



The Development of the Usage of Blockchain for Waqf and Zakat Globally: A Bibliometric Study

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ABSTRACT

Zakat and waqf funds in the global scope are equivalent to 1% of the total GDP in the world. However, the usage of zakat and waqf funds is still not optimal. Blockchain could be used to supervise the management of the waqf and zakat. This study has a purpose for the topic development of previous studies related to the usage of blockchain for zakat and waqf management globally. This study used the bibliometric method to gather and analyze the secondary data. The data were collected from the Web of Science (SCI) website from 1979-2023. There were 415 metadata documents found and would be analyzed using R Studio software. The result showed that the majority of the total documents as in previous studies were article type. The co-authorship per paper was 23.13% from 415 documents. The affiliation countries of the authors with the biggest papers were Indonesia and Malaysia. They were also the two words that were most frequently used both in the abstract and in the title of the previous studies.

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1. INTRODUCTION

The potential for zakat and waqf in a global scope is enormous. According to the World Zakat Forum, the potential for global zakat reaches USD 300 billion per year. This figure is equivalent to 1% of global GDP (Razak, 2020). The potential for waqf is no less large than zakat, reaching USD 1 trillion per year. This amount is equivalent to 3.5% of global GDP. The potential of zakat and waqf has many benefits, both socially and economically. Socially, zakat and waqf can help reduce poverty and social inequality. Economically, zakat and waqf can encourage economic growth and development (Khan, 2001).

However, the potential of zakat and waqf has not been fully exploited globally. According to the World Zakat Forum, the realization of the collection and utilization of zakat and waqf in the world is still low, reaching only 25% of its potential (Nik Azman et al., 2021). One of the reasons for the lack of potential for zakat and waqf is that the regulations governing zakat and waqf are still not strong, especially in terms of legal sanctions for perpetrators of misuse of these funds. In addition, zakat and waqf management facilities are still inadequate, thus hampering the acceleration of the collection and utilization of zakat and waqf (Iman & Mohammad, 2017).

Technology has great potential to increase the utilization of zakat and waqf. Technology can be used to increase public awareness, strengthen regulations and facilities, and increase

public trust in zakat and waqf management institutions. Technology can be used to increase the transparency and accountability of zakat and waqf management institutions (Vidiati et al., 2021). This can be done by developing an integrated reporting and monitoring system. One of the technologies that could be used for zakat and waqf management was blockchain (Qosim, 2022).

Blockchain technology is a technology that records transactions in a decentralized manner in a secure and transparent network. Blockchain is not managed by one particular party, but by a network of computers spread all over the world (Mohd Nor et al., 2021). This makes the blockchain more secure and transparent because no one party has full control over the data stored on the blockchain. All transactions that occur on the blockchain are visible to all parties connected to the blockchain network. This makes blockchains ideal for storing data that requires transparency, such as financial and transaction data. Zakat and waqf were the social aid that needed transparency in managing it. Besides that, Blockchain is suitable for storing data regarding zakat and waqf because it is very difficult to change. Each block is protected by a hash of the previous block. This makes blockchains ideal for storing immutable data, such as records of asset ownership (Mardiyah et al., 2021).

Research about blockchain that uses primary or secondary data is plenty. However, there was no research conducted that concerned the development of the usage of blockchain in zakat and waqf management as a topic. There were only a few studies that also discussed the citation development of those previous studies. Therefore, this study has the purpose of observing the topic development of previous studies related to the usage of blockchain for zakat and waqf management globally. The theoretical implication of this study is to view the novelty of research about the usage of blockchain for waqf and zakat, so that the further study would not duplicate with the previous studies with the same topics. The practical implication of this study is to be hoped to be used as a reference for regulators to focus more in developing the usage of blockchain for waqf and zakat in Indonesia, since Indonesia has the biggest number of Muslims in the world.

Blockchain can be used to hold more secure and transparent online elections. Blockchain features that can be used to do live tracking for goods and services. It makes this technology a way to reduce the occurrence of misuse of funds. Blockchain can be used to create an easier and more efficient system for channeling zakat funds. With blockchain, zakat funds can be transferred directly from muzakki (zakat givers) to mustahiq (zakat recipients) without going through intermediaries (Gazali & Ismail, 2019).

However, regulations related to zakat management still do not fully accommodate the application of blockchain technology. Blockchain technology is still relatively new, so there are still many people who don't understand about blockchain technology (Oktavendi & Mu'ammal, 2022). This can be an obstacle in applying blockchain to Zakat and waqf because people need to understand the benefits and workings of blockchain technology to accept and support its application. To overcome these challenges, it is necessary to educate and socialize related to blockchain technology to the public and zakat management institutions (Zulkarnaen et al., 2021).

In addition, there needs to be regulations that support the application of blockchain technology for the management of zakat. Regulations related to the management of zakat and waqf in Indonesia still do not fully accommodate the application of blockchain technology (Habib & Ahmad, 2020). This can be an obstacle in implementing blockchain because zakat and waqf management institutions need to ensure that the application of blockchain technology follows applicable regulations. Zakat and waqf management institutions need to conduct education and outreach regarding blockchain technology to the public. Education and socialization can be done through various media, such as social media, websites, and seminars (Huda, 2021). According to that background, this study has a purpose to analyze.

2. RESEARCH METHOD

2.1 Data Collection

This study used the quantitative method in collecting and analyzing the secondary data. The method was bibliometric in observing the development of certain topics, citations, affiliations, and mostly used words, along with the development of journals and papers. This study collected the meta-data of documents from the Web of Science one of the oldest indexing institutions that was

used to rank the universities globally. The data in Web of Science was rich and could be downloaded in a neat format.

The documents were collected by inserting several queries into the search feature in the Web of Science website, namely *zakat (Topic) OR waqf (Topic) AND blockchain (Topic)*. There were 578 documents found. The documents screened to exclude non-article types. 415 documents were remaining. The documents are then exported into *savedrecs* type of file. Before being exported, the content that needed to be saved was clicked, namely *full records and cited references*. The duration of the data was 1979-2023. The duration of the data was automatically chosen by the system after the documents were screened, which was the only article that was included as a sample of this study.

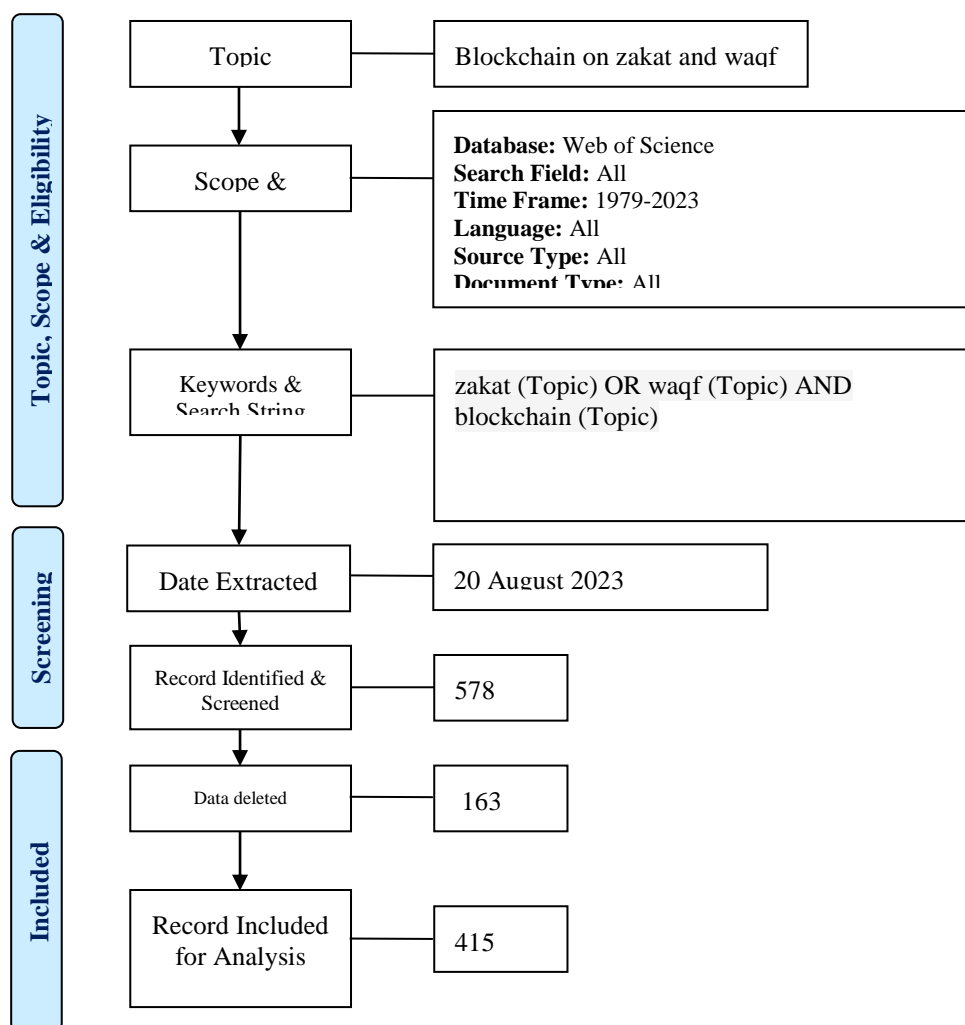


Figure 1. Flowchart of data collection (Compton et al., 2017)

2.2 Data Analysis

This study observed the most frequently used words in the abstract that represent the topic of the previous studies. Besides, the most frequently used words, this study also observed the development of the papers, the citations, and the affiliation of the authors. The data then being analyzed using *Biblioshiny*, a feature of R Studio in conducting analysis of bibliometric. The data then was depicted into a figure for the most frequently used words and a table for affiliation of authors and citation analysis.

3. RESULTS AND DISCUSSIONS

Table 1. Main information about previous studies

Description	Results
Time of the observation	1979:2023
Documents	415
Annual Growth Rate %	8.98
Document Average Age	5.03
Average citations per doc	5.417
International co-authorships %	23.13
Article	361
article; book chapter	31
article; early access	21
article; proceedings paper	2

Source: Data processed using R studio

Table 1 shows that the annual growth rate of documents per year was 8.98% from a total of 415 documents. Meanwhile, the number of articles was 361 from 415 total documents. It means that the total documents so far were good because 90% of them were article-type documents. According to the study conducted by (Martín-Martín et al., 2021), an article is a type of scientific paper that presents new research results mostly using statistical data or primary data collected from field studies. An article is a type of scientific paper that presents new research results. Articles have a strict structure making it easier for readers to understand the research flow and the results obtained. In addition, the publication of articles in reputable scientific journals can increase the visibility and recognition of authors in their fields (Alencar & Barbosa, 2021).

The number of documents co-authorship was 23.13% from 415 documents. A study by (Chinchilla-Rodríguez et al., 2012) found that the number of co-authorships was positively correlated with research productivity. Moreover, co-authorship can improve the quality of research, because researchers can share different ideas and perspectives. The number of co-authorships in the total number of published documents to be considered good depends on several factors, such as the field of study, the number of years the researcher is active, and the goals of the individual researcher. However, as a general rule, researchers with a minimum of 2-3 co-authorships per document are considered productive (Kwiek, 2021).

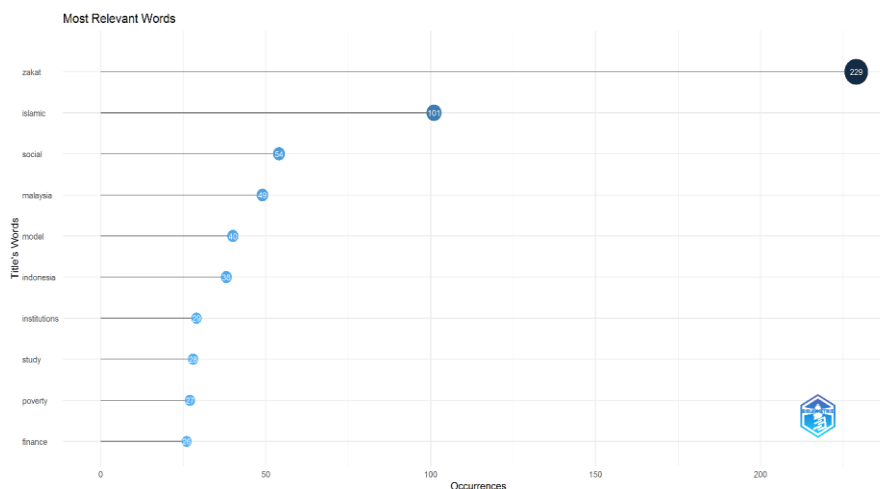


Figure 2. Most frequently used words in the title of previous studies

Source: Data processed using R studio

Figure 2 shows that the most frequently used words in the title were *zakat*, *Islamic*, *social*, *Malaysia model*, *Indonesia*, *institution*, *study*, *poverty*, and *finance*. The words *Malaysia* and *Indonesia* here could mean that the topic about the usage of blockchain in zakat and waqf management was published by authors from those countries. It could also mean that the people of Indonesia and Malaysia frequently use blockchain for managing waqf and zakat.

Meanwhile, the words *poverty* and *finance* in Figure 2 could mean that waqf could alleviate poverty. As a result, waqf should be maximized, either in crowdfunding, as well in the management of utilization of waqf funds for optimal business models. Waqf funds can be used for potential business capital, both on a large and small scale (Qosim, 2022). This is because waqf funds are funds that cannot be sold or donated so that their value can be maintained and developed sustainably. Indonesia, which is an agricultural country, can take advantage of the large potential of waqf funds to advance its agribusiness sector. This business has great potential in Indonesia, considering that Indonesia is an agricultural country with large agricultural land. Waqf funds can be used to develop agriculture and plantations, such as to buy land, equipment, and fertilizers (Qosim & Buhori, 2022).

Apart from the agribusiness sector, Indonesia, which is rich in marine products and has great fisheries potential, can also utilize waqf funds to finance fisheries and marine businesses. This business also has great potential in Indonesia, considering that Indonesia is a maritime country (Isroni et al., 2019). Waqf funds can be used to develop fisheries and marine affairs, such as to buy boats, fishing gear, and fish seeds. Freshwater fish was popular in Indonesia as a source of protein for society besides meat from livestock. Freshwater fish such as catfish, milkfish, carp, and bass are the most popular ones and the demand is high (Ansori et al., 2022).

On the other hand, the usage of blockchain in Malaysia for waqf is still in its early stages. According to the study conducted (Gazali & Ismail, 2019), blockchain has the potential to provide great benefits for waqf management. In Malaysia, several companies have developed blockchain platforms for waqf, such as Finterra. Finterra is a fintech company that develops a blockchain platform for waqf. This platform allows people to endow their funds online and monitor the status of their waqf. Awqafchain is a blockchain platform developed by Universiti Teknologi Malaysia (UTM). This platform allows people to endow their land and track the status of their waqf. Waqf data will be stored on the blockchain, which is a very secure system. This will reduce the risk of corruption and misuse of waqf funds (Tsoukas et al., 2022).

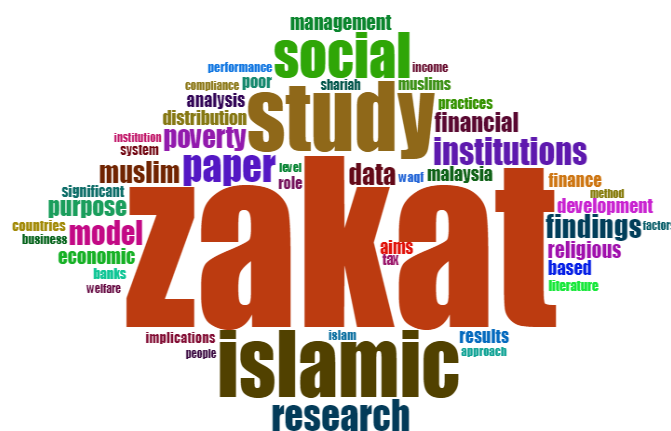


Figure 3. Most frequently used words in abstracts of previous studies

Source: Data processed using R studio

Figure 3 shows that the most used words were *zakat, Islamic, research, study, social, paper, institution, finding, data, and model*. It could be inferred that the previous studies related to the usage of blockchain and waqf mainly talked about the research and publication on how to develop the usage of blockchain itself. It was understandable because the system of blockchain was not very well adjusted in many developing countries with Muslims as the majority of the country's people.

Table 2. Mean of citations of previous studies

Year	Mean of Total Citation per-Article	Total Documents	Mean of Total Annual Citation
1979	0	1	0.00
1981	19	1	0.44
1987	93	1.001	2.51
1992	1.5	2.00	0.05
1994	14	1.00	0.47
1997	40	1.00	1.48
1999	69	1.00	2.76
2000	48	1.00	2.00
2006	2	3.00	0.11
2007	0	1.00	0.00
2008	17	2.00	1.06
2009	20	4.00	1.33
2010	8.29	7.00	0.59
2011	12.7	10.00	0.98
2012	2.25	12.00	0.19
2013	18.77	13.00	1.71
2014	10.6	15.00	1.06
2015	8.62	13.00	0.96
2016	5.78	18.00	0.72
2017	4.09	33.00	0.58
2018	5.81	31.00	0.97
2019	4.97	37.00	0.99
2020	4	51.00	1.00
2021	3.78	46.00	1.26
2022	1.58	66.00	0.79
2023	0.68	44.00	0.68

Source: Data processed using R studio

Table 2 shows that the development of the mean of total citations/articles was dynamic. The highest mean of total citations per article was in 2020. Ironically, the mean of total citations per article has decreased over 3 years recently. It was interesting that even though the blockchain is a technology that has gotten interest in recent decades, the study about it began in 1979. Blockchain research started in the 20th century, with several researchers publishing papers on the basic concepts of this technology. A study conducted by Stuart Haber and W. Scott Stornetta in 1991 was considered one of the oldest studies that observe the foundation of blockchain. The title of their paper was "*How to Time-Stamp a Digital Document*". In their study, they suggested using a digital system to time-stamp digital documents. The system uses distributed timestamps to prevent document forgery. Thus, a year after their study was published, their system suggested that their study filed a patent and issued in 1998 (Haber & Stornetta, 1991).

Another paper that discussed the foundation of blockchain was a paper written by Adam Back in 1997. His paper entitled, "*Hashcash: A Denial-of-Service Countermeasure*" is one of the seminal works in the field of computer security. This paper proposes the use of functional hashes to prevent denial-of-service (DoS) attacks. He explained that DoS attacks are attacks that aim to render a computer system or network unusable. This attack can be carried out in various ways, such as sending lots of bogus requests to the server, or hacking the server and deleting or corrupting data. Hashcash works by requiring the sender of the message to calculate a functional

hash of the message. A functional hash is a function that converts data into a unique string of numbers and letters. The functional hash calculation process requires considerable time and computational resources (Back, 2002).

By requiring the sender of a message to calculate a functional hash, Hashcash makes DoS attacks more difficult to execute. This is because the sender of the message must spend time and computational resources to calculate the functional hash. Paper Hashcash has been implemented in a variety of applications, including email, web, and social networks. Hashcash has also been used in the digital currency Bitcoin. However, there were several drawbacks of Hashcash, namely can slow down system performance, and can be used to perform distributed denial-of-service (DDoS) attacks (Stebila et al., 2011).

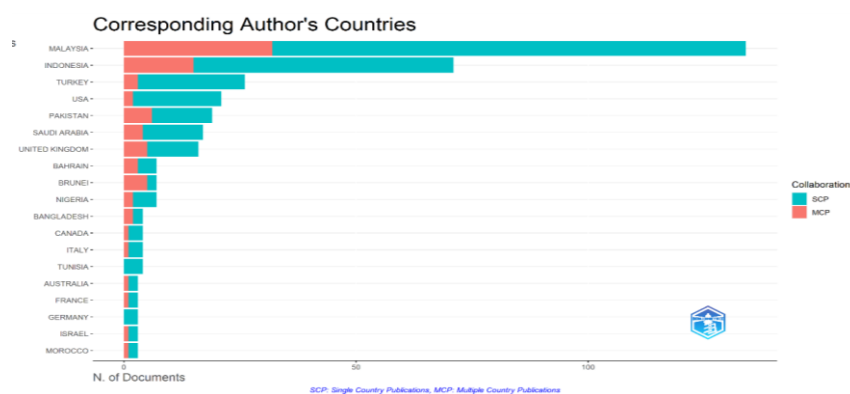


Figure 4. Corresponding author's country of previous studies
Source: Data processed using R studio

Figure 4 shows that the countries with the highest number of papers written by corresponding authors were Malaysia and Indonesia as part of Southeast Asia Countries. It was understandable for Indonesia because this country has the biggest number of Muslims in the world, according to the data reported by the World Bank in 2022 (Wahyudin et al., 2021). Indonesia is the country with the largest Muslim population in the world, with a Muslim population reaching 237.55 million people or around 87.2% of Indonesia's total population. This makes Indonesia the country with the largest Muslim population in the world, followed by Pakistan with a Muslim population of 212.3 million, and India with a Muslim population of 200.02 million. Islam entered Indonesia in the 7th century AD, brought by traders from Arabia and India (Niswatin et al., 2016). Islam then developed rapidly in Indonesia and became the majority religion in this country. The existence of Islam in Indonesia has a great influence on the lives of Indonesian people. Islam has become an integral part of Indonesian culture and identity. Islam has also made a major contribution to the development and progress of Indonesia (Qosim & Buhori, 2022).

The potential for zakat and waqf in Indonesia is very large, considering that Indonesia is a country with the largest number of Muslims in the world. According to the Ministry of Religion, the potential for zakat in Indonesia reaches IDR 400 trillion per year, while the potential for waqf reaches IDR 180 trillion per year (Laila et al., 2022). However, the potential of zakat and waqf in Indonesia has not been maximally explored. The realization of zakat and waqf in Indonesia is still relatively low, which is only around 10% of its potential. There was a lack of public literacy and understanding of zakat and waqf by Indonesian people. This has led to low public awareness of tithe and waqf. The public also does not fully trust zakat and waqf management institutions because there are no legal sanctions that apply to perpetrators of misuse of zakat and waqf funds.

Therefore, the government and society need to work together to increase the realization of zakat and waqf in Indonesia (Nizar et al., 2019).

4. CONCLUSION

According to the result above, it can be concluded that the total documents so far were good because 90% of them were article-type documents. Moreover, the co-authorship per paper was 23.13% from 415 documents, which means good enough. Indonesia and Malaysia were the two words that were most frequently used both in the abstract and in the title. It could mean that the research about blockchain usage for zakat and waqf management was done by Indonesian and Malaysian authors. The theoretical implication of this study is to view the novelty of research about the usage of blockchain for waqf and zakat, so that the further study would not duplicate with the previous studies with the same topics. The practical implication of this study is to be hoped to be used as a reference for regulators to focus more in developing the usage of blockchain for waqf and zakat in Indonesia, since Indonesia has the biggest number of Muslims in the world.

Further study need to observe more on how the government addresses blockchain in their regulation on zakat and waqf management. According to this study, most of the previous studies explained the usage of blockchain, either on waqf or zakat in Malaysia. However, Indonesia that has far bigger number of Muslims than Malaysia still has not fully used blockchain for the management of waqf and zakat. It needs to observe more about the challenge in implementing blockchain for waqf management. The regulation was also need to be observed in Indonesia because it was the most essential in applying a new technology into Islamic social finance in society.

This study is limited to observe the metadata gathered from web of Science. The scope is limited to only metadata of documents discussed about blockchain usage on zakat and waqf. This study also only used metadata of previous studies as samples, not statistic of something or primary data from field study.

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