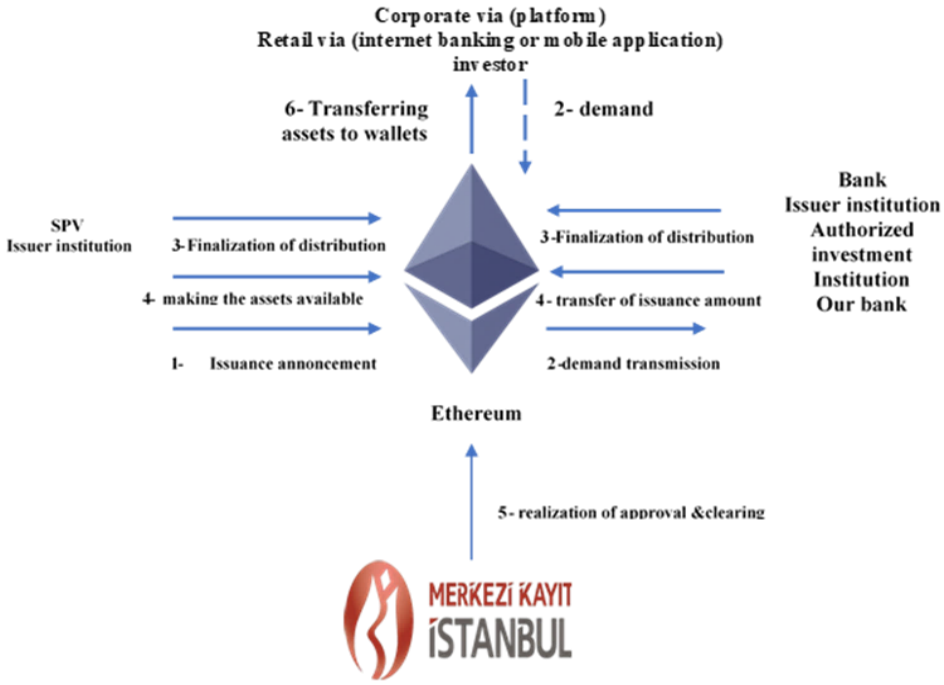
7.2.3. Finalization of distribution after receiving the requests, this process is completed by the SPV and the bank;

7.2.4. Equivalent value of sukuk tokens: SPV equals Sukuk tokens to the respective country's currency via platform at the clearing day; the exchange of both transactions via Smart Contract will be approved by the Central Registry Institution (CRI) in this country;

7.2.5. The approval and registration: In order to complete the transaction, the smart contract will be given automatic approval through the central registry and the bank and finally the Transfer Sukuk tokens to clients' wallets by CRI.

The previous stages are shown in the following figure:

Fig.7. Blockchain sukuk issuance structure



Source: (Hamza, 2020, p. 4)

8.Tokenization and islamic finance:

Generally known as "tokenization", "digital securitization" refers to the creation of the digital representation of an asset called a token on blockchain (Laurent & et autres, 2018).

Asset tokenization is a method that converts the rights to an asset into a token. The tokens are issued on a blockchain platform that supports smart contracts, so that the tokens can be freely traded on various exchanges (elivise, 2020)

Through what was mentioned previously, tokenization makes it possible to materialize and enhance existing assets from the physical world to the digital world.

According to Shariah Review Bureau, tokenization can be structured in a way that is in compliance with the rules of Islamic finance. tokenized assets are similar to investment in Sukuk bonds where the tokens represent interest in the underlying assets, beneficial ownership, and constructive possession implies possession of the tokens. (Faraz Adam, 2018, p. 2)

It should be noted here, that Qintar was the first Sharia-compliant token which is Launched in April 2019. (prnewswire, 2019)

The Qintar platform ensures the following: (bitcoinplanet, 2019)

8.1. Sharia Compliant Token: It is based on Islamic Blockchain (ISL) which is a private blockchain that has received a Fatwa from several Islamic scholars and researchers;

8.2. ISL Blockchain: All financial products and contracts issued via ISL Blockchain are Sharia compliant.

8.3. Blockchain platforms for tokenization

Digital platforms are new business models and strategies, emerges as one of the most powerful manifestations of the digital revolution (Elliott & others, 2018, p. 3)

Based on the definition of both the tokenization and the digital platform, the following definition of the tokenization platform can be given" Asset tokenization platforms enable individuals and organizations to create a digital proof of ownership and convert it into digital tokens"

9. An analytical study of the most important smart Sukuk issuance platforms

9.1. Smart sukuk issued through the Blossom platform: Blossom Finance introduced for the first time its smart sukuk platform to standardize and automate the legal, accounting and payment aspects of bonds. The platform uses Ethereum smart contracts to increase the efficiency and compass of sukuk issuance globally.

The genesis of the Blossom Finance goes back to October 2014, it was established in San Francisco, California USA but started operating in 2016. (blossomfinance, 2021)

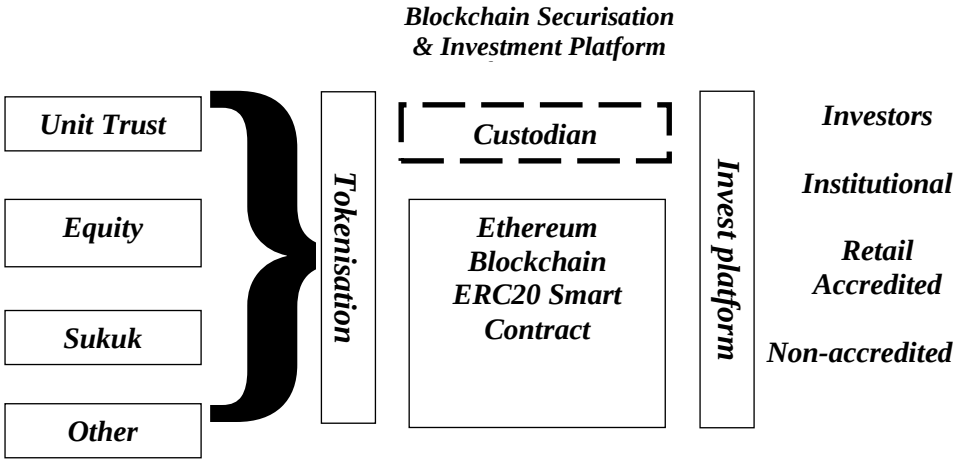
9.1.1. Blossom's smart Sukuk

Blossom Finance is at the primacy in arranging micro sukuk issuance to fund Baitulmal Wa Tamwil (BMT) in Indonesia. Enhanced by blockchain technology, the BMT sukuk issuance ERC20 token is a smart contract which has big importance because it defines a common list of rules that all Ethereum tokens must adhere to. It also facilitates transactions of tokenized sukuk and eliminates intermediaries. (Securities Commission Malaysia, 2020, p. 58)

The following figure explain this process:

Fig.8. Blossom Finance's Blockchain Securitisation Model

Outcome: Blockchain Securisation



Source: (Securities Commission Malaysia, 2020, p. 59)

Through the previous figure, to invest with smart sukuk, you must create your investor account, then choose and fund your investment which matches your goals via bank transfer, stable coins or crypto, and finally collect your profits until the project ends.

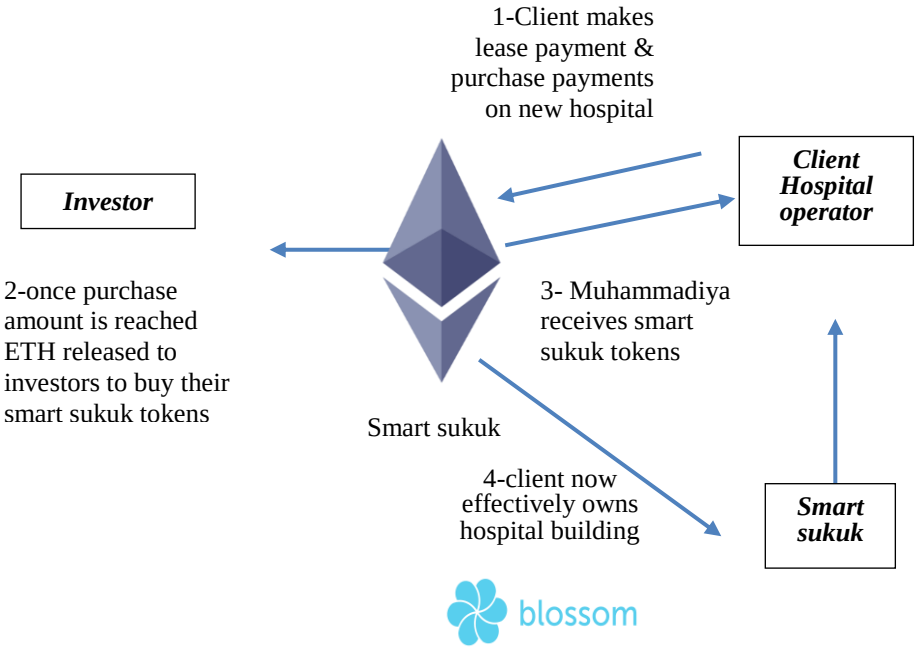
9.1.2. Sukuk mechanisms on the Blossom's platform: There are two mechanisms, the first one sukuk al mudarabah profit-sharing structure, is collecting funds to be invested into the issuer PBMT Social Ventures. (Whitehead, 2018)

Its second structure, an Asset-Based Lease Sukuk, or sukuk al istithmar al ijara, does not yet active. In this case, the sukuk would fund projects such as hospital construction or school, on accomplishment, the hospital operator would lease its facilities from the sukuk's investors at a profit.

A smart contract encodes business rules directly into the underlying payment currency itself, the blockchain itself complies the contract rules regarding payments and transfer of ownership. (Whitehead, 2018)

This can be illustrated through the following figure:

Fig.9. Smart Sukuks through Blossom Finance (sukuk Al-istisna Al-Ijara)



Source: (ifnfintech, 2018)

9.2. Wethaq platform experience: Wethaq (Capital Markets) is a limited liability company, registered with the Dubai International Financial Center (DIFC), and regulated by the Dubai Financial Services Authority (DFSA). Wethaq Solutions Ltd is a limited liability company registered in the United Kingdom. (Wethaq, 2021)

9.2.1. In the second half of 2018 the wethaq team worked on a proof of concept (PoC) prepared to apply new technologies to Sukuk markets for institutional investors. Wethaq look to validate its essence assumptions of what the issuance of Sukuk al-Ijara using distributed ledger technology and "smart clauses" would require. (r3, June 2019, p. 4);

9.2.2. In April 2019, wethaq was granted an Innovation Test License (ITL) from the Dubai Financial Services Authority. (r3, June 2019, p. 17)

9.2.4. Wethaq aims, through the use of ledger technology in the sukuk market, to: (Michalopoulos, 2019)

- Have the ledger operate as a registry and central securities depository;
-"Inter-operate" with other arrangement infrastructures and payment gateways;
- Have market participants, service providers and governance stakeholders

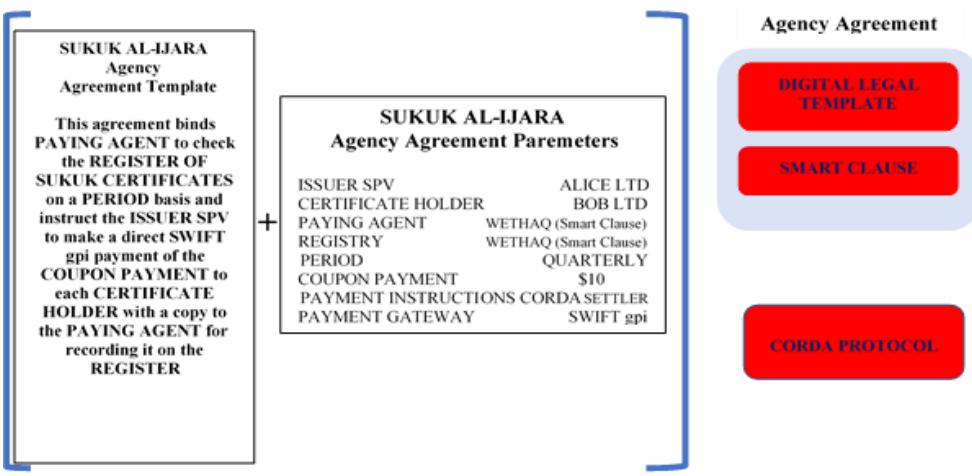
interact with each other within the platform;

9.2.5. The Wethaq is designed to respond with existing regulations through its combination of: (r3, June 2019, p. 4)

- Contractual relationships with, and duties towards, the fundraiser and other parties (Smart Clauses);
- The use of a permissioned distributed ledger for the facilitation of the sukuk issuance and administration and the efficient exercise by wethaq of its responsibilities like "Corda Protocol" to manage orders that is automated with pricing algorithms and supported by smart conditions.

The following figure shows the digital legal model for sukuk al-ijarah for the wethaq platform. (r3, June 2019, p. 9)

Fig.10. The digital model for Sukuk Al-Ijarah by the Wethaq platform



Source: (r3, June 2019, p. 8)

9.3. HLC smart sukuk platform experience: HLC Foundation (HalalChain), a public blockchain company based on Proof of Work, which is friendly to small payment and quick transaction. In addition, HLC has developed consortium chain to address the issues in Halal industry and Islamic Finance, (Securities Commission Malaysia, 2020, p. 50).

HLC promotes the opportunities to make Asset Backed Tokens (ABT) a new financial instrument which can increase efficiency of raising capital for real economy companies by investing in the Smart Sukuk.

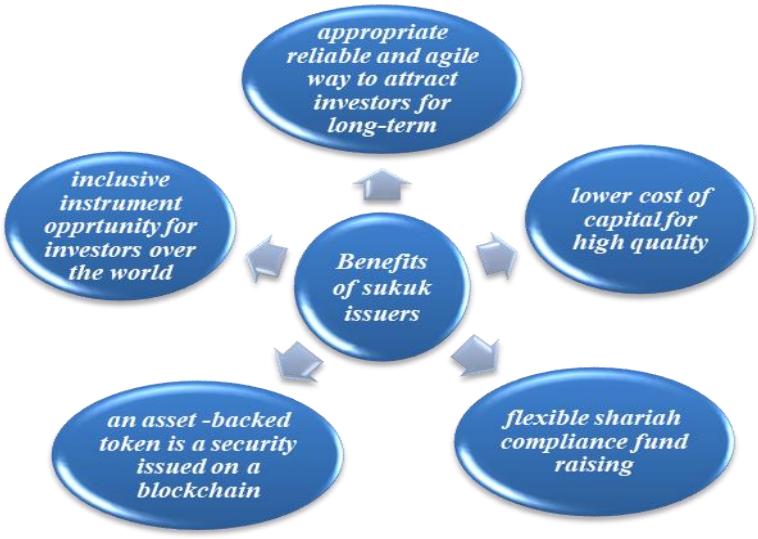
9.3.1. Characteristics of HLC smart sukuk platform: there are several ones specially in the field of smart sukuk: (HLC Smart Sukuk Platform, p. 10)

- Highly shariah compliance;

- Sustainable cash flows to token owners;
-Transparency and accountability based on the relevant legal structure;
- Low costs of offerings and a new class of low-risk future proof tokens;
-Smart contracts and smart property.

9.3.2. Benefits of sukuk issuers with HLC platform: Sukuk issuers on the HCL platform have many advantages, both in terms of cost and compliance with Sharia, and this can be illustrated through the following figure

Fig.11. Benefits of sukuk issuers with HLC platform



Source: by other depending on (HLC Smart Sukuk Platform, p. 10)

10. Conclusion:

Through this research, a number of results were reached, the following can be mentioned:

- The application of blockchain and smart contract has the potential to enhance the digital transformation of the Islamic capital markets, the expansion of the mechanism of issuing Sukuk, and solving issues of standardization of the legal framework of Sukuk;
- The blockchain helps to simplify the structure of sukuk issuance in all its stages, whether in the area of issuance, the trading process and the settlement period and this means digitization of the Sukuk process issuance;
- Sukuk Tokenization represents a major opportunity for the islamic financial industry, the first issuance in the world in this field dates back to Blossom company which provided two types of structures, the first one

sukuk al mudarabah profit-sharing structure, and the second one is the Asset-Based Lease Sukuk;

- HLC platform promotes the opportunities to make Asset Backed Tokens (ABT) as a new financial instrument, and on the other hand Wethaq platform propose a digital legal model for sukuk al-ijarah by using smart clauses and the corda protocol;
- Both wethaq, HLC, Blossom platforms, aims to improve transparency in the sukuk market by using blockchain technology.

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