Proceedings of Femfest International Conference on Economics, Management, and Business

Volume 1, 2023
https://ejournal.unida.gontor.ac.id/index.php/JTS/index

Toward Digital Islamic Finance Technology by Blockchain

Sandiko Yudho Anggoro[1*], Khoirul Umam[2]

[1, 2] University of Darussalam Gontor, Indonesia
*Corresponding author(s). E-mail(s): sandikoyudho@unida.gontor.ac.id
Contributing authors: khoirulumam@unida.gontor.ac.id;

Abstract

Fintech has made new achievements with IoT by developing web 3.0. This was clarified by the rise of blockchain and bitcoin in 2009, as well as the emergence of digital art assets and the procedures for transacting. However, blockchain technology's advantages that bring are weaknesses at the same time, because it creates a quandary in the established digital financial order. In this case, digital Islamic finance which is still a start-up when compared to the capitalist makes it a dilemma, how to respond to the transformations and developments of this digital financial system. For this reason, this research tries to examine and offer a blockchain-based digital economic system. This study uses an in-depth interview method with several experts and uses a bibliometric approach to achieve it. The findings from this study performance the accountability of coins as currency has a balance of positive legal ethics transparency and the probability of prohibition in digital financial transactional. Furthermore, based on accountability and transparency the blockchain system can be a solution to some weaknesses in digital finance. The main idea of blockchain technology is a ledger that functions to record, confirm, and transfer data flawlessly.

Keywords: *Blockchain, Digital Finance, Islamic Fintech*

Introduction

The development of web 3.0 brought major changes to various lines of technology, including financial aspects that were egalitarian with technological developments. Offers for various financial sectors then grew widely and became something called fintech.(Mohamed & Ali, 2018) In this regard, 2009 was the forerunner to the creation of the blockchain, a technology that permanently changed the digital system.(Nakamoto, n.d.) Blockchain was formed simultaneously with the publication of bitcoin as a digital currency. Furthermore, since the introduction of Ethereum in 2015, blockchain technology has progressed to level two, and blockchain has been associated with the concept of the sharing economy by business academics.(Tan, 2021) From here, the fintech sector which has been leaning on the technological order little by little from the start a bit starting to shift 180 degrees towards the blockchain. One of the achievements born of the blockchain system is the art of digital assets that are familiar with the term NFT (Non-Fungible Token).(Ante, 2021; Blinova et al., 2022) However, the advantages that blockchain technology brings are at the same time a weakness because it creates confusion in the previous centralized financial order.(Atzori, 2015) On the other hand, the blockchain system also encourages the formation of a digital currency central bank as a reflection of currency sovereignty.(Chohan, 2022) Furthermore, various Islamic fintech sectors, which are mostly start-ups, are becoming the dilemma of how to respond to changes and developments in the digital financial system.(Alam et al., 2019) For this reason, the development of blockchain technology must be viewed in harmony with the development of fintech.

There are at least 121 Scopus articles related to the development of blockchain and Islamic law. In the last 5 years research to initiate an Islamic blockchain system consisting of Islamic law and blockchain technology itself has increased rapidly.

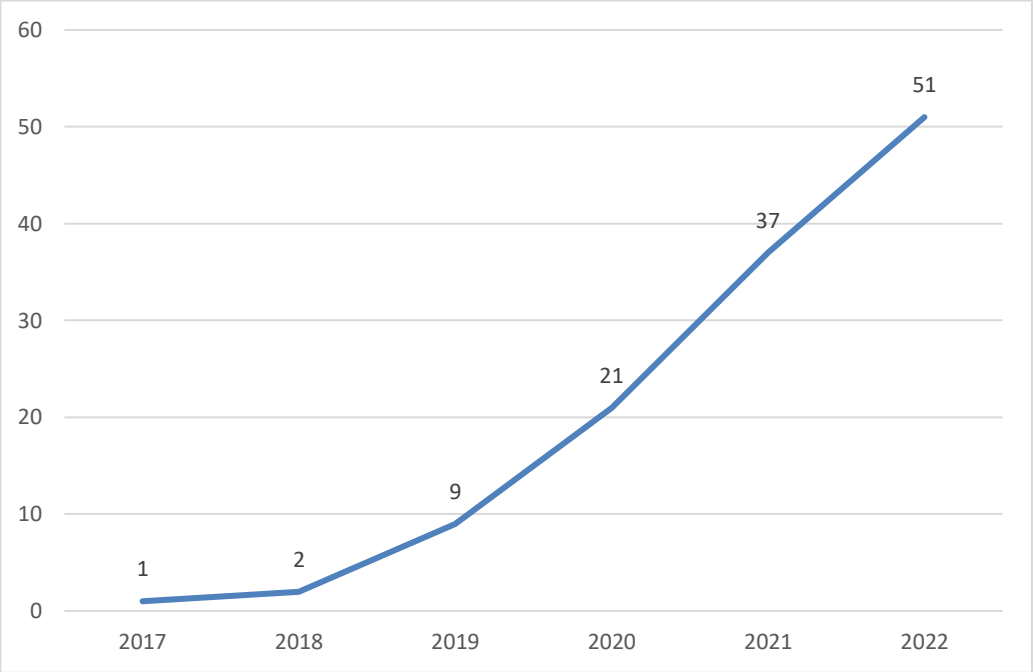

Figure 1 Research articles refined by years

Studies related to Blockchain and Islamic Law has basically been carried out by various authors before. A number of topics or focus of study also means that they have been studied a lot by these authors, especially those that are linear in their studies related to Blockchain and Islamic Law. Based on the Scopus selected articles data which processed by the researchers in Figure 1, it can be found that several names of the most dominant or massive authors studied the previous themes of Blockchain and Islamic Law. Matti Mäntymäki is the author with the highest study representation with five studies. Next followed by Assunta di Vaio and Nazrul Islam with four studies and Amandeep Dhir, Rohail Hassan, AKM Najmul Islam, Rosa Palladino, and Larisa Yarovaya with three studies. Finally, there are several names of authors such as Sreejith Balasubramanian, Puneet Kaur, Amir Masoud Rahmani, Vinaya Shukla, Anushree Tandon, Muhammad Umar with the same number of studies, namely two studies. A number of the names of these authors provide a positive value in studies related to Blockchain and Islamic Law. This is important because it provides updates and knowledge, especially in studies related to Blockchain and Islamic Law. In detail, the description can be seen in the Figure 2.

As explained by Anushree Tandona, Matti and Amandeep Dhir that Blockchain has gained substantial recognition for its ability to drive transformation and innovation in existing business models and frameworks.(Tandon et al., 2021) Consequently, the application of this technology to the management domain and the process has attracted increasing interest in academia and industry. Furthermore, Matti also explained that the reason why blockchain networks have not reached absolute convention is because disagreements within the

blockchain community often cause divisions in the blockchain and the community. (Islam et al., 2019)

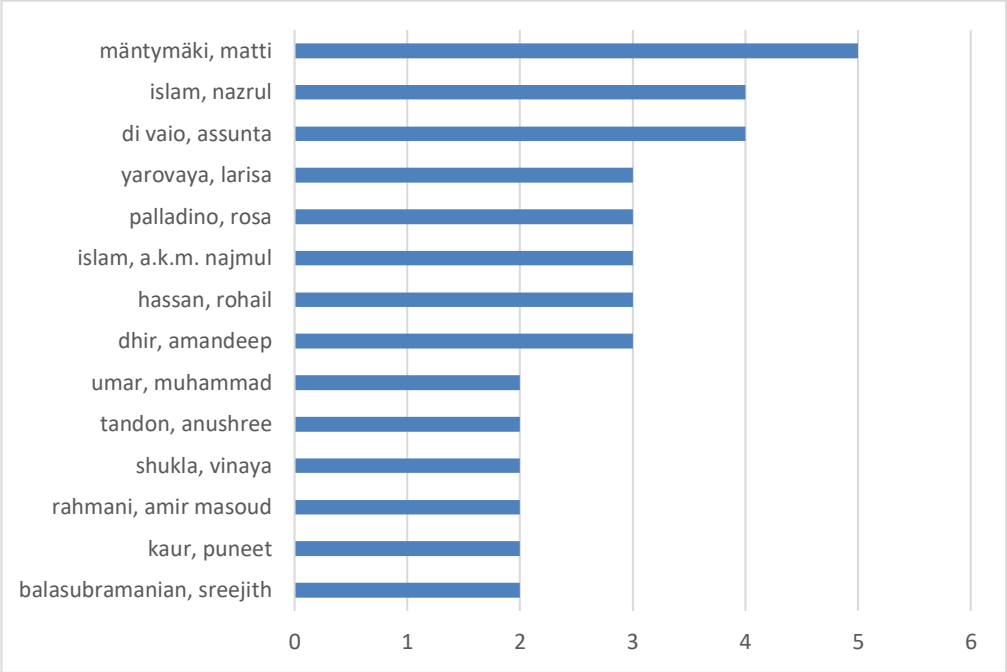

Figure 2 Study of Blockchain and Islamic Law by Name of Authors

The next elaboration will review the study of Blockchain and Islamic Law based on the field of science or scientific focus. Figure 3 described those studies related to Blockchain and Islamic Law are dominantly discussed within the scope of Business, Management and Accounting science with a representation of 34%. Furthermore, it can be seen that the next dominant study related to Blockchain and Islamic Law focused on Decision sciences with a representation of 19%. The next field of science is Economics, Econometrics and Finance sciences with a representation of 12% and followed by the scope of Computer sciences with a study representation of 16% and Social Science with a study representation of 15%. On the other hand, there are 4% of several scientific focuses which also have studies related to Blockchain and Islamic Law.

Based on the data graph shown above, researches concerning blockchain technology were only focusing on its transaction, its relation with cryptocurrencies and the structure of the system itself. Most researches criticized the system's decentralization problem and the difficulties on tracking its circulation. It is arguably true that this mechanism, along with all online transactions with their decentralized form, absent of any authoritative institution, could shock the conventional market. This raised many concerns because up until this time, the right and duty to manage the economy, especially the permit of money printing/making, was always the privilege of government authorities. But blockhain system has many advantages which enable it to bypass the government, both in economic regulations and money making. With this concern in mind, the author aims to reveal the system's probability and possibility of creating *gharar* (hazardous uncertainty), complemented with solutions should it actually happens.

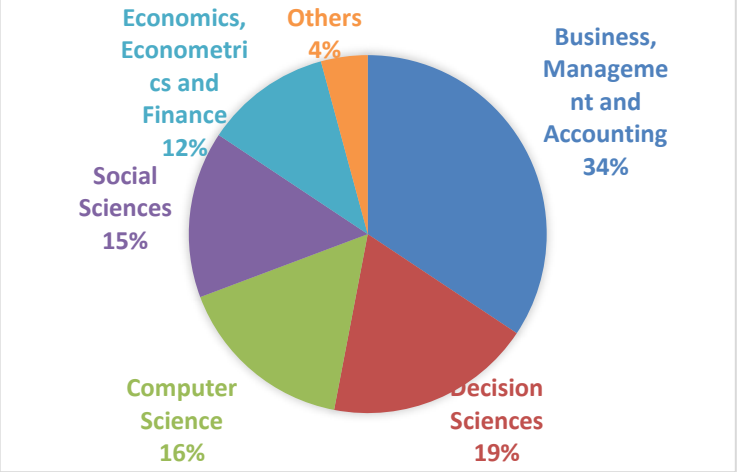

Figure 3. Study of Blockchain and Islamic Law by Field of Science

Furthermore, between human and non-human actors moving into micro and macro positions in the network affects the development of blockchain.(Islam et al., 2019) Finally, from this background this research tries to examine, examine, and offer a blockchain-based digital financial system in scope of Islamic law. This is based on the influence of blockchain in the development of fintech. Thus, consolidation of actors in homogeneous groups plays a key role in blockchain system agreement.

Material and Methods

To achieve the research objectives, this study uses a systemic literature review approach to ascertain the main roots of Islamic fintech problems. Then the initial results are confirmed by focusing on in-depth interviews with experts. A wide range of techniques, starting from keywords, document citations, even authors will be used in the bibliometric method as a whole.(Glänzel, 1995, 1999; Randhawa, 2016) Bibliometric analysis is a system of drawing conclusions that involves a multi-phase process. Its use for analyzing statistical tools is indispensable for mapping the state of the art of scientific knowledge and identifying important information for various purposes.(Mohadab et al., 2020; Oliveira et al., 2019) Thus, it is possible to open up the evolutionary nuances of a particular scope to find clusters,(Donthu, 2021) such as fintech islamic blockchain governance.

The descriptive analysis using the systematic literature review method will be processed through the VOS viewer application as a data processing tool. By using the VOS viewer analysis tool the data obtained will be easier to describe. The main data is obtained from selected articles that have been reviewed to find the dominant concepts around Islamic fintech and blockchain. In this case the article data includes such as citation analysis, author co-citation analysis, document co-citation analysis, co-word analysis, and textual analysis.(Glänzel, 2002) To achieve the objectives of this research, cross-disciplinary literature on blockchain is focused, especially on document co-citation clustering analysis.(Randhawa, 2016) Finally, this method uses a descriptive approach to obtain reliable, valid and explicit information. from experts in their respective fields. To build a systematic methodology in Islamic economics, a philosophical foundation is needed.

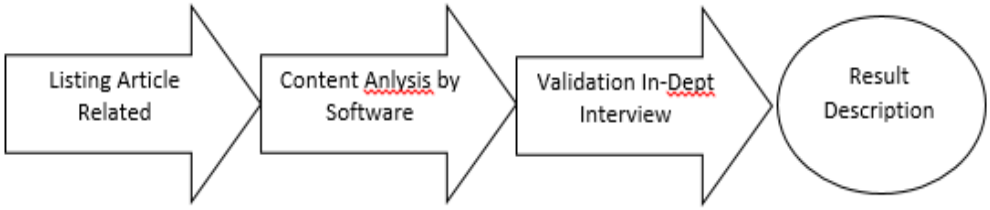

Figure 4. Methods in data collection

Result and Discussion

Previous study has shown theories and concepts about blockchain-based transaction systems have applied to the rising many features. Blockchain technology has been recognized as one of the potential technologies to be utilized in the capital market, for those several digital cryptocurrencies were underlain by blockchain technology. The framework for the blockchain system by Jānis Bauvars (2021) is applied to assess the blockchain technology to settle securities. Blockchain technology can be applied to securities settlement, otherwise, the blockchain type that is used must be a private blockchain with a proof-of-authority consensus mechanism.(Bauvars, 2021) So, the blockchain technology model has the potential to increase some of the current securities resolution problems, such as expensive reconciliation and difficult cross-border securities.

This technology stores information with digital signatures in decentralized and distributed networks. Some of the blockchain superiority include decentralization, eternity (no hack), transparency, audit capabilities, and make-save transactions. Like a Monrat (2019) said, besides cryptocurrency, blockchain technology can be used in many features such as financial and social services, risk management, health facilities, and so on.(Monrat et al., 2019) An initiative of the blockchain assessment from an evolutionary perspective technology has developed in a broader scope than cryptocurrency and asset management.(Colomo-Palacios et al., 2020) Also, blockchain architecture can be used to build a very reliable network IoT. (Kim et al., 2021) Because, Internet of Things (IoT) networks usually consists of many sensors and actuators. Operation control for artificial intelligence, robots in smart factories, or drones produces enormous data volumes that require high reliability. From this point, blockchain is considered the latest innovation in technology, but no one has examined the transaction procedures on virtual market based on blockchain. In addition, the use of VOS viewer analysis tools aims to see how the dominant concepts in the study are related. It is believed to be able to present data that is truly relevant in studies. Some of the dominant concepts in the study of related themes in detail can be seen in the following figure 5 and 6.

Based on the data described in figure 5, it can be understood that there are several dominant concepts in the related. Some of the dominant concepts are as follows: cryptocurrency, market, barrier, and network. Some of these concepts are the most massively discussed or the dominant focus in previous studies related to Blockchain and Islamic Law. On the other hand, there are several concepts that are also discussed in this study, such as Islamic fintech, community, platform, economy, risk, bitcoin, money, and NFTs.

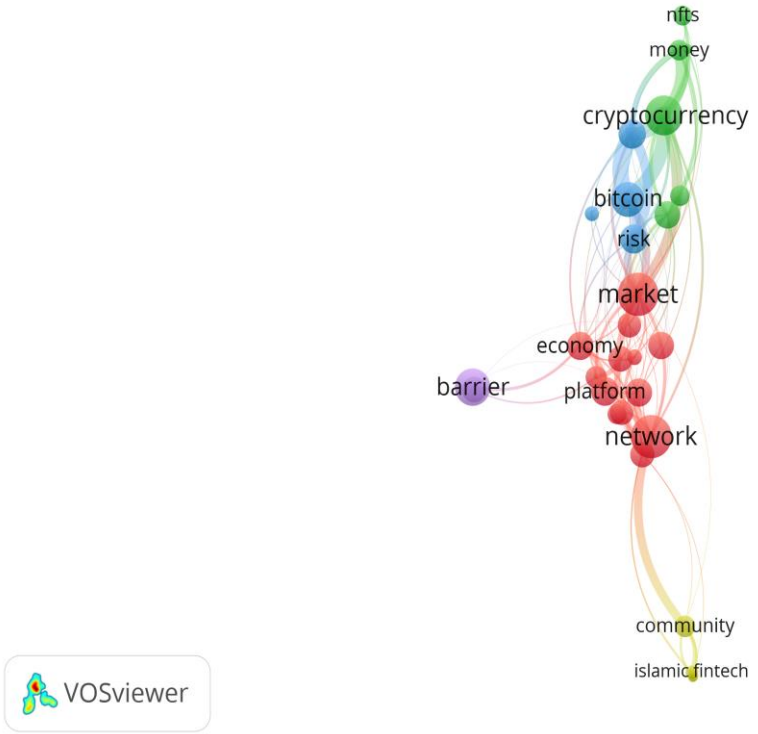

Figure 5. The Relation of Concepts in the Study of Blockchain

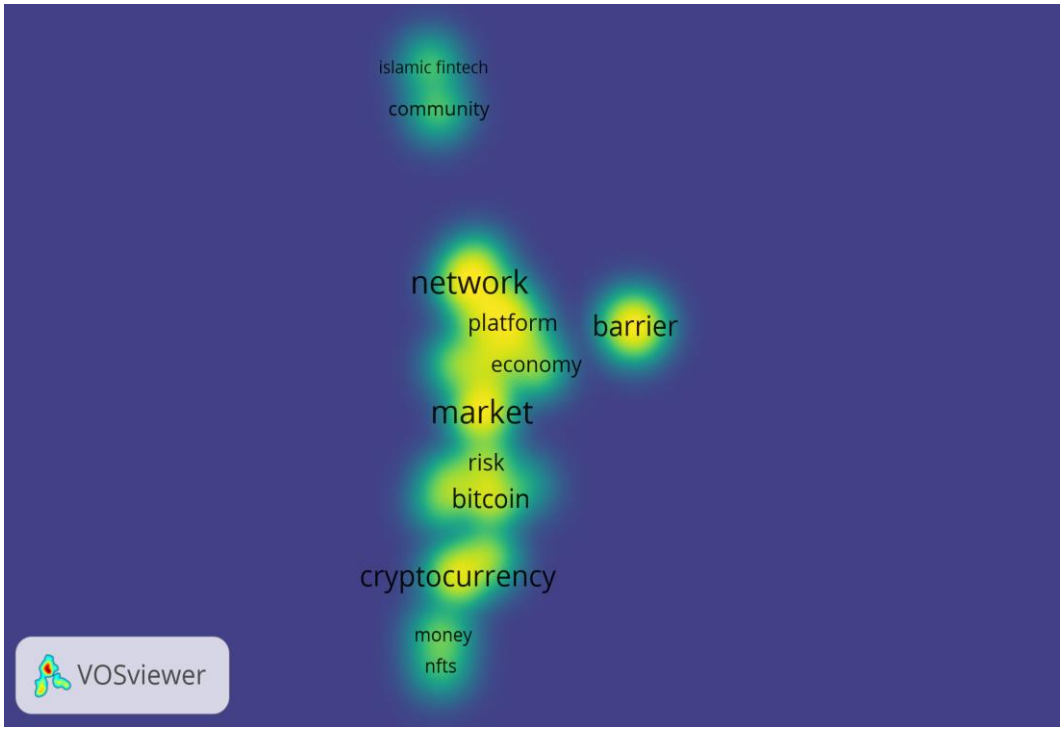

Figure 6. Dominant Concepts in Blockchain

Furthermore through the vosviewer co-occurance analysis, out of 1000 journal articles obtained through cross-reff ranking, 3467 terms were obtained and re-selected into 2080 terms related to blockchain discussion, then re-selected to 1060 related to blockchain and finance and re-selected to 109 related to Islam from the 109 terms, 65 selected articles are determined because there are at least 10 terms out of the 109, with manual data collected based on each of the references contained in the 65 selected articles, a co-citation matrix analysis

was carried out using bibexel in which 13 articles did not show linkage/correlation, from this, 52 recommended articles were obtained. And from 109 terms it is reduced again to 59 terms of the 52 related articles, followed by hierarchical cluster analysis using Instant Clue to determine clusters of 109 terms from the remaining 52 articles, followed by k-means clustering to determine sub-domains.

Table 1. Keywords Categorized by Cluster

Cluster	Sub Cluster	Terms
Implementation	Monetary Instrument	Cryptocurrencies, Coins, Tokens, World, Regional, Ledger, L/C
	Financial Services	Fintech, Payment, Settlement, Capital Market, Crowdfunding, P2P Lending, Neo-Banking, Asset, Insurance, Sukuk, Smart City
Operation	Compliance	Legal, Trust, Reciprocity, Contract, Intellectual, Property, Accounting, Sharia
	Infrastructure	Internet, Network, Sharing, Databases, Processing, Storage, Communication, Cybersecurity, Cloud-computing, Big Data, IoT, AI, Machine Learning, Deep Learning
Challenge	Governance	State, Regulatory, Management, Platform, Protocol, Global
	Market	Transaction, Trade, Bussiness, Ecosystem, Customer, Agility, Scalability, Opportunity, Supply Cain, Logistic, Company, Agriculture, Education, Art

Looking at the exposure to the data set out in table 1, it can be understood that in general there are three cluster categorizations in related studies of Blockchain and Islamic Law to make Islamic fintech flow. The cluster distinctions are classified based on the similarity of dominant concepts or keywords between one another. The drawing of the described net indicates the existence of a concept linkage in each cluster.

Based on some of the previous descriptions, it can be found that there are several dominant topics discussed related to Blockchain and Islamic Law. The first dominant topics of the study was the cryptocurrency. Studies related to this concept can be seen, for example, in the study conducted by Dodik Siswantoro, Rangga Handika, Aria Farah Mita (2020) under the title, the requirements of cryptocurrency for money, an Islamic view. This research aims to evaluate the suitability of cryptocurrency as money from the Islamic perspective. Money, in the Islamic perspective, has specific characteristics and requirements, such as stability and is based on assets. Cryptocurrency may not fulfil this as it has queries as money from the Islamic perspective. The research method applied data of 23 cryptocurrency prices and related information. The result shows that cryptocurrency is hugely volatile and has limits to being called money, as it is limited and used for speculation, which is prohibited in Islam. The

research implies that Muslims would be reluctant to use cryptocurrency as money, as a currency of transaction. This reason raises an expectation that the cryptocurrency will not develop rapidly in Muslim countries.

The second dominant topic related to Blockchain and Islamic Law was market. Studies related to this concept can be seen, for example, in the study conducted by Walid M.A. Ahmed (2021), How do Islamic equity markets respond to good and bad volatility of cryptocurrencies? The case of Bitcoin, which investigates the differential sensitivity of Sharia-compliant stocks to Bitcoin's realized volatility of positive and negative intraday returns in bear, normal, and bull market states. We use a quantile regression approach, after orthogonalizing raw equity returns with respect to a variety of relevant global factors and accounting for structural breaks in the data. For developed markets, the results indicate that upside volatility tends to exert contemporaneous and lagged negative influences on Islamic stocks more in bear than in bull market conditions, whereas the downside counterpart positively affects returns when Sharia-compliant equities are in bear and bull phases. For emerging markets, we find that Bitcoin's upside (downside) volatility has lagged negative (positive) effects on returns across all market regimes. The dependence structures tend to be asymmetric and have noticeably become stronger in the last two years than in earlier periods of the sample. Our evidence offers important implications for investors.

The third dominant topic related to Blockchain and Islamic Law was barrier. Studies related to this concept can be seen, for example, in the study conducted by Iman Ghasemian Sahebi, Behzad Masoomi, Shahryar Ghorbani (2020), Expert oriented approach for analyzing the blockchain adoption barriers in humanitarian supply chain, which aims to present a comprehensive review of blockchain adoption barriers in the context of humanitarian supply chain management. An integrated approach using Fuzzy Delphi and Best-Worst method (BWM) has been used for analyzing the barriers. Based on the literature, 14 barriers of the blockchain adoption in humanitarian supply chain were identified. According to the Fuzzy Delphi result, 9 barriers were accepted. After that, the BWM calculated the importance of each barrier. The findings showed that regulatory uncertainty, lack of knowledge/employee training and high sustainability costs are the important barriers. This research provides useful guidelines for policy makers so that they can benefit from the results to optimize their solutions.

The fourth dominant topic related to Blockchain and Islamic Law was network. Studies related to this concept can be seen, for example, in the study conducted by Nazanin Zahed Benisi, Mehdi Aminian, Bahman Javadi (2020), Blockchain-based decentralized storage networks: A survey, which presents a comprehensive survey on the blockchain-based storage systems and how they work and then compares them with cloud-based storage networks. Also an overview on the advantages and also weak points of blockchain-based storage systems and a discussion about future research directions.

Thus, AI-enhanced Blockchain creates the possibility to coordinate transactional activities through strong mechanisms of trust and transparency in the new global economy. Especially in matters of the financial system, Blockchain technology will operationalize trust mechanisms and will become commonplace through the proliferation of cryptocurrencies, smart contracts, full-reserve lending platforms, transfers, public registries, document consolidation, and other processes that have not been imagined. This will allow banks to facilitate trading transactions between their clients by offering greater transparency, more automation and lower risk. Also, blockchain technology can increase the accountability and transparency of Islamic economic finance. In this case there are at least 6 things that must be considered monetary instruments, financial services, compliance, infrastructure, governance, and market.

Conclusion

Trading on the Internet relies almost entirely on financial institutions that serve as trusted third parties to process electronic payments. While this system works reasonably well for most transactions, it still has the inherent drawbacks of the trust-based transaction model. The solution needed is an electronic payment system based on cryptographic evidence rather than trust, which allows two willing parties to transact directly with each other without the need for a trusted third party. Transactions that are computationally impractical to reverse protect sellers from fraud, and routine escrow mechanisms can easily be implemented to protect buyers. Based on research problems related to technological accountability and transparency, blockchain can be a solution to some of the weaknesses that digital Islamic finance currently has. The main idea is that the decentralized transaction ledger function of the blockchain can be used to register, confirm, and transfer all kinds of contracts and property. In this case there are at least 6 instruments that must be considered to maximize the potential of blockchain in overseeing the Islamic fintech system. These six things are monetary instruments, financial services, compliance, infrastructure, governance, and market.

References

Alam, N., Gupta, L., & Zameni, A. (2019). *Fintech and Islamic finance*. Springer. https://link.springer.com/content/pdf/10.1007/978-3-030-24666-2.pdf

Ante, L. (2021). Non-fungible token (NFT) markets on the Ethereum blockchain: Temporal development, cointegration and interrelations. *SSRN Electronic Journal*, *22*, 1–23. https://doi.org/10.2139/ssrn.3904683

Atzori, M. (2015). Blockchain technology and decentralized governance: Is the state still necessary? *Available at SSRN 2709713*, *Query date: 2022-06-19 10:43:18*. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2709713

Bauvars, J. (2021). Applicability of Blockchain Technology in Securities Settlement. *Complex Systems Informatics and Modeling Quarterly*, *28*, 34–58. https://doi.org/10.7250/csimq.2021-28.03

Blinova, U. Yu., Rozhkova, N. K., & Rozhkova, D. Yu. (2022). The phenomenon of NFT (non-fungible tokens) as an accounting entity. *Vestnik Universiteta*, *11*, 103–109. https://doi.org/10.26425/1816-4277-2021-11-103-109

Chohan, U. (2022). Central Bank Digital Currencies (CBDCs). *Available at SSRN*, *Query date: 2022-06-26 06:10:41*. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4052577

Colomo-Palacios, R., Sánchez-Gordón, M., & Arias-Aranda, D. (2020). A critical review on blockchain assessment initiatives: A technology evolution viewpoint. *Journal of Software: Evolution and Process*, *32*(11), 1–11. https://doi.org/10.1002/smr.2272

Donthu, N. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, *133*(Query date: 2022-12-05 13:50:25), 285–296. https://doi.org/10.1016/j.jbusres.2021.04.070

Glänzel, W. (1995). A bibliometric study on ageing and reception processes of scientific literature. *Journal of Information Science*, *21*(1), 37–53. https://doi.org/10.1177/016555159502100104

Glänzel, W. (1999). A bibliometric study of reference literature in the sciences and social sciences. *Information Processing and Management*, *35*(1), 31–44. https://doi.org/10.1016/S0306-4573(98)00028-4

Glänzel, W. (2002). Journal impact measures in bibliometric research. *Scientometrics*, *53*(2), 171–193. https://doi.org/10.1023/A:1014848323806

Islam, A., Mäntymäki, M., & Turunen, M. (2019). Why do blockchains split? An actor-network perspective on Bitcoin splits. *Technological Forecasting and …, Query date: 2022-06-19 17:03:36*. https://www.sciencedirect.com/science/article/pii/S0040162518319711

Kim, J. H., Lee, S., & Hong, S. (2021). Autonomous operation control of IoT blockchain networks. *Electronics (Switzerland)*, *10*(2), 1–16. https://doi.org/10.3390/electronics10020204

Mohadab, M. E., Bouikhalene, B., & Safi, S. (2020). *Bibliometric method for mapping the state of the art of scientific production in Covid-19*. https://doi.org/10.1016/j.chaos.2020.110052

Mohamed, H., & Ali, H. (2018). *Blockchain, Fintech, and Islamic Finance: Building the Future in the New Islamic Digital Economy*. De Gruyter. https://doi.org/10.1515/9781547400966

Monrat, A. A., Schelén, O., & Andersson, K. (2019). A survey of blockchain from the perspectives of applications, challenges, and opportunities. *IEEE Access*, *7*, 117134–117151. https://doi.org/10.1109/ACCESS.2019.2936094

Nakamoto, S. (n.d.). *Bitcoin: A Peer-to-Peer Electronic Cash System*. 9.

Oliveira, O., Silva, F. F. da, Juliani, F., Barbosa, L. C. F. M., & Nunhes, T. (2019). *Bibliometric Method for Mapping the State-of-the-Art and Identifying Research Gaps and Trends in Literature: An Essential Instrument to Support the Development of Scientific Projects*. https://doi.org/10.5772/intechopen.85856

Randhawa, K. (2016). A Bibliometric Review of Open Innovation: Setting a Research Agenda. *Journal of Product Innovation Management*, *33*(6), 750–772. https://doi.org/10.1111/jpim.12312

Tan, T. M. (2021). Ethical Marketing in the Blockchain-Based Sharing Economy: Theoretical Integration and Guiding Insights. *Journal of Business Ethics*, *Query date: 2022-06-30 06:09:57*. https://doi.org/10.1007/s10551-021-05015-8

Tandon, A., Kaur, P., Mäntymäki, M., & Dhir, A. (2021). Blockchain applications in management: A bibliometric analysis and literature review. *Technological Forecasting and Social Change*, *166*, 120649. https://doi.org/10.1016/j.techfore.2021.120649