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Tinjauan *Financial Technology* dalam Sektor Perbankan: Sebuah Studi Bibliometrik **OVERVIEW OF FINANCIAL TECHNOLOGY IN BANKING SECTOR: A BIBLIOMETRIC STUDY**

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ABSTRAK

Penelitian ini bertujuan untuk memberikan bukti empiris mengenai pertumbuhan dan tren publikasi terkait *fintech* di sektor perbankan dan mengkaji variabel apa saja yang sering dikaitkan dengan *fintech*. Data yang digunakan merupakan artikel publikasi tahun 2013-2023, dibatasi sampai saat penelitian ini dilaksanakan dengan analisis bibliometrik menggunakan aplikasi VOSviewer. Jumlah artikel yang dijadikan data berjumlah 816 artikel yang diperoleh dari laman Scopus. Hasil penelitian ini menunjukkan bahwa publikasi penelitian mengenai *fintech* pada sektor perbankan telah banyak dilakukan di berbagai negara. Ada beberapa variabel yang terkait dengan topik *fintech* dan perbankan, antara lain teknologi, industri, covid, masa depan, dan blockchain. Beberapa nama penulis yang banyak ditemui yakni M.K. Hassan, H. Banna, dan M.R. Rabbani yang dapat dijadikan referensi. Keterbatasan penelitian ini adalah tidak dapat memberikan gambaran mengenai arah tren penggunaan variabel penelitian pada tahun 2023. Penelitian ini diharapkan dapat memberikan implikasi dalam pengembangan penelitian selanjutnya khususnya terkait *fintech* dan perbankan.

Kata kunci: Fintech; Perbankan; Bibliometrik

ABSTRACT

This study aims to provide empirical evidence regarding the growth and trend of fintech-related publications in the banking sector and examine what variables are often associated with fintech. Utilizing bibliometric analysis via the VOSviewer application, this study analyzes 816 articles published on Scopus from 2013 to 2023. The results of this study indicate that research publications on fintech in the banking sector have been widely carried out in various countries. Several variables related to fintech and banking topics include technology, industry, covid, future, and blockchain. Some of the authors that are widely found are M.K. Hassan, H. Banna, and M.R. Rabbani which can be considered as references. The study's limitation lies in its inability to provide an overview of variable usage trends in 2023. This research is expected to provide implications for the development of future research, especially related to fintech and banking.

Keywords: Fintech; Banking; Bibliometrics

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INTRODUCTION

The banking sector is the backbone of the global economy and plays a central role in supporting a country's growth and financial stability. DPR (2021) stated that as one of the main pillars of the country's economic structure, the banking sector also plays an important role in allocating financial resources and facilitating investment and consumption. As a financial institution that provides various essential services such as lending, investment, and fund management, banks have a strategic role in allocating financial resources to support productive projects and economic growth.

A company that employs technology, specifically automated information processing, and the internet, to deliver financial solutions is known as financial technology or fintech (Gabor & Brooks, 2017; Milian et al., 2019; Zavolokina et al., 2016; Alt et al., 2018; Gomber et al., 2018; Puschmann, 2017). Broadly, fintech is defined as financial technology innovation that produces new business models, applications, processes, or products with material effects related to financial institutions and the provision of financial services (Financial Stability Board, 2017). This innovation in the financial industry has led to improved business operations, high efficiency, speed, flexibility, and cost reduction. (Zavolokina et al., 2016; Lee & Shin, 2018; Thakor, 2020). Based on these various definitions, it can be concluded that fintech is a financial industry that applies technology to provide services and increase financial activities. In this study, the term fintech is associated with the use of technology that helps the financial and banking industries in providing services to the public to increase financial activities.

Fintech incorporates innovation into retail banking, cryptocurrency, investments, financial literacy, and education (Gomber et al., 2018). Due to the automation of most services, business models have changed to allow for the provision of individualized services to customers without regard to time zone or location. Fintech has additionally aided in disintermediation (Thakor, 2020) and provided online platforms for trading, lending (crowdfunding and peer-to-peer, P2P), and asset management, for example, robo-advising (Gomber et al., 2018; Alt et al., 2018; Lee & Shin, 2018; Puschmann, 2017). The growth of infrastructure, data analysis, big data, and mobile devices are further methods used to accomplish this intermediation (Lee & Shin, 2018).

There are three periods of fintech evolution according to Arner et al., 2016, namely: fintech 1.0 (1866-1967), characterized by the invention of ATM and telegraph technology that allows rapid transmission, information, and financial transactions; fintech 2.0 (1967-2008), dominated by electronic payments, clearing systems, ATMs, and online banking services; and fintech 3.0 (2008-present), where established technology companies provide direct financial products and services using online platforms to businesses and the general public. At least, there are two main factors for the evolution in fintech innovation (Awrey, 2013). First is the shift in people's preferences, especially the millennial generation, who grew up in a digital environment. In addition, the ease of internet access drives expectations for the convenience, speed, cost and ease of financial services. Second is the emergence of businesses that use technologies such as big data, artificial intelligence, blockchain, and cryptocurrencies

which are currently growing rapidly (Frame et al., 2018).

The success of fintech industry innovation requires transparent and clear regulations for new start-ups, the banking industry, and financial innovation companies (Muhammad & Sari, 2020). Several research results show the importance of the role of regulators (state) in providing a platform for fintech companies to promote innovation in the field of financial services as well as safeguard the interests of consumers and investors.

In Indonesia, there are *Peraturan Otoritas Jasa Keuangan* (POJK) Number 10/POJK.05/2022 concerning Information Technology-Based Joint Funding Services (POJK LPBBTI/Fintech P2P Lending) and POJK Number 13/POJK.02/2018 concerning Digital Financial Innovation in the Financial Services Sector. In addition, there is also *Peraturan Bank Indonesia* Number 18/40/PBI/2016 concerning the Implementation of Payment Transaction Processing. In the European Union, Payment Services Directive 2 (PSD2) was enacted to regulate electronic payment services and strengthen the security of electronic transactions. In Singapore, the Monetary Authority of Singapore (MAS) enforces regulations to grant licenses to fintech companies that meet certain requirements. This license covers a wide range of business models, including payment services, e-money, and digital asset services. The Financial Conduct Authority (FCA) in the UK issued regulations to oversee crowdfunding activities, including licensing requirement requirements, limits on investment amounts, and consumer protection.

In a modern era driven by technological innovation, fintech has become a revolutionary force in the banking sector. In the ever-evolving

digital era, fintech has become the driving force of transformation in the financial industry. Fintech summarizes various technological innovations that are changing the way money is managed, transferred, and invested (Mauline, 2022). Along with these developments, the banking sector has also undergone significant transformation. Innovations such as digital banking applications, application-based payment services, peer-to-peer lending (P2P lending), advanced security technologies, and online investment platforms are clear examples of how fintech has changed the way traditional banking operates. Fintech in the banking sector is a very interesting and relevant topic in the context of a changing global economy.

Fintech presents new financial solutions supported by modern technology such as artificial intelligence, big data analytics, and application-based financial services (mobile finance) (Ma'ruf, 2021). These innovations not only facilitate customer access to financial services but also create operational efficiencies and trigger breakthroughs in risk management. By driving operational efficiency, improving the accessibility of financial services, and providing a better customer experience, fintech creates new opportunities and challenges for the banking sector. Rapid changes in fintech technology force traditional banks to continue to adapt in order to remain competitive and relevant (Ayu, 2023). Therefore, it is important to know how fintech develops in the banking sector.

Fintech is supported by the public for its ease in financial transactions compared to rigid and convoluted conventional banking administrative processes (Kristianti & Tulenan, 2021). Complicated administrative processes

and strict regulations are some of the reasons why banking has not been optimal for financial penetration. Fintech's presence in the banking sector has created broader financial inclusion. Fintech has opened the door for individuals and small businesses to access previously hard-to-reach financial services, expanding accessibility significantly. Fintech makes low-income people able to access financial services such as low-interest loans more easily (Ramlah, 2021).

This article aims to present a comprehensive literature review of the growth and trends of fintech publications within the banking sector and the variables attributed to fintech. An overview of fintech within the banking sector is not only important to understand these industry trends, but also to help banks anticipate and adapt to ever-changing technological developments. By analyzing various empirical research, conceptual frameworks, and case studies, this article explains how fintech is developing in the banking sector. Thus, the role of fintech in the banking sector has become very relevant in responding to the demands of the ever-changing and increasing financial ecosystem.

Some bibliometric analysis has already been carried out on fintech trends. However, this paper contributes to the literature as it focuses specifically on fintech over ten years from 2013 to 2023 in the banking sector.

RESEARCH METHODS

This study employs bibliometric analysis (bibliometrics), a type of literature analysis that is a component of the research assessment technique. It is feasible to do bibliometric analysis utilizing a unique methodology from a variety of widely generated literature (Ellegaard

& Wallin, 2015). The research method uses the VOSViewer application which involves a series of steps for the analysis and visualization of bibliometric data. Bibliographic data relevant to the research topic is downloaded from the scientific database Scopus for the reason that this page is assumed to include all publications at the international level. This data is then imported into VOSViewer for network analysis.

The research period is from 2013 to 2023. Furthermore, the data processing steps include filtering to limit the time range, subject area, as well as the language used. At this stage, VOSViewer builds a network of co-citations or co-authors based on the interrelationships between documents or authors. Cluster analysis is also carried out to identify similar thematic groups or research focuses. During this process, special features of VOSViewer, such as layout and coloring, are used to improve understanding of structure and trends in bibliometric networks. The results of this analysis can help identify research developments, collaboration between authors, and key concepts in the literature. This method provides a strong visual and deep insight into the existing knowledge framework in a particular research domain.

RESULTS AND DISCUSSION

The initial data obtained in this study amounted to 1,149 papers which were then carried out in the screening stage to produce 816 papers. Data is taken from journal publications on the Scopus page obtained using fintech and banking keywords through several screening stages presented in Figure 1 below.

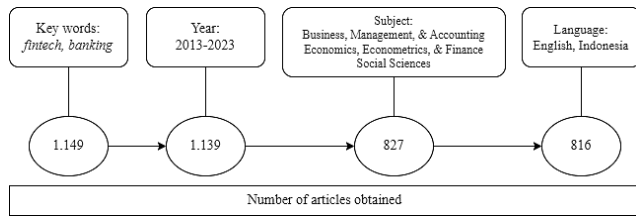


Figure 1. Data Selection Process

Source: data processed by author (2023)

Figure 1 is the process of selecting data from the Scopus page where there were 1,149 papers at the beginning of the search. The year 2013-2023 is used as the second screening stage for the reason that fintech publications have developed a lot during that period. The third screening stage is data taken from publications in journals with the subject of Business, Management, & Accounting; Economics, Econometrics, & Finance; and Social Sciences because research on this subject is research in a field that is in accordance with the aims and objectives of the study. The data used in this study were from English and Indonesian language publications, which were 816 papers. The distribution and development of such publications are shown in Figure 2.

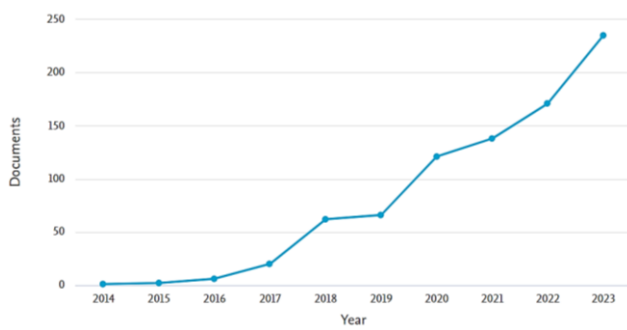


Figure 2. Graph of Research Development Related to Fintech and Banking Topics

Source: <https://www.scopus.com/>

Figure 2 shows that in general, the publication of articles related to fintech and banking has increased in quantity since 2013. In 2014, the number of articles published on

Scopus was 1 document and continued to show a consistent increase until 2019 of 66 documents. A significant increase occurred in 2020 as many as 121 documents. This number continues to increase until 2023, when this year the number of articles has reached 235 documents published on Scopus. Furthermore, the distribution of fintech and banking topics by country is presented in Figure 3.

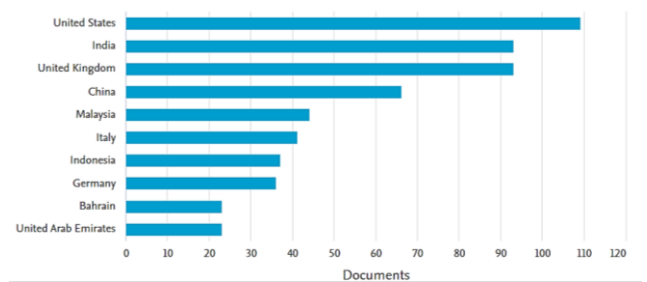


Figure 3. Publication Graph on Fintech and Banking Topics By Country

Source: <https://www.scopus.com/>

Figure 3 shows the 10 countries with the highest paper publication contributions on fintech and banking topics. The highest position is the United States with 109 documents, followed by India with 93 documents, and so on. This shows that in general, the United States has concerns about fintech issues. Out of the 10 countries, Indonesia occupies the seventh position with 37 documents published in Scopus. It can be assumed that Indonesia also has a fairly high concern for fintech. Table 1 presents about 10 (ten) publication articles with the highest citations on the Scopus page.

Table 1. Ten Papers with The Highest Citations on Fintech in The Banking Sector

No	Title and Author	Year	Journal	Quartile Scopus	Number of Citations
1	Fintech: Ecosystem, business models, investment decisions, and challenges Author: I. Lee, Y.J. Shin	2018	Business Horizons	Q1	600
2	Fintech and banking: What do we know? Author: A.V. Thakor	2020	Journal of Financial Intermediation	Q1	337
3	Taming the beast: A scientific definition of fintech Author: P. Schueffel	2016	Journal of Innovation Management	Q2	242
4	Fintech and regtech: Impact on regulators and banks Author: I. Anagnostopoulos	2018	Journal of Economics and Business	Q2	217
5	Fintech investments in European banks: a hybrid IT2 fuzzy multidimensional decision-making approach Author: G. Kou, Ö. Olgu Akdeniz, H. Dinçer, S. Yüksel	2021	Financial Innovation	Q1	187
6	Do fintech lenders penetrate areas that are underserved by traditional banks?	2018	Journal of Economics and Business	Q2	173
7	Banking goes digital: The adoption of FinTech services by German households Author: J. Jagtiani, C. Lemie	2020	Finance Research Letters	Q1	128
8	Does fintech innovation improve bank efficiency? Evidence from China's banking industry Author: M. Jünger, M. Mietzner	2021	International Review of Economics and Finance	Q1	127
9	Data security and consumer trust in FinTech innovation in Germany Author: C. C. Lee, X. Li, C.H. Yu, J. Zhao	2018	Information and Computer Security	Q2	114
10	Can fintech improve the efficiency of commercial banks? —An analysis based on big data Author: H. Stewart, J. Jürjens	2021	Research in International Business and Finance	Q1	112
					Author: Y. Wang, S. Xiuping, Q. Zhang

Source: Scopus (processed)

Table 1 shows the 10 papers with the highest citations related to fintech and banking topics. The number of citations is an indicator to measure the impact or influence of the paper on other papers related to fintech and banking. The high number of citations is often taken as an

Variables	Cluster	Total link strength	Occurrences	Average Year
relationship	7	4	8	2022
traditional bank	7	1	5	2020

Source: data processed by author (2023)

Table 2 shows the group of variables found as a result of data processing using VOSviewer, the application used in this study. According to the processed publication data, the variable grouping consists of seven clusters. This suggests that there are groups of variables that have a tendency to be related to each other, which often appear together in research conducted and published. This grouping is non-captive, meaning it is possible that variables within one cluster correlate with other variables outside the cluster.

The number in the total link strength column shows how strongly one variable is associated with another variable. The greater the number in this column, the more frequently this variable is related to other variables. The number in the occurrences column indicates how much research used the variable. The numbers in these two columns are almost aligned. Publications with associated variables appeared on average in that year, as indicated by the number in the average year column. An overview of the trends in the variables that surfaced in the span of years of this study is shown below.

Table 3. Trend Variables Used

Year	Trend of Variables Used
2019	Fintech industry; islamic finance; introduction
2020	Disruption; opportunity; future; financial innovation; implication; business; financial sector; cryptocurrency; trust; rise; shadow banking; comparative study; digital technology; mobile

Year	Trend of Variables Used
	banking; traditional bank
2021	Islamic bank; technology; industry; blockchain; lending; digital transformation; determinant; fintech company; open banking; fintech innovation; peer; digital financial inclusion; age; smes; islamic fintech; advancement; fintech service; insurance
2022	Covid; intention; fintech adoption; pandemic; blockchain technology; relationship; sustainability; empirical study; nexus; fintechs

Source: Data processed by author (2023)

Table 3 shows the trend of variables used in research and publication in the 2019-2022 time frame. For the years 2013 to 2018, there are still very few publications so they do not appear in the results of VOSviewer data processing. Meanwhile, in 2023, the variables used are increasingly varied so there are still very few levels of occurrence, resulting in these variables could not be detected by VOSviewer. The trend of the emergence of this variable indicates the movement of problems observed by authors who develop in the world. This trend can give the authors a broad overview from which to grow further, both from variables that are already known and from those that have not yet been thoroughly investigated. This is undoubtedly consistent with the evolution of issues within the organization and in society at large.

Some authors, either individually or in conjunction with other writers, publish research findings on subjects linked to this research. A picture of several authors names and their connections to other authors is shown below as presented in Figure 5.

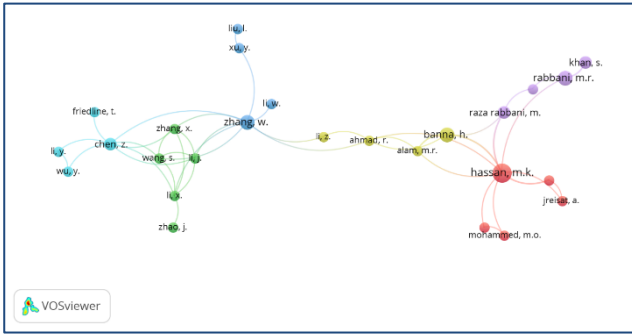


Figure 5. Authors and Their Relationships with Other Authors

Source: data processed by author (2023)

Figure 5 shows the names of authors who published their research related to this research topic. The line in Figure 5 shows the relationship or partner between one author and others. For example, Hassan in conducting research and publications has partnered with Jreisat, and in other studies Hassan partnered with Mohammed. Furthermore, on another occasion, Zhang partnered with Li, Liu, and Xu. The larger the circle on the author’s name indicates the more publications have been made. This may suggest that the author is delving deeper into the subjects covered by this research the more frequently they publish. The following table of author names related to the topic in this study is presented based on the results of VOSviewer data processing. The distribution of published research related to the research topics by the authors is presented in Table 4.

Table 4. Authors Who Often Publish Research Related to Research Topics

Author	Cluster	Total link strength	Documents
Hassan, M.K.	1	12	7
Banna, H.	4	6	4
Rabbani, M.R.	5	4	4
Zhang, W.	3	9	4
Chen, Z.	6	8	3

Author	Cluster	Total link strength	Documents
Khan, S.	5	2	3
Rabbani, M. R.	5	4	2
Ahmad, R.	4	5	2
Alam, M.R.	4	4	2
Bashar, A.	5	2	2
Friedline, T.	6	1	2
Jreisat, A.	1	2	2
Li, J.	2	5	2
Li, W.	3	1	2
Li, X.	2	6	2
Li, Y.	6	2	2
Li, Z.	4	2	2

Source: Data processed by author (2023)

Table 4 shows that the aforementioned writers published their research findings using the variables listed in the cluster column, which are included in the cluster. The number in the total link strength column shows how strongly or often the author partners with other authors in publishing on topics relevant to this study. The number in the documents column indicates how many publications the VOSviewer application found by mentioning the author’s name. The names of the authors listed in Table 4 can be used as references for further research related to the topic. The more often the name of an author appears, the more the author studies and understands the intended research topic.

Overall, the data processing findings obtained with the VOSviewer application indicate that several variables are often utilized in numerous papers in this area of study. All of the variables used in processed publication data, particularly those with very limited quantity, cannot be displayed by VOSviewer. On the one hand, this makes it difficult for the author to get a more detailed picture of how relevant variables were used in related studies.

On the other hand, this may indicate that variables that have not been mentioned have not been thoroughly explored to allow for the latest future research.

CONCLUSION

This study aims to provide empirical evidence regarding the growth and trend of fintech-related publications in the banking sector and examine what variables are often associated with fintech. This study found that the development of research related to fintech and the banking sector is very varied, as evidenced by the many publications related to the topics. There are several variables associated with fintech and banking topics, including technology, industry, covid, future, and blockchain. However, there are still many unexplored variables that can be attributed to this research topic, such as advancement, digital technology, shadow banking, mobile banking, and insurance. These variables can be considered for further research as the novelty of future research.

Several names of authors related to the fintech and banking topics, namely Hassan, Banna, and Rabbani, indicate that these authors have published the results of their research several times related to this research topic. Thus, the author can be used as a reference consideration. The limitation of this study is its inability to give a broad picture of the usage of research variables in 2023, including their trend direction. An impact on how future research is developed, particularly in the areas of fintech and banking.

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