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Bibliometric Computational Mapping Analysis of Publications on Financial Technology in Islamic Capital Market

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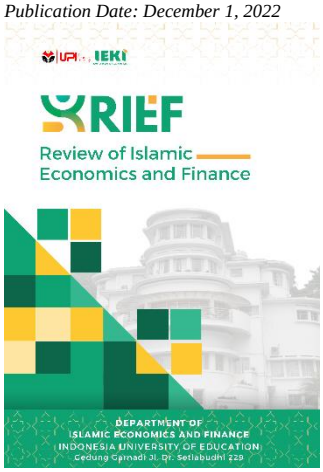

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Abstract

Purpose *- This study aims to explore and categorize research literature on Financial Technology in Islamic Capital Market systematically by mapping and visualizing it through bibliometric analysis using VOSviewer.*

Methodology *- The research from publications that have appeared in journals that are indexed by Google Scholar served as the foundation for the article data used in this study. A reference manager tool called Publish or Perish is used to gather research data. A literature review on the subject we chose was done with the help of the program Publish or Perish.*

Findings *- The results show that research on Financial Technology in Islamic Capital Market is separated into 3 terms: Financial Technology, Islamic, Capital Market. The term "Financial Technology" is associated with 168 links with a total link strength of 581. The term "Islamic" has 191 links with a total link strength of 661. The term "Capital Market" has 219 links with a total link strength of 840. While the popular Islamic capital market research was carried out in 2019, namely 134 studies.*

Keywords: *Bibliometric, Computational maping analysis, Financial Technology, Islamic Capital Market, VOSviewer*

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1. INTRODUCTION

The development of Islamic finance in 2022 is supported by the presence of Financial Technology (fintech). Although some parties consider fintech as a disruptive phenomenon for financial services, on the other hand fintech is also considered an innovative catalyst in increasing the growth of Islamic finance. Based on the IFN Islamic Fintech Landscape, there are 371 sharia fintech companies in the world, of which 70% are engaged in providing financial services such as money transfers, crowdfunding, and digital banks. While the rest focuses on infrastructure such as Artificial Intelligence and robotics. Nearly half of these Islamic fintech companies are located in Asia (Fianto, Hendratmi, & Aziz, 2021).

Financial technology is all forms of new technology that aims to improve and automate the use of financial services (financial). Financial technology is also often abbreviated as fintech. Fintech products are usually in the form of a system built to carry out specific financial transaction mechanisms (Ren, Hu, Dong, Sun, Chen, Y., & Chen, Z., 2019). The Islamic capital market is a capital market whose forms of investment and instruments do not conflict with the sharia principles of the Islamic religion. In the Islamic capital market, the instruments traded may not be related to prohibited business activities such as usury (interest/rent), gambling, speculation, liquor producers, food manufacturers containing pork, and others.

The Capital Market is basically a meeting place for investors and issuers to get profits or returns for investors according to the chosen risk. different from the general market in the capital market, the object being transacted is the ownership of securities offered by the Issuer. The capital market is one of the important economic instruments for a country. Today the development of investment trends is progressing. This is in line with the growth of public knowledge and awareness in investing (Fianto, Hendratmi, & Aziz, 2021; Ren, Hu, Dong, Sun, Chen, Y., & Chen, Z., 2019). The development of society's demands for technology and industry makes the capital market also growing. However, in the field of financial technology and capital markets, is it much in demand or not, especially in Islamic capital market research.

There is one analytical technique that can be used to determine the development of research in the field of financial technology in Islamic capital markets, namely bibliometric analysis. Bibliometric analysis is a form of meta-analysis of research data that can assist researchers in studying bibliographic content and analysis of citations from articles published in journals and other scientific works (Ahmi, & Mohamad, 2019; Ahmi, & Mohd Nasir, 2019).

There have been many studies on bibliometric analysis, including bibliometric analysis in the field of economics (Ahmid, & Ondes, 2019; Bonilla, Merigó, & Torres-Abad, 2015; Brodeur, Gray, Islam, & Bhuiyan, 2021; Castillo-Vergara, Alvarez-Marin, & Placencio-Hidalgo, 2018), bibliometric analysis in Islamic economic research (Firmansyah & Faisal, 2019; Ajmi, Hammoudeh, Nguyen, & Sarafrazi, 2014; Shidiq, 2023). However, research on financial technology and Islamic capital markets bibliometric analysis of published data specifically to determine research development has not been carried out. Especially bibliometric analysis for research in the last 10 years in the period 2012 to 2021 through the VOSviewer application.

Therefore, this study was conducted to conduct computational research on mapping bibliometric analysis of articles indexed by Google Scholar using VOSviewer software. This research was conducted with the hope that it can be a reference for researchers to conduct and determine the research themes to be taken, especially those related to the field of financial technology and Islamic capital market.

2. LITERATURE REVIEW

An essential area of study in the bibliometrics community is bibliometric mapping. The design of the bibliometric map and the graphical display of the map are two distinguishable bibliometric features. The creation of the bibliometric map is the topic of most discussion in the bibliometric literature. Different mapping strategies were used in research pertaining to the effects of variations in similarity assessments (Wahid, Ahmi, & Alam, 2020).

Less consideration has been given to the bibliometric map's graphic portrayal. Although some researchers take graphical representations seriously, the majority of publications published in the bibliometric field rely on straightforward graphical representations offered by software tools like SPSS and Pajek. A straightforward graphical representation typically produces acceptable results for thumbnails with no more than, say, 100 items. However, a trend toward larger maps seems to be emerging, and for such maps, simple graphic depiction is insufficient. (Shidiq, 2023; Wahid, Ahmi, & Alam, 2020).

A zoom feature, unique labeling methods, and density metaphors, for example, might further enhance the graphical display of a big bibliometric map. The computer applications that bibliometric researchers frequently employ do not have this functionality. In this article, we present a brand-new computer software for bibliometric mapping.

The development process and knowledge structure of a particular field of research (Rusydiana, 2019). Bibliometrics can be used to depict the overall picture of a particular research field at the macro level, and it can also be used to analyze hot topics at the micro level, so more and more scholars have applied it in their research (Rabbani, Bashar, Nawaz, Karim, Ali, Rahiman, & Alam, 2021; Rusydiana, 2019).

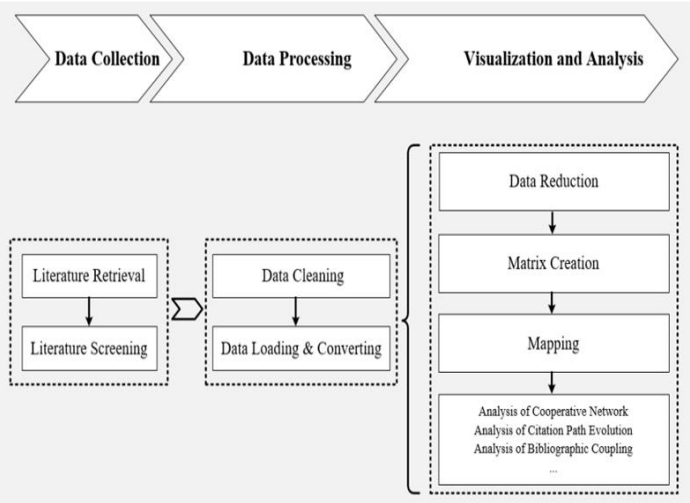

Figure 1. Logical Framework Financial Technology in Islamic Capital Market Bibliometric

3. METHODOLOGY

The research from publications that have appeared in journals that are indexed by Google Scholar served as the foundation for the article data used in this study. Because the Google Scholar database is free source, we used it for this study. A reference manager tool called Publish or Perish is used to gather research data. A literature review on the subject we chose was done with the help of the program Publish or Perish. A prior study (Nandiyanto, Al Husaeni, D.N., & Al Husaeni, D.F., 2021) provided step-by-step instructions for using and installing the program and acquiring data, and an earlier work (Azizah, Maryanti, & Nandiyanto, 2021) by Azizah et al. provided thorough instructions for using library searches to find data on Google Scholar.

The research was conducted through several stages:

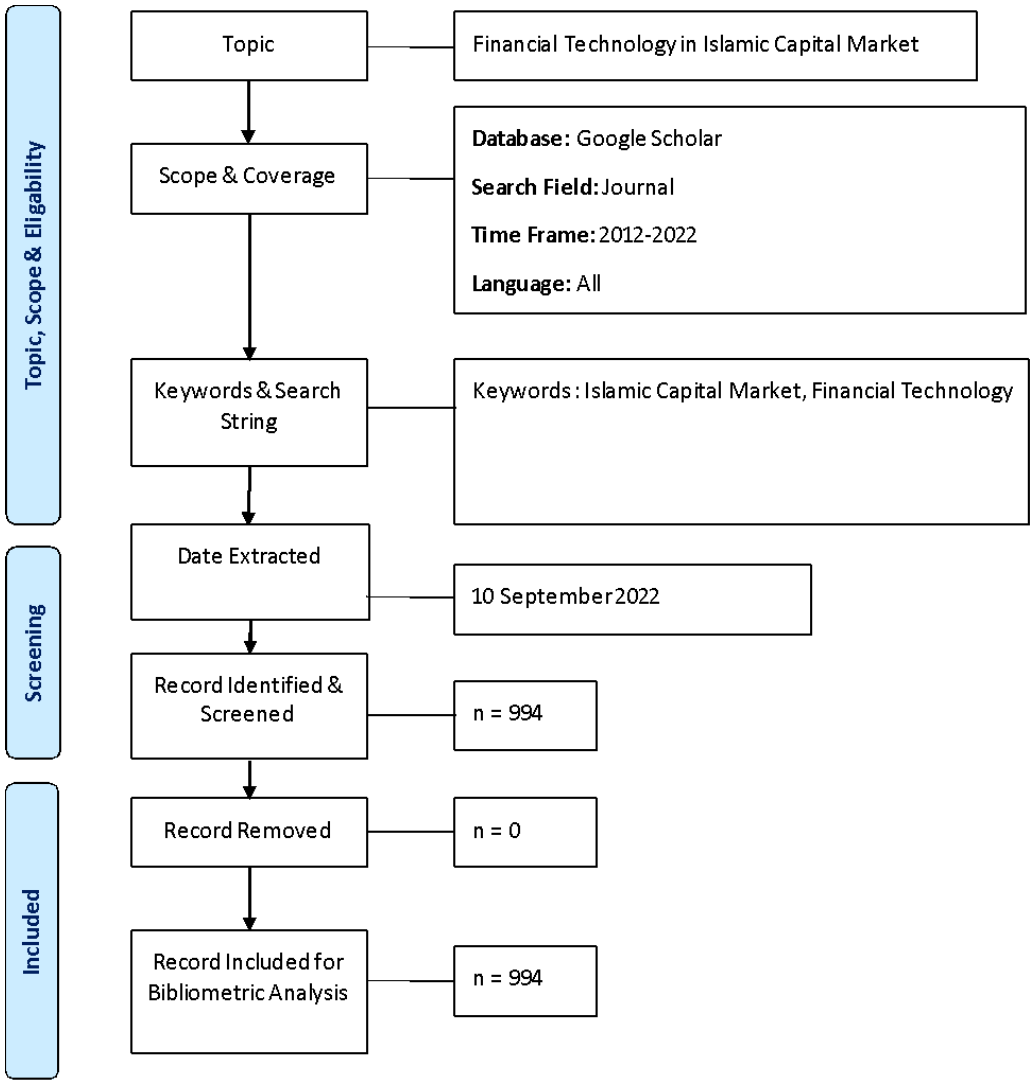

Figure 2. Research Stages of Financial Technology in Islamic Capital Market Bibliometric

Search article data in Publish or Perish is used to filter publications using the keywords "Financial Technology" and "Islamic Capital Market" based on the requirements of the publication title. The papers used were published between 2012 and 2021. All data were obtained in September 2022. The articles that had been collected and matched the research analysis criteria were then exported into two types of files: research information system (.ris) and comma-separated value format (. *.csv). VOSviewer is also used to visualize and evaluate trends using bibliometric maps. The article data from the source database is then mapped.

VOSviewer is used to create 3 variations of mapping publications, namely network visualization, density visualization, and network-based overlay visualization (co-citation) between existing items. When creating a bibliometric map, the keyword frequency is set to be found at least 3 times.

4. RESULTS AND DISCUSSION

4.1. Publication Data Search Results

Based on data searching through the publish or perish application reference manager from the Google Scholar database, 994 article data were obtained that met the research criteria. The data obtained in the form of article metadata consisting of the author's name, title, year, journal name, publisher, number of citations, article links, and related URLs. Table 1 shows the research trends obtained from this study.

Table 1. Year of Publication

Year	TP	TC
2012	79	7406
2013	82	6530
2014	94	7601
2015	78	5538
2016	79	4481
2017	87	4292
2018	112	5567
2019	134	3981
2020	119	4202
2021	102	3520
2022	28	335
Total	994	

Notes: TP=total number of publications; TC=total citations;

Table 2 shows the citation metric analysis of the published data used in the VOSviewer analysis of this study. This table describes the number of citations of all articles used in this study, the number of citations per year, the number of citations per article, the average authors in the articles used, all articles having an average h-index and a g-index.

Table 2. Citations Metrics

Metrics	Data
Papers	999
Number of Citations	53663
Years	10
Citations per Year	5366.30
Citations per Paper	53.72
Authors_Paper	2.62
h_index	110
g_index	169

Table 3 shows some examples of published data used in the VOSviewer analysis of this study. The data samples taken are the 10 best articles that have the highest number of citations.

Table 3. Top 10 Highly cited articles

No.	Authors	Title	Year	Cites	Cites per Year	Ref.
1	JL Arcand, E Berkes, U Panizza	Too much finance?	2015	1215	173.57	(Arcand, Berkes, & Panizza, 2012)
2	J Nofsinger, A Varma	Socially responsible funds and market crises	2014	587	73.38	(Nofsinger, and Varma, 2014)
3	AY Almajali, SA Alamro, YZ Al-Soub	Factors affecting the financial performance of Jordanian insurance companies listed at Amman Stock Exchange	2012	569	56.90	(Almajali, Alamro, & Al-Soub, 2012)
4	A Brodeur, D Gray, A Islam…	A literature review of the economics of COVID-19	2021	562	562.00	(Brodeur, Gray, Islam, & Bhuiyan, 2021)
5	T Beck, B Büyükkarabacak, FK Rioja…	Who gets the credit? And does it matter? Household vs. firm lending across countries	2012	558	55.80	(Beck, Büyükkarabacak, Rioja, & Valev, 2012)
6	K Gai, M Qiu, X Sun	A survey on FinTech	2018	425	106.25	(Gai, Qiu, & Sun, 2018)
7	O Haroon, SAR Rizvi	COVID-19: Media coverage	2020	396	198.00	(Haroon, & Rizvi, 2020)

		and financial markets behavior—A sectoral inquiry				
8	M Kouhizadeh, S Saberi, J Sarkis	Blockchain technology and the sustainable supply chain: Theoretically exploring adoption barriers	2021	343	343.00	(Kouhizadeh, Saberi, & Sarkis, 2021)
9	AN Ajmi, S Hammoudeh, DK Nguyen…	How strong are the causal relationships between Islamic stock markets and conventional financial systems? Evidence from linear and nonlinear tests	2014	254	31.75	(Ajmi, Hammoudeh, Nguyen, & Sarafrazi, 2014)
10	NR Mosteanu, A Faccia	Digital systems and new challenges of financial management–FinTech, XBRL, blockchain and cryptocurrencies	2020	130	65.00	(Mosteanu, & Faccia, 2020)

4.2. Research Development in the Field of Financial Technology in Islamic Capital Market

Table 4 shows the development of research in the field of Financial Technology in Islamic Capital Market published in the Google Scholar indexed journal. Based on the data shown in Table 4, it can be seen that the number of researches in Financial Technology in Islamic Capital Market is 994 articles from 2012-2021. In 2012 there were 79 articles. In 2013 there were 82 articles. In 2014 there were 94 articles. In 2015 there were 78 articles, in 2016 there were 79 articles, in 2017 there were 87 articles, in 2018 there were 112 articles, in 2019 there were 134 articles, in 2020 there were 102 articles and in 2021 there were 28 articles. From the number of publications, it can be seen that research on financial technology in Islamic capital market is still relatively rare every year, especially in the last 10 years (2012-2021). Its development is also quite volatile as can be seen clearly in Figure 1.

Table 4. Development of financial technology in Islamic capital market research

Year of Publications	Number of Publications
2012	79
2013	82
2014	94
2015	78
2016	79
2017	87
2018	112
2019	134
2020	119
2021	102
2022	28.0
Total	994.0
Average	33.8

Figure 2 shows the development of financial technology and Islamic capital market research during the last 10 years in the range of 2012 to 2022. Based on Figure 1, it is known that the development of research related to financial technology and Islamic capital market has decreased from 2014-2016. This decline can be seen from the number of publications in 2014 as many as 94 to 2016 only 79 publications. The development of financial technology and Islamic capital market research also fluctuated from 2017 to 2021, before finally experiencing a drastic decline again in the last 1 year, namely in 2022 as many as 28 articles. These data indicate that the popularity of financial technology and Islamic capital market research tends to be unstable and recently interest in financial technology and Islamic capital market research has decreased.

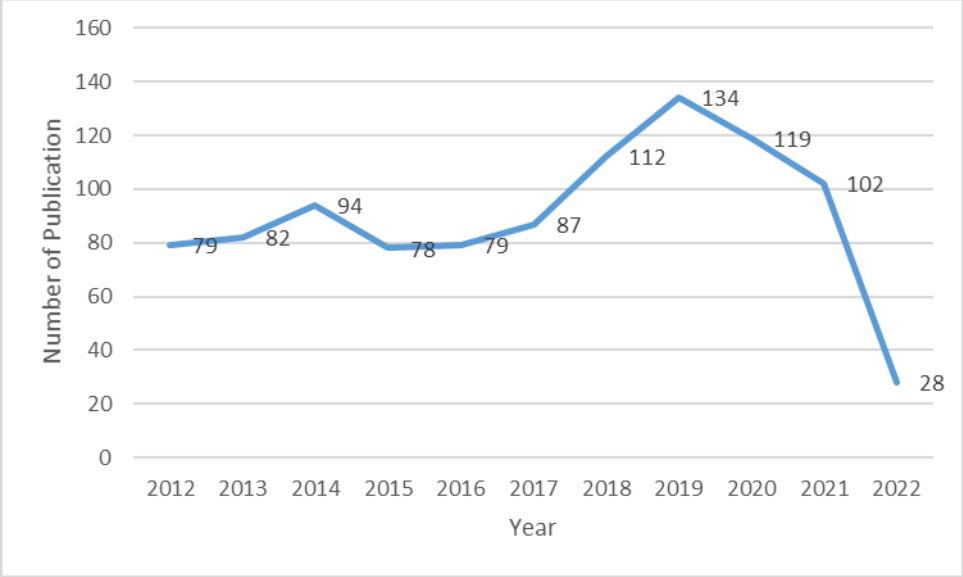

Figure 3. Level of development in Financial Technology and Islamic Capital Market Bibliometric research

4.3. Visualization of Financial Technology and Islamic Capital Market Topic Areas Using VOSviewer.

Computational mapping was carried out on article data. VOSviewer is used in computational mapping. From the results of computational mapping found 291 items. Each item found related to mechanical engineering education in data mapping is divided into 6 clusters, namely:

1. Cluster 1 has 68 items and is marked in red, 68 items are analysis, author, case study, change, covid, data, diversification, energy, equity, equity market, event, evidence, exchange rate, finance industry, financial asset, financial crisis, financial innovation, financial market, fund, gcc, global financial crisis, globalization, government, implication, index, inflation, influence, integration, investor, investor sentiment, Islamic equity fund, Islamic equity market, Islamic finance industry, Islamic index, islamic stock, islamic stock index, islamic stock market, macroeconomic factor, macroeconomic variable, market, market capitalization, market efficiency, movement, oil price, percent, period, price, relationship, return, sector, state, stock, stock market, stock market index, stock market reaction, stock market return, stock market volatility, stock price, stock return, sukuk, market sukuk, technological advancement, technology sector, time, volatility spillover , years.
2. Cluster 2 has 65 items and is marked with green color, the 65 items are ability, acceptance, addition, adoption, application, attitude, awareness, banking, behavior, blockchain, blockchain technology, challenge, consumer, context, crowdfunding, cryptocurrency, customer, customer satisfaction, decade, dividend policy, experience, factor, financial inclusion, financial literacy, financial product, financial sector, financial service, financial technology, fintech, future, gap, Indonesia, insurance, intention, Islamic financial institution, Islamic financial service, Islamic law, issue, lack, Malaysia, mobile banking, model, muslim, new technology, opportunity, paper, person, perspective, population, practice, process, product, research, service, service quality, shariah, study, technology, technology acceptance, theory, trust, use, world.

3. Cluster 3 has 53 items and is marked in blue, the 53 items are advanced technology, approach, assets, banks, banking sector, capital, capital structure, commercial bank, company, comparative analysis, corporate governance, creation, debt, determinant, digital technology, disclosure, effect, efficiency, empirical investigation, empirical study, financial, financial performance, financial structure, firm, firm performance, human capital, imprtance, increase, industry, information, intellectual capital, internet, investment, Islamic bank , level, leverage, market share, number, operation, performance, productivity, profitability, ratio, relation, risk, sample, scale, size, source, technological change, technological progress, transparency, value.
4. Cluster 4 has 52 items and is marked in yellow, the 52 items are accounting, activity, bangladesh, capital market, communication, comparative study, comparison, contribution, conventional bank, conventional banking, corporate social responsibility, development, difference, establishment, finance, financial institution, growth, information technology, institution, interest, islamic, islamic banking, islamic banking industry, islamic banking system, islamic principle, jordan, management, muslim country, need, order, organization, order, organization, overview , pakistan, part, problem, prospect, quality, reason, recent year, regulation, science, shariah compliant, society, stability, survey, sustainable development, system, term, work.
5. Cluster 5 has 32 items and is marked with purple color, 32 items are access, capital accumulation, case, country, credit, economic growth, economy, empirical analysis, empirical evidence, energy consumption, external finance, FDI, financial capital, financial development, financial instrument, financial resource, financial system, financing, foreign direct investment, form, gcc country, gdp, impact, Islamic country, measure, resource, role, stock market capitalization, stock market development, technological innovation, trade, uae .
6. Cluster 6 has 22 items and is marked with sky blue, the 22 items are advance, area, basis, business, goal, innovation, islam, knowledge, link, literature, literature review, loan, marketing, proxy, r&d, response, review, sms, stock market performance, technological development, type, view.

The relationship between one term and another is shown in each existing cluster. Labels are assigned to each term with colored circles. The size of the circle for each term varies depending on the frequency of occurrence of the term (Mulyawati, & Ramadhan, 2021; Nandiyanto, Al Husaeni, D.N., & Al Husaeni, D.F., 2021). The size of the label circle shows a positive correlation with the occurrence of terms in the title and abstract (Nandiyanto, Al Husaeni, D.N., & Al Husaeni, D.F., 2021). The more often the term is found, the larger the label size (Al Husaeni, D.F., & Nandiyanto, 2022). The mapping visualization analyzed in this study consists of 3 parts: network visualization (see Figure 4), density visualization (see Figure 5), and overlay visualization (see Figure 6) (Hamidah, Sriyono, & Hudha, 2020).

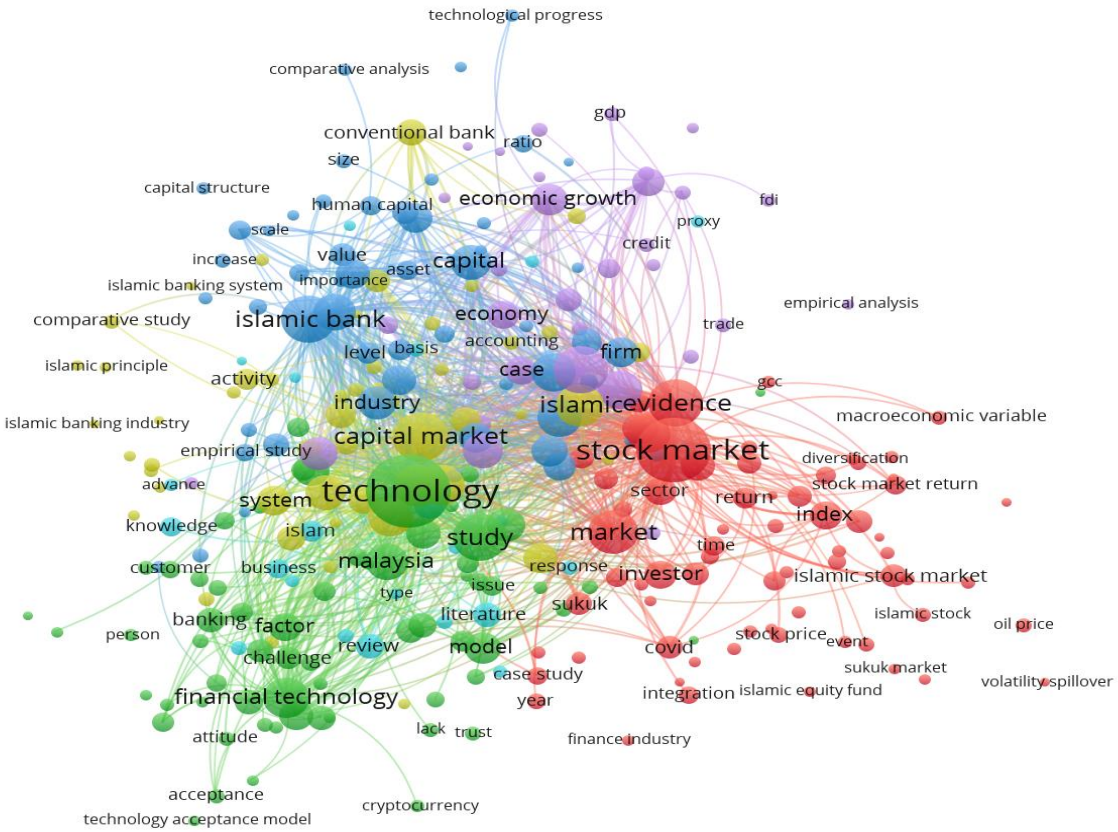

Figure 4. Network visualization of Financial Technology and Islamic Capital Market keyword

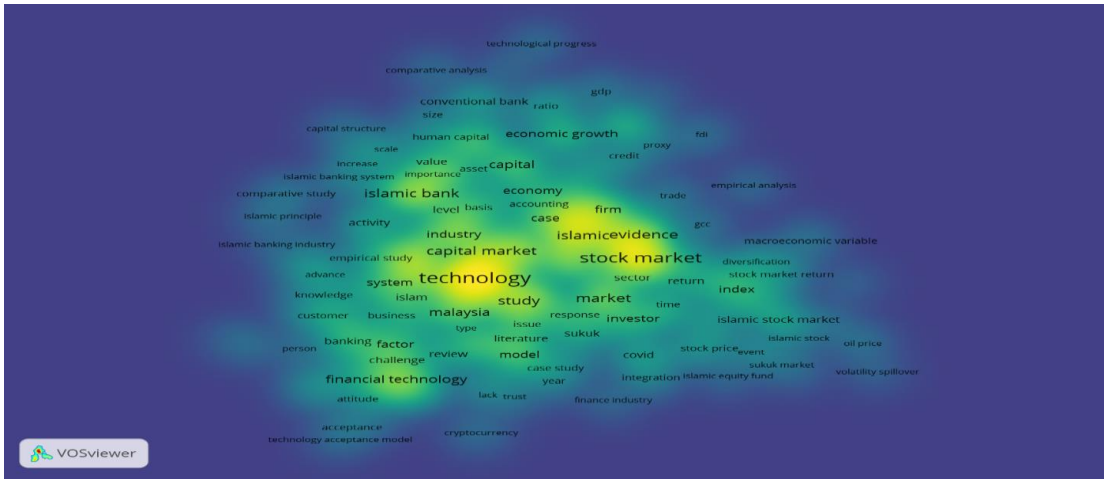

Figure 5. Density visualization of Financial Technology and Islamic Capital Market keyword

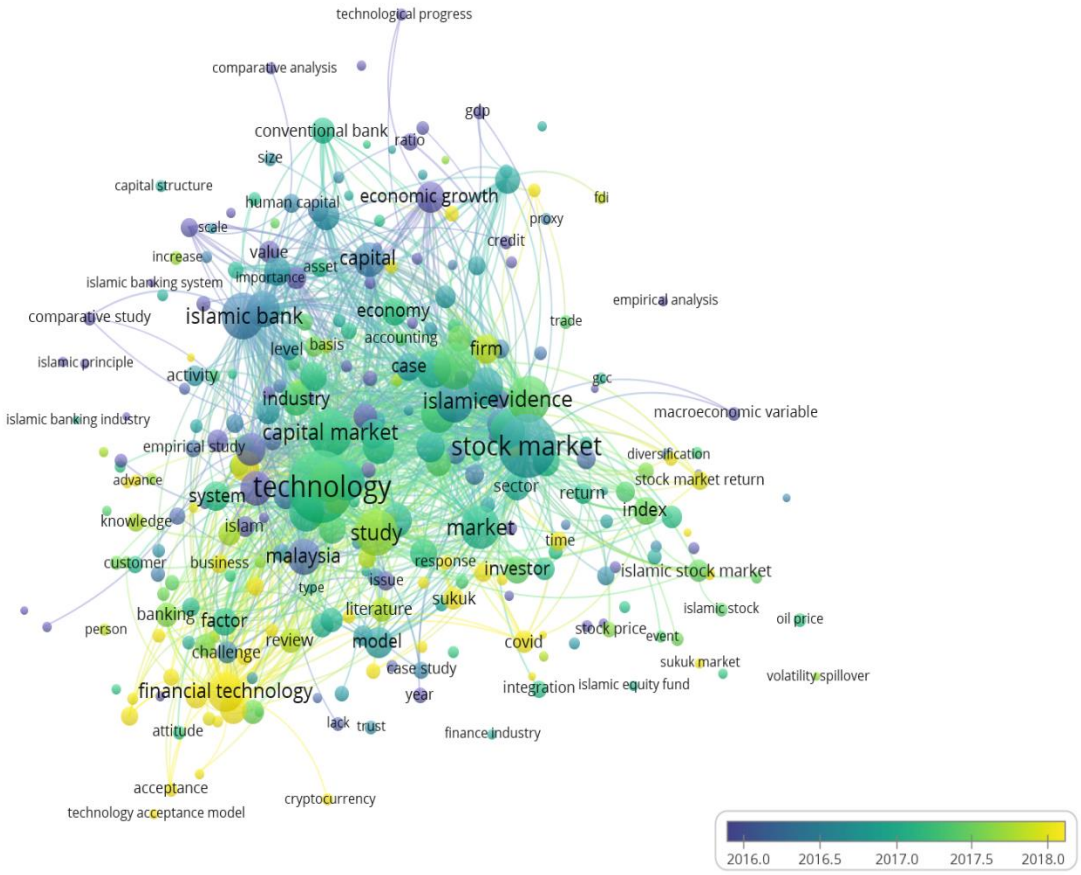

Figure 6. Overlay visualization of Financial Technology and Islamic Capital Market keyword

Figure 4 shows the relationship between terms. The relationship between terms is described in an interconnected network. Figure 5 shows the clusters of each term that is often researched and related to the topic of financial technology and Islamic capital market research. From the clusters contained in the network visualization, it can be seen that the results of the study indicate that the research on Financial Technology in Islamic Capital Market is separated into 3 terms: Financial Technology, Islamic, Capital Market. The term "Financial Technology" is associated with 168 links for a total link strength of 581 (see figure 7). The term "Islamic" has 191 links with a total link strength of 661 (see figure 8). The term "Capital Market" has 219 links with a total link strength of 840 (see figure 9).

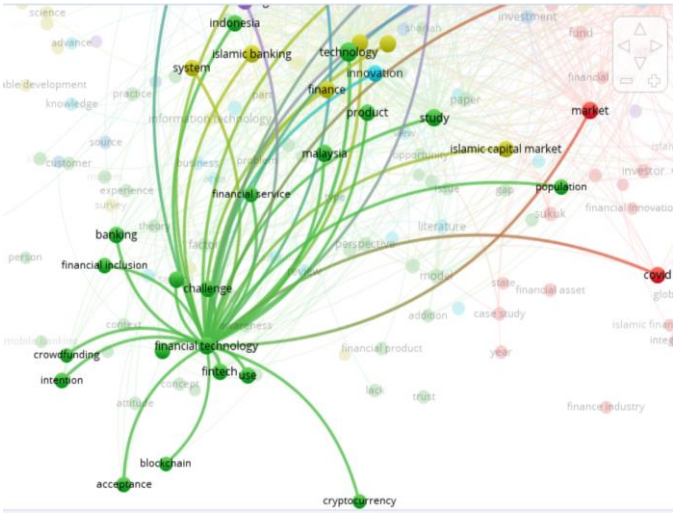

Figure 7. Network visualization of financial technology

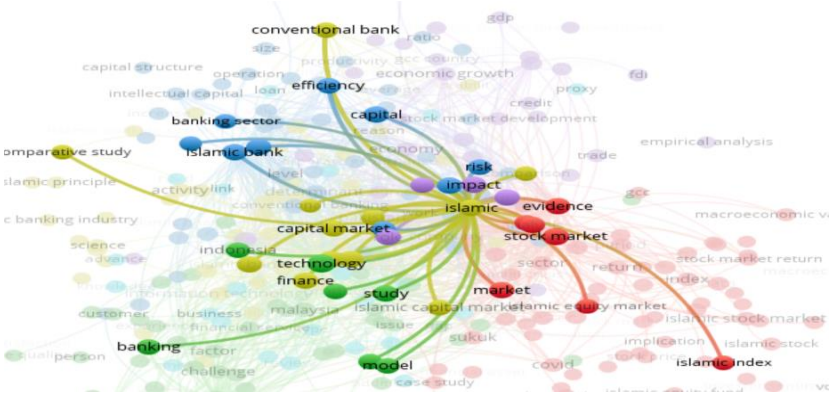

Figure 8. Network visualization of Islamic

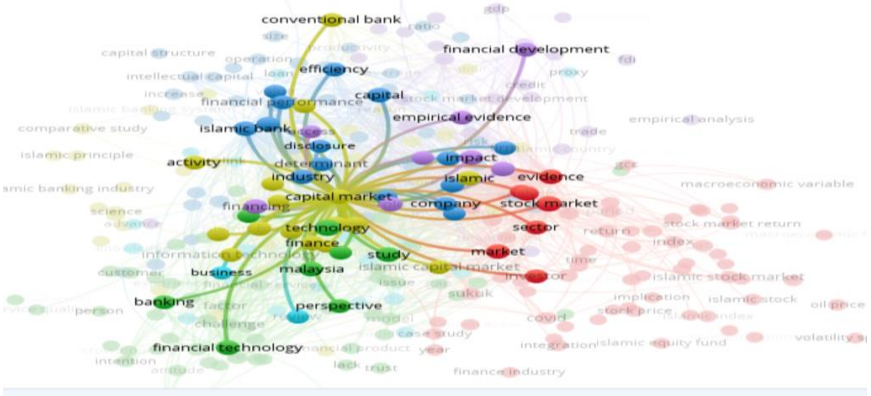

Figure 9. Network visualization of capital market

Figure 5 shows the density visualization. Density visualization means that the brighter the yellow color and the larger the circle diameter of the term label, the more often the term appears (Mulyawati, & Ramadhan, 2021; Nandiyanto, Al Husaeni, & Al Husaeni, 2021; Nandiyanto, & Al Husaeni, 2021). This means that a lot of research on related terms has been done. On the other hand, if the color of the term fades close to the background color, then the number of studies on the term is small. Based on Figure 5, it can be seen that research related to the terms financial technology, technology, stock market, economy has a high number of studies.

Figure 6 shows the overlay visualization in financial technology research in Islamic capital markets. This visualization overlay shows the novelty of research on related terms [nandiyanto, nandiyanto, alhusaini, hamidah]. Figure 6, which is clarified in Figure 10, shows that research on financial technology and Islamic capital markets was mostly carried out from 2016 to 2018. The time for the popularity of the term Islamic capital market in research has been quite long. Thus, we can easily make new research on financial technology in Islamic capital market.

Figure 7 shows a network of financial technology relationships with other terms, namely acceptance, blockchain, cryptocurrency, intention, crowdfunding, financial inclusion, banking, challenge, use, financial service, malaysia, product, study, Islamic capital market, population, market, covid, finance, innovation, Islamic banking, system. Figure 8 shows the network of relationships between Islamic terms and existing terms, including models, banking, market, stock market, technology, Islamic index, study, capital market, risk, impact, Islamic bank, efficiency, capital, comparative study, impact. While Figure 9 shows the network of capital markets associated with the terms, financial technology, perspective, business, banking, study, market, financing, sector, stock market, empirical evidence, financial development.

From these data, it can be seen that the Islamic capital market is still slightly associated with other terms. From the mapping results, the Islamic capital market only has 149 links and is connected to 51 terms. In contrast to Islamic and financial technology, which tend to have a high level of relevance and are often associated with various terms. It can be concluded that the Islamic capital market is still very likely to be researched and associated with other terms, this will have a higher impact on the novelty of the research.

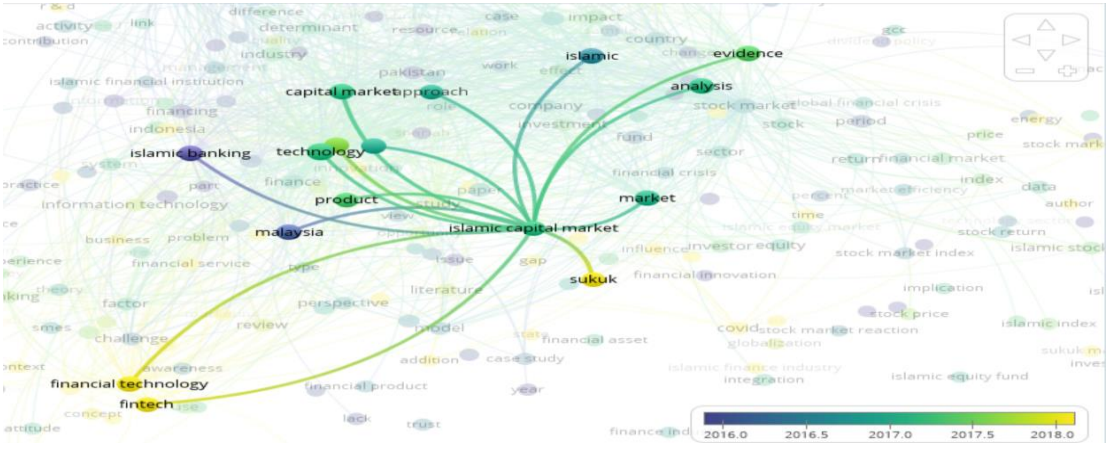

Figure 10. Overlay visualization of Islamic capital market term in 2016 to 2018

Based on the results of the mapping of the collected article data, it can be seen that the keyword financial technology in Islamic capital market is still rarely used in research. Most studies

only use terms or fields related to financial technology, Islamic finance. From the results of this study, we can look for research on financial technology in Islamic capital market that is more recent and up to date.

5. CONCLUSION

The purpose of this study was to perform computational mapping analysis on the bibliometric data of research articles. The publication theme taken in this research is "Financial Technology in Islamic Capital Market". The articles used are taken from the Google Scholar database via Publish or Perish. The library data used in this study include titles and abstracts. From the search results, as many as 994 relevant articles were published in the range of 2012 to 2022. The development of research related to financial technology and Islamic capital markets has decreased from 2014-2016. This decline can be seen from the number of publications in 2014 as many as 94 to 2016 only 79 publications. The development of financial technology and Islamic capital market research also fluctuated from 2017 to 2021, before finally experiencing a drastic decline again in the last 1 year, namely in 2022 as many as 28 articles. The results show that research opportunities in the Islamic capital market still have a high enough opportunity and are related to other terms.

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