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Implementing the Blockchain Technology in Islamic Financial Industry: Opportunities and Challenges

Omar Alaeddin*

*Corresponding author, Senior Lecturer, University Kuala Lumpur Business School, Malaysia. Email: omar.alaeddin@unikl.edu.my, ORCID: 0000-0002-9850-923X.

Mohanad Al Dakash

Lecturer, Emirates Institute for Banking and Financial Studies, United Arab Emirates. Email: Mohanadaldakash@hotmail.com.

Tawfik Azrak

Assistant Professor, Social Sciences, Faculty of Islamic Studies, University of Ankara, Turkey. E-mail: tawfikazrak@gmail.com, ORCID: 0000-0001-9059-2115

Abstract

Blockchain technology is rapidly gaining the attention of financial institutions around the world, especially among decision makers in Islamic financial institutions who are planning to apply this innovative technology into their institutions activities which could be an upright solution for their issues and challenges. This paper contributes to the emerging literature on financial technology by discussing some of the innovative applications of blockchain in Islamic financial institutions. In addition, this paper sheds light on the main opportunities and challenges facing application of Blockchain Technology in the Islamic financial industry and highlight the way forward to address these issues. Relying on the previous literature and analysis; this paper confirms the enormous opportunities for utilizing blockchain technology in various Islamic financial applications such as Waqf, Zakat and Sukuk. On the other hand, the main challenges towards implementing blockchain in this industry are the complexity of Islamic finance products added to the opacity of its application which end up with unclear regulations and lack of standards.

Keywords: Islamic Finance; Blockchain; Innovative technology; Fintech.

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Introduction

Blockchain Technology

The current century had built up a stack of new ideas and applications cause to call it as the digital century, one of this technology which expected to change the face of the future is called the blockchain technology. Blockchain technology can be simply explained as cryptographically linked list of records, which was invented in the year 2008 by Satoshi Nakamoto and used later by him to invent which is global known as cryptocurrency bitcoin.

Blockchain technology been defined by Risius and Spohrer (2017) as "Blockchain technology refers to a fully distributed system for cryptographically capturing and storing a consistent, immutable, linear event log of transactions between networked actors." From this definition we can say in simple words that block chain technology is a logbook which stores set of transactions can be accessed only by the authorized personnel to approve the transactions, additionally this logbook guaranteeing high level of accuracy as none of the entered transactions can be erased once been approved (Rabbani, Khan & Thalassinos, 2020).

As the blockchain recording all the transactions performed so it goes as stack of blocks of data added to each other to form a chain of blocks, those blocks are added to each other in a linear, chronological order to show the whole set of blocks starting from the genesis block to the most resect one (Fanning & Centers, 2016). Blockchain started as a system with the emergence of the Bitcoin cryptocurrency, but currently its uses exceeded from digital currencies to many areas including smart contracts, data storage, resource management, and others (Abojeib & Habib, 2019).

This technology has shown a wide range of advantages leveling up its value in application. Blockchain technology has the ability to keep system running without any disruption as is relying on peer-to-peer network, added to the clarity practiced in keeping the transactions visible to all parties in charge and blocking any form of edit on the preformed transaction which leads to high level of trustworthiness and can be applied to transform many industries to higher level (Fanning & Centers, 2016).

Islamic Finance

Islamic finance recorded an increasing improvement in the recent years of 2018 and 2019 in terms of total wealth. The Islamic Financial Services Board (IFSB) indicated that Islamic finance size is estimated to stand at USD 2.19 trillion as the second quarter of 2018 compared to the USD 2.05 trillion recorded for the same period of 2017. In terms of segment share in the whole Islamic finance industry, the size of Islamic banking was decreased by 4% to reach 72% in the second quarter of 2018. On the other hand, the Islamic capital market segment share increased by around 4% to reach 27% share of the whole industry in 2018. (GIFR, 2018).

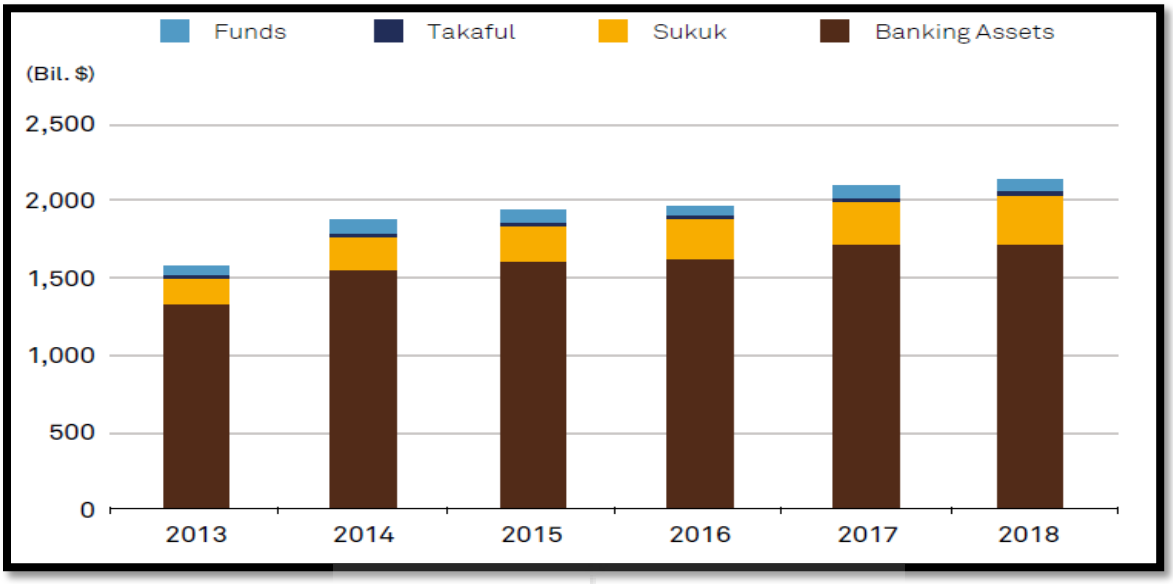


Chart 1. Islamic finance growth during the recent years
Source: Islamic finance Outlook 2020 edition. S&P Global Rating. (S&P Global Rating, 2020)

Correspondingly, the Islamic finance industry market share is expanding not only in the majority Muslims countries but also to non-Muslims and western countries, as it reaches the stage of global integration between the two financial system to be adopted at high levels. One of the high potential areas to have this global integration is by implementing blockchain technology as new high tech medium of integration (S&P Global Rating, 2020).

Application of blockchain in Islamic Finance

While Islamic finance experienced double-digit annual expansion over the past few decades, growth has slowed to single digit in the past four years (GIFR, 2018), and based on the S&P global rating report for 2020 the total Islamic finance assets is increased by only 2% in 2018 compared to 10% in 2017, and one of the potential areas to get back this rapid and two-digit growth in the industry is by applying the new technology in Islamic finance to leverage the growth and speed it up. (Rabbani, Khan, & Thalassinos, 2020).

In Islamic finance there are many applications for blockchain technology, for example it can be applied into smart contracts, payment and remittance as well as streamlining the business process.

1. Smart contracts

Defining the contracts as smart taking the concept to higher level of self-executing contracts which are performed as automated facilitation, verification and performing of the contract without any third party interfering (Cong & He, 2019)

The idea of using the decentralized ledger in smart contracts was initiated by Nick Szabo in 1994, the idea started with concept of storing the contracts in reliable system where the logbook recording all the steps performed and use the ledger feedback for authorizing the transactions. This idea can be used effectively in transferring money and delivering products and services.

The main objective of smart contract is to establish contract law through electronic commerce protocols, and to design business practices through computer programs on internet among strangers (Dickerson, Gazzillo, Herlihy & Koskinen, 2019). In related to application of smart contract in Islamic finance; it could be executed through three channels, first of all using the smart contracts to reduce the element of uncertainty (Gharar) and in this case the contractual terms will be verified only if the conditions are met, also will automate the entire contractual process which will be due to the easy, immutable and secure verification, which lead to mitigate Gharar in the form of operational risks and counterparty risks. Gharar in the form of administrative and legal complexities and redundancies will also be mitigated.

Secondly, as the most common disadvantage taken against the Islamic finance is the high administrative and legal costs caused by unique products which require multiple contractual arrangements, smart contracts can reduce those costs by applying the Self-executing system.

Thirdly, the decentralized nature of smart contracts made it to have fast and lower execution cost, while still the transactions are traceable and irreversible which eliminate the risk of moral hazards among participants. (Nienhaus, 2019).

2.Zakat collection and distribution

"And be steadfast in prayer and regular in charity: And whatever good ye send forth for your souls before you, ye shall find it with Allah" (Qur'an 2:110)

Zakat as known among Muslims is one of the pillars of Islam with the concept of transferring ownership of specific amount of money or property from someone to another, this ownership movement is based on certain criteria and rule regulating everything starting from the amount to be paid and not ended with deciding the eligibility of person to receive the zakat (Abojeib & Habib, 2019).

Using the blockchain technology will make the whole zakat process auditable, immutable and trackable which means we can track the zakat from A to Z and in this regard the whole process will be transparent which allow to figure out any possible gap or mistake in the system immediately (Salleh, Rasid & Basiruddin, 2019).

3.Smart Sukuk

Sukuk in general play an important role in Islamic capital market, its market share is increasing and growing in rapid way around the World. With regard to the smart Sukuk it seems to be the future of Islamic crowd funding for business and infrastructure developments.

As been noted by Elasrag (2019) that the new Sukuk technology can be used by the small and medium enterprises SMEs, social impact projects, groups to improve their efficiency and transparency and reduce the cost of it.

Therefore, using blockchain technology for issuing Sukuk will reduce its cost, and make the issuance more transparent and effective, as it was proven in the first issuance of Sukuk "blossom finance" which received wide range of acceptance globally. The first primary Sukuk issuance on a public blockchain was performed by an Indonesian Islamic microfinance corporation known as BMT Bina Ummah which has successfully 710 million rupiahs ($50,000).

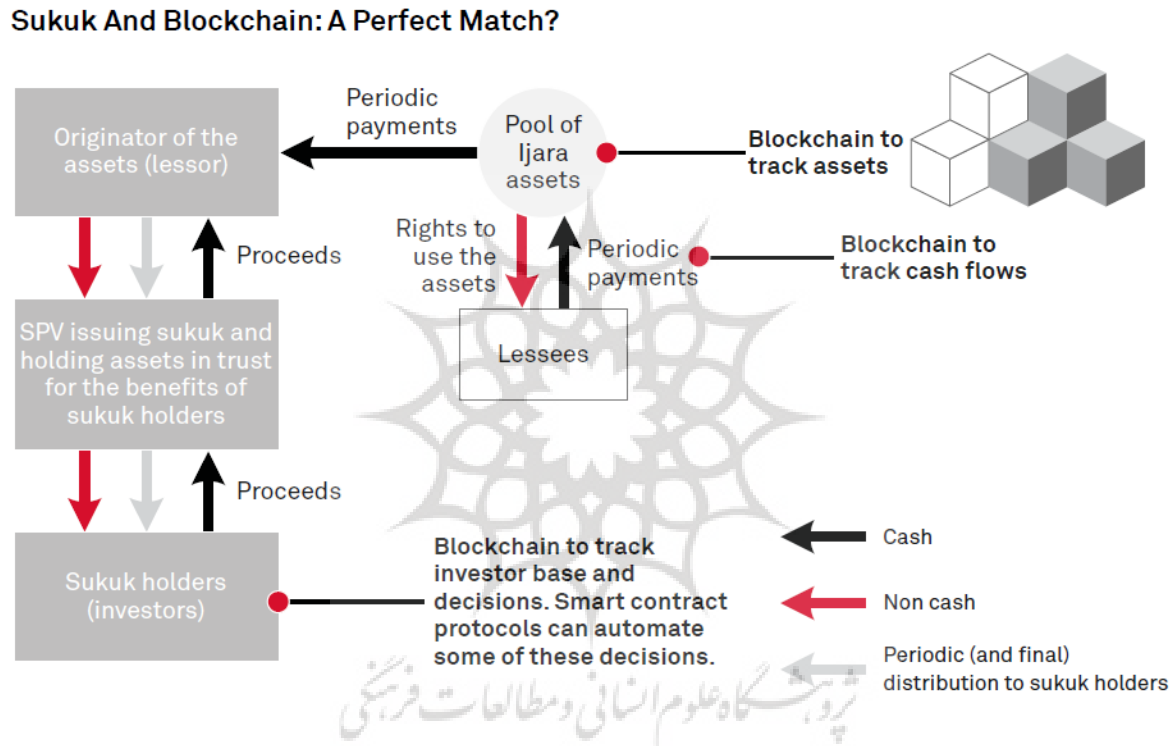


Chart 2. Sukuk and Blockchain: A perfect Match?
Source: Islamic finance Outlook 2020 edition. S&P Global Rating.

4. Waqf utility

Another potential area to use blockchain technology in Islamic finance is to enhance Waqf utilization, first of all, Waqf draws its inspiration from the spirit of giving contained in the Quran and Sunnah, it is a mechanism for the institutionalization of charity (Muneeza, Arshad & Arifin, 2018; Gazali & Ismail, 2019).

In terms of applying the concept of blockchain in Waqf, a new innovative entrepreneurship organization called Finterra was established in Malaysia aiming to develop a crowdfunding platform based on smart contracts to allow Waqf bodies, NGOs, Corporate CSRs, Trusts and

other stakeholders to fund their Waqf projects using the Finterra platform. The process of fundraising is managed totally by smart contracts concept which control the start of the project then manage the money execution to right receivers as been programmed in the system through the Finterra Inter-Chain Protocol (Abojeib and Habib, 2019).

Main challenges of implementing blockchain in Islamic Finance

Although there are a lot of advantages of using the blockchain and its modern applications in financial institutions such as ease of delivery of financial services to all people, low cost, ease of procedures, dispensing of mediation and increasing profitability as a result of all that and many other advantages. However, we cannot ignore the challenges that stand in the way of adopting this revolutionary technology at the level of contracts and transactions in financial institutions in general. Based on the previous studies the challenges could be divided into four types as follows:

Challenges related to the legal and legislative aspects:

In most countries, the competent legislative bodies did not issue clear laws and legislations to control the financial transactions done through the modern technology that we are talking about (blockchain and its applications), therefore, the financial institutions will not use this technology on a large scale before the existence of clear rules and regulations that control the rights of all parties on one hand, and regulate the dealing mechanism on the other hand, even though, some other countries such as Germany and Japan that have made good efforts in this regard and issued some good guidelines and laws, which is considered the beginning of a solution to this challenge (Alzubaidi & Abdullah, 2017).

Security challenges:

One of the most prominent challenges of using a blockchain in financial institutions is the security issues. The customer's data in financial institutions and its protection is among the most important concerns of those institutions. Using the new financial technology and transfer all the data to modern applications been argued as having possible threat data loss or hacking and thus they may use it to control customer accounts which may lead to lose hundreds of millions due to robberies. Therefore, it is important to work on the security side of these technologies and study any possibility of a vulnerability in which pirates may target customer data or assets through Identity theft, hacking, and online fraud (Xu & Jennifer 2016).

In addition to that, there are safety risks in the (Public Blockchain) if a certain party acquires 51% of mining activity (Lin & Liao, 2017), which is called the majority attack (51% attack), as this is risky from more than one side, most notably preventing the rest of the minerals from adding new block (Prevent Bitcoin Generation), and therefore this entity has great control over mining and thus the entire system. Also, stopping the processes of checking transactions that have been done (Prevent Confirmation) may lead to double spending, and with the difficulty of checking this, it poses significant risks to the entire system, and this happened already once in

2014, which is known as Ghash.io Incident (Lin & Liao, 2017).

Money laundry is one of the most prominent challenges that concern the legislative authorities in the world1, especially the usage of it to support terrorism and financing illegal activities such as human and drug trafficking operations, hence; International institutions consider the cryptocurrencies and other new financial technologies as a fertile environment for passing suspicious deals, and therefore all focus currently is on mechanisms for monitoring and controlling any financial process conducted through modern means and cryptocurrencies, Then, any financial institution shall, before it begins dealing through these technologies, guarantee the safety of operations on the one hand, and know the other party that deals with it on the other hand, otherwise this exposes them to violations that may result in loss of hundreds of millions and more serious than that, penalties that may affect those institutions as a result of their classification within the institutions dealing with suspicious activities (Bello & Perez, 2020).

Challenges related to Sharia compliance:

Sharia compliance considers the main pillar of Islamic financial institutions activities, as it deals only with approved contracts by the Sharia regulations, and any new application that may be used to execute the contracts should go through compatibility and legal commitment to the correct mechanism of implementation (Lacasse, Lambert & Nida, 2018). Therefore, every Islamic financial institution shall ensure the Sharia compliance of any new technology or mechanism, whether it is a blockchain or any of its applications, the use of smart contracts is a good thing for institutions, but it is necessary to review a mechanism of the contracts and its correct sequence, as well as the mechanism for setting conditions, approving them and implementing them, and other matters that guarantee the safety of the legal side in financial dealings in Islamic financial institutions (Mohamed & Ali, 2018).

Technology infrastructure challenges:

The potential customers of financial institutions are the main pillar of the success of their commercial activities, and therefore any change in the mechanisms of financial transactions must be made by taking into considerations the customers' benefits. The financial institutions cannot start using modern technologies in their dealings unless the digital infrastructure is qualified to start this, otherwise what is the benefit for financial institutions using technologies in their dealings in a country and the internet service is not available in that country in most regions, it is necessary to work hard from the various stakeholders to encourage telecommunications companies to provide the infrastructure for that (Bakar & Rosbi, 2018).

In fact, spreading the awareness among people about the benefits of using technology and alerting them to the proper and safe way of it is one of the most successful ways that supportive

institutions can take to encourage the spread of technology and its use in society (Alaeddin & Altounjy, 2018).

Form other hand, having technology infrastructure suits the blockchain technology is associated with having high cost, here we talk about two main costs the operating cost of the blockchain and the mining operations, like the cost of electricity needed by continuous mining operations to verify the validity of the operations as one of the largest costs that result from the use of this technology (Madisetti & Bahga, 2019), as well as the cost of computers that the mining process needs, which should be in high specifications especially the fast processors, as well as the cost of storing data and information and the cost of having network with the large volume of transactions and the passage of time. Also the cost of shifting from the current mechanism to the new mechanism as most of the financial institutions currently have many systems that they invested in it, and cost hundreds of millions, hence, moving to a new mechanism means giving up all of those programs and mechanisms and wasting that high cost that these institutions paid to obtain these programs, which constitutes a major challenge for financial institutions. (Schmidt & Wagner, 2019)

Experts' perception of the challenges facing Implementing the Blockchain Technology in Islamic Financial Industry

To study the experts' perceptions about the challenges facing Blockchain implementation in Islamic financial institutions, a self-administered questionnaire been developed based on the above discussed challenges. The 250 questioners been distributed among experts' in both blockchain and Islamic finance to execute their opinions about the challenges. The response rate reach to 76% with 190 responses were received. Checking the validity of responses caused to drop 6 responses because not all the questions in the survey were answered (Tabachnick & Fidell, 2007).

Respondents profile:

The 190 respondents were clustered to 77% Male and 23% female. From educational level the 19% of them had PhD level while majority of 43% are having bachelor degree while the rest are either with master or only diploma level. Furthermore, majority of the respondents were from category of RM4001 to RM6000 of the monthly income. Moreover, 29% of them are self-employed and management position in their organizations while majority of them (33%) having more than 3 years of experience.

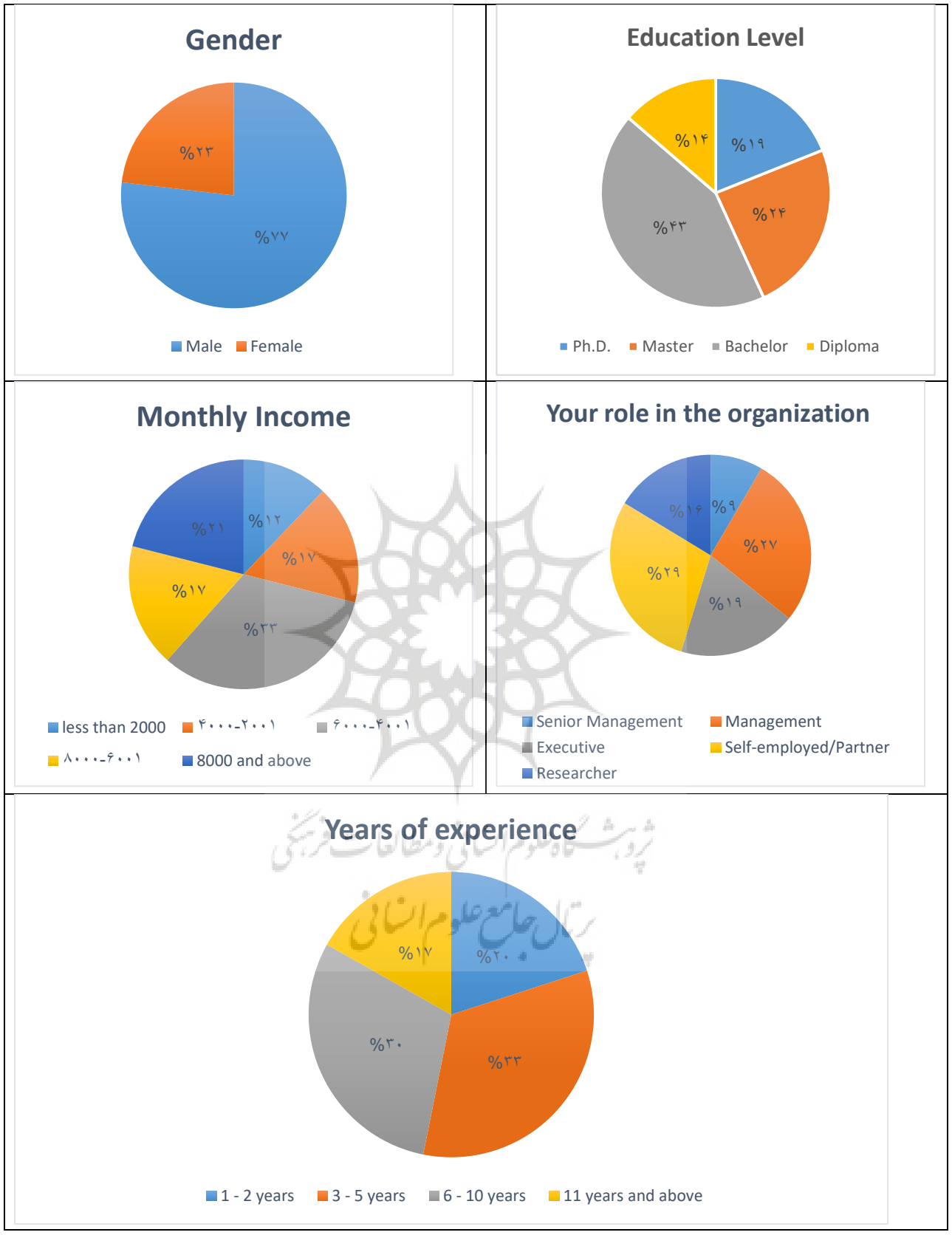


Chart 3. Respondents profiles

Descriptive analysis

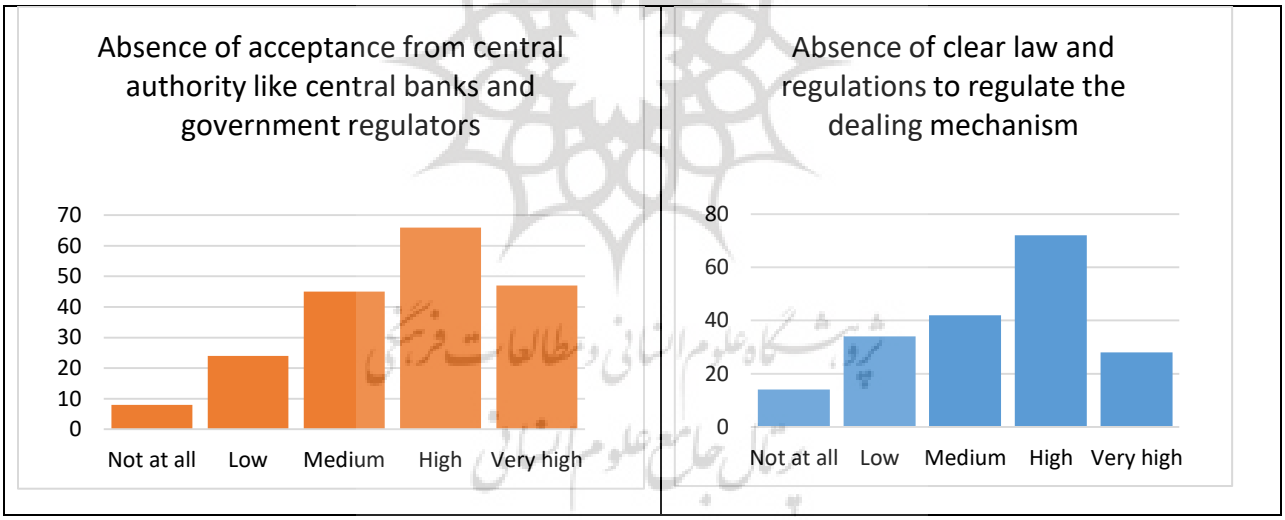
A descriptive analysis was performed in this study primarily to summarize and explain the main features of the dataset from standpoint of survey respondents in relation to every variable considered in this study.

Challenges facing blockchain implementation in Islamic banking industry (legal issues)

Respondents answers are aligned with the discussion above from the previous literature which are showing the challenging from the legal issues' standpoint. Whereas most of them agree on considering the usage of blockchain applications for some illegal and unethical activities such as money laundry, terrorism funding is the highest challenge blocking the way of this implementation.

Additionally, most of the respondents considered that the Absence of acceptance from central authority like central banks and government regulators and Lack of legal standards to standardize the activities under blockchain applications is more medium to low challenge.

The following figures support the idea of importance to consider the legal issues as one of the most challenges facing the implementation of blockchain in Islamic finance industry.



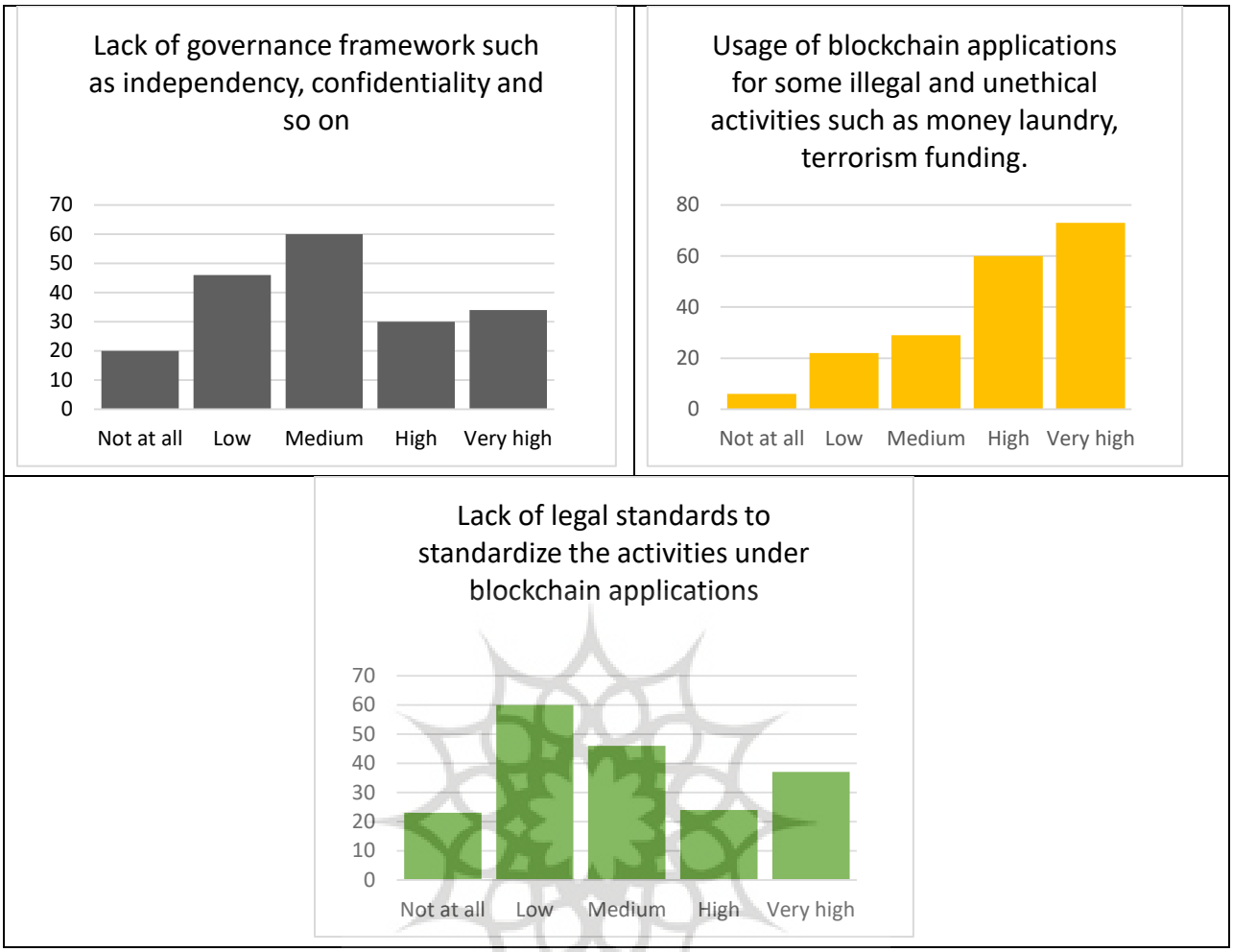


Chart 4. Challenges facing blockchain implementation in Islamic banking industry (legal issues)

Challenges facing blockchain implementation in Islamic banking industry (Security issues)

Regarding the respondents' point of view on the security issues as a challenge, most of them come to considerate the high cost for improving security is the highest challenge to face the implementation. Additionally, majority of respondents considered that the privacy leakage under blockchain applications is more medium to high challenge. These figures support the idea of importance to consider the security issues as one of the main challenges facing the implementation of blockchain in Islamic finance industry.

Chart 5. Challenges facing blockchain implementation in Islamic banking industry (Security issues)

Challenges facing blockchain implementation in Islamic banking industry (Technical Infrastructure)

Regarding the respondents' point of view on the technical infrastructure issues, the majority of them consider the complexity as the highest challenge facing the implemtation. Wheras regarding the scalability which leads for high storage size, mjority of respondents considered it as more low to medium challenge. Furthermore, the technical infrastructure issues, with different dimensions such as shifting cost, computational efficiency and immaturity are consistent with the

idea that relate to consider this issues part of the main challenges facing the implementation of blockchain in Islamic finance industry. Also we can figure from the following figures that all the technical infrastructure aspects are falling in the cluster of high and very high challenge to face the blockchain implementation in Islamic financial industry.

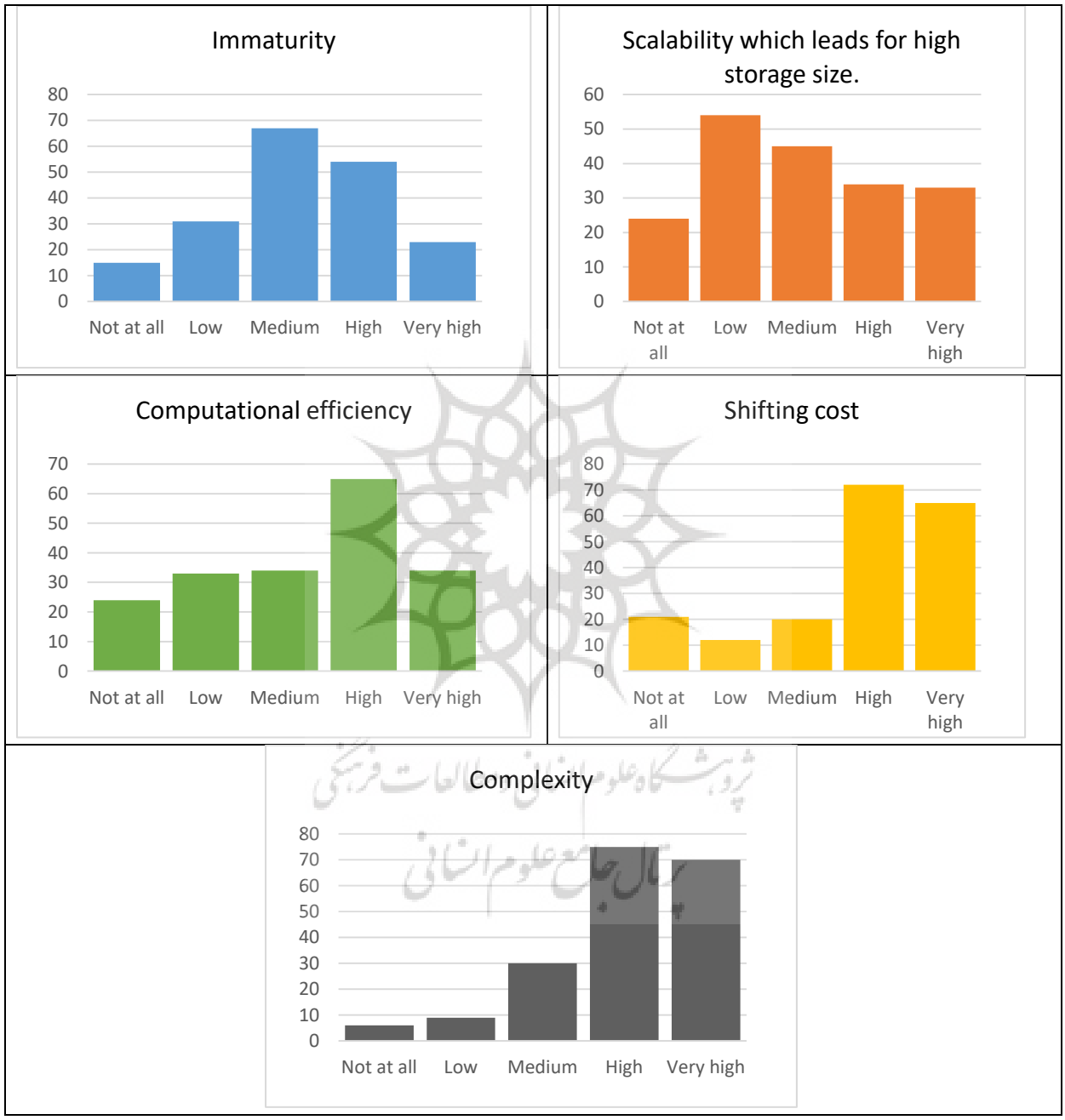


Chart 6. Challenges facing blockchain implementation in Islamic banking industry (Technical infrastructure)

Challenges facing blockchain implementation in Islamic banking industry (Shariah compliance)

Finally, the Experts' responses on the Shariah compliance support the idea of importance to include these issues as part of the main challenges facing the implementation of blockchain in Islamic finance industry. The following figures show most of the responses come to consider the lack of central Shariah supervision authorizing blockchain technology applications and absence of Shariah standards is the highest challenge facing the implemntation. Also majority of respondents considered that the lack of experts in both fields shariah and blockchain technology is more medium to high challenge.

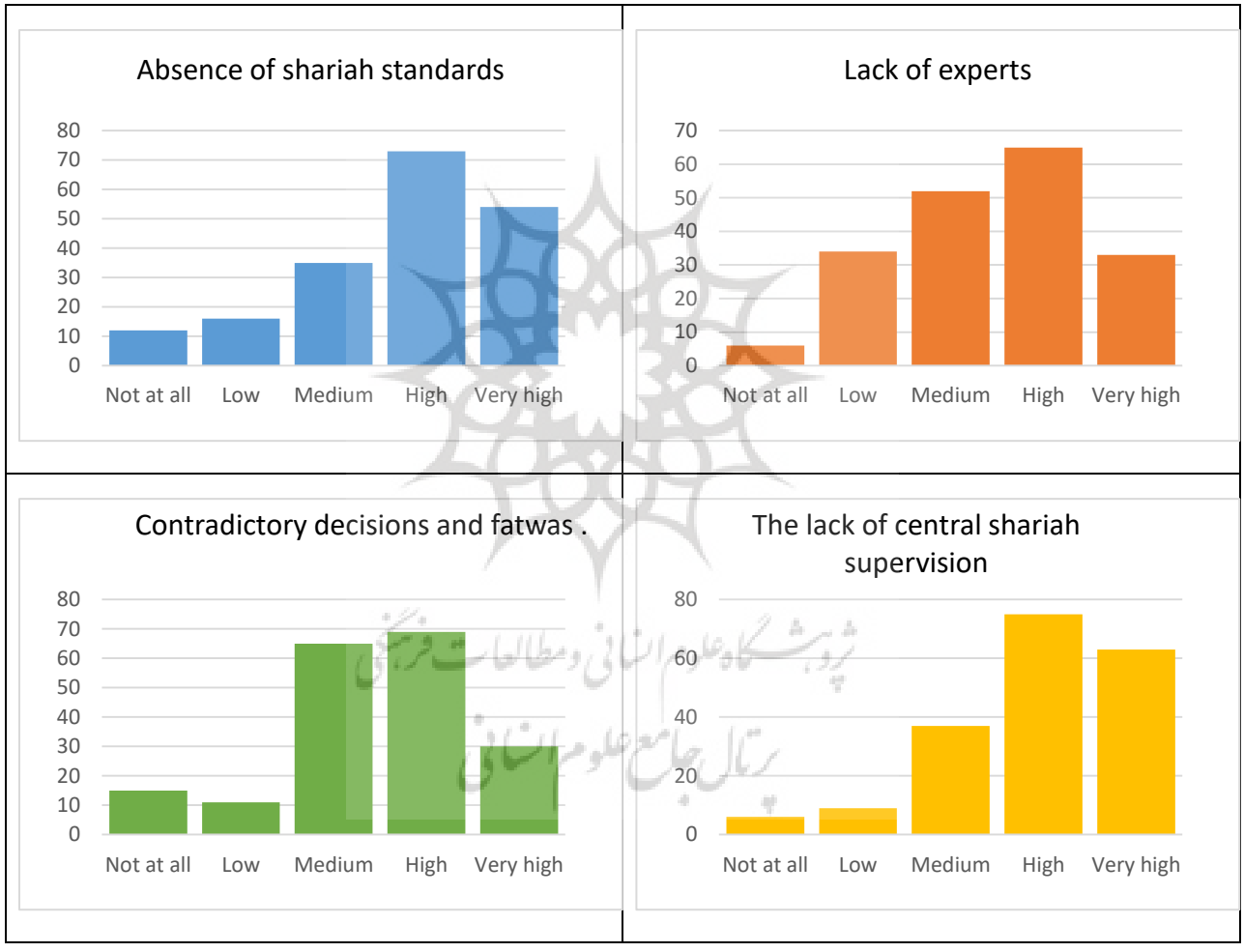


Chart 7. Challenges facing blockchain implementation in Islamic banking industry (Shariah Compliant)

Conclusion

Blockchain technology is gaining huge attention of financial institutions around the world, and especially Islamic financial institutions as it could be an upright solution for their issues and challenges.

The theoretical discussion and the descriptive analysis that performed in this study summarize and explain the main challenges of applying the blockchain in Islamic finance, by dividing it to four main categories which are the legal issues, security, technical infrastructure and Shariah compliance issues. The Experts' responses and opinions that have been collected in this survey were aligned with the discussion showing the challenging level of this different aspects.

Despite of all the challenges of applying the blockchain in Islamic finance, the opportunities and the benefits of this implementation would be highly recognized especially when some crisis affects the world such as the Covid-19. Which had attracted a huge attention of moving from traditional era to the internet-based era. Thus, the blockchain can be considered a crucial solvency on this new era of applying technology in Islamic finance to work efficiently and be a survivor player in the highly competent financial system.

Conflict of interest

The authors declare no potential conflict of interest regarding the publication of this work. In addition, the ethical issues including plagiarism, informed consent, misconduct, data fabrication and, or falsification, double publication and, or submission, and redundancy have been completely witnessed by the authors.

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