

Şukūk on blockchain: a legal, regulatory and Sharī'ah review

Şukūk on
blockchain

Sherin Kunhibava and Zakariya Mustapha
Faculty of Law, Universiti Malaya, Kuala Lumpur, Malaysia

Aishath Muneeza
*International Centre for Education in Islamic Finance,
Kuala Lumpur, Malaysia*

Auwal Adam Sa'ad
*IIUM Institute of Islamic Banking and Finance,
International Islamic University Malaysia, Kuala Lumpur, Malaysia, and*

Mohammad Ershadul Karim
Faculty of Law, Universiti Malaya, Kuala Lumpur, Malaysia

Received 9 June 2020
Revised 25 August 2020
23 October 2020
30 November 2020
4 December 2020
Accepted 5 December 2020

Abstract

Purpose – This paper aims to explore issues arising from *şukūk* (Islamic bonds) on blockchain, including Sharī'ah (Islamic law) and legal matters.

Design/methodology/approach – A qualitative methodology is used in conducting this research where relevant literature on *şukūk* was reviewed. Through a doctrinal approach, the paper presents analyses on the practice of *şukūk* and *şukūk* on blockchain by discussing its legal, Sharī'ah and regulatory issues. This culminates in a conceptual analysis of blockchain *şukūk* and its peculiar challenges.

Findings – This paper reveals that digitizing *şukūk* issuance through blockchain remedies certain inefficiencies associated with *şukūk* transactions. Indeed, structuring *şukūk* on a blockchain platform can increase transparency of underlying *şukūk* assets and cash flows in addition to reducing costs and the number of intermediaries in *şukūk* transactions. The paper likewise brings to light legal, regulatory, Sharī'ah and cyber risks associated with *şukūk* on blockchain that confront investors, practitioners and regulators. This calls for deeper collaboration in research among Sharī'ah scholars, lawyers, regulators and information technology experts.

Research limitations/implications – As a pioneering subject, the paper notes the prospects of blockchain *şukūk* and the current dearth of literature on it. The paper would assist relevant Islamic capital market entities and authorities to determine the potential and impact of blockchain *şukūk* in their respective businesses and the financial system.

© Sherin Kunhibava, Zakariya Mustapha, Aishath Muneeza, Auwal Adam Sa'ad and Mohammad Ershadul Karim. Published in *ISRA International Journal of Islamic Finance*. Published by Emerald Publishing Limited. This article is published under the Creative Commons Attribution (CC BY 4.0) licence. Anyone may reproduce, distribute, translate and create derivative works of this article (for both commercial and non-commercial purposes), subject to full attribution to the original publication and authors. The full terms of this licence may be seen at <http://creativecommons.org/licences/by/4.0/legalcode>

The authors would like to acknowledge the financial support provided by QRC plc and IBH, Research Grant number IF057A-2018.

Note: An earlier version of this paper was presented at I-ARIEF 2019 INCEIF-ISRA Inaugural Annual Conference on Islamic Economics and Finance (I-ARIEF) 2019 on 25–26 November 2019.



Practical implications – Blockchain *ṣukūk* will assist in addressing issues inherent in classical *ṣukūk* and in paving the way to innovative solutions that will facilitate and enhance the quality of *ṣukūk* transactions. For that, *ṣukūk* would require appropriate regulatory technology to address its governance and regulation peculiarities.

Originality/value – Integrating *ṣukūk* with blockchain technology will add value to it. The paper advances the idea that blockchain *ṣukūk* revolutionises *ṣukūk* and enhances its practice against known inadequacies.

Keywords Blockchain, Blockchain technology, Legal issues, Regtech, Regulatory issues, Sharī'ah, *Ṣukūk*

Paper type Research paper

Introduction

Ṣukūk, often referred to as Islamic bonds, is linguistically the plural of the Arabic word “*ṣakk*” which, from a finance perspective, refers to a certificate or document that evidences a transaction, specifying the right, obligations and conditions of contracting parties thereto (ISRA, 2017). According to the Securities Commission Malaysia, *ṣukūk* are defined as “certificates of equal value evidencing undivided ownership or investment in asset(s) using Sharī'ah principles and concepts endorsed by the Sharī'ah Advisory Council” (Securities Commission Malaysia, 2014, p. 5). The Accounting and Auditing Organisation for Islamic Financial Institutions (AAOIFI) uses similar criteria to define *ṣukūk* in its Sharī'ah standards as:

[...] certificates of equal value representing undivided shares in the ownership of tangible assets, usufructs and services or (in the ownership of) the assets of particular projects or special investment activity (AAOIFI, 2017, p. 468).

In accordance with what *ṣukūk* is commonly assumed to be, some authors have loosely defined *ṣukūk* as “financial instruments similar to bonds and shares that are compliant with Islamic law” (Zolfaghari, 2017, p. 5). It is evident from the generality of the formal definitions that, unlike a share or bond, *ṣukūk* should represent some ownership of tangible assets, services, usufructs, or of assets of certain special investment activities or particular projects. Accordingly, *ṣukūk* are governed by principles and rules of Sharī'ah which must be complied with at all times, including the prohibition of *ribā* (interest) (Latham and Watkins LLP, 2017). As such, in a *ṣukūk* transaction, profit is generated from a Sharī'ah-compliant transaction such as selling an asset or leasing an asset or by entering into a profit-and-loss sharing Sharī'ah-compliant business activity. In contrast, the relationship between a bondholder and bond issuer in a conventional bond is generally based on a loan contract with interest, which is considered *ribā* from a Sharī'ah perspective. Another principle is that the underlying *ṣukūk* assets must be Sharī'ah-compliant which means that a *ṣukūk* transaction cannot deal with Sharī'ah-prohibited activities such as gambling and the selling of alcohol. Furthermore, *maysir* (speculation), *gharar* (uncertainty) and *jahālah* (ignorance of essential information about the contract's subject matter) are prohibited in all *ṣukūk* transactions.

Ṣukūk are said to have originated from business practices of the classical Islamic era (700–1300 AD) where financial obligations related to commercial and trading activities were recorded on paper in accordance with the provisions of the *Qur'ān* (2:282). This particular Qur'ānic verse sanctions and encourages contracts to be established in writing. In contemporary times, the International Islamic Fiqh Academy of the Organisation of Islamic Cooperation issued a statement in 1988 which is considered the basis for the formulation of *ṣukūk*, wherein it held:

[A]ny combination of assets (or the usufruct of such assets) can be represented in the form of written financial instruments which can be sold at a market price provided that the composition

of the groups of assets represented by the *ṣukūk* consist of a majority of tangible assets (Latham and Watkins LLP, 2017, p. 2).

As a modern financial instrument, *ṣukūk* were first issued in 1990 when Shell MDS Sdn. Bhd. issued a *bay' bi thaman ajil* (deferred payment sale) *ṣukūk* worth 125m Malaysian ringgit (Hashim, 2018).

The emergence of Industry 4.0 or the Fourth Industrial Revolution marks a technological transformation that is altering the way work is done as well as interrelationships with one another generally (Schwab, 2016). Its impact will extend to the regulation and governance of all activities or dealings that leverage on technology. Financial instruments are being rapidly transformed by technological innovation, and linking *ṣukūk* with blockchain is one area that is being explored (Blossom Finance, 2019). Currently, however, limited literature is available on blockchain-based *ṣukūk*. There is therefore a need to explore the *modus operandi* of such *ṣukūk* issuances/operations and the challenges facing their development.

Findings by existing academic and professional works have affirmed *ṣukūk* as a technical instrument whose processes are not only sophisticated but intricate, engaging numerous entities and requiring much expertise, which entails significant costs (Sole, 2008; Securities Commission Malaysia, 2009a; Nazar, 2011; Zakariaa *et al.*, 2012; Saeed and Salah, 2014; ISRA, 2015; Nagano, 2016; Tasnia *et al.*, 2017; AAOIFI, 2017; Murugiah, 2018; Zolfaghari, 2017; Al-Ali, 2019; Paltrinieri *et al.*, 2020; Balli *et al.*, 2020). Due to the issues of sophistication and cost, issuance of *ṣukūk* is a complex and expensive task such that *ṣukūk* remains a financing instrument issued by sovereigns and large entities. Even so, *ṣukūk* issuances have grown in many countries owing to the success of *ṣukūk* as an instrument to finance public expenditure as well as funding businesses.

Most existing legal research on *ṣukūk* was undertaken to understand or expedite the development and workings of *ṣukūk* in their extant framework with regard to compliance to developing Islamic capital market principles (Usmani, 2007; Majid *et al.*, 2011; Bouheraoua *et al.*, 2012; Lahsasna, 2014; Safari *et al.*, 2014; ISRA, 2017; Alzahrani, 2019; Busari, 2019; Khawaja *et al.*, 2020; Abd Majid *et al.*, 2020; IFSB, 2020). The use of technology to address issues such as transparency, simplicity and high costs of *ṣukūk* appears to be largely beyond the scope of existing works.

With the emergence of the digitization of Islamic financial services, particularly the structuring and issuance of *ṣukūk* via blockchain technology, the need arises to review and analyse such *ṣukūk* in the light of legal, regulatory and Shari'ah parameters. This appears unexplored in existing works. The potential of technology for innovative solutions to make *ṣukūk* simple, efficient and affordable is huge; hence, the need for relevant stakeholders to understand blockchain *ṣukūk*. This study would come in handy in this regard, thereby filling the gap in existing works.

The objectives of the paper are first to review existing literature. Second, the paper will identify possible legal, regulatory, Shari'ah and other challenges that blockchain *ṣukūk* may face in practice. The research objectives are collectively premised upon the following research questions that would ultimately be answered by the research:

RQ1. What are blockchain *ṣukūk* in contrast to classical *ṣukūk*?

RQ2. What challenges would blockchain *ṣukūk* have to overcome?

A qualitative research methodology that encompasses three approaches was employed in attaining these objectives: exploratory study, descriptive and doctrinal analyses (Hutchinson, 2015). Principally focusing on library and online databases, explorative study and descriptive analysis were carried out where primary and secondary data sources –

mainly regulatory guidelines, articles and textbooks – were examined and analysed in elucidating the subject of *ṣukūk* and blockchain (Mayer, 2015). Further, through a doctrinal approach, content analysis was conducted through careful study of the data from the identified sources to present issues that would be encountered in implementing blockchain *ṣukūk* (Cownie and Bradney, 2013).

The paper is divided into five sections. Following the introduction, second section two is on understanding *ṣukūk*. This section reviews *ṣukūk*, its nature and its inherent risks. The section also elucidates blockchain and its application in *ṣukūk*. The third section explains blockchain-based *ṣukūk* and the *modus operandi* of some pioneer initiatives. The fourth section identifies and examines potential legal, regulatory, Sharī'ah and other challenges that blockchain *ṣukūk* will face, whereas the fifth section offers some recommendations and direction for future research. The sixth section concludes the paper.

Understanding *ṣukūk*

As a financing and investment instrument, *ṣukūk* are issued by public and private enterprises including governments, multilateral development agencies, multinational corporations and other corporate bodies. *Ṣukūk* have gained traction in national and international markets alike and have been issued in almost every region of the world to fund various public and private projects. *Ṣukūk* issued by national governments are known as sovereign *ṣukūk* while corporate *ṣukūk* involve a corporate entity (state-owned or private) as the issuer. *Ṣukūk* issued by multilateral bodies are, on the other hand, referred to as supranational *ṣukūk*. Constituent governments in a federation, i.e. state governments, also issue *ṣukūk* that are known as sub-sovereign *ṣukūk* (Safari *et al.*, 2014; Nagano, 2016; Alzahrani, 2019).

The global *ṣukūk* market comprising all *ṣukūk* issuances, both domestic and international (corporate and sovereign), recorded 22.2% growth in 2019, with total *ṣukūk* outstanding increasing from US\$444.8bn in 2018 to US\$543.4bn in 2019 (IFSB, 2020, pp. 6, 12). These figures are testimonies of *ṣukūk* growth and its acceptability among investors and seekers of funds to finance developmental projects in both the public and private domains. Moreover, *ṣukūk* have been issued and traded in both Muslim-majority and non-Muslim majority nations (Hassan *et al.*, 2019).

In everyday usage, *ṣukūk* are often called Islamic bonds or Islamic investment certificates, having been developed as an Islamic alternative to bonds. Bonds are generally evidence of debt from issuers to investors. The repayment of a simple bond consists of the loan capital (principal) plus interest. Since loans cannot receive any increase in Sharī'ah, bonds are not permissible (ISRA, 2009). Moreover, as a genre of Islamic securities, referring to *ṣukūk* as “Islamic bonds” does not adequately cover the substance and nature of *ṣukūk*. For, unlike bonds, *ṣukūk* holders are considered to be part owners regardless of the underlying Islamic financial contract upon which the *ṣukūk* are structured (Saeed and Salah, 2014). Thus, to avoid interest and also ensure that investors obtain a return on their investments, a variety of Sharī'ah contracts are used for the purpose of structuring and issuing *ṣukūk* in consideration of the *ṣukūk*'s Sharī'ah-compliant underlying assets. In fact, AAOIFI(2017) mentions 14 types of Sharī'ah structures in *ṣukūk* securitization.

Ṣukūk are structured to effect the investor or *ṣukūk* holder's acquisition of undivided beneficial ownership of the underlying *ṣukūk* assets (Securities Commission Malaysia, 2009a). As beneficial owners, holders of *ṣukūk* accrue profits and losses generated from the *ṣukūk*'s underlying assets and have a right to proceeds obtained from the sale of the *ṣukūk* assets (Securities Commission Malaysia, 2009a). Accordingly, *ṣukūk* are “hybrid” financial instruments with characteristics of bonds and shares (Securities Commission Malaysia,

2009a). An underlying asset is a requirement of every *ṣukūk* structure and, based on the extent of ownership rights over such asset, the nature of *ṣukūk* is determined as either asset-based or asset-backed. *Ṣukūk* are said to be asset-based when their holders depend on an obligor alone for payments of the principal and profits. Therefore, in the event of default, holders of such *ṣukūk* do not have recourse to the underlying assets and are thus considered unsecured creditors of the obligor. However, asset-backed *ṣukūk* are secured by the assets as in a conventional asset-backed security (Securities Commission Malaysia, 2009b).

In a standard traditional *ṣukūk* structure, a number of parties are required to enable proper transfer of assets, assure protection of the rights of investors and ensure compliance with relevant regulations throughout the *ṣukūk* tenor. Thus, in a standard *ṣukūk* issuance, the following parties, *inter alia*, will be present:

- the issuer, typically a special purpose vehicle (SPV) that issues *ṣukūk* and protects the underlying assets for the *ṣukūk* holders;
- *ṣukūk* holders, who are the owners of the *ṣukūk*;
- the obligor, who is in need of funding and is responsible for paying the *ṣukūk* holders;
- Sharī'ah advisors, who ensure Sharī'ah compliance of the *ṣukūk* structure;
- the regulator, that is the approving body for the capital market;
- legal advisors, who ensure the structure is legally sound;
- an investment bank, either individually or as part of a group, that acts as the lead arranger, rating advisor, book runner or lead manager who underwrites and arranges the offering and advises the obligor; and
- a facility agent that manages the operational aspects of the *ṣukūk* structure (COMCEC, 2018, p. 23).

Depending on several factors, the structure of each *ṣukūk* is bespoke. These factors include economic objectives of the obligor, nature of the underlying asset, credit rating of the obligor, the jurisdiction's legal framework and implication of the tax regime on the structure of the *ṣukūk* (ISRA, 2009) (Figure 1).

Like any other financial product, there are risks associated with *ṣukūk* that need to be understood. Risk has generally been defined as “the possibility that the outcome of an event could result in an adverse result” and in the context of finance “risk refers to the probable loss of income and asset value” (Ismail, 2010, p. 227). *Ṣukūk* are exposed to a number of risks, for example market risk, Sharī'ah non-compliance risk, legal risk and default risk (Financial Islam, 2020; Lahsasna, 2014; Al-Ali, 2019). Furthermore, different kind of *ṣukūk* structures are underpinned by unique Sharī'ah contracts which have their own unique risks as well (Alswaidan *et al.*, 2017). Each class of such risks portends the likelihood of suffering unfavourable consequences in any transaction in which the risk occurs. Each class may encompass other sub-class of risks. More on risks in relation to blockchain *ṣukūk* will be discussed below.

Blockchain technology and its application in ṣukūk

Blockchain is a distributed or peer-to-peer [1] public or private ledger that consists of “blocks” maintained by a distributed computer network which contains multiple verified transaction records without a central authority or third-party intermediary (Allen, 2017). The blockchain comprises three essential elements: a transaction, record of the transaction, and a system for verification and storage of the transaction. Therefore, the blockchain is

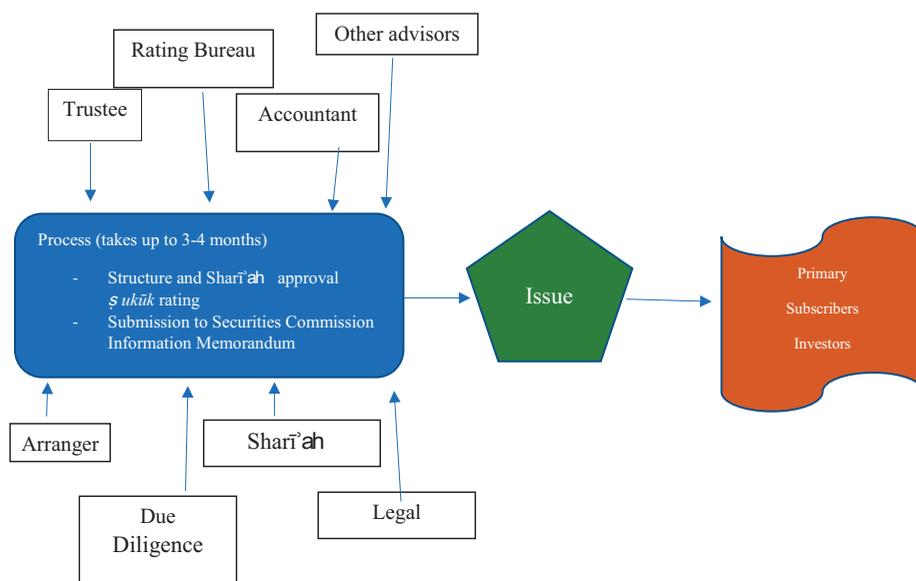


Figure 1.
Traditional *sukuk*
issuance process and
setup

Source: Mohamed (2019)

constituted of transaction records in a shared database system which operates as a historical public ledger where each and every transaction conducted and distributed on the system is verified by unanimity of a majority of participating parties therein. The records on the blockchain are designed to be immutable and so impossible to alter or erase. The blockchain maintains a certain and provable account of every single transaction ever conducted on it (Allen, 2017). Overall, blockchain technology is in essence a combination of three concepts: distributed ledger, cryptography and smart contracts (Muneeza and Mustapha, 2019). Blockchain technology has not been commonly used for capital market instruments; however, this trend has begun to change.

Many people mistakenly equate blockchain technology with digital currencies such as Bitcoin. Actually, blockchain is the technology used in Bitcoin and other digital currencies' transactions that use a distributed payment protocol. It can be used for other applications as well (Nakamoto, 2008; Dula and Chuen, 2017). The idea of issuing bonds on it has already been successfully tried, as explained by Andreas (2019) and Elasmag (2019). The case of Nivaura's Control Bond and Experimental Bond, as explained in Cohen *et al.* (2018), is an example in this regard. Applications for it can also be found in Islamic finance, and some are discussed below.

Idea of *sukuk* on blockchain

Blockchain *sukuk* is a novel concept in the world today. A simple way of describing such *sukuk* is that it is a financial instrument where the blockchain technology is used via smart contracts to execute functions in a transparent and reliable manner. There would be no difference in the underlying Sharī'ah contracts used to set up blockchain-based *sukuk* and classical *sukuk*. The difference lies with the use of technology (blockchain technology) in structuring and executing the contracts whereby business rules are directly encoded into an

underlying payment currency by smart contracts on a designed algorithm that enforces contract rules *vis-à-vis* payments and ownership transfer (Blossom Finance, 2019).

In a blockchain *ṣukūk*, the *ṣukūk* issuance process is digitised (Blossom Finance, 2019). Operationally, the blockchain automates and applies rules of contract with regard to payment and ownership transfer, enabled by a smart contracts algorithm which encrypts business rules and parties' agreement where investments are made through digital tokens or currency (Blossom Finance, 2019; Wethaq, 2019). The blockchain platform enables standardisation of the *ṣukūk* structure and eliminates some of the parties from a traditional *ṣukūk* issuance, thus reducing execution risks, reducing costs, and increasing transparency of underlying assets and cash flows (Murugiah, 2018). It also ensures better traceability of funds against specific assets since all records would be documented in the blockchain (Shaikh and Zaka, 2019).

Thus, in the blockchain version of a *ṣukūk*, the papers (trust certificates) issued to primary subscribers and investors are distributed to them as tokens (crypto), which represent their portion/ownership of the underlying asset and/or dividend payment (Mohamed, 2019). The process becomes much leaner and less cumbersome in the following ways:

- due diligence verification is done via new innovative credit insights from non-traditional sources, through electronic know-your-customer and identity of issuing shareholders;
- rating of *ṣukūk* based on an assessment of the issuer and asset is done via automated market valuation methods;
- Sharī'ah compliance and assessment are done by an automated artificial intelligence-driven review process; and
- legal terms and allocation of dividends/payments are done via smart contracts.

There are different modules integrated within the blockchain *ṣukūk* platform. Therefore, the platform facilitating the offering of the blockchain *ṣukūk* is critical. The platform needs to be run by credible, trustworthy personnel apart from the blockchain element to provide confidence, as it enables trust and enforceability within its systems of processes and accountability (Mohamed, 2019). As such, the intervention of a regulatory authority is important to regulate and authorise platforms to provide confidence in the platform to the users. There is the possibility for regulatory technology (regtech) to play a role in this respect.

Globally, to date, there have been reports of research and limited use of blockchain in the issuance of *ṣukūk*. An example is Al Hilal Bank's US\$500m Senior Sukuk (Albawaba, 2019). Blossom Finance's SmartSukuk, which began operations in 2019, is another successful platform for blockchain *ṣukūk*. According to Blossom Finance (2019), the idea of *ṣukūk* on blockchain commenced with research by Matthew Joseph Martin, founder and CEO of Blossom Finance of Indonesia. As his own initiative of creating a blockchain *ṣukūk*, he called this kind of *ṣukūk* SmartSukukTM, which simply indicates that smart contracts are used to execute the transactions (IFN Fintech, 2019). In May 2018, the company announced that a platform for issuing the SmartSukukTM, an Islamic financing instrument powered by blockchain and drawn on Ethereum [2] smart contracts, was ready (Blossom Finance, 2019; Esteves, 2019).

Blossom Finance's SmartSukuk mobilizes and pulls funds together from investors in consideration for SmartSukuk tokens signifying ownership of undivided assets of the *ṣukūk* (Blossom Finance, 2019). Once the issuer effects payments, the money is automatically

shared and allocated among the SmartSukuk token holders through the blockchain in accordance with the smart contract rules so that the need for intermediaries is significantly diminished. The tokens for the SmartSukuk are compatible with an industry standard protocol – the ERC20 – based on the Ethereum smart contract. This standard enables tokens to be exchanged and/or traded worldwide on different public digital currency exchanges (Blossom Finance, 2019).

As the Blossom Finance SmartSukuk uses a *ṣukūk* structure with no involvement of intermediaries for fund transfer, transaction costs are reduced. It is essential to note that in this structure, not all intermediaries involved in the *ṣukūk* transaction will be eliminated; only the intermediaries [3] used to transfer funds. It is also important to note that Blossom Finance specialises in microfinance and that the blockchain SmartSukukTM it issued using the Ethereum platform was for microfinance (Esteves, 2019).

Blossom Finance has set up two contractual mechanisms for its *ṣukūk* on the blockchain (Whitehead, 2019). For the issuance of the first *ṣukūk*, which is a *ṣukūk muḍārabah* structured on profit-sharing principles, funds were collected and invested in a venture capital firm – PBMT Social Ventures – as the issuer of the *ṣukūk*. The issuer finances microfinance co-operatives which provide funding to small scale businesses including farming and homegrown or local convenience stores. Income generated from financed activities are remitted to the fund and shared among investors. As a regulated entity under the Financial Services Authority of Indonesia, PMBT maintains a Sharī'ah review board that oversees the *muḍārabah* agreement as well as the underlying financing activities of the firm (Blossom Finance, 2019). The second *ṣukūk* is structured as *ṣukūk al-istiṣnā' wa al-ijārah* or asset-based lease *ṣukūk*. However, even though the technology is ready, no funds have yet been mobilised for the *ṣukūk*. Blossom Finance is said to be at the moment evaluating potential issuers of the second *ṣukūk*, which would be used to finance projects such as construction of a hospital. Upon completion, the hospital and its facilities would be leased out at a profit by the *ṣukūk*'s investors to an operator of the hospital (Blossom Finance, 2019).

Other recent developments in blockchain *ṣukūk* include the following two initiatives:

- (1) In July 2018, a partnership between Curiositas (a technology research and development company) and Dubai-based ArabianChain Technology developed a digital platform by means of smart contracts together with legal automation. The platform is designed for Islamic capital markets, particularly investment banks and financial institutions, for the purpose of issuing *ṣukūk* ranging in size from US \$1m to US\$10m (Whitehead, 2019).
- (2) In November 2018, blockchain was used to conduct a secondary market transaction in Abu Dhabi for the US\$500m Senior *Ṣukūk* of Al Hilal Bank, which is to mature in September 2023. This was said to be the first instance in the world of using blockchain to execute a segment of a *ṣukūk* transaction (Albawaba, 2019). Jibrel Network, which had partnered with Al Hilal Bank in the debut blockchain-based *ṣukūk* trading in the secondary market, announced its partnership with Al Hilal Bank and Abu Dhabi Global Market in January 2019 in the creation of a state-of-the-art *ṣukūk* (Jibrel, 2019). According to Jibrel (2019), the partnership ushered in smart *ṣukūk* that automate and standardize legal and accounting requirements as well as payment disbursement of traditional *ṣukūk* offerings. Enabled by smart regulation, participating entities are able to verify and share from one identical source (a single blockchain), and updates are automatically provided on each *ṣukūk* with respect to its ownership status and the condition of its underlying asset. In a single view, the blockchain updates and provides records that are enforced via

consensus mechanisms. Figure 2 illustrates the infrastructure that Jibrel used to issue ṣukūk.

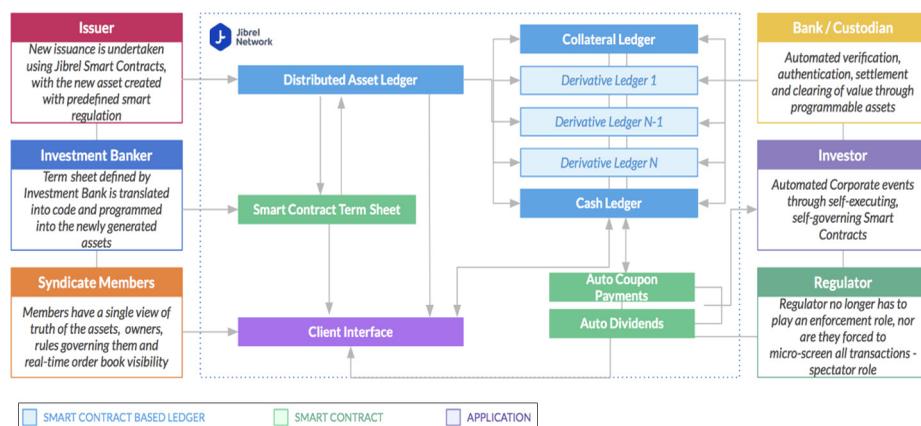
Jibrel (2019) further explains that there are six ways in which reorganisation of the management of multiparty activities in its blockchain improves issuance and trading of ṣukūk. First is in the efficiencies of clearing and settlement processes of securities, whereby blockchain helps institutions save thousands of dollars in back office and operational costs. Second is in the reduction of risk exposure, particularly with respect to settlement, which is lowered by more than 99%, bringing down costs dramatically. With settlement occurring in real time, counterparty risk is dispelled as well. Third is the reduction of issuance cost because of removal of superfluous intermediaries and the associated fees involved. Consequently, the operational risks and administrative burden of the traditional ṣukūk issuance, which is often a manual and multi-tiered process, are lessened. Fourth is the relatively low cost of creating the blockchain system and of its continued application, not only to render transactions faster but cheaper too. Fifth is the 24/7 uptime and availability of the system with absolute replication among participants on the network, which ensures seamless and foolproof synchronisation within its infrastructure. Last is the transparent, traceable and auditable nature of transactions on the system. These enable a single record view to effect a faultless auditing process, enabling regulators to observe more easily and intervening only when needed.

The advantage of blockchain in ṣukūk issuance is that it can increase transparency of underlying assets and cash flows (Murugiah, 2018). Blockchain can enhance investors' decision-making given the wealth of information it makes available. The fact that blockchain provides real-time and a uniform view of transaction data, devoid of the need for many reconciliations, will go a long way in reducing costs and removing certain inefficiencies and frictions that plague the financial system (Khan et al., 2020).

Having explained the way ṣukūk on blockchain functions, the paper now moves on to investigate possible challenges facing this kind of ṣukūk.

Challenges facing blockchain ṣukūk

The legal, regulatory and Sharī'ah requirements must be complied with in a ṣukūk issuance. This paper will explore the challenges facing blockchain ṣukūk under these three categories.



Source: Jibrel (2019)

Figure 2. Jibrel's infrastructure for ṣukūk issuance

One more category encompassing challenges peculiar to blockchain *ṣukūk* will also be discussed.

Legal challenges

In certain *ṣukūk* structures like *bay' bi thaman ajil*, the *ṣukūk* is issued directly by the corporate receiving the funds, and the assets are bought and sold back to the corporate issuer within a short period of time. Here, there is no need of an intermediary as the *ṣukūk* evidences a debt obligation of the issuer (ISRA, 2015). However, where the *ṣukūk* holders own the underlying assets for the duration of the *ṣukūk*, like in an *ijārah* (lease) *ṣukūk* structure, an intermediary is required. This is typically done by selling the underlying assets to an SPV which holds the assets on trust for the *ṣukūk* holders (Securities Commission Malaysia, 2009b). After the sale, the SPV will then lease to the lessee (obligor) and issue the *ṣukūk* to the *ṣukūk* holders to raise funds (Securities Commission Malaysia, 2009b).

To ensure legal certainty for this transaction, the trust and other financial contractual obligations must be legally recognized by the respective jurisdiction within which the *ṣukūk* is issued or enforced (Bouheraoua *et al.*, 2012).

Trust laws allow the splitting of ownership rights into two, namely, legal title ownership and beneficial ownership, as previous studies have noted (Nazar, 2011; Adawiah *et al.*, 2015). What this means is that the one who has legal title ownership has legal interest in the property and can hold the property but for the benefit of the beneficial owner. The beneficial owner can enforce his rights on the property and is recognised as its true owner. The benefit of this arrangement is that it enables circumventing the need for certain tax payments and registration requirements. The jurisdiction within which the *ṣukūk* is to be enforced must recognize the dual nature of ownership and trust law. It is generally understood that jurisdictions that adopt the common law system recognize and enforce trust laws, however jurisdictions that follow the civil law legal system generally do not. The question occurs whether this legal issue will remain with blockchain *ṣukūk*.

On the issues of transfer of assets and delineation of ownership (beneficial and legal title), it is believed that blockchain *ṣukūk* can avoid these legal concerns if the blockchain is recognised as an independent register of the legal title in the underlying assets. This solution would be especially pertinent to civil law jurisdictions, and even common law jurisdictions that are considered trust-law friendly would benefit from having just one register. Accordingly, in the case of transfer of assets, the blockchain platform can act as an instantaneous register of both the legal title and beneficial ownership as they are recorded in the blockchain. This was successfully demonstrated when Nivaura, a digital capital market solution provider, assisted LuxDeco, a corporate to issue two different blockchain bonds under the UK Financial Conduct Authority regulatory sandbox (Cohen *et al.*, 2018).

In the LuxDeco/Nivaura blockchain bond, two different blockchain bonds were issued: a control bond as baseline and an experimental bond as pilot. The control bond, structured in the normal way, was a regular registered Pound sterling denominated bond. The control bond provided a prototype for tokenisation of fiat currency. Tokenisation is generally a way of replacing confidential data with distinctive recognition symbols that preserve the information about the data and ensure its security. In the case under consideration, tokenisation enabled the substitution and linking of fiat currency (pound sterling) to a token as nominal digital representation of the bond security. Through the tokenisation technique, information about the fiat currency was rendered tamper-proof and undecipherable as the tokenised fiat currency remains a security (Diego, 2014). Thus, a tokenised pound sterling-denominated bond was issued to holders/subscribers, and it was cleared, settled and registered on Nivaura's blockchain platform. The pilot or experimental bond was the

world's first digital currency (Ether)-denominated bond that was fully registered, cleared and settled on an open public blockchain (Sehra, 2017). It is interesting and noteworthy that in both the control bond and experimental bonds, blockchain served as the register that registered the legal title of the bond ownership (Cohen *et al.*, 2018).

The approach used in the control and experimental bonds simplified the issuance of securities and reduced costs and processes in several ways. Firstly, the legal fees and process complexity were both reduced because the structure and documents were simpler and there was a reduction in the number of parties involved and quantity of documentation. This means saving complexity, time and cost (Cohen *et al.*, 2018).

Nevertheless, where the law of the land requires registration of the legal title of the asset in a specialised register, this requirement will still have to be satisfied regardless of the blockchain platform being able to record the transfer of the asset. Also, other risks such as risk of breach of terms of contract, default risk and legal risks remain in blockchain *ṣukūk*.

Regulatory challenges

Without the regulatory authority's approval, capital market products generally cannot be issued. The regulatory authorities for the *ṣukūk* market are mainly the capital market regulator or the securities commission of respective countries. One of the main reasons why the regulatory authority supervises the capital market is to ensure that investors are protected and the activities of the market are organized in a manner which is acceptable and ethical. One of the characteristics of blockchain *ṣukūk* is that parts of the issuance process are decentralized thus raising regulatory issues. If there is no centralized regulatory authority to supervise all aspects of the issuance, then there is possibility of breaching some of the current consumer protection standards used in capital markets. This is an issue noted in earlier research works (Sole, 2008; Majid *et al.*, 2011; Zakariaa *et al.*, 2012; Tasnia *et al.*, 2017). The point that needs to be understood is that blockchain *ṣukūk* can also fail and that the risk of default still exists. As such, continuous disclosure requirements imposed by regulatory authorities and the function of imposing punishments for non-compliance are essential for the successful implementation of blockchain *ṣukūk* projects.

Shari'ah challenges

For the purpose of ensuring that *ṣukūk* are Shari'ah-compliant products, there is need for a competent Shari'ah advisor or Shari'ah committee to endorse its structure in accordance with applicable Shari'ah rules as required in any other Islamic financial product (Securities Commission Malaysia, 2018a; Bank Negara Malaysia, 2019). When a blockchain-based *ṣukūk* is structured, the same requirement needs to be followed, as Shari'ah compliance of its structure is essential for the validity of the whole *ṣukūk*.

Unlike *ṣukūk*, a conventional bond needs only one blockchain-based structure for all issuances regardless of differences in the objectives of the issuances. The relationship between the issuer and bond holders also remains that of debtor and creditor. Accordingly, the structure would remain uniform in all issuances. However, in *ṣukūk* structures, depending on the type of underlying Shari'ah contract or contracts used to structure it, the steps involved will differ with each type of contract and the variations need to be brought to the structure (Bouheraoua *et al.*, 2012). For this, the presence of a Shari'ah advisor or Shari'ah committee is required in each and every step of the *ṣukūk* issuance, including a blockchain-based *ṣukūk* (Securities Commission Malaysia, 2018b).

As such, unlike in blockchain bonds, blockchain *ṣukūk* require endorsement of the structure by a Shari'ah committee, and it would be challenging to have a uniform blockchain *ṣukūk* structure for all types of *ṣukūk*. This means that even in blockchain-based

ṣukūk, the financial cost involved in obtaining services of the Sharī'ah adviser cannot be eliminated as the absence of a Sharī'ah adviser leads to Sharī'ah non-compliance risk.

Challenges and risks peculiar to blockchain ṣukūk

If digital currencies are used for blockchain *ṣukūk*, then their legal and Sharī'ah acceptance will be an issue. Developments, however, are underway on the acceptance of digital currencies as legal tender; for example, by the Central Bank of China (People's Bank of China) (Bloomberg News, 2019). In Islamic finance, the Sharī'ah compliance of digital currencies is an issue that has not yet been settled unanimously among jurists. While most jurists do not sanction the legality or lawfulness of digital currencies, others have shared contrary viewpoints (Abubakar *et al.*, 2018). The controversy surrounds the speculative and unstable nature of cryptocurrencies. However, in Malaysia the Malaysian Sharī'ah Advisory Council had in June and July 2020 decided that digital assets are Sharī'ah compliant if approved as securities by the SC. This definitely opens up possibilities for blockchain *ṣukūk* (Shariah Advisory Council Securities Commission Malaysia, 2020).

Cyber risks are also definitely unique to blockchain *ṣukūk*. The risk of hacking and other cyber threats is relevant. Some jurisdictions have attempted to address this issue through regulations. For example, the Securities Commission Malaysia has issued distinct regulations on cyber risks, i.e. the Guidelines on Management of Cyber Risk in 2016 which applies to all capital market operators or entities. These Guidelines lay down the responsibilities and roles of relevant companies' management and board of directors in the management of cyber risks. Among other things, the guidelines require capital market operators to maintain cyber risk management procedures and policies in addition to all-inclusive plans and measures for dealing with cyber risks. These include prevention, detection and recovery of cyber incidents as well as instant reporting of violations to the Securities Commission Malaysia.

Recommendations and future research direction

Digital solutions to solve the above challenges are suggested in this section; these recommendations would require further research to explore their viability.

Legal issues such as risk of breach of terms of the contract and default risk can be mitigated through smart contracts within the blockchain platform that will be triggered when certain predefined events occur. Smart contracts that ensure compliance are a form of regtech, a class of technology that is used to ensure regulatory compliance. Another new term used in the market today is legaltech which can be defined as the use of technology to provide legal services (Asian Legaltech Association, 2020). For instance, standardised automated legal documentation could be used for blockchain *ṣukūk* issuances. Document automation is an area that needs to be explored for *ṣukūk*; the fees currently paid for legal documentation in the *ṣukūk* market can be significant, and this can be addressed with the introduction of legaltech.

With regards to reporting compliance and other reporting requirements, the regulatory authorities should upgrade this function by adopting regtech (Butler and O'Brien, 2019). Smart contracts coded on the blockchain platform can ensure that compliance is automated. Thus, most reporting requirements can be automatically complied with, with the use of regtech solutions coded into the *ṣukūk* blockchain (Butler and O'Brien, 2019). This solution will require the joint efforts of computer programmers, legal specialists and the regulators working in tandem to develop digital solutions.

As for Sharī'ah advisors, a solution that can be proposed is to develop an artificial intelligence (AI) technology with smart contracts to check the ongoing Sharī'ah compliance

of the blockchain *ṣukūk*, possibly named “Shariahtech” (Abdullah, 2019). Its role would be to facilitate the function of Sharī’ah advisers in the monitoring of *ṣukūk*. While a Sharī’ah expert would be needed for initial structuring, continuous monitoring of the Sharī’ah compliance process could use technology. In other words, checking Sharī’ah compliance and mitigating Sharī’ah non-compliance risk in Islamic financial transactions could use technology to achieve Sharī’ah compliance. Since Sharī’ah advisory services are intermediary services used in *ṣukūk* transactions, instead of having human intervention throughout the duration of the investment, technologies such as AI could be used. If this is made possible, the cost of hiring the services of Sharī’ah advisers may be reduced without compromising Sharī’ah compliance (Khan *et al.*, 2020). While the initial cost of developing the prototype Shariahtech may be high, in the long run the authors believe it will actually be reduced.

Conclusion

As an enabler, blockchain technology has made possible innovative changes to financial intermediation, including within the Islamic capital market and in *ṣukūk*. However, caution needs to be exercised while incorporating innovative technologies in *ṣukūk*, as in any other Islamic financial product, to guard against legal risk, regulatory risk, Sharī’ah risk and other risks. The foregoing discussions in this paper highlight how *ṣukūk* may benefit from blockchain technology. Even though blockchain has its advantages, there are, however, risks unique to blockchain *ṣukūk* that have to be overcome.

In this regard, to develop Islamic finance and ensure its continued relevance, a purposive synergy needs to be created among all stakeholders, from Sharī’ah scholars and academia to regulators and the industry. Technology-enabled innovations do not make proper regulations redundant. The current processes in the Islamic capital market such as in *ṣukūk* issuance can be enhanced with the help of technology. However, technology cannot replace all the existing risk mitigation mechanisms in the *ṣukūk* issuance or any other product without properly enhancing the existing mechanisms using technology.

On this note, it is proposed that regtech, Shariahtech, legaltech and other suitable innovations be developed to complement blockchain *ṣukūk*. Accordingly, further research needs to be carried out in this regard.

Notes

1. A peer-to-peer, or more commonly P2P, is a description of a decentralised communication model via computer application that enables linkup of commercial and/or private users of the internet to communicate or share resources with the same ability such that any participant can start off a communication session.
2. Described as public and open source, Ethereum is a blockchain-based distributed operating system and computing platform that features smart contracts (scripting) among other functionalities (Krishnamurthi and Shree, 2019). Ethereum has provided for an adapted version of Nakamoto consensus through transaction-based state transitions.
3. For example the underwriters were eliminated from a blockchain bond issuance named Bond-i by World Bank in collaboration with the Central Bank of Australia (World Bank, 2018).

References

Abd Majid, N., Mohamad Ariff, A. and Mohamad, N.R. (2020), “The role of related party transactions on *ṣukūk* financing”, *Journal of Islamic Accounting and Business Research*, Vol. 11 No. 6, pp. 1175-1190.

- Abdullah, O. (2019), "Machine learning for shari'ah-compliant financial services", available at: <https://islmfintech.com/machine-learning-Shari'ah-compliant-financial-services/> (accessed 20 April 2020).
- Abubakar, Y.S., Ogunbado, A.F. and Saidi, M.A. (2018), "Bitcoin and its legality from shari'ah point of view", *SEISENSE Journal of Management*, Vol. 1 No. 4, pp. 13-21.
- Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) (2017), "Shari'ah standards: investment sukuk", Manama, Bahrain, available at: <http://aaoifi.com/shariaa-standards/?lang=en> (accessed 9 April 2020).
- Adawiah, E.R., Kloplic, N., Ellias, M.R.F. and Haron, M.N. (2015), "Application of the concept of beneficial ownership in sukuk structures: an Islamic legal analysis", *ISRA International Journal of Islamic Finance*, Vol. 7 No. 2, pp. 105-133.
- Al-Ali, S. (2019), "Raising capital on sukuk markets – structural", *Legal and Regulatory Issues*, Palgrave, Macmillan, Cham.
- Albawaba (2019), "World's first blockchain sukuk transaction just happened in Abu Dhabi", available at: www.albawaba.com/business/world%E2%80%99s-first-blockchain-sukuk-transaction-just-happened-abu-dhabi-1219090 (accessed 9 August 2019).
- Allen, D. (2017), "Discovering and developing the blockchain cryptoeconomy", Social Science Research Network, available at: <https://ssrn.com/abstract=2815255> (accessed 18 April 2020).
- Alswaidan, M.W., Daynes, A. and Pasgas, P. (2017), "Understanding and evaluation of risk in sukuk structures", *Journal of Islamic Accounting and Business Research*, Vol. 8 No. 4, pp. 389-405.
- Alzahrani, M. (2019), "Islamic corporate finance, financial markets, and institutions: an overview", *Journal of Corporate Finance*, Vol. 55, pp. 1-5.
- Andreas, S. (2019), "The first global blockchain bond", Hackernoon, available at: <https://hackernoon.com/the-first-global-blockchain-bond-38952bdf1dac> (accessed 19 April 2020).
- Asian Legaltech Association (2020), "Building the South East Asian legal tech ecosystem", available at: www.aseanlegaltech.com/# (accessed 31 January 2020).
- Balli, F., Billah, M., Balli, H.O. and Gregory-Allen, R. (2020), "Economic uncertainties, macroeconomic announcements and sukuk spreads", *Applied Economics*, Vol. 52 No. 35, pp. 3748-3769.
- Bank Negara Malaysia (2019), "Shari'ah governance", available at: www.bnm.gov.my/index.php?ch=57&pg=137&ac=834&bb=file (accessed 19 April 2020).
- Bloomberg News (2019), "China's PBOC says its own cryptocurrency is 'close' to release", Bloomberg, available at: www.bloomberg.com/news/articles/2019-08-12/china-s-pboc-says-its-own-cryptocurrency-is-close-to-release (accessed 14 April 2020).
- Blossom Finance (2019), "Invest in changing lives good return: great impact", available at: <https://blossomfinance.com/> (accessed 29 November 2020).
- Bouheraoua, S., Sairally, B.S. and Hasan, S.M. (2012), "A critical appraisal of shari'ah issues related to sukuk al-ijarah", *ISRA International Journal of Islamic Finance*, Vol. 4 No. 1, pp. 167-176.
- Busari, S.A. (2019), "Juristic analysis of sukuk default: East Cameron gas United States of america", *Al Hikmah Journal*, Vol. 2 No. 1, pp. 109-127.
- Butler, T. and O'Brien, L. (2019), "Understanding RegTech for digital regulatory compliance", in Lynn, T., Mooney, J.G., Rosati, P. and Cummins, M. (Eds), *Disrupting Finance: FinTech and Strategy in the 21st Century*, Palgrave Macmillan – Springer Nature, Cham, pp. 85-102.
- Cohen, R., Smith, P., Arulchandran, V. and Sehra, A. (2018), "Automation and blockchain in securities issuances", *Butterworths Journal of International Banking and Financial Law*, pp. 145-146, available at: www.allenoverly.com/global/-/media/allenoverly/2_documents/news_and_insights/campaigns/blockchain/cohen_smith_automation_blockchain.pdf (accessed 26 April 2020).
- COMCEC (2018), "COMCEC annual progress report 2018", available at: www.comcec.org/en/wp-content/uploads/2018/10/34th-COMCEC-Progress-Report.pdf (accessed 29 November 2020).

- Cownie, F. and Bradney, A. (2013), "Socio-legal studies: a challenge to the doctrinal approach", in Watkins, D. and Burton, M. (Eds), *Research Methods in Law*, Routledge, London, pp. 34-54.
- Diego, O.Y. (2014), "A critical review of the EMV payment tokenisation specification", *Computer Fraud and Security*, Vol. 10 No. 10, pp. 5-12.
- Dula, C. and Chuen, D.L.K. (2017), "Reshaping the financial order", Chuen, D.L.K. and Deng, R.H. (Eds), *Handbook of Blockchain, Digital Finance and Inclusion*, Academic Press, London, Vol. 1, pp. 1-18.
- Elasrag, H. (2019), "Blockchains for Islamic finance: obstacles and challenges", Munich Personal RePEc Archive, available at: https://mpra.ub.uni-muenchen.de/92676/1/MPRA_paper_92676.pdf (accessed 22 April 2020).
- Esteves, R. (2019), "Blossom finance's 'smart sukuk' to automate issuance of Islamic bonds", available at: www.newsbt.com/2018/10/27/blockchain-powered-islamic-bonds-to-fund-microfinance-projects-in-indonesia/ (accessed 24 April 2020).
- Financial Islam (2020), "Risks underlying şukūk", available at: www.financialislam.com/risks-underlying-şukūk.html (accessed 12 April 2020).
- Hashim, H. (2018), "Malaysian sukuk: a superior alternative to traditional bonds", The Malaysian Reserve, available at: <https://themalaysianreserve.com/2018/12/11/malaysian-sukuk-a-superior-alternative-to-traditional-bonds/> (accessed 29 November 2020).
- Hassan, M.K., Aliyu, S. and Hussain, M. (2019), "A contemporary review of Islamic finance and accounting literature", *The Singapore Economic Review*, pp. 1-38, doi: 10.1142/S0217590819420013, (accessed 25 April 2020).
- Hutchinson, T. (2015), "The doctrinal method: incorporating interdisciplinary methods in reforming the law", *Erasmus Law Review*, Vol. 8, pp. 130-138.
- IFN Fintech (2019), "Blockchain sukuk: the smart way of doing it", IFN Fintech, available at: www.ifnfintech.com/secure/admin/uploadedFiles/2018-q3-1545307691.pdf (accessed 20 April 2020).
- Islamic Financial Services Board (2020), "Islamic financial services industry stability report 2020", available at: <https://ifsb.org/download.php?id=5724&lang=English&pg=/sec03.php> (accessed 24 August 2020).
- Ismail, A.G. (2010), *Money, Islamic Banks and the Real Economy*, Cengage Learning Asia Pte. Ltd., Singapore.
- ISRA (2009), *Islamic Financial System – Principles and Operations*, International Shari'ah Research Academy for Islamic Finance, Kuala Lumpur.
- ISRA (2015), *Islamic Capital Markets, Principles and Practices*, International Shari'ah Research Academy for Islamic Finance, Kuala Lumpur.
- ISRA (2017), *Şukūk: Principles and Practices*, International Shari'ah Research Academy for Islamic Finance, Kuala Lumpur.
- Jibrel (2019), "Sukuk bonds on the blockchain", available at: <https://medium.com/jibrel-network/sukuk-bonds-on-the-blockchain-9b5bf02778d0> (accessed 29 November 2020).
- Khan, N., Kchouri, B., Yattoo, N.A., Kräussl, Y., Patel, A. and Statea, R. (2020), "Tokenization of sukuk: Ethereum case study", *Global Finance Journal*, doi: 10.1016/j.gfj.2020.100539, available at (accessed 9 June 2020).
- Khawaja, M., Bhatti, M.I. and Henry, D. (2020), "On the role of ownership and governance structure in raising capital: a şukūk example", in Qadri, H.M.U.D. and Bhatti, M.I. (Eds), *Growth of Islamic Finance and Banking: Innovation, Governance and Risk Mitigation*, Routledge Publishers, Oxford, pp. 50-76.
- Krishnamurthi, R. and Shree, T. (2019), "A brief analysis of blockchain algorithm and its challenges", Shi, N. (Ed.), *Architectures and Frameworks for Developing and Applying Blockchain Technology*, IGI Global, Hershey, pp. 69-85.

-
- Lahsasna, A. (2014), *Shari'ah Non-Compliance Risk Management and Legal Documentations in Islamic Finance*, John Wiley and Sons, Singapore.
- Latham and Watkins LLP (2017), "The sukuk handbook – a guide to structuring sukuk", 2nd ed., available at: www.lw.com/thoughtLeadership/guide-to-structurings-sukuk-2015 (accessed 20 May 2020).
- Majid, H., Shahimi, S. and Abdullah, M.H.S.B. (2011), "Sukuk defaults and its implication: a case study of Malaysian capital market", *Proceedings of 8th International Conference on Islamic Economics and Finance, Sustainable Growth and Inclusive Economic Development from an Islamic Perspective*, Doha, Qatar, available at: www.iefpedia.com/english/wp-content/uploads/2011/12/Hafizi-Ab-Majid.pdf (accessed 10 April 2020).
- Mayer, I. (2015), "Qualitative research with a focus on qualitative data analysis", *International Journal of Sales, Retailing and Marketing*, Vol. 4 No. 9, pp. 53-67.
- Mohamed, H. (2019), "Blockchain-based impact sukuk", in *Blending Islamic Finance and Impact Investing for the Sustainable Development Goals, 4th Annual Islamic Finance Conference JW Marriot Surabaya 24-25 July*, available at: www.academia.edu/41300047/Blending_Islamic_Finance_and_Impact_Investing_for_the_Sustainable_Development_Goals (accessed 29 November 2020).
- Muneeza, A. and Mustapha, Z. (2019), "Blockchain and its shari'ah-compliant structure", in Billah, M. (Ed.), *Halal Cryptocurrency Management*, Palgrave Macmillan, Cham, pp. 69-106.
- Murugiah, S. (2018), "Sukuk industry could benefit from blockchain technology, says S&P global ratings", *The Edge Markets*, available at: www.theedgemarkets.com/article/sukuk-industry-could-benefit-blockchain-technology-says-sp-global-ratings (accessed 19 April 2020).
- Nagano, M. (2016), "Who issues sukuk and when? An analysis of the determinants of Islamic bond issuance", *Review of Financial Economics*, Vol. 31, pp. 45-55.
- Nakamoto, S. (2008), "Bitcoin: a peer-to-peer electronic cash system", available at: <https://bitcoin.org/bitcoin.pdf> (accessed 10 April 2020).
- Nazar, J.K. (2011), "Regulatory and financial implications of sukuk's legal challenges for sustainable sukuk development in Islamic capital market", *Proceedings of 8th International Conference on Islamic Economics and Finance, Sustainable Growth and Inclusive Economic Development from an Islamic Perspective, Doha, Qatar*, available at: www.iefpedia.com/english/wp-content/uploads/2011/12/Jhordy.Kashoogie-Nazar.pdf (accessed 29 April 2020).
- Paltrinieri, A., Hassan, M.K., Bahoo, S. and Khan, A. (2020), "A bibliometric review of sukuk literature", *International Review of Economics and Finance*, doi: [10.1016/j.iref.2019.04.004](https://doi.org/10.1016/j.iref.2019.04.004).
- Saeed, A. and Salah, O. (2014), "History of sukuk: pragmatic and idealistic approaches to structuring sukuk", Ariff, M., Iqbal, M. and Mohamad, S. (Eds), *The Islamic Debt Market for Sukuk Securities: The Theory and Practice of Profit-Sharing Investment*, Edward Elgar Publishing Ltd., Cheltenham, pp. 42-66.
- Safari, M., Ariff, M. and Shamsheer, M. (2014), *Sukuk Securities*, John Wiley and Sons, Singapore.
- Schwab, K. (2016), "The fourth industrial revolution: what it means, how to respond", *The World Economic Forum*, available at: www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/ (accessed 29 November 2020).
- Securities Commission Malaysia (2009a), *Sukuk*, Kader Thomas, A. (Ed.), Sweet and Maxwell, Kuala Lumpur.
- Securities Commission Malaysia (2009b), *The Islamic Securities (Sukuk) Market*, LexisNexis, Kuala Lumpur.
- Securities Commission Malaysia (2014), "Guidelines on sukuk (revised)", available at: www.sc.com.my/api/documentms/download.ashx?id=60055712-b085-4584-ab99-eb2bda4ddd90 (accessed 20 May 2020).
- Securities Commission Malaysia (2018a), "Capital market architecture blueprint in a decentralised world", available at: <http://castor.my/wp-content/themes/castor/assets/blueprint.pdf> (accessed 29 April 2020).

- Securities Commission Malaysia (2018b), “Guidelines on issuance of corporate bonds and ṣukūk to retail investors”, available at: www.sc.com.my/api/documentms/download.ashx?id=7be24ad9-1846-4de9-8897-d5ed58ec0011 (accessed 19 April 2020).
- Sehra, A. (2017), “Nivaura executes world’s first automated cryptocurrency denominated bond”, Nivaura, available at: https://medium.com/@avatar_15406/nivaura-executes-worlds-first-automated-cryptocurrency-denominated-bond-6394c33f2f63 (accessed 19 October 2020).
- Shaikh, S. and Zaka, F. (2019), “Blockchain ṣukūk-financing”, in Mehandjiev, N. and Saadouni, B. (Eds), *FinanceCom 2018: Enterprise Applications, Markets and Services in the Finance Industry, Lecture Notes in Business Information Processing*, Springer, Cham, Vol. 345, pp. 66-76.
- Shariah Advisory Council Securities Commission Malaysia (2020), “Digital assets from shari’ah perspective”, available at: www.sc.com.my/development/islamic-capital-market/resolutions-of-the-sc-shariah-advisory-council (accessed 4 December 2020).
- Sole, J. (2008), “Prospects and challenges for developing corporate ṣukūk and bond markets: lessons from a Kuwait case study”, *International Journal of Islamic and Middle Eastern Finance and Management*, Vol. 1 No. 1, pp. 20-30.
- Tasnia, M., Mustapha, I.M. and Shakil, M.H. (2017), “Critical assessment of the legal recourse for the case of ṣukūk default for the asset-backed and asset-based ṣukūk structures”, *European Journal of Islamic Finance*, Vol. 7, doi: [10.13135/2421-2172/2066](https://doi.org/10.13135/2421-2172/2066). (accessed 28 April 2020).
- Usmani, M.T. (2007), “Ṣukūk and their contemporary applications”, available at: <https://ifresource.com/2008/05/11/mufti-taqi-usmanis-critique-of-contemporary-ṣukūk-issues/> (accessed 10 August 2020).
- Wethaq (2019), “Innovating in ṣukūk capital markets”, available at: https://talkingtech.cliffordchance.com/content/micro-cctech/en/emerging-technologies/blockchain—distributed-ledger-technology/innovating-in-ṣukūk-capital-markets/_jcr_content/text/parsysthumb/download/file.res/Ṣukūk%20Capital%20Markets.pdf (accessed 30 April 2020).
- Whitehead, R. (2019), “Islamic microfinance start-up sets up smart ṣukūk on blockchain”, available at: www.salaamgateway.com/en/story/islamic_microfinance_startup_sets_up_ṣukūk_on_blockchain_targets_smes_social_impact_projects-SALAAM12082018092223/ (accessed 15 April 2020).
- World Bank (2018), “Webinar on blockchain bond world bank treasury”, available at: www.youtube.com/watch?v=lqYAcDTTAU0 (accessed 7 September 2020).
- Zakariaa, N.B., Md-Isab, M.A. and Abidina, R.A.Z. (2012), “The construct of ṣukūk, rating and default risk”, *Social and Behavioral Sciences*, Vol. 65, pp. 662-667.
- Zolfaghari, P. (2017), “An introduction to Islamic securities (ṣukūk)”, Uppsala Faculty of Law Working Paper 2017:2, available at: www.diva-portal.org/smash/get/diva2:1189896/FULLTEXT01.pdf (accessed 12 May 2020).

Further reading

- Archer, S. and Karim, R.A.A. (2013), *Islamic Finance: The New Regulatory Challenge*, John Wiley and Sons (Asia) Pte Ltd., Singapore.
- El-Tiby, A.M. and Graiss, W.M. (2015), “Islamic finance and economic development: Risk management”, *Regulation and Corporate Governance*, John Wiley and Sons Inc., NJ.
- Fintech News (2019), “World Bank issues second tranche of its Kangaroo Blockchain Bond via Bond-I”, available at: <http://fintechnews.sg/33140/australia/world-bank-issues-second-tranche-of-its-kangaroo-blockchain-bond-via-bond-i/> (accessed 30 April 2020).
- Hasan, R., Ahmad, A.U.F. and Parveen, T. (2019), “Sukuk risks – a structured review of theoretical research”, *Journal of Islamic Accounting and Business Research*, Vol. 10 No. 1, pp. 35-49.
- Iqbal, Z. and Mirakhor, A. (2007), *An Introduction to Islamic Finance: Theory and Practice*, John Wiley and Sons (Asia) Pte Ltd., Singapore.
- Islamic Financial Services Board (2019), “IFSB-19 guiding principles on disclosure requirements for Islamic Capital market products (ṣukūk and Islamic collective investment schemes)”, available

at: [www.ifsb.org/standard/IFSB%2019%20-%20Guiding%20Principles%20on%20Disclosure%20of%20ICM%20Products%20\(final\).pdf](http://www.ifsb.org/standard/IFSB%2019%20-%20Guiding%20Principles%20on%20Disclosure%20of%20ICM%20Products%20(final).pdf) (accessed 24 April 2020).

Kaltenbrunner, A. and Lysandrou, P. (2017), "The US dollar's continuing hegemony as an international currency: a double-matrix analysis", *Development and Change*, Vol. 48 No. 4, pp. 663-691.

About the authors

Sherin Kunhibava, PhD, is Senior Lecturer at Faculty of Law at University Malaya. She is the Program Co-ordinator for the Masters in Commercial Law and Academic Advisor of University Malaya's Law Review. Sherin Kunhibava is the corresponding author and can be contacted at: sherin@um.edu.my

Zakariya Mustapha is PhD candidate at the Faculty of Law University Malaya. He is a barrister and solicitor of Nigeria's Supreme Court and a member of the Nigerian Bar association.

Aishath Muneeza, PhD, is Associate Professor at the International Centre for Education in Islamic Finance (INCEIF), Kuala Lumpur, Malaysia. She is a registered Shari'ah Advisor at the Capital Market Development Authority of Maldives and the Securities Commission Malaysia.

Auwal Adam Sa'ad, PhD, is Assistant Professor at the IIUM Institute of Islamic Banking and Finance, International Islamic University Malaysia. His areas of research are Islamic commercial law, Islamic banking and finance, Islamic fintech, Islamic capital markets, blockchain *shukūk*, crypto currencies and the use of artificial intelligence in Islamic banking and finance.

Mohammad Ershadul Karim, PhD, is Senior Lecturer at the Faculty of Law, University of Malaya, Malaysia (UM). He is the Co-Director of the Centre for Law and Ethics in Science and Technology, and Research Fellow at the University of Malaya Malaysian Centre of Regulatory Studies, UM.

For instructions on how to order reprints of this article, please visit our website:

www.emeraldgroupublishing.com/licensing/reprints.htm

Or contact us for further details: permissions@emeraldinsight.com