Mapping A Decade Of Financial Technology Landscape : Open Knowledge Maps

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Abstract. *The study of financial technology has become one of the most interesting studies for researchers in recent years. The purpose of this paper is to present the development of research on financial technology over the last 10 years. This study analyzed 85 papers in terms of financial technology using the Open Knowledge Maps (OKM) application. The data source was obtained from the metadata of scientific journals from 2013 – 2022. Based on the results of analysis using open knowledge maps shows that there are 11 research clusters on financial technology. There are three key dimensions of the result analysis are highlighted: (1) an exhaustive overview and descriptive information for the complete document set sourced from BASE-indexed articles, (2) data on article categorization into relevant clusters along with corresponding document counts, and (3) areas related to financial technology that present substantial opportunities for future research agenda. The results indicate that there is considerable interest in studying financial technology in terms of demography and linking it to corporate innovation. Numerous underexplored research opportunities exist in the fintech domain, including themes such as human capital, innovation capability, sharia financial technology, peer-to-peer lending, and financial literacy. This study contributes to both practical and academic areas by (1) it can guide decision-making processes related to the company's use of financial technology, (2) this research can serve as a foundation for identifying research gaps, and as a reference source for future studies in the field of financial technology.*

Keywords: *Financial Literacy; Financial Technology; Financial Technology Syariah; Literature Review; Peer to Peer Lending.*

INTRODUCTION

Financial Technology has an important role in various aspects, including the business world. The topic of financial technology or digital technology is also a topic that is attracting a lot of attention from researchers today. Han et al., (2022) stated that the rapid and effective development of financial technology will help promote the development of scientific and technological innovation activities at the micro level, optimize and adjust the regional industrial structure at the intermediate level, and promote the regional innovation capability at the macro level. Knewtson & Rosenbaum (2020) defines financial technology into three definitions, namely: (1) FinTech is technology used to provide financial markets a financial product or financial service, characterized by sophisticated technology relative to existing technology in that market; (2) it uses the definition of FinTech to identify FinTech firms and create an industry framework to increase understanding of this emerging research area; (3) it provides a description of firms in the industry using this framework with characteristics set forth in the definition of FinTech. Fintech represents a novel approach to conducting financial transactions, seamlessly integrating the areas of finance and information technology with a single click (Rahim et al., 2023).

Financial technology utilizes agents and systems of third-party intermediaries to enhance accessibility and reduce service costs (Antwi-Wiafe et al., 2023). Several governments in developing and emerging markets are progressively adopting financial technology to enhance financial inclusion and integration within their respective nations (Ediagbonya & Tioluwani, 2023). In recent times, the proliferation of digital technologies within the financial sector has led to the emergence of Fintech. (Elia et al., 2023) investigated the role of Fintech in the banking industry. This has initiated a dynamic and swift transformation that poses challenges for business operators and regulatory authorities in the banking industry to keep pace with.

The topic of financial technology by academics is widely studied from various perspectives and various samples produce various interesting findings. The study of Hu & Li (2023) provides valuable insights for the development and optimization of fintech, the green transformation of the real economy, and high-quality development. The study results of Jali et al., (2023) show that high school teachers have a good grasp of financial technology, and they possess strong financial literacy skills. The correlation analysis indicated that financial literacy skills are the most important attribute influencing financial behavior of high school teachers. The research findings by Kusumawati et al. (2022) indicate that financial technology has a significant positive impact on financial inclusion. The study of Alshehadeh et al., (2023) recommends that Jordanian banks, in light of global competitiveness and the global trend towards digital transformation, follow the financial technology approach and make the most of the opportunities and advantages offered by digitization to banks in order to preserve their customers and compete. According to Gunawan et al., (2023) the results showed that financial literacy, financial technology, and financial inclusion affected the performance of MSMEs in Medan City, and financial inclusion did not mediate the effects of financial literacy and financial technology on the performance of MSMEs in Medan City.

In this research, we will elaborate on the advancements in the field of financial technology. This study aims to explore and analyze research trends in financial technology. A literature review is used in this study by conducting an open knowledge maps of financial technology by measuring research trends financial technology in the last ten years.

METHOD

This study examined 'financial technology' by conducting a data investigation process with data sourced from the article published in the internet that was indexed by Bielefeld Academic Search Engine (BASE) from 2013 to 2022. In these ten years, the study discussed

financial technology. Finally, research on financial technology has been extensively examined by researchers from various perspectives over the last 10 years.

In this study, the Open Knowledge Maps platform is employed for the analysis of papers. According to Kraker et al., (2016) the goal of Open Knowledge Maps is to create a visual interface to the worlds scientific. The Open Knowledge Maps is a tool provided by one of the article indexers, namely the Bielefeld Academic Search Engine (BASE), located at base-search.net. Base-search.net is an institution that indexes journals available on the internet. Base-search has created a tool called open knowledge maps, whose algorithm is text-based. The text uploaded on the internet undergoes an analysis process based on entered keywords. After entering the keywords, open knowledge maps will categorize documents (articles) based on research topics that have been previously conducted according to the indexing done by base-search.net.

This investigation aims to delve into details regarding the exploration of the financial technology research topic spanning from 2013 to 2022. The dataset is derived from articles published on the internet, indexed by the Bielefeld Academic Search Engine (BASE), and the data collection process is conducted utilizing Open Knowledge Maps, as ilustrated in Figure 1.

Figure 1: Data Collection Process
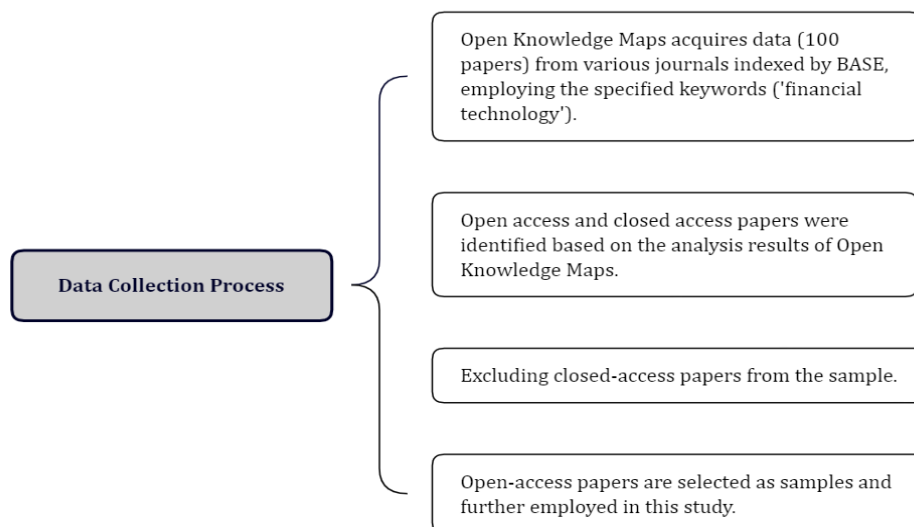
The papers selected for analysis are sourced from articles published in journals indexed by BASE. The paper selection process is facilitated using the Open Knowledge Maps platform. Open Knowledge Maps aids in the paper selection based on the entered keyword, 'financial technology.' Through this keyword, 100 relevant papers are identified. Subsequently, the next step involves identifying open-access and closed-access papers. Closed-access papers are

excluded as samples, while open-access papers are further analyzed in this research. The stages of the paper selection process with Open Knowledge Maps are outlined in Figure 2 below.

Figure 2: Stages of Data Analysis Process Using Open Knowledge Maps
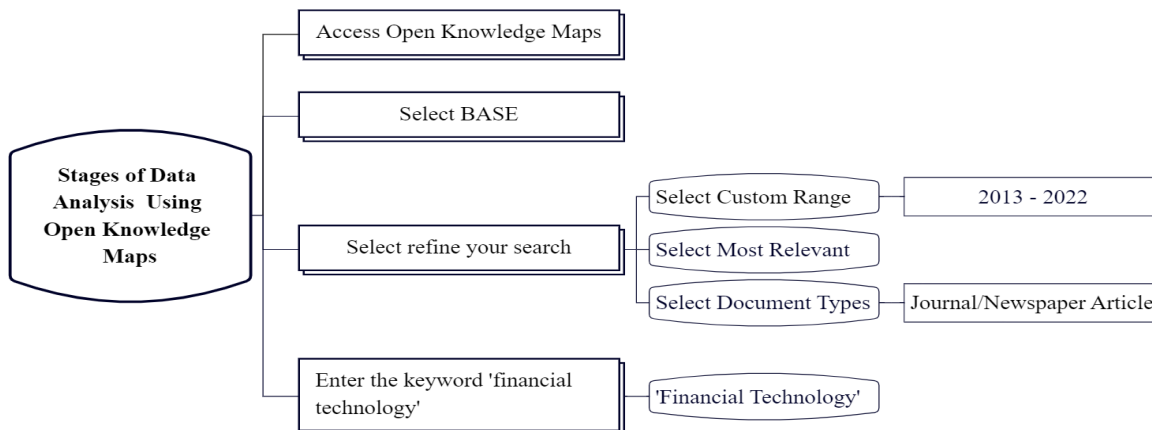
There are several stages in the data analysis process to obtain papers for this research, as illustrated in Figure 2. The first step is to open the Open Knowledge Maps platform. Second, select BASE. Third, choose "Refine Your Search," and in this section, there are several stages: select a custom range (2013 - 2022), choose "most relevant," and select document types. The selected document types are journal/newspaper articles. The fourth stage is to enter the keyword ('financial technology').

RESULTS AND DISCUSSION

**Figure 3:** Results of the Open Knowledge Maps Analysis
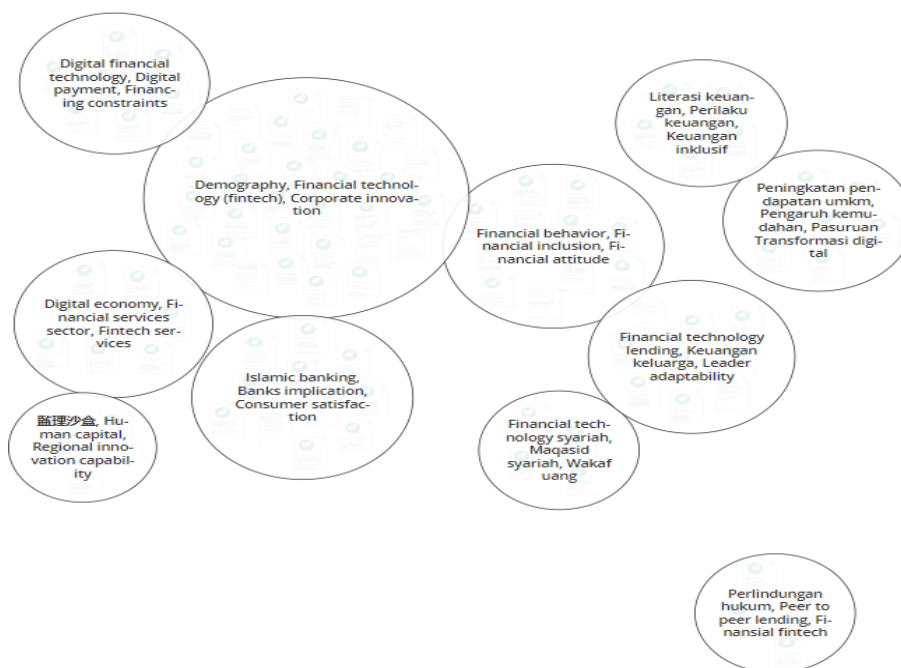
Open Knowledge Maps categorizes papers into clusters. Papers with the same topic are grouped into one cluster. Based on the analysis results of Open Knowledge Maps using the keyword 'financial technology,' it produced 11 clusters from a total of 100 papers. Cluster 1 is Demography, Financial Technology, Corporate Innovation, consisting of 31 papers. Clusters 2 and 3 each contain 11 papers, where Cluster 2 is Islamic Banking, Banks Implication, Consumer Satisfaction. and Cluster 3 is Financial behavior, Financial Inclusion, Financial Attitude. Cluster 4 is Financial Technology Lending, Keuangan Keluarga, Leader adaptability, consisting of 9 papers. Subsequently, cluster 5 is Digital Economy, Financial services Sector, Fintech Services with 8 papers. Clusters 6 and 7 both consist of 7 papers. Cluster 6 is Digital Financial Technology, Digital Payment, Financing Constraints, and Cluster 7 is Peningkatan pendapatan UMKM, Pengaruh Kemudahan, Transformasi Digital. Cluster 8 contains 5 papers, namely Literasi keuangan, Perilaku Keuangan, Keuangan Inklusif Cluster. Then, Clusters 9 and 10 are Financial Technology Syariah, Maqasid Syariah, Wakaf Uang cluster and Perlindungan Hukum, Peer to peer lending, Fintech cluster, each containing 4 papers. Lastly, Cluster 11 is the Human Capital, Regional Innovation Capibility cluster with 3 papers. The amount papers of each clustering based on the results of Open Knowledge Maps is shown in Table 1.

Table 1: Clustering and the number of papers within each cluster

No.	Cluster	Cluster Categorization Names	Number of Documents
1.	Cluster 1	Demography, Financial Technology, Corporate Innovation.	31
2.	Cluster 2	Islamic Banking, Banks Implication, Consumer Satisfaction.	11
3.	Cluster 3	Financial behavior, Financial Inclusion, Financial Attitude.	11
4.	Cluster 4	Financial Technology Lending, Keuangan Keluarga, Leader adaptability	9
5.	Cluster 5	Digital Economy, Financial services Sector, Fintech Services	8
6.	Cluster 6	Digital Financial Technology, Digital Payment, Financing Constraints	7
7.	Cluster 7	Peningkatan pendapatan UMKM, Pengaruh Kemudahan, Transformasi Digital	7
8.	Cluster 8	Literasi keuangan, Perilaku Keuangan, Keuangan Inklusif	5
9.	Cluster 9	Financial Technology Syariah, Maqasid Syariah, Wakaf Uang	4
10.	Cluster 10	Perlindungan Hukum, Peer to peer lending, Fintech	4
11.	Cluster 11	Human Capital, Regional Innovation Capibility	3
		Total	100

The paper selection process based on accessibility is illustrated in figure 4 below.

Figure 4: Overview of the results of the sampling process
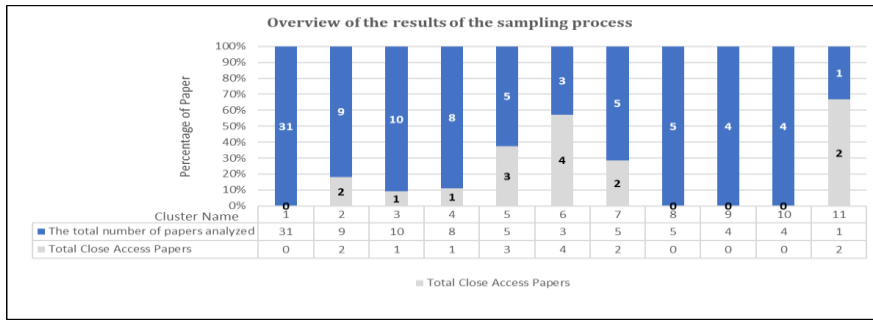
Figure 5: Close Access Paper and Analized Paper Comparison
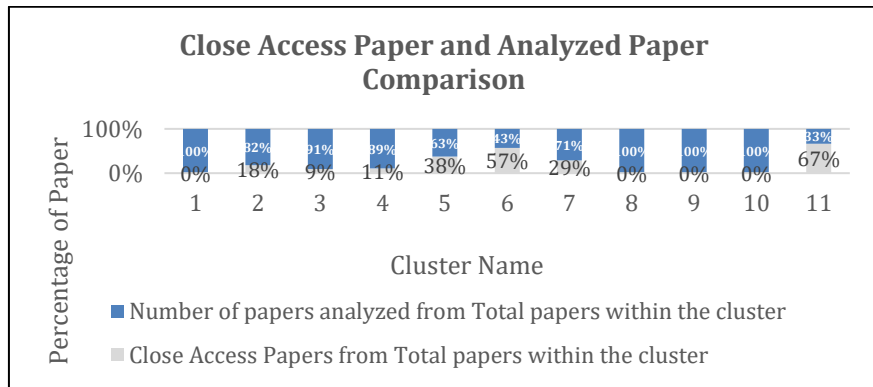
These 100 papers were then filtered based on their accessibility. From the paper selection, a total of 85 accessible papers were obtained, while the rest (15 papers) were inaccessible. In Cluster 1, there are 31 open-access papers. In Cluster 2, there are 2 (18%) closed-access papers, resulting in 9 (82%) papers being open access. Moving on to Cluster 3, there are 10 91%) open-access papers and 1 (9%) closed-access paper. In Cluster 4, there are 8 (89%) papers available for analysis and 1 (11%) closed-access paper. Clusters 5, 7, and 8 each contain 5 (63%, 71%, 100%) open-access papers. In Cluster 6, there are 3 (43%) open-access papers and 4 (57%) closed-access papers. Clusters 9 and 10 have all papers accessible, with 4 papers in each cluster. Lastly, in Cluster 11, only 1 (33%) paper is available for analysis out of a total of 3 papers in that cluster. Therefore, the overall number of papers available for analysis is 85.

Figure 6: The development of the number of papers based on the years from 2013 to 2022.
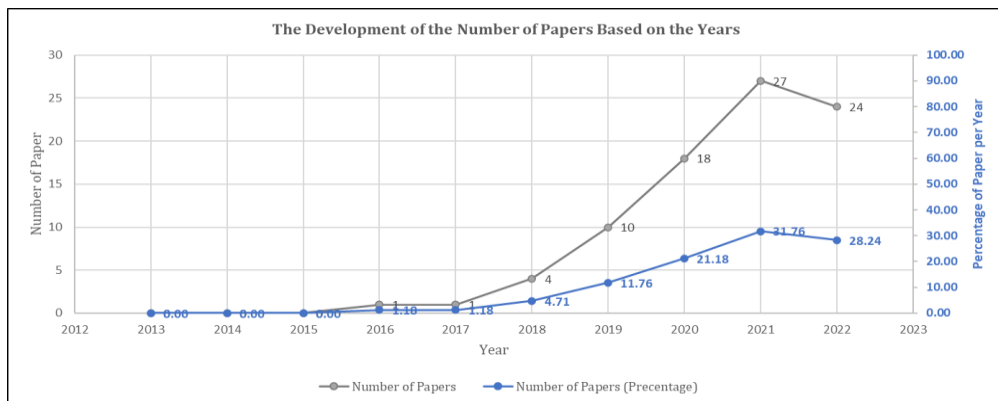
Figure 4 delineates the progression in the quantity of research pertaining to financial technology from 2013 to 2022. The depicted trend reflects the volume of open-access papers derived from articles indexed in BASE, utilizing open knowledge maps as a methodological framework. Based on Figure 4, it is evident that there was an absence of scholarly inquiry into the topic of financial technology from 2013 to 2015. Research on financial technology commenced in 2016 and continued through 2022. The highest number of papers during the research years was in 2021, accounting for 31.76%, followed by 28.24% in 2022, and subsequently, 21.18% in 2020. Based on these analytical findings, it can be concluded that research on financial technology has been increasingly explored from 2019 to 2022, within the specified research timeframe.

Discussion

This research aims to investigate and examine the current research patterns within the field of financial technology. A comprehensive review of the literature was undertaken, employing open knowledge maps to analyze the landscape of financial technology research trends over the past decade. The primary goals of this study involve conducting a descriptive analysis on data and research trends, along with formulating an agenda for future investigations into financial technology. The literature review not only facilitated an exploration of financial technology but also assisted in mapping research advancements over the course of the last ten years.

The result measured the growth of financial technology studies through an analysis using open knowledge maps on selected articles from 2013 to 2022. Eighty-five documents were published under the category of financial technology between 2013 and 2022. The average trend revealed an increase in publications from 2019 to 2021. Research on Demography, Financial Technology, and Corporate Innovation (Cluster 1) is the most extensively studied topic, as conducted by (Setyaningsih, 2018), (Tampi, 2019), (Andari et al., 2020), (Cahyo & Tri Bawono, 2021), (Widyastuti & Hermanto, 2022), (Sihotang & Kuning, 2022) and (Rohmah et al., 2022). Furthermore, research focusing on Islamic Banking, Banks Implication, and Consumer Satisfaction (Cluster 2) has been conducted by (Narastri & Kafabih, 2019), (Haridan et al., 2020), (Utami & Slamet, 2021), (Arif et al., 2022) and (Shafira & Amsari, 2022).

The topic of Financial Behavior, Financial Inclusion, and Financial Attitude (cluster 3) has also been extensively examined by researchers, including the work conducted by (Kusuma, 2019), (Alawi et al., 2020), (Farida et al., 2021) and (Safrianti et al., 2022). Other research has been conducted by (Paula et al., 2019), (Fauji & Widodo, 2020), and (Palito et al., 2021), examining Financial Technology Lending, Family Finance, and Leader Adaptability (Cluster

4). Another study has been conducted by (Muljanto, 2020), (Pratama, 2020), (Amir Hamzah dan Dadang Suhardi, 2019), (Suharmanto et al., 2021) and (Misal & Kanthe, 2022), focusing on Digital Economy, the Financial Services Sector, and Fintech Services (Cluster 5).

The study on financial technology also addresses Digital Financial Technology, Digital Payment, and Financing Constraints (Cluster 6), as explored by (Tanoto, 2021) and (Mikrad et al., 2022). Researchers such as (Rohmah et al., 2022) examine financial technology from the perspectives of enhancing the income of Micro, Small, and Medium Enterprises (MSMEs), the influence of convenience, and digital transformation (Cluster 7). (Artika & Shara, 2021) and (Rini & Sulistiyowato, 2022) investigate financial distress from the angles of financial literacy, financial behavior, and inclusive finance Cluster 8).

The subsequent research on fintech examines aspects related to Islamic Financial Technology, Shariah Maqasid, and the concept of money Wakaf (Cluster 9), as previously conducted by (Muhammad & Lanaula, 2019), (Triyanto, 2020) and (Kurrohman & Harapan, 2022). (Fisabilillah & Hanifa, 2021) and (Sihotang & Kuning, 2022) analyze financial technology from the perspectives of Legal Protection, Peer-to-Peer Lending, and Fintech (Cluster 10). Lastly, (Han et al., 2022) examines financial technology from the perspectives of Human Capital and Regional Innovation Capability (Cluster 11).

CONCLUSION

The outcomes of the comprehensive analysis are hereby documented and presented. Consistent with the article's research objective, three principal dimensions are emphasized, including (1) a comprehensive overview and descriptive details pertaining to the entire set of documents derived from articles indexed by BASE, (2) Information regarding the categorization of articles into relevant clusters along with the respective document counts is provided, (3) topics related to financial technology that still have significant potential for further exploration. Researchers examine financial technology from various perspectives, such as linking it with Corporate Innovation, financial Behavior, Financial Inclusion, Financial Attitude, Financial Technology Lending, Family Finance, Shariah Maqasid and others. Based on the analysis using Open Knowledge Maps, research on financial technology began to be explored in 2016. The study in this area has shown continuous growth, as indicated by the increasing trend in the number of papers each year. The peak of research on financial technology was observed in 2021.

The analysis suggests that research on financial technology remains highly interesting, with many gaps yet to be explored by other researchers. There are still many research

opportunities related to financial technology, such as studies linking fintech with Human Capital and Regional Innovation Capability; Legal Protection, Peer-to-Peer Lending, and Fintech; Financial Technology Shariah, Shariah Maqasid, and Wakaf Uang; as well as Financial Literacy, Financial Behavior, and Inclusive Finance. Research on financial distress with a focus on linking it to those variables still holds significant potential for discovering research gaps that could bring novelty to the field.

This research contributes to both the practical and academic aspects. In the practical context, the literature review findings on financial technology can serve as a reference for corporate decision-making, especially regarding the adoption of financial technology within the company and its benefits. It can guide various decision-making processes related to the role of financial technology for the company. In the academic sphere, this research can serve as a foundation for researchers as one approach to identifying research gaps for future studies in the field of financial technology. Additionally, it can be a reference source for conducting research in this particular topic.

This study maps research in the field of financial technology using Open Knowledge Maps. The data was sourced from journal articles indexed in BASE over a ten-year period from 2013 to 2022. Further research could expand on this by utilizing different analytical tools, such as VOS Viewer, and incorporating data from reputable international journals like Scopus and others. The use of analytical tools with diverse data sources can provide additional new insights, particularly in the evolving landscape of financial technology research.

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