Application of blockchain information technology in Ṣukūk trade

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Abstract

Purpose – This study aims to explore the opportunities and challenges in activating a Smart Contract to enhance the efficiency and effectiveness of Ṣukūk offerings in the Islamic capital market.

Design/methodology/approach – The study adopts a mono-method qualitative approach. Data were obtained from survey interviews of two issuances on the fusion of smart contracts in Ṣukūk structures that were Sharīʿah-compliant. A thematic approach was further used to analyze the interview data based on the onion research method while opportunities and challenges of activating the Smart Ṣukūk (SṢ) relied on doctrinal evidence.

Findings – The results from the issuances across two jurisdictions showed that deployment of SṢ can resolve contractual ambiguities arising from Sharīʿah interpretations, jurisdictional policies and legal regime issues, which affect Ṣukūk origination and issuances especially on the right of investors in the event of Ṣukūk defaults. Although SṢ is automated, the third party's presence is not eliminated as the blockchain platform still relies on the validators who are usually blockchain developers functioning as a third party in the Ṣukūk chain.

Research limitations/implications – The study relies on doctrinal literature to explain the features and requirements of SṢ. The empirical approach is limited to interview data based on local SṢ issuances. Future studies need to explore regulators' role and global standards in cross-border issuance of SṢ with multiple jurisdictions/laws.

Practical implications – The paper concludes that the offering of SṢ using local currency has been successful in the two issuances because of the facilitative regulatory environment. However, addressing Ṣukūk's challenges in cross-border offerings would require guidance from international standard-setters such as the Accounting and Auditing Organization for Islamic Financial Institutions and the Islamic Financial Services Board.

Originality/value – This study is an advanced application of smart contracts to alleviate the related Ṣukūk challenges in the Islamic capital market.

Keywords Blockchain, Sharīʿah-compliance, Smart Ṣukūk, Ṣukūk challenges

Paper type Research paper

1. Introduction

Ṣukūk is an Islamic financial instrument that can contribute to a country's overall development. Ṣukūk is an Islamic alternative to conventional bonds, which forbids usury without necessarily guaranteeing returns on investment. It contributes to economic growth by providing funding to industries, corporations and governments from *halal* sources

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(Shahida, 2013). Ṣukūk is considered one of the most equitable financial instruments that can generate the adequate distribution of profits and losses for corporate and government development projects (Hamzah *et al.*, 2018). Ṣukūk relies on risk-sharing rather than risk transfer practices in conventional bonds (Al-Ḥilmī, 2014). Ṣukūk continues to receive growing interest from non-Muslims given its economic and social benefits, transcending ethnic and religious bias, and has shown strength as a viable alternative to conventional bonds (Sherif and Erkol, 2017). This is tacit to the statement credited to David Cameron, the former Prime Minister of the United Kingdom (UK), when he expressed the UK Government's intent to consider exploring the opportunity of issuing Ṣukūk for developing infrastructure (Wilson, 2013; Busari, 2019). The Intenational Islamic Financial Market Annual Sukuk Report (2018) also noted that Ṣukūk investments have gone beyond the mere intent of profit and loss sharing to developmental investments. Thus, it targets social development projects in emerging markets such as the Gavi immunization fundraising initiative in 2014 for third world countries (Sairally *et al.*, 2017).

However, Ṣukūk issuances are still trailed with specific regulatory challenges limiting its wider application in different jurisdictions. For instance, the recent Dana Gas Ṣukūk default case represents a moral hazard issue triggered by a Sharīʿah argument arising among contracting parties challenging the legality of the *Ṣukūk Muḍārabah* contract (Hekmatyar and Parkar, 2018; Abdul-Rahman and Nor, 2016). To prevent such occurrence when a Ṣukūk defaults, a smart contract application is the latest financial technology being explored to address present challenges in Ṣukūk issuances globally (Islamic Financial Services, 2009). The basic idea of Smart Ṣukūk (SṢ) is to create fully automated payment streams where all the contractual clauses are automatically simulated using the software. To ensure an adequate regulatory environment for digitization to thrive, the Securities Commission Malaysia (SCM) initiated several digitally-driven capital market initiatives with large Sharīʿah-compliant firms (Securities Commission Malaysia, 2017). The smart contract is a recent initiative and most of the extant studies are qualitative. The fairly recent introduction of SṢ may explain the lack of primary data of used SṢ cases. This study aims to close the gap by exploring how smart contract can play a role in addressing the challenges in the Islamic capital market, particularly in relation to Ṣukūk.

2. Literature review

The application of blockchain technology is the next-generation investment mechanism being adopted by many institutions to achieve operational efficiency and meet the present growing and varying economic and legal demands to maximize wealth. In Islamic finance, the application of BT in Ṣukūk is recent and extant literature is sparse (Alswaidan *et al.*, 2017). However, some contemporary scholars have declared the permissibility of smart contracts. In relation to this, Al-Qaradāgī (2018) contended that bitcoin as an electronic currency is not forbidden (haram) in itself except that it must fulfill certain regulatory conditions to ensure it conforms to Sharīʿah. Huckle *et al.* (2016) investigated the possibility of using blockchain technology to create a decentralized economy by monetizing services to create wealth. Their study highlighted that blockchain technology and the internet of things are technologies used in platforms such as peer-to-peer (P2P) automatic payment systems, foreign exchange platforms, capital market platforms, digital rights management and cultural heritage management. Saʿad (2018) noted that blockchain financial technology can improve Ṣukūk issuances by further extending current digital dimensions like crowdfunding and Fintech. The tokenization of Ṣukūk using blockchain technology may enhance financial and investment inclusion for medium and small-scale investors who may

not be able to make substantial capital investments like multinational companies and institutional investors. The study suggests that SṢ may boost the Islamic capital market's efficiency, improve transparency and reduce costs, particularly for issuers (Saʿad, 2018). Feig (2018) showed how to develop a framework for blockchain application, particularly in the financial sector. Khan, *et al.* (2020) explored secondary data to analyze the comparative advantage of Ṣukūk tokenization. The study found that SṢ was more cost-effective and attractive to potential investors compared to conventional issuances. Huckle *et al.* (2016) used a descriptive approach to explore the decentralization of the Ṣukūk chain on P2P to get more subscribers and enlarge the shared economy. The following sections present the literature discussing the various concepts covered such as smart contracts, its operational procedures and application of blockchain to bonds and Ṣukūk.

3. Smart contract

The concept of Fintech came about in the early 1990s to enhance efficiency, transparency, reduce cost and widen the scope of financial transactions. Fintech has successfully carved a niche for itself linking financial services and technology (Khotinskay, 2019). Financial technology theory is based on P2P digital technology for financial transactions with little or no human intermediation. Financial institutions such as banks, insurance companies, capital market players have used smart contracts to facilitate seamless transactions, often without human intervention at lower costs while promoting financial inclusion (Dietz *et al.*, 2016; Global Fin Tech Report, 2016; Vives, 2021; Zhang-zhang and Rohlfer, 2020). It is fair to say that blockchain technology for financial contracts (smart contracts) is one of the most significant financial disruptors in the twenty-first century. It is fast becoming a popular tool to alleviating the inherent challenges in conventional Ṣukūk issuances (Elasrag, 2019).

3.1 Operational procedures in smart contract

A blockchain is a sequence of blocks of data in which each block, other than the first, is cryptographically linked to its predecessor. Ṣukūk chain network is a P2P Ṣukūk network in which Ṣukūk investors peer up and collaborate to achieve a common goal through the use of blockchain technology (Crosby *et al.*, 2015). The concept of a Ṣukūk chain is an immutable public record of transactions on an electronic ledger relying on public consensus and transparency of transactions among members of a platform. In a Ṣukūk chain's application, the blockchain acts as a distributed ledger where Ṣukūk contractual transactions are stored. Consequently, the Ṣukūk chain continues to grow over time as the platform adds new blocks to the transactions. The chain allows Ṣukūk issuances and investments without the need for any middle man such as legal personnel and Sharīʿah advisory board and other third parties (Hölbl *et al.*, 2018). The chain generates SṢ contracts for the contracting parties. The smart contract representing ownership in a particular Ṣukūk investment has in-built safeguards against downtime risk, censorship and fraud (Buterin, 2016). It is a vital economic enabler applicable to Ṣukūk investment (Lindman, 2017). The Standing Committee for Economic and Commercial Cooperation of the Organization of the Islamic Cooperation (COMCEC) opined that SṢ can deliver absolute objectivity and trust to the digital world as a better alternative to trustees. The Ṣukūk chain can enhance the Islamic economy and social systems, particularly in Muslim countries. Blockchain Ṣukūk ensures efficiency, transparency, prevents fraud and provides greater visibility to most supply chain and business relationships (COMCEC, 2018).

4. Application of blockchain in bond

4.1 Santander bank smart bond using blockchain technology

Banco Santander in Spain was one of the earliest financial institutions to use blockchain technology in the capital market to issue a public blockchain bond. However, this bond was limited to the primary market for an initial public offer, yet, the bank was able to use the Ethereum blockchain platform to issue a token worth of US$20m debt to represent a cash account in its custody. Societe Generale in France also issued a smart bond in 2019 through the Ethereum public platform (Allison, 2019). Sovereign international institutions have also used a private version of Ethereum to issue smart bonds. In such instances, the relationships between the bond issuer and the investors are coordinated digitally through the analog legacy system. This technological disruption has allowed blockchain technology to eliminate the conventional intermediary regulators and special purpose vehicles (SPVs) (Faridi, 2019).

4.2 Bond-i – the first global blockchain bond

One of the United Nation's Sustainable Development Goals is to develop a broader strategy for leveraging the potential of disruptive technology in championing sustainable economic development globally. In 2018, the World Bank and Commonwealth Bank of Australia jointly developed the world's first blockchain technology model named Bond-i. The model leveraged blockchain technology to create digital records and audits for participants' transactions (Allison, 2019). The Bond-i, which uses blockchain technology accounted for over US$50bn in World Bank annual issuances aimed at increasing financial inclusion globally (World Bank Group, 2018). Figure 1 below shows the structure of Bond-i based on the blockchain using artificial intelligence to streamline capital raising and trading in the secondary market. The processes involved the systematic deployment of nodes between Washington and Sydney in a smart contract. The Bond-i project automated bond swaps between the two institutions without the manual intervention of regulators or SPVs of any form (Gilder, 2019).

4.3 The concept of Islamic financial technology and juristic opinions

Scholars have recently ruled on the legality of bitcoin electronic money that is based on blockchain technology. Mufti Magdy Ashour of Dar Ifta and Shaykh Assim of Islamic Religious Body of Turkey gave a fatwa that forbids bitcoin transactions. This fatwa is based on the fact that bitcoin transactions are not based on any known Sharīʿah contract, has elements of ambiguity and lack authoritative support (Kelso, 2017; Tawfeek, 2018).

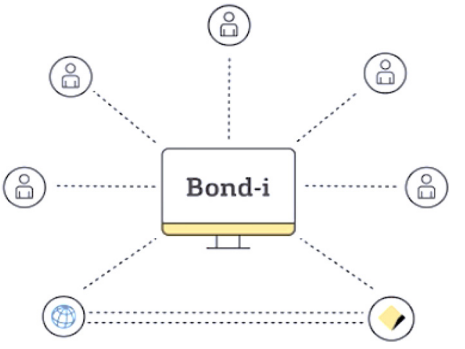

Figure 1.
Bond-i is a sample of bond trading on the blockchain platform of the Commonwealth Bank of Australia 2019

Other scholars have used Takyīf Fiqh (juristic conditioning) to assess its application in Islamic finance.

In Indonesia, the Majlis ʿUlamā viewed that Fintech application must be based on approved Sharīʿah contracts. However, recent juristic opinions on financial transactions using blockchain suggest the original rule of its permissibility is based on the Sharīʿah principle of "the basis in the transaction is permissibility" (*Al-aslu fi al-muāmalāt al-Ibāḥah*). Furthermore, the Sharīʿah Advisory Council of the SCM permitted the use of digital currency (DC) backed by gold, silver and legal currency when its proceeds, rights and benefits are used for Sharīʿah-compliant purposes. Hence, DC backed by usury-based items are considered non-permissible (Securities Commission Malaysia, 2020).

Abu-Bakar (2017) and Al-Qaradāgī (2018) also noted that the application of blockchain technology must not violate any fundamental Sharīʿah requirements such as *maysir* (gambling), *gharar* (uncertainty) and *riba* (usury). The contractual agreements must also be based on justice and devoid of *tadlis* (cheating) and *ikrah* (coercion), (ISRA, 2015). Allah says in the Quran: "O believers! Do not devour one 'another's wealth illegally, but rather trade by mutual consent [. . .]" (An-Nisai: 29).

Islamic jurisprudential opinions on the application of blockchain in Islamic financial contracts are ongoing, and Islamic scholars and standards-setting bodies are still careful in releasing definitive consensus and institutionalized Sharīʿah standards.

4.4 Ṣukūk chain network dynamics

Three participants – developers (software experts), users (Obligor and SPV) and peers (Ṣukūk holders) operate on the Ṣukūk chain platform. Developers of the Ṣukūk chain are mere service providers who develop chain platforms for SṢ transactions and contractual agreements. The blockchain networks of the Ṣukūk chain comprise of the following entities:

- Information technology developer who creates and deploys the network for Ṣukūk chain and transactions between Ṣukūk investors and obligors;
- Users (SPV and Obligors) who input data into the system (users may not be a peer but the platform participants who input transactions on the platform); and
- Peers (Ṣukūk investors) who propose blocks to add to the Ṣukūk chain while another peer (Ṣukūk holder) validates the proposed blocks and the last peer (Ṣukūk holders) strives to reach consensus. Peers are users and owners of the investments in the platform (Feig, 2018).

Ṣukūk transactions on the blockchain are linked in chronological order to each other like a chain of substances. The Ṣukūk chain order contains a hash of the previous Ṣukūk block distributed on a database of records and it is publicly accessible to all participants of the chain (Elasrag, 2019). Most of the participants will verify the Ṣukūk chain transactions before deals become confirmed and binding. Hence, once transactions are entered into the database, the information can never be erased (Crosby, *et al.*, 2015).

The entity receiving the digital Ṣukūk owns the digital signature that verifies the Ṣukūk transaction on the public platform and broadcasts every node in the Ṣukūk chain network in a public ledger (Sassen, 2015). The confirmation of the node in the Ṣukūk chain follows two procedures:

(1) The spender owns the crypto-Ṣukūk through ownership of the digital signature; and

(2) The spender should have the minimum accredited amount of crypto-Ṣukūk in his wallet account before a Ṣukūk transaction can be completed on the platform.

The system broadcasts the transactions node by node among participating investors to avoid double-spending (Crosby, *et al.*, 2016).

4.5 Operational procedures of a smart ṣukūk

The procedures for the operations of a SṢ are as follows:

- Fintech firms (like; Finterra [FR] and Blossom) incorporate SPV and Obligor into the smart contract (via blockchain), using Ethereum.
- The SPV raises a SṢ and offers it to investors. The SPV is a separate legal entity meant to protect originator's and investors' underlying assets in case of deficits.
- The investors pay the SPV and obtain the SṢ. A Ṣukūk chain platform provides well-structured investment access for investors and the global Islamic capital market.
- SPV takes the proceeds from investors' fund and channels it to the underlying Ṣukūk projects on the blockchain based on contracts such as *Muḍārabah* and *Ijārah*.
- The obligor pays the installments as agreed to the SPV and the SPV transfers the requisite profit from the payment proceeds to the different investors.

Regulators/Sharīʿah boards of the SṢ originator work together to prevent fraud and provide automated endorsements for Ṣukūk token issuance. Figure 2 below shows the flow of operation.

5. Smart ṣukūk methodology

This study used mono-method qualitative research based on Saunders onion research (Melnikovas, 2019). Data were obtained from survey interviews of two issuances on the fusion of smart contracts in Ṣukūk structures that were Sharīʿah-compliant. This paper uses doctrinal evidence to analyze the opportunities and challenges of using SṢ in the Islamic capital market.

5.1 Data collection

The application of smart contracts in Islamic financial contracts is a new phenomenon and its use in Ṣukūk issuances is still fairly recent. To ascertain the level of academic discussions

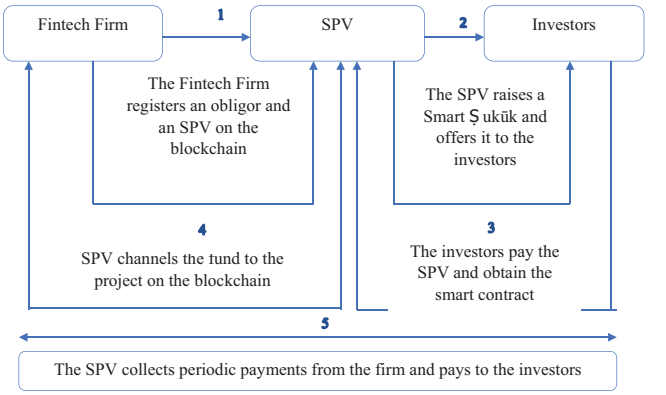

Figure 2.
Process of Ṣukūk issuance in smart contract

on the issue, this study first embarked on an extensive literature review to gather extant information on the integration of information technology such as blockchain in Ṣukūk offerings. Khan *et al.* (2020) noted that most of the existing studies relied on literature review as the main means of extracting information relating to Ṣukūk research. Given the lack of literature and related used cases, this study used formal interviews to extract practical market information from experts in Ṣukūk. This is in line with Lailaa and Anshorib (2020), who combined literature surveys and in-depth interviews to gather relevant information for their research. Halabi *et al.* (2010) explained that interview is an effective research tool to seek opinions, attitudes and descriptions. Hence, this study chose the interview method to collect data as per its main objective to gather working knowledge of senior members of blockchain and Ṣukūk companies on their activities involving Ṣukūk offerings and smart contracts. The interviewees were from as follows:

- Blossom Finance, located in Indonesia, a public blockchain company and a pioneer primary issuer that is also involved in micro-Ṣukūk; and
- FR Technology Sdn. Bhd., a leading technology-based firm offering blockchain-based Islamic applications.

It has five offices globally with more than 700,000 investors.

Blossom Finance operates small-scale Ṣukūk issuances while FR does so on a larger scale. As SṢ is a new area, there are not many companies that have experience in it; thus interviews are limited to the few practitioners in the Islamic finance industry.

5.2 Participants

Five interviewees from both companies participated in the interviews. The first interview was conducted via Skype with the chief executive officer of Blossom Finance while the second was a focused group discussion attended by four experts from FR via Zoom. Four of the interviewees are male ($n = 4$) while only one was female ($n = 1$). Two interviewees have managerial experience of the entire SṢ process; two others are Sharīʿah and Islamic social finance experts while the last one is a blockchain developer. The interviews were conducted in English and all data gathered were transcribed verbatim for further thematic analysis.

5.3 Thematic framework

The study identified two major themes and seven sub-themes from the framework analysis. The first theme looked into SṢ's opportunities while the other focused on challenges. The seven sub-themes formed the study's interview questions. For this study, SṢ is labeled as (SṢ), interview questions as (Q), data from Blossom respondents as (BR) and Finterra as (FR). The researcher's analysis and interpretation of the data is represented as (N).

6. Findings

This section focuses on the seven sub-themes of the interviews which highlighted the opportunities and challenges of SṢ, respectively, as follows:

In the first question, it is posited that SṢ promotes transparency in cash flow management among contractual parties. In light of this, the use of SṢ is expected to bring to the Islamic capital market space a high level of transparency in managing Ṣukūk both locally and globally. According to (FR3) "the SṢ is a certificate we generated for each investor, containing the amount invested and other information stored in the blockchain,

immutable." Four respondents claimed that the use of SṢ makes managing Ṣukūk easier. Leading the discussion, (BR1) explained that as follows:

> So we go from 600 pages of Ṣukūk contract documentation in conventional practice to just 4 pages using SṢ; "this makes it very easy for investors to understand the story and to understand what their money is being used for? We don't want to be like a black box, like putting your money in the Bank. It's a black box, and you have no idea of what your money is used for. In our model, it's not a black box. You can see the impact, you can see the details of what is going on inside.

From an auditing perspective, (FR2) noted that:

> [. . .] if you do a financial audit, currently, it will take about three to six months, but now on the blockchain, it is reduced to a few seconds. That is why people are moving to blockchain for financial audit, not only in Ṣukūk transactions but generally in all financial transactions.

In addition, (FR3) commented that: "SṢ can make the audit much easier for the external Sharīʿah and financial auditors." In summary, (FR4) explained that as follows:

> [. . .] all the transactions conducted from the lead arranger to the issuer, to the trustees, to the investors – everything is already in the smart contract itself. This makes it a lot easier (as) you can monitor everything.

Given the responses above, it can be implied that P2P in blockchain enhances the efficiency of the entire contracting activities among the stakeholders. Supporting this, (BR1) stated that:

> [. . .] we provide all the information to the investors through social impact videos and pictures, so the investors feel confident and happy about the way their money is used. However, retail individuals are not allowed to select beneficiaries and financing because they're not qualified to do that and it's not efficient.

The second question looked into ways to reduce the potential of litigation and disputes between contracting parties in a Ṣukūk default (given the Dana Gas case). The findings showed that even though *SṢ* has the potential to resolve litigation issues around the conventional Ṣukūk, especially in cross-border offerings, being still in its infancy, there remain ongoing unresolved litigation challenges. The legality of digital transactions globally is a factor supporting the use of *SṢ* with automated litigation in the event of a breach of contract. According to (FR1), "Two countries in the world have already accepted a digitally-signed certificate as an actual contract, moving litigation away from an actual contract." Similarly, (FR2) added that: "Switzerland and Luxemburg are already accepting the Ricardian Contract because it is technologically proven on the blockchain."

SṢ use is likely to promote out-of-court settlement or arbitration in the event of default providing optimal outcomes for the parties involved. This is because participants digitally agree to resolve disputes in this manner. Following the above, (FR1) stated that:

> In out of court settlement, with consensus in blockchain, where owners agree to out of court settlement for litigation issue, they need to digitally sign the documents to tell the Sukuk chain that this is out of court settlement and settled.

(BR1) also stated that:

> Our objective, in this case, is to get the money for the investor by creating a structure that will be able to effectively and quickly recover as much as possible of the investors' assets in event of default [. . .] let's say the Baitul Mal Tamwīl (BMT) got bankrupt, well, we still have a portfolio. We still have 200 asset-backed murābaḥah asset-backed financing.

However, the two issuances of Ṣukūk discussed in the study were micro-Ṣukūk offerings focusing on microfinancing instruments and did not experience any defaults. In terms of other Ṣukūk investments, traditional Ṣukūk investors are more sophisticated and may not invest in cross border offerings not subject to English law that has been accepted in other jurisdictions supported by legal precedence. Based on this, (BR1) noted, "Now, of course, the downside is that an institutional investor will most likely invest in an instrument that's registered with the jurisdiction in Indonesian law."

Additionally, SṢ has the potential of increasing the volume of cross-border transactions in the Islamic capital market. SṢ cross-border offerings can connect more investors and promote global economic growth because it provides opportunities for small businesses and individual investors to participate alongside sophisticated institutional investors. (FR1) provided further insights stating as follows:

> [. . .] if you are providing a micro-Ṣukūk entry point for fifty to one hundred Ringgit Malaysia, then you are giving access to all the community to participate. I think this is where the blockchain makes a better sense – that you could take Ṣukūk structure, break it into micro-units and then push it out to the whole community where then everybody has a chance to participate.

At present, there are just three issuances of SṢ – one each in the United Arab Emirates (AUE), Malaysia and Indonesia. (FR1) noted that as follows:

> [. . .] the success of Wethaq, a Dubai-based blockchain Fintech is not known to them. However, the used cases of Blossom Finance and Finterra are well-documented. Blossom named their product micro-Ṣukūk while Finterra called it Islamic Redeemable Preference Shares (IRPS) in place of Ṣukūk to avoid the regulator's stare.

SṢ ensures real-time tracking of the underlying assets that guarantee the interest of the Ṣukūk investors. There are flexibilities in the approach of tracking underlying assets and investment projects. Investors may rely on the platform's owner to safeguard their investments. In this instance, (BR1) asserted that as follows:

> [. . .] we would never allow retail investors to start picking individual loans or individual murābaḥah financing because retail investors just do not have qualifications to underwrite financing. The BMT is the expert and has built a model with solid due diligence process to select an institution to invest in.

Stakeholders can also agree to jointly manage their participation in a SṢ. The blockchain permits participants' consensus on the use and application of the funds and underlying assets. Hence, participants can vote to disclose/not disclose and decide on their SṢ investments. (FR2) mentioned that:

> [. . .] most of the things that we write in a contract can be completely automated online like; X happened, Y needs to happen, why it is happening, self-governing, and automatically update everyone on the blockchain. Automation is also possible when the smart contract needs external input, from either a group of consensus owners who work for certain decision to be taken democratically.

However, there is still the lack of a comprehensive regulatory framework and it impedes the growth of using SṢ. This can be a hindrance seen from one perspective or an opportunity as demonstrated in the two issuances. There is no internationally recognized regulatory framework for issuing SṢ, which is essential for efficient cross-border investments. (FR3) expressed dissatisfaction that:

> [. . .] there is no SṢ regulation or provisions yet, especially from the AAOIFI's new standards. We are collaborating with different institutions worldwide, from AAOIFI, CIBAFI and others to

> create a committee that can come up with the provisions, regulations or standards for the SṢ, Ṣukūk chain or Ṣukūk on blockchain.

(FR4) also mentioned that:

> [. . .] currently, there is no such provision, but Malaysia has been looking into it, and in a recent conference in Bahrain, some [. . .] few banks have shown their interest, and the main interest is coming from the World Bank, [. . .]. Everyone is looking into it.

(FR1) also expressed a similar concern that:

> I have not come across any regulation for SṢ anywhere in the world. Yes, there have been discussions, but competitors expect regulation from the angle of Initial Coin Offering (ICO) and Field Coin Offering (FCO).

In the absence of global standards and regulations for issuing SṢ, existing SṢ have relied on adapted regulations. (FR1) hinted that:

> [. . .] there are ongoing discussions on global standards and regulations for DLT (Distributed Ledger Technology) ICO and FCO, championed by Malaysia. I foresee, AAOIFI and the World Bank Sharīʿah research partnering to bring it to life.

At present, there are neither global standards for issuing SṢ nor managing cross-border SṢ. However, there are local regulations in specific jurisdictions where SṢ have been issued. SS experts confirmed that the extent of existing issuances relied on adapted regulations. According to (FR2):

> Ṣukūk-chain is deployed in countries with a Sharīʿah board which needs all the committee members' consensus to decide whether the Sharīʿah applies or not. The issuance is based on a predefined consensus process where at least 50% or 70% acceptance is programmed in the smart contract.

Also, (BR1) highlighted that "We have digital signature law since I think 2011 or 2010, which is for over a decade. So, we have digital signature law in Indonesia. It is important to note that Fintech firms that have issued SṢ have relied on individual or Sharīʿah consulting firms for fatwas on their issuances. The new SṢ market cannot yet maintain in-house Sharīʿah boards. Besides, the automated nature of SṢ may not require in-house Sharīʿah boards compared to traditional Ṣukūk issuances. More so, the bulky and complex nature of traditional Ṣukūk structures may have required strict Sharīʿah-compliance and vetting. In response to this, (BR1) said: We do have Sharīʿah advisers, but no official Sharīʿah board; we do plan to have a formalized Sharīʿah board." (FR1) explained that "since we are not Sharīʿah experts and do not have an in-house committee that is certified by AAOIFI or ISRA, by default we have to engage partners like Salihin, Tawafuq or ISRA" while (FR4) noted that "even though the processes have been automated, we still need a Sharīʿah board. So, our structure is approved by Sharīʿah experts before the issuance, especially the structure and cash flow of the Ṣukūk."

Finally, there are still hindrances to cross-border issuances which limit the opportunities for stakeholders compared to the conventional Ṣukūk. (FR1) stated that *in Equity Crowdfunding (ECF), there are regulations for participation like, Know Your Customer (KYC) and the Anti-Money Laundering (AML) regulations. These regulations ensure that non-accredited investors are not able to participate* in ECF:

> However, for ICO, currently, every Tom, Dick and Harry can participate. The amount of Ṣukūk participation through ICO packages are 10, 50 or 100 dollars, which is higher compared to ECF and for Ṣukūk specifically, which is very expensive in Malaysia.

The regulations for cross-border offerings are a matter of choice and business consideration rather than the blockchain's potential capability to capture these regulations. (FR1) noted that:

> [. . .] the structure of a Ṣukūk chain comes down to the issuing country and the laws it is based on. For example, our current forestry project based in Malaysia is governed by the laws of Malaysia, with the product being offered all over the world for external investors. SṢ technology can adopt multiple jurisdiction laws but (this may) not be an attractive business strategy because it complicates the offering by having so many countries' regulations.

Figure 3 summarizes the findings from the interviews on the potential opportunities and challenges of a Ṣukūk chain in the global Islamic capital market.

7. Discussion and implications of findings

SṢ is receiving more attention because of the complexities of traditional Ṣukūk and other related challenges are yet to be resolved. These complexities have contributed to the reduction in the volume of Ṣukūk issuances in recent years (Kunhibava *et al.*, 2021; Pegah, 2017). SṢ using a Ṣukūk chain can streamline procedures that can ensure a reliable and straightforward system facilitating transactions between Ṣukūk contracting parties. When a Ṣukūk account is not adequately ringfenced, the Ṣukūk fund may be violated, resulting in cash flow issues triggering defaults (Busari and Zakariyah, 2019). On the other hand, the legal and Sharī'ah-compliance documentations in SṢ are automatically sealed and contractually binding (Radzi, 2018). However, reported issuances of SṢ by Wethaq Fintech, FR and Blossom Finance are still recent as there is no sufficient evidence that SṢ can ensure transparency of cash flow in Ṣukūk investments. Despite the potential benefits of SṢ, the third party's presence is not eliminated as the platform still relies on validators who are usually blockchain developers functioning as a third party in the Ṣukūk chain (Elasrag, 2019).

Despite the advantages of digital technology, placing full reliance on the digital economy still poses risks to investors as third-party owned digital platforms can still be hacked and manipulated. A country cannot afford to entirely rely on digital economic platforms that can be manipulated by unknown parties, taking advantage of the digital space (Fitch, 2018). It is also important to note that the "right to recourse" from a smart contract is another potential issue between contracting parties on a blockchain platform. Islamic financial contracts remain binding between contracting parties after separation at the point of agreement. In

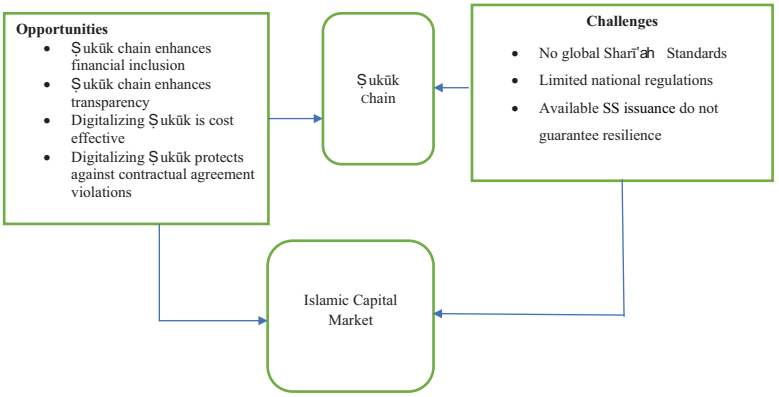

Figure 3.
Opportunities and challenges of Ṣukūk chain to the Global Islamic Capital Market

modern applications, a contract becomes a binding agreement after it has been signed and sealed. This position is evident from the hadith of the Prophet (PBUH) that states, "The contractual parties have the choice to terminate the contract if they have not separated from the contractual meeting point." (Muḥammad bin Ismā'īl Al-Bukhārī, 2002, no. 1973). This hadith implies that the contract's termination is limited to the period of formation until the agreement is stamped and sealed. However, some circumstances might require the termination of the contractual agreement. In Islamic jurisprudence, contracting parties must agree to the contractual choices of clauses and terms. The parties have the right to seek recourse to cancel a contract in the event of a violation of a contract's terms. The contractual agreement between parties should include terms that can trigger the termination of the agreement (Al-Kasānī, 1986, vol.5 p. 268). Nevertheless, in cross-border Ṣukūk, the governing law remains the most contentious (Busari, 2019). Based on the SS issuances from FR and Blossom Finance, the investment potential of SṢ in cross-border offerings cannot be fully ascertained as these cases used locally-adapted regulations.

8. Conclusion

This study explored data from the opportunities and challenges of SṢ issuances from two different Fintech firms. The findings showed the potential of SṢ being successfully applied in the two companies because of the possibility to adapt local regulations in their respective jurisdictions. However, cross-border issuances with multiple jurisdiction laws seem more challenging because of the lack of global standards and regulations for smart contract applications. The SṢ has the potential to promote global economic growth and sustainable development but requires globally recognized governing laws and standards. The study suggests that leading international organizations such as International Islamic Fiqh Academy IIFA, Accounting and Auditing Organization for Islamic Financial Institutions and Islamic Financial Services Board develop global standards for the application of smart contracts in different Islamic financial products especially Ṣukūk. Regulators such as central banks and capital market authorities should develop robust regulatory frameworks that will ease local and cross-border Ṣukūk offerings. This study is limited to desk research and interview data from two different SṢ issuances. Therefore, the researcher suggests a future study to investigate the opinions of local and global regulators of the Islamic capital market on the possible policy interventions that can aid the use of SṢ in cross-border offerings across multiple jurisdictions.

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