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Aysan, Ahmet Faruk and Unal, Ibrahim Musa

Hamad bin Khalifa University

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A Bibliometric Analysis of Fintech and Blockchain in Islamic Finance

Ahmet Faruk Aysan

Professor & Program Coordinator, Ph.D. in Islamic Finance and Economy

Hamad Bin Khalifa University,

College of Islamic Studies, Qatar Foundation

aaysan@hbku.edu.qa

ORCID: 0000-0001-7363-0116

Ibrahim Musa Unal

Ph.D. in Islamic Finance and Economy

Hamad Bin Khalifa University,

College of Islamic Studies, Qatar Foundation

unal3451@gmail.com

ORCID: 0000-0001-6802-8446

Abstract

This paper conducts a bibliometric research in the literature on Fintech and Islamic finance. The data of this study consists of relevant articles obtained from the Scopus database as of February 2021. A keywords bundle related to Islamic finance and keyword has been used for the search, resulting in 89 publications included in this research. Results show the stunning increase in the Islamic Fintech publications after 2017, mainly in the fields of cryptocurrencies, micro-finance, impact investing, and SRI investing, and so on. The two main centers of Islamic Fintech research are Malaysia-Indonesia Region and the GCC area. The increasing number of Islamic Fintech publications show the potential of the field for the industry's future.

Keywords: Fintech, Islamic, bibliometric, blockchain, cryptocurrency

JEL Codes: G19; E4

Fintech And Blockchain in Islamic Finance: A Bibliometric Analysis

1. Introduction

The technology boom that humankind experience in the 21st century affects the financial area significantly as well. Fintech is one of the most trending regions within economic studies worldwide and can be defined as the use of innovative and disruptive technology for providing financial services (Rabbani, 2020). Although the term fintech was in use since the early 21st century, it became more popular in the late 2010s in the research area (Haddad, 2019).

Increasing global competition in the financial sector triggered a new seeking for cost minimization strategies for financial institutions, and using disruptive technologies has been preferable for this aim. The friction of transaction costs is one of the main challenges within financial services. Reducing them would significantly help the institutions to gain a competitive advantage, which fintech would provide efficiently (Anikina et al., 2016).

Another reason for fintech to emerge in the 2010s is, no doubt, the loss of trust in the financial institutions with the sub-prime crisis (Abdelsalam et al., 2021). While the recovery from the crisis was ongoing, people started looking for new strategies to establish their investments more trustable and transparently (Rabbani, 2020). Therefore, the idea of decentralizing the financial systems and using open-source bookkeeping attracted people (Aysan et al., 2021)¹, which afterward started the rapid establishment of fintech and blockchain technologies.

¹ One may see some of the related works of the authors as follows in the references: Akyıldırım, E., Aysan, A.F., Cepni, O. & Ceyhan Darendeli, S.P. (2021), Aysan, A. F. (2021a), Aysan, A. F., Demirtaş, H. B. & Saraç, M., (2021b), Aysan, A. F., Disli, M., Nagayev, R., Rizkiah, S. K. & Salim, K. (2021c), Abdelsalam, O., Aysan, A. F., Batten, J. A., & Chantzias, A., (2021d), Aysan, A. F., Muğaloğlu, E., Polat, A. Y. & Tekin, H., (2021e), Aysan & Bergigui (2020), Aysan, A. F., Kayani, F. & Kayani, U. N., (2020). Aysan & Güler & Orman (2013) and Aysan & Güler & Orman (2013a).

PWC (2019) estimates that global Fintech investment will exceed USD1.5B in the next 3 to 5 years. Until the Fintech boom, financial institutions were stuck in finding innovative solutions (Aysan et al., 2021). They were in dire need of finding paths to increase efficiency and reduce costs, and fintech opened new horizons for financial institutions in this regard (Tornjanski et al., 2015).

Fintech, as a term first mentioned by Abraham Leo Bettinger in 1972 with the following words: "Fintech can be defined as a contraction which combines bank experience and expertise with information technology" (Bettinger, 1972). However, the emergence of fintech reaches earlier times. The first action for fintech is the transatlantic cable laying project in 1866, which is also accepted as the starting date for Fintech 1.0 (Ahmi et al., 2020). Table-1 summarizes the evolution of fintech with four main eras (Ahmi et al., 2020).

Table 1: Evolution of Fintech

Era	Period	Technology Evolution	Some Innovations in FinTech
FinTech 1.0	1866-1967	Analog technology	1866: Transatlantic Cable 1918: Fedwire Funds Service 1934: IBM®801 Bank Proof Cash Machine 1945: Cheques 1950: Diner's Club 1958: Credit Card 1966: Telex
FinTech 2.0	1967-2008	Digitalization and Globalization	1967: ATMs 1971: NASDAQ invented Electronic trading and IPO 1973: Society for Worldwide Interbank Financial Telecommunication (SWIFT) 1981: Bloomberg – Innovative Market Solutions (IMS) 1982: TradePlus 1990s: Internet Banking 1993: Citicorp initiate Financial Services Technology Consortium 1995: Online checking account 1995: First Virtual Bank – Security First Network Bank 1997: First Mobile Payment 1998: PayPal 2000: Crowdfunding 2006: Amazon Web Services (Cloud Computing)
FinTech 3.0	2008-2014	Global Financial Crisis, ushered a new age of FinTech startups and rapid digitalization and revolution in FinTech	2009: Cryptocurrencies (Bitcoin) 2011: Google Wallet 2013: Apply Pay (Digital Wallet/Mobile Payment)
FinTech 3.5	2014-2017	Market Reform	2014: Blockchain Technology R3 is formed 2015: Hyperledger 2016: First FinTech bachelor program 2017: Cryptomina - Coinbase
FinTech 4.0	2018-present	Industry Revolution 4.0.	

Source: Ahmi et al., 2020

The Islamic finance world reasonably welcomes Fintech innovations as well. With some extra challenges, Islamic finance's core competencies are often in line with the innovations that fintech promises. Moreover, technological developments that fintech brings into the finance world can support protecting Islamic finance's salient values such as transparency, ethical business standards, capital, risk-sharing philosophies, etc. The general design of fintech shared capital aligns with

Shariah requirements, allowing individuals and institutions to establish risk-sharing mechanisms better. The transparency and ethical business philosophy also can be obtained clearly by the public bookkeeping feature of blockchain technology (Gomber, 2018). Combining these and ore facts with the potential of fintech shows that Islamic finance² has a more considerable potential than its conventional counterpart in terms of catching up with the Fintech innovations (Rabbani, 2020).

Moreover, Islamic finance, especially micro-finance institutions, needs to significantly increase their cost-effectiveness, as their profit margins are very narrow. Using fintech helps these organizations make online and instantaneous transactions, thus minimizing the transaction friction in time and money. As these organizations often focus on narrow-income people who live in rural areas, these people's reachability and financial inclusion are other main challenges. The fact that smartphones became very widespread and most banking transactions can be obtained with the mobile branches help these institutions reach more people and enlarge their volume (Aysan et al., 2013). Thus theoretically, they will enjoy the economies-of-scale advantage better. Additionally, the overall benefits of increasing the financial inclusion for an economy would be obtained with these features of Islamic Fintech.

Besides all these advantages, Islamic finance has certain disadvantages for adopting fintech as well. Two main challenges are the lack of trained human force and clear policies from governments (Rusydiana, 2018). An overall ecosystem with organizations, institutions, and regulations would bring a more efficient development for Islamic Fintech and give Islamic finance a better competitive position against its conventional counterpart. Non-Islamic institutions have a size

² For the sample of Islamic finance and banking paper, see the work of Aysan et al. At various years in the references, (Aysan et al. 2017, 2019)

advantage in Fintech investments, and the Islamic finance world needs to find practical and creative solutions for closing this gap.

Lastly, the Muslim population is expected to be 3 billion in 2060, and countries such as Malaysia, Indonesia, and the United Kingdom are leading Islamic Fintech around the globe (Cooper, 2018). Therefore, strong positioning in the Fintech world for Islamic finance is vital from many dimensions. With all negative and positive aspects, Islamic finance gives more attention to fintech, and the increasing number of research papers in the literature proves this interest. Especially after 2010, researchers focus on the areas such as Islamic Fintech, blockchain, and its usage in Islamic financial institutions, micro-finance and fintech, and many more.

The literature has reached a significant volume on these issues. Evaluating the quantity and quality of existing literature would help researchers better understand how Islamic Fintech will move in the future. In this regard, this paper conducts a bibliometric research in the literature on Fintech and Islamic finance.

Although the birth of the term "bibliometric" is often mentioned together with Pritchard (1969), it became very famous in recent times. Bibliometric research classifies and analyses the existing literature in a particular area and helps readers understand the journals, authors, countries, and keywords under the spotlight (Ahmi & Mohamad, 2019). Hence, the future direction of research would be more accurately predicted, and therefore, it will be a helpful guide for researchers.

2. Data & Methodology

The data of this study consists of relevant articles obtained from the Scopus database as of February 2021. Following keyword search is used to limit the scope of the research; (*Islamic OR "islamic banking" OR "islamic finance"*) AND (*Fintech OR "financial technology" OR "financial*

technologies") OR (crypto OR cryptocurrency OR cryptocurrencies OR bitcoin OR blockchain OR "digital currency"), from the title, abstract or keywords of the articles. The research outcome of the field in Scopus started in 2011; therefore, we limit the period to the last ten years.

With this query, 89 papers have occurred for this bibliometric analysis. Selected papers are exported, and the investigation is conducted in Microsoft Excel and VOS viewer (www.vosviewer.com) apps simultaneously.

Bibliometric studies collect all articles about the particular issue and classify them by their aspects such as year, keywords, journal, author, country, and many more. For more consistency, studies are often limited to a specific timespan and database(s). Visualization techniques such as tables, word clouds, co-occurrence and co-existence graphs, and various other matrices help understand the study better (Eck & Waltman, 2017). All these techniques shall be applied to the selected area in the next chapter.

3. Results and Analysis

As fintech is relatively new, the articles about Islamic Fintech started to take place in the literature roughly in the last ten years. Therefore, we limited this study between 2010 and the present day. Figure 2 shows the number of publications by year. Islamic Fintech research started trending in 2017-2018, and the interest in this area increases continuously since then. There are four publications in 2021 (until early February), and with this ratio, it is highly expected that 2021 will exceed 2020. Moreover, considering the exponential increase of the conferences, seminars, reports, and many other clusters about Islamic Fintech, especially in the Malaysia-Indonesia region and the GCC area, the interest in Islamic Fintech is expected to grow sharply in the future.

Year	Number of Published Articles	Percentage (N=89)	Cumulative Percent	Growth Rate
2011	1	1.12%	1.12%	
2013	2	2.25%	3.37%	100%
2014	1	1.12%	4.49%	-50%
2016	1	1.12%	5.62%	0%
2017	4	4.49%	10.11%	300%
2018	13	14.61%	24.72%	225%
2019	28	31.46%	56.18%	115%
2020	35	39.33%	95.51%	25%
2021	4	4.49%	100.00%	-89%
TOTAL	89	100%		

Figure 2: Number of publications by year

These publications include mostly articles by 65%. This ratio shows the interest of academia in Islamic Fintech and its potential for development in the future. Conference papers, book chapters, and erratum have similar percentages, around 9 to 10%. There are also five books and two conference reviews in the dataset.

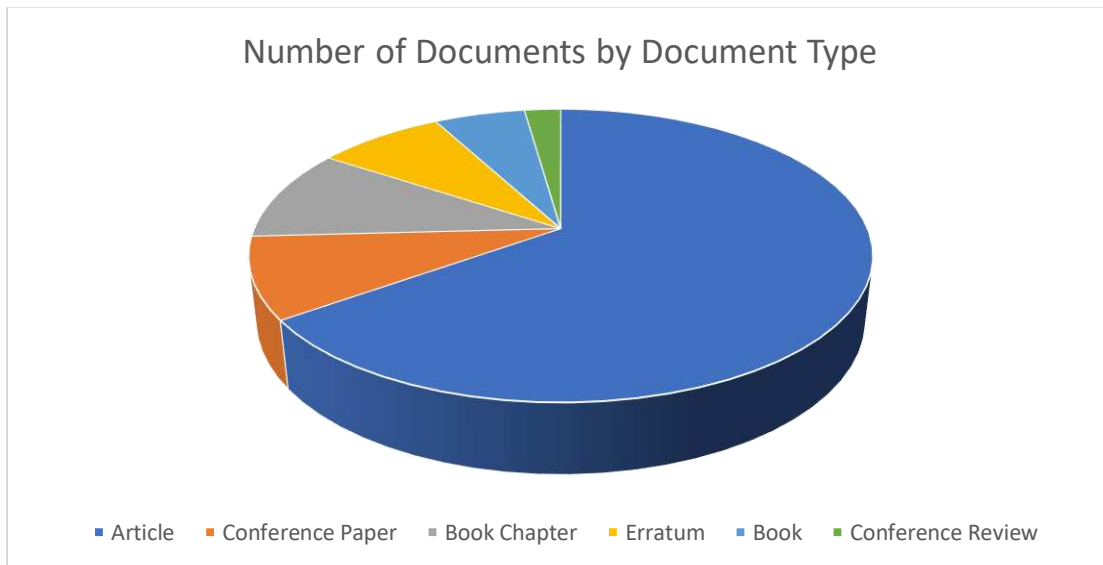


Figure 3: number of publications by document type

Related to the document types, most of the sources of these publications are from journals, followed by books and conference proceedings. There are five books and seven book chapters, completing the number of book sources to 12, and eight conferences related to these publications.

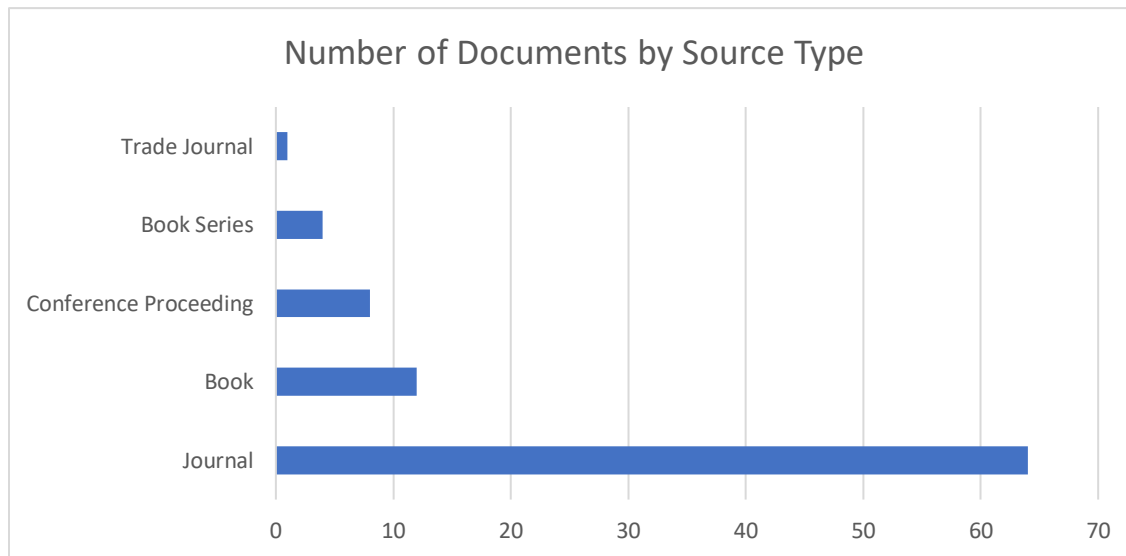


Figure 4: Number of documents by source type

Figure 5 shows the sources with the highest number of publications. The first source, "Impact of financial technology Fintech on Islamic Fintech and financial stability," is a book by Imam Mohammad Ibn Saud Islamic University and the University of Sfax from Saudi Arabia and Tunisia released in 2019. As a Journal, "Quarterly Review of Economics and Finance" comes to the forefront of Islamic Fintech publications. The rest of the list contains a similar number of total publications between 1 and 3.

Source Title	Total Publications	% (N=89)
Impact Of Financial Technology Fintech On Islamic Finance And Financial Stability	8	8.99%
Quarterly Review Of Economics And Finance	6	6.74%
Al Shajarah	3	3.37%
International Journal Of Islamic And Middle Eastern Finance And Management	3	3.37%
Journal Of Islamic Marketing	3	3.37%
Arab Law Quarterly	2	2.25%
IEEE Access	2	2.25%
International Journal Of Economics And Business Administration	2	2.25%
Proceedings International Conference On Information And Communication Technology For The Muslim World 2018 Ict4m 2018	2	2.25%
Qualitative Research In Financial Markets	2	2.25%
Others	56	62.92%

Figure 5: Sources with the most publications

Keywords related to these studies are focusing on Fintech, Islamic finance, blockchain, and bitcoin issues. Figure 3 shows the occurrence map for author keywords, colored by year. The year span starts from 2017, possibly because the VOS viewer app writes each particular keyword's average year. However, still, the shift of interest by year is observable by this keyword cloud. Islamic Fintech raises in the literature relatively after fintech, cryptocurrencies, and Fintech issues.

It is worth mentioning that a significant amount of Islamic Fintech papers focuses on cryptocurrencies within the Fintech scope. This is because cryptocurrencies have a strong potential within the Islamic finance world, specifically for Islamic banks and micro-finance institutions. Some papers also focus on AI, financial inclusion, business modeling, and similar areas, which shows the possible further applications of fintech within the Islamic finance scope. Figure-4 shows the top author keywords and their number of occurrences. Malaysia takes attention as a keyword in the top-10 and proves its activity as an Islamic finance hub.

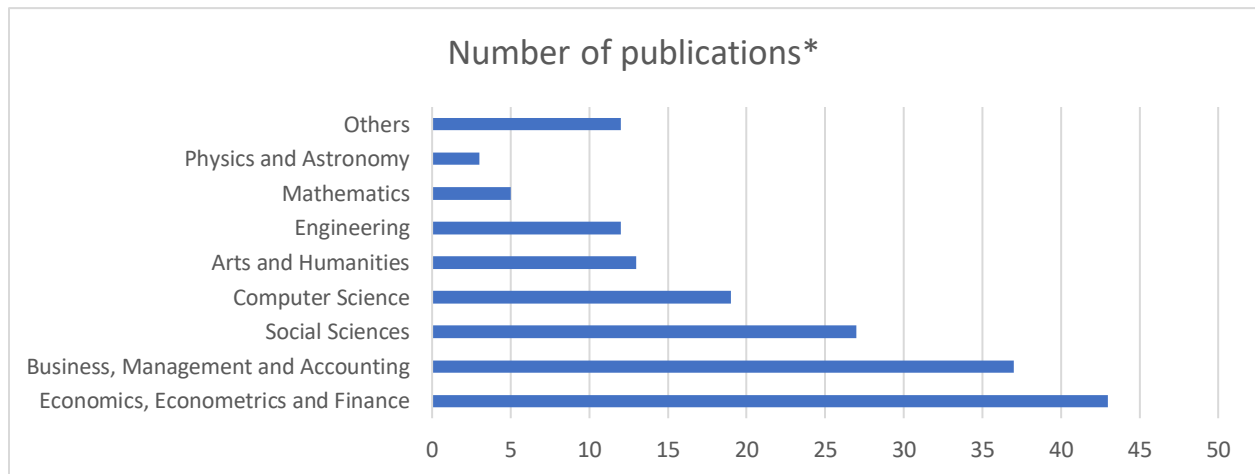
Similarly, the cloud of title words performs a similar table. The highest mentioned words are Islamic, financial, technology, economics, and similar general terms. It grabs attention that these words are closely related to the keywords we used in the search bar when collecting the data.



Figure 9: Word cloud of Title words

Figure 10 illustrates the number of publications by the subject area. As Islamic Fintech is related to several areas beyond Islamic finance, such as computer sciences, engineering, and mathematics are included in the dataset. However, economics, econometrics, and finance areas lead this list because of the disruptive nature of fintech within the finance world. The finance industry is expected to change significantly in recent years with fintech. Although engineering, AI, machine learning, mathematics, and many more share the same potential within the Fintech scope, economics and finance show the highest interest. Because fintech is not only an opportunity for

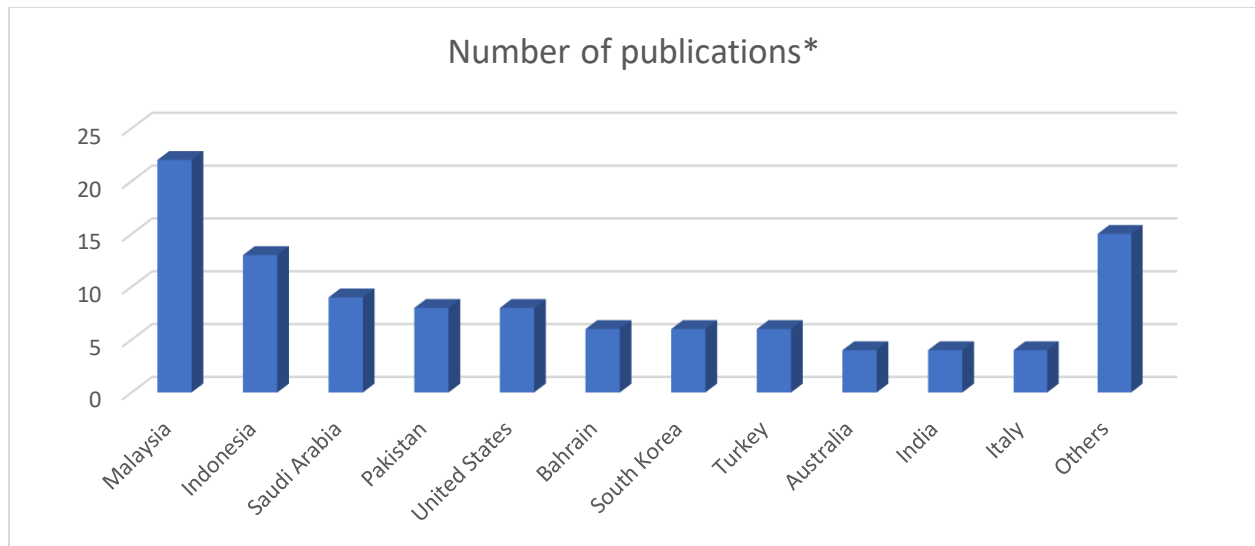
the finance industry, but it is also a threat for institutions that cannot adapt to the rapidly changing world of fintech. This threat is valid for Islamic finance institutions with the same sharpness as well.



*Some documents are categorized in more than one subject area

Figure 10: Number of publications by area

Figure 11 shows the top countries that contributed to the Islamic Fintech literature. As expected, Malaysia has the highest number of publications, followed by Indonesia, Saudi Arabia, and Pakistan. Except for Southeast Asia, the countries have no regional focus, indicating that most countries still penetrate the Islamic Fintech area at the research level. Regarding the Fintech boom at the industrial level in most Muslim-majority countries, it is fair to expect Islamic Fintech to be a more trending research area within these countries, possibly in the GCC area or more widely in the Middle East. Announced Fintech hubs and policies of these states also look promising for the future of Islamic Fintech in Muslim countries.



*Some documents are categorized in more than one subject area

Figure 11: Number of publications by country

a. Author Analysis

This part will continue the authors' analysis and their affiliation, citations, and titles. Starting with the affiliations, Malaysia and Indonesia again include the most active institutions in the dataset, followed by the Woosong University in South Korea. More institutions are taking place in figure 12.

Affiliation	Number of publications*	% (N=89)
International Islamic University Malaysia	5	5.62%
Universitas Indonesia	5	5.62%
Woosong University	4	4.49%
Al-Imam Muhammad Ibn Saud Islamic University	3	3.37%
Universiti Kuala Lumpur	3	3.37%
University College of Bahrain	3	3.37%
Kingdom University	3	3.37%
University of Bahrain	2	2.25%
Bilkent University	2	2.25%
Others	59	66.29%

Figure 12: Institutions with the highest number of publications

Meanwhile, figure 13 discloses the publications and their authors, which cited the Scopus database's highest. The article "*Dynamic risk spillovers between gold, oil prices and conventional, sustainability and Islamic equity aggregates and sectors with portfolio implications*" by Mensi et al. (2017) has the highest citations within our search by 41 citations. Its citation by year is 10.25 and has an almost 50% difference from its closest competitor. "*The use of crypto-currencies in funding violent jihad*" by Irwin et al. (2016) has 21 citations, and the rest of the list has eight or fewer citations.

Authors	Publication Title	Citations
Mensi W., Hammoudeh S., Al-Jarrah I.M.W., Sensoy A., Kang S.H.	Dynamic risk spillovers between gold, oil prices and conventional, sustainability and Islamic equity aggregates and sectors with portfolio implications	41
Irwin A.S.M., Milad G.	The use of crypto-currencies in funding violent jihad	21
Chandra G.R., Liaqat I.A., Sharma B.	Blockchain Redefining: The Halal Food Sector	8
Mensi W., Ur Rehman M., Maitra D., Hamed Al-Yahyaee K., Sensoy A.	Does bitcoin co-move and share risk with Sukuk and world and regional Islamic stock markets? Evidence using a time-frequency approach	5
Rehman M.U., Asghar N., Kang S.H.	Do Islamic indices provide diversification to bitcoin? A time-varying copulas and value at risk application	5
Rabbani M.R., Khan S., Thalassinis E.I.	FinTech, blockchain and Islamic finance: An extensive literature review	5
Rashid S.K.	Potential of Waqf in contemporary world	5
Buallay A., Cummings R., Hamdan A.	Intellectual capital efficiency and bank's performance: A comparative study after the global financial crisis	4
Lahmiri S., Bekiros S.	Decomposing the persistence structure of Islamic and green crypto-currencies with nonlinear stepwise filtering	4
Alidin A.A., Ali-Wosabi A.A.A., Yusoff Z.	Overview of Blockchain Implementation on Islamic Finance: Saadiqin Experience	4
Alam N., Gupta L., Shanmugam B.	Islamic finance: A practical perspective	4

Figure 13: Most cited publications and their authors

Figure 14 illustrates the co-occurrence of authors within the dataset. Here, three leading groups are observable. Rabbani M.R. and Khan S. are frontiers in the occurrence map where other authors

have similar occurrence amounts. However, these ratios change significantly in the authors' citation map. Figure 15 shows the authors with the most citations. Mensi W. and Irwin A.S.M have the highest number of citations among authors; the highest cited two articles mentioned above. Again, the rest of the authors have close numbers to each other.

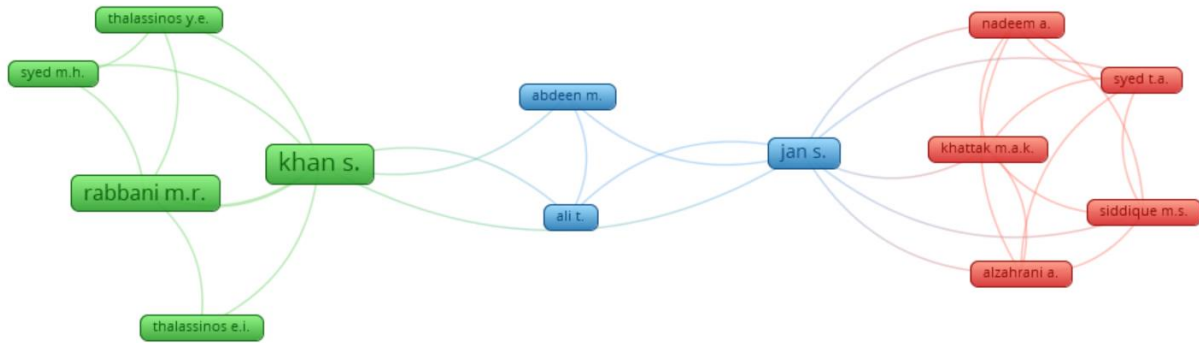


Figure 14: Authors occurrence map

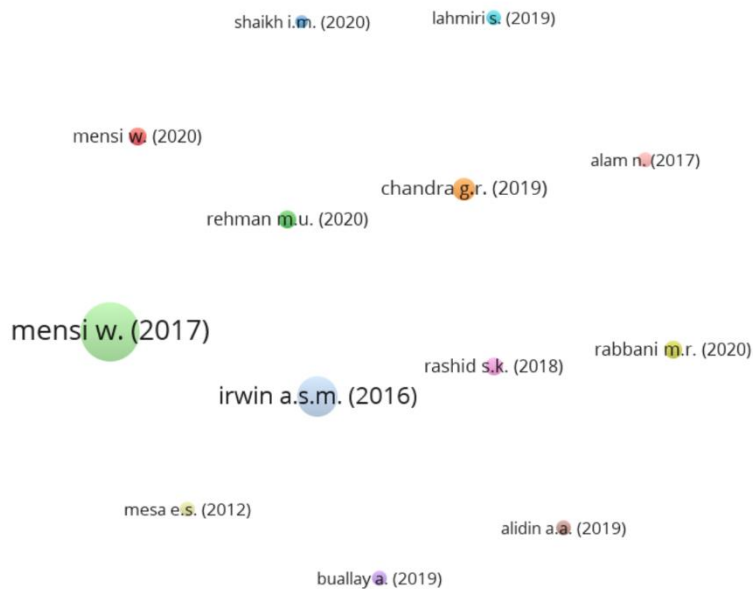


Figure 15: Authors' citation map

Lastly, figure 16 discloses some additional metrics about the several qualifications of the publications related to Islamic Fintech. As mentioned in the data part, publications are limited to the years between 2010 and 2021, with a citation year of 11. However, it is worth showing that there is no publication about Islamic Fintech in 2010, proving how young the field is for potential research. There are 89 papers related to Islamic Fintech within these years in the Scopus database. These papers have 137 citations in total, with an average of 1.5 citations per paper. This ratio is relatively meager comparing to more mature fields. This dataset's h-index is 5, which means that five articles in this database have five or more citations.

Metrics	Data
Publications years	2010-2021
Citation years	11
Papers	89
Citations	137
Cites/year	12.5
Cites/paper	1.5
h-index	5

Figure 16: Further metrics about the dataset

4. Further Analysis & Conclusion

This study has been conducted to analyze all kinds of scholarly works related to the Islamic Fintech area. Although fintech is a trendy field in recent years, Islamic Fintech is relatively lagging it. In the last few years, the potential usage area of fintech within the Islamic finance world is understood better, and researchers started to pay more attention. The potential of fintech within cryptocurrencies, micro-finance, impact investing, and SRI investing is promising for Islamic

finance institutions. Moreover, as a similar research area, taxation, Zakat, and Sadaqa circulation within the Muslim countries based on financial technologies are earning more attention lately.

Islamic Fintech hubs within Malaysia, Indonesia, Saudi Arabia, Turkey, Qatar, and more countries are publishing reports about the potential of Islamic Fintech. They build a vision and path for the future of this industry to be stronger. However, the regulation part's weakness and the lack of qualified employees leave question marks about the end of the sector. Certifications such as Chartered Fintech Professional (CFtP) by Global Fintech Institution would help increase the qualified employee in Fintech-related fields. More actions by the organizations are required for establishing a full basement for the Islamic Fintech related to its infrastructure, regulations, demand by customers and entrepreneurs.

This paper's findings primarily focus on the quick change of the focal areas of Islamic Finance literature. In the last few years, the trending topics have changed to more blockchain and digitalization-based areas, and this has been reflected in this study's bibliometric results. The growing interest in Islamic fintech and blockchain-related literature promises a bright future for researchers in this area. The increasing volume of transactions also signals lawmakers for focusing on the regulatory part immediately, as these fintech companies started to compete with the financial institutions widely. Besides the regulatory discussion, the Shariah-compliance of Islamic Fintech tools should also be on the table, as new tools could be off-the-lines of the Shariah.

This paper contributes to the current literature by showing the direction of Islamic Finance literature and calls researchers to focus on Islamic Fintech and blockchain studies more in the near future. We believe that our paper contributes by showing the classifications, types, journals, and other details of the Islamic Fintech research and help researchers to contemplate over Islamic Fintech. Lastly, our paper contributes more to understand how Islamic fintech and blockchain

technologies would evolve in the future. This is particularly important because it would help to understand the future shape of the Islamic economies.

By their potential, fintech and blockchain technologies should be used more in Islamic Finance, as they are practical tools for ensuring the primary doctrines of Islam and applying Islamic financial, social solutions such as Zakat, Sadaqa, or Waqf management.

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