The Evolution of FinTech in Scientific Research: A Bibliometric Analysis

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Abstract: This study aims to investigate how FinTech evolved over time in research using bibliometric analysis. First, 1359 publications particularly related to the field of FinTech, from 2010 to 2021, were collected from the Scopus database. This study analyzed the fundamental issues and characteristics of FinTech in research, such as the annual contribution of publication, hot in the press, and foci, using theme analysis, concurrence analysis, and timeline analysis of authors' keywords. Second, prolific objects, such as journals, authors, institutions, countries, regions, and corresponding pivotal cooperative relationship mapping were used to present who leads considerable attention in FinTech research. Third, the citation structures of authors and journals were investigated, and presented the burst detection analysis of cited authors, journals, and references. Finally, combining the analysis results with the current financial environment, the challenges and future development opportunities are discussed further. This bibliometric analysis revealed an increasing annual publication trend, a shifting focus on financial inclusion, a dominance of authors from the USA, and a growing number of international collaborations and publications from different sources, indicating FinTech as a lively field with potential for further scientific enrichment. Accordingly, this comprehensive study of the FinTech documents not only reviews the current research characteristics and trajectories, but also helps scholars find the appropriate research entry-point and conduct in-depth research.

Keywords: FinTech; research; bibliometric analysis; Scopus

1. Introduction

Financial Technologies (FinTech), as a scholarly field, has appeared recently, with promising prospects of enhancing operational effectiveness and efficiencies [1]. Because of the positively influential relationship of FinTech with activities (i.e., transaction management, fund management, and insurance) related to the global financial sector, the field has already garnered noticeable research interest internationally [2]. Additionally, as the shared aspects of the field and sustainability [3,4] indicate, FinTech has the potential to guide future organizations within the banking sector to promote, nurture, and facilitate environmentally, economically, and socially sustainable practices. Moreover, the emergence of further disruptive technologies, including Artificial Intelligence, Cloud Computing, Blockchain, and Machine Learning, is rapidly expanding the field's width [5]. Attributing to the benefits of FinTech regarding the efficiency of operation, output quality, management

transparency, security, and added convenience for customers, previously identified growth in the field, in terms of annual production numbers [1,5–8], can be justified. Besides, Fin-Tech is actively facilitating financial inclusion, with technologies such as Mobile Banking, Online Banking, and Agent Banking [9,10]. Hence, the multidimensional need for this field's evolution can be acknowledged.

Despite being a distinct research area, the development of the field remained scattered [7], mainly for the dependency of the field on different technology-related domains [2,11,12]. Furthermore, the expanding horizon of the field due to rapid technological advancement [13–15] has resulted in incongruent perspectives regarding FinTech among researchers [6,10], which complexifies the synchronized development of the field. However, the present research acknowledges the dearth of conceptual uniformity and unanimity within the field, as argued by Bajwa, Ur Rehman [5], which may lead to misinterpretation and improper identification of research gaps. The present research aims to solve these issues by revealing the current state of development, and prominent authors whose contributions have been seminal to noticeable scientific works in the field, as well as current trends and possible future research directions.

The present study answers the research questions of what the current state of development is, who the most prominent contributors are, which sources, including countries and journals, have the most noticeable impact, what the publication trend in the field is, what the breadth and spread of existing knowledge is, and what the future research directions in the scholarly field of FinTech are. This study answers these questions with bibliometric analyses, together with citation and co-citation analyses conducted on the existing scientific works. The contribution of this research is manifolded. First, the revealed publication trend indicates the field's current development and life-cycle stage. This finding can enable future researchers to estimate the fit of their research intentions. Second, the identification of the most contributing papers and authors and their most used keywords can enable future researchers to recognize the dominant contributors in the field and congregate conceptual bases that can lead to harmonized development of the field. Third, the cluster analysis conducted for this research divulges the current extent of knowledge and future research scopes. Finally, with the recognition of the most contributing countries, which signifies the current state of FinTech adoption in the respective regions, this research facilitates the discerning of international collaboration scopes for future researchers that can foster knowledge transfer and contextualization of the adoption, thus expediting financial inclusion and sustainability in the global financial sector through FinTech.

The rest of the study is structured as follows. The next section presents the background of this study. In the third section, the methodology this research has adapted has been described. Then, the results of the analysis are presented and discussed in sections four and five. Finally, this paper concludes with practical and theoretical implications, as well as a recognition of the limitations of this research.

2. Background of the Study

The historical development of FinTech started in early 1988. Based on the Consumer International [4] report, we can present the historical evaluation period of FinTech in three phases. The progress story of FinTech started in early 1986. The first evaluation period of FinTech was counted between 1986 to 1967, and, during this period, this remarkable development was invented by the telegraph and set up by transatlantic cable. The second phase, between 1967 and 2008, includes the major achievement of the emergence of ATM machines and online banking services. The third phase began in 2008, and started a new paradigm in the era of digitalization [5].

The financial service sector globally is confronting thoroughgoing changes, due to rapid technological advancements, prompting process automation, interconnectivity among different institutes, and efficiency of service delivery [2,6]. This unprecedented reformation of the global financial service sector is embraced by the scientific works produced in the academic domain of FinTech. Researchers around the world are working to

contextualize the impact and implementation, as well as developing new technologies and novel implementations for existing innovations.

Despite being a new research field, FinTech has proliferated, indicating its wider acceptances and implementations. However, the contribution and impact of distinct authors and scientific papers are unknown to a great extent, which may lead to a lack of conceptual similarities among future research works. Moreover, the field's present contexts and future directions are still vague, as previous studies conducted with these objectives are limited to fewer keywords and, therefore, directions. Besides, the sources contributing to the field and their publishing trend remained unrevealed. Additionally, the contributions made by different countries and their tendency toward international collaboration have not been studied previously. The country-based publication numbers may indicate the advancement of the financial service sector in these regions. Further, insight into the international collaboration tendency may help future researchers collaborate across frontiers to channel the advancements.

Thus, FinTech continues to be highlighted in research related to finance, focused primarily on digitalized products and services because of its secure, easy, and transparent procedures. Moreover, the advancement of finance and technology is closely related to the industry 4.0 revolution, including Blockchain, Big data, Robbo Advisor, Internet of Things (IoT), Cybersecurity, Cloud Computing, and Crowdsourcing. The number of annual publications increased gradually, until 2018. However, COVID-19 brings crucial implications for international finance, and is growing and reshaping the phenomenon of research in finance [7,8]. Onward from 2019, the field enticed massive research interest, which resulted in an escalation of annual publication numbers.

To explore the current trends and future directions in the field of FinTech, this research applied bibliometric techniques for conducting quantitative analysis. The analysis revealed the characteristics and contributions made by different authors and countries, the impact of different authors, and development trends, as well as research directions, in the mentioned scholarly field. This research has been structured and executed revolving around the aim of facilitating future scientific producers to advance the field in a more informed and organized way.

3. Methodology

To analyze the emerging patterns and characteristics in the scholarly field of FinTech, bibliometric analyses, together with citation and co-citation analyses, have been conducted on published scientific papers. Bibliometric analysis has been proven to be an effective way of identifying common keywords and ideas evolving over time, along with future trends [9,10]. It employs quantitative measurements and investigation techniques on written documents, following an objectivist philosophy [11]. Citation and co-citation analysis focus on revealing emerging trends and the impact of different journals, authors, similar keywords, and shared ideas. It also identifies the course of formation and development of a scholarly field attributed to individual authors and collaborations [12].

Bibliometric studies (e.g., citation and co-citation analyses) can extract trends and characteristics from written documents. Bibliometric studies also ease the process of exploration, organization, and articulation of works done in any specific field during any specific period by analyzing the growth, institutional scholarship strengths, and possible school(s) of thought [13,14]. Citation and co-citation analyses enable researchers to administer analytical capabilities, techniques, and tools on written documents published in academic sources, such as journals, books, and articles, to explore and observe any particular field of research, or a portion of a discipline [3,15]. Bibliometric studies provide a comprehensive overview of the past, present, and future directions of the field, or sub-field, that is being studied [9,11].

As an effective and objective procedure of applying quantitative tools and analyzing capabilities to published written documents, adopting bibliometric research techniques allowed the researchers to respect the objectivist research philosophy and to understand

and present the findings in quantitative terms [3,9,16,17]. A summary of the methodological process has been presented in Figure 1. The written documents used in the bibliometric analyses were mined by the researchers from the Scopus Database by employing "FinTech" as a search keyword. "FinTech" itself is the most common keyword for papers written in the selected scholarly field. However, other closely related keywords, such as "Financial Technologies", "Innovation in Finance", "Technology in Banking", "Digital Banking", and "Financial Inclusion", were also considered when searching the papers. The deployment of only these keywords can be acknowledged as a limitation of the present study. Additionally, databases other than Scopus were not selected and utilized by the authors, due to a deficit in authorized access. The authors had authorized access only to the Scopus Database, which, thereby, left the opportunity to use other relevant keywords and mine from other respected databases (e.g., Web of Science, ScienceDirect, DOAJ, and JSTOR) in future research.
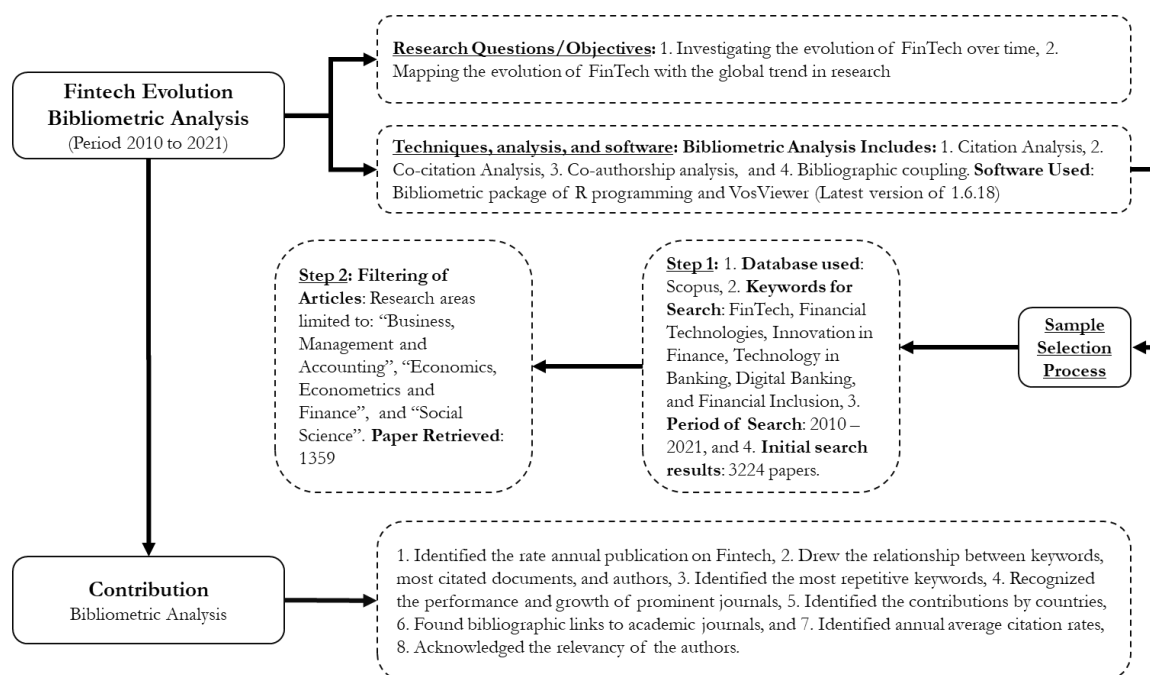
Figure 1. Outline of the methodology.

After loading the database, the authors used the periodic filtering strategy to extract the documents from 2010 to 2021. As a relatively new academic field, the database contains 1359 documents in total, starting from 2010. The period between 2010 and 2021 has been selected because the proliferation of the field started after the year 2010. The year 2022 has been excluded, as the total number of documents published was unknown at the culmination of this research. The authors have not applied "Document Type" filters, as they have considered all types of documents (e.g., articles, books, book chapters, conference papers, short surveys, and note previews) applicable for, and relevant to, bibliometric analyses. The authors had not excluded any particular document types, as the application of the keyword "FinTech", and other related ones, only retrieved 3224 results. Furthermore, the authors set an objective of investigating the theoretical and applied development of FinTech in every scholarly field to identify the associated research areas limited to "Business, Management and Accounting" AND "Economics, Econometrics and Finance", AND "Social Sciences". Other studies conducted in recent years administrated similar strategies to constitute the whole FinTech research [1,13,14]. To calculate "Average citations per document" the researchers considered both highly cited and lowly cited papers, which facilitates the process of identifying good and mediocre studies. Additionally, all the sources of scholarly works were considered to maximize the number of total papers. With these filtration techniques, the authors retrieved 1359 documents. The bibliometric package of R programming has been exerted on these

documents from the Scopus Database for the analyses. The VOS viewer (latest version of 1.6.18) has also been used to present networking analysis.

4. Results

4.1. Summary Statistics

This chapter compiles the findings from the bibliometric analysis conducted on 1359 documents particular to the research field of FinTech, published from the year 2010 to 2021. Table 1 abridges the findings from the analysis. Each of the documents fetched from the Scopus Database accumulated 9.937 citations on average. The higher unit of average citations pronounces an expeditious growth in the number of papers contributed to the scholarly field of FinTech during the specified period. The results also revealed the number of unique authors contributing to this field. Altogether, 2733 authors contributed by publishing a total of 1359 documents, among which 316 authors published 395 single-authored documents. The numbers of authors, co-authors, and published documents connote that, on average, 2.46 authors contributed to completing each document, while every single author contributed to at least 0.497 documents. In other words, documents per author are enumerated at 0.497, while co-authors per document are 2.46. In addition, these results manifest a good number of collaborations among the authors in the field of FinTech. The results also attest to a significant number of international collaborations, substantiated by 21.49% of international co-authorships.

4.2. Performance Analysis

Figure 2 presents the trend in annual scientific production from 2010 to 2020. As it indicates, the research on FinTech-related fields has not started before 2014. This indicates the novelty of the scholarly field of FinTech. The proliferation of the annual publication on the field began in 2019. The field experienced exponential growth between late 2018 and early 2019 in annual publication numbers. This growth continued to remain visible in 2021. The increased implications of FinTech globally can justify the annual growth rate in the research numbers depicted in Figure 2. By obtaining the perspective of Pareto's Law to observe this growth, the publication of 99% of the total number of documents (1359) in the scholarly field of FinTech can be attributed to the contributions made in only 7 years (2015 to 2021). These studies, retrieved from the Scopus database, focused mostly on financial technologies, innovations in finance, technologies in banking, digital banking, and Financial Inclusion.

4.3. Relationship between Keywords, Most Cited Documents, and Authors

Figure 3 delineates the three-field analysis conducted on keywords and most cited articles and authors of the documents published on the Scopus Database in the field of FinTech from 2010 to 2021. It depicts the relationship among the variables' most cited articles (the left column), most cited authors (the middle column), and keywords (the right column). In the figure, CR represents the name of the most cited articles, AU denotes the cited authors, and DE is designated for the keywords used by the authors and articles. The analysis confirms that FinTech is the most commonly occurring keyword selected by the authors in this field. However, "Financial Inclusion", "Blockchain", financial technology", "Crowdfunding", "Cryptocurrency", and "Artificial Intelligence" are used repeatedly with closely related terms to FinTech. The commonly occurring keyword is also presented in Figure 4, using the power of word Cloud Analysis. New trends in Financial Inclusion and Blockchain have evidently emerged through these analyses. This also indicates the growing interest in providing a wide population with financial services (financial inclusion), and the implications of Blockchain for enhancing the efficiency and security of financial transactions and user data. However, more research is focused on FinTech in a broader sense than any of the other above-listed keywords. Different researchers have contributed to the field, but the contributions of Wojcik D, Baber I, Rabbani MR, Arner DW, and Zhang Y are similarly significant for proliferating the keywords "FinTech", "Financial Inclusion", and "Blockchain". The peripheral usage of keywords related to Cryptocurrency and Artificial

Intelligence implies that these particular areas are still at a preliminary stage. Therefore, future researchers can work on Cryptocurrency and Artificial Intelligence to expand and burgeon FinTech as an academic research field.

Table 1. Summary Statistics.

Description	Results
Documents	1359
Sources (Journals, Books, etc.)	672
Annual Growth Rate %	75.32
Document Average Age	2.3
Average Citations per Doc	9.937
References	69,820
Document Contents	
Keywords Plus (ID)	2094
Period	2010–2021
Author's Keywords (DE)	2993
Authors	2733
Authors of Single-Authored Docs	316
AUTHORS COLLABORATION	
Single-Authored Docs	395
Co-Authors per Doc	2.46
International Co-Authorships %	21.49
Document Types	
Article	865
Book	45
Book Chapter	161
Conference Paper	174
Conference Review	6
Editorial	22
Erratum	3
Letter	2
Note	8
Review	71
Short survey	2
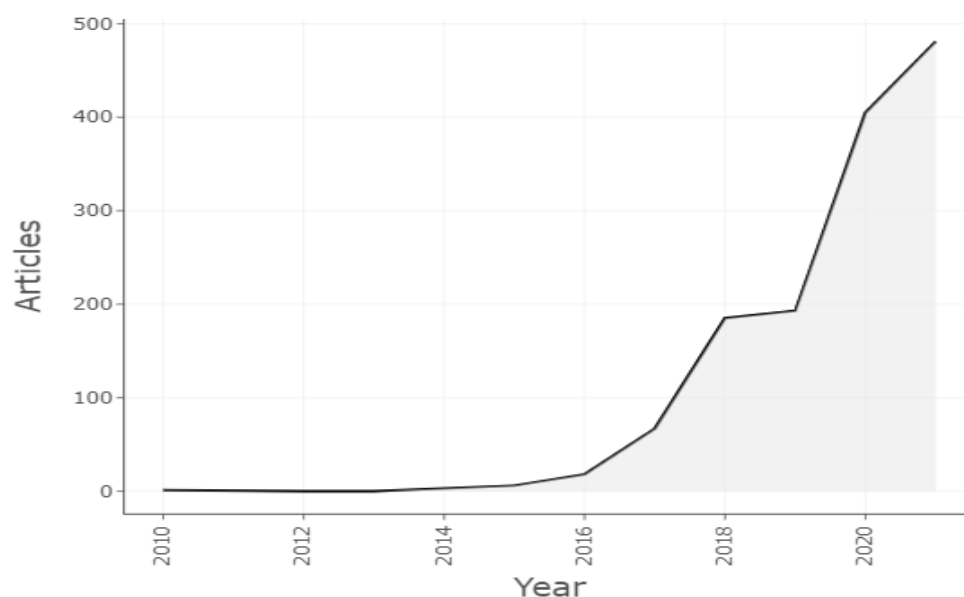
Figure 2. Annual Scientific Production on FinTech.
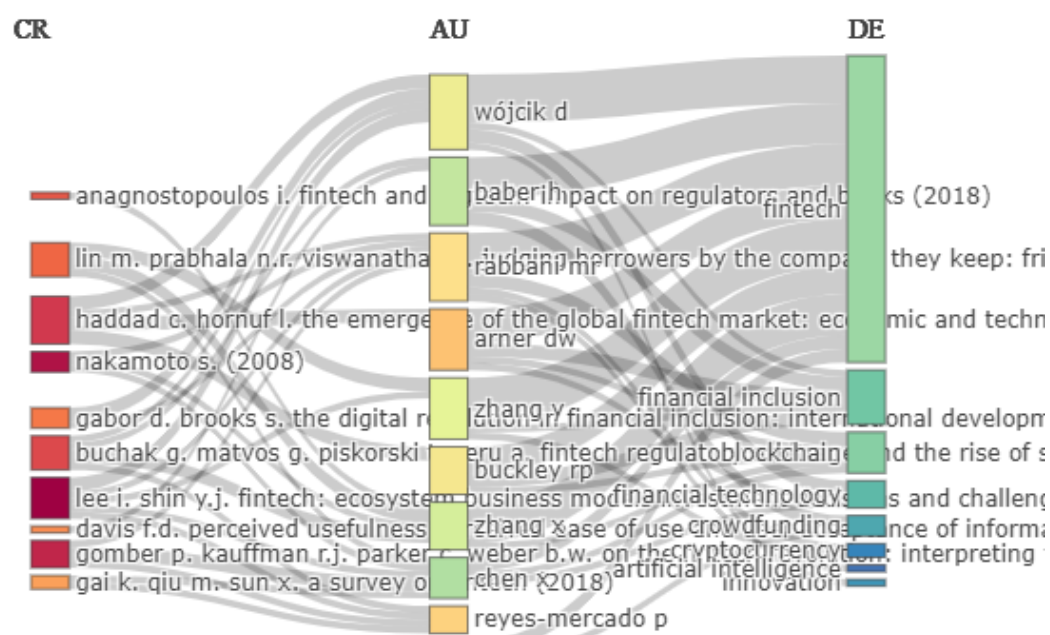
Figure 3. Three field analyses in FinTech.

4.4. Performance of Academic Journals

Figure 5 indicates the contributions of different journals based on the number of documents published in the field of FinTech. The Switzerland-based international journal "Sustainability" had the highest contribution in this domain. This journal solely published 32 research papers from 2010 to 2021. The "Journal of Payment Strategy and System", and "Financial Innovation" have published 21 and 19 papers, respectively. Despite having a strong editorial board, the United Kingdom-based journal "Economist" has not contributed significantly to the field of FinTech.

Figure 4. Word Cloud Analysis in FinTech.
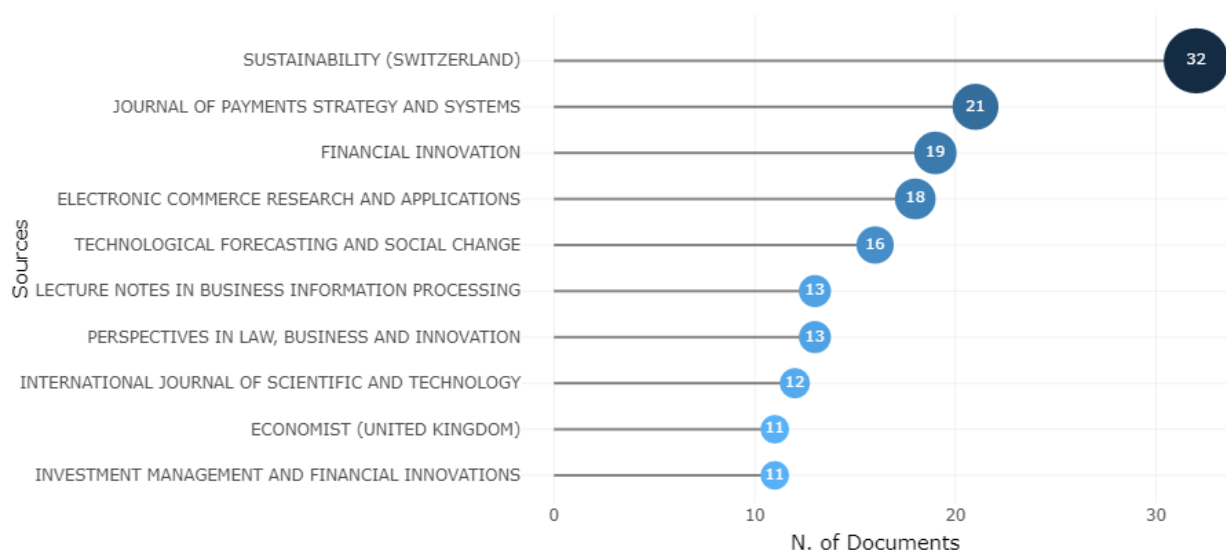
Figure 5. Most Contributing Journal in FinTech.

4.5. Source Growth of FinTech over Time

As stated earlier in this paper, "Sustainability" had the most contribution in the field of FinTech. However, contributions from this source had not started until 2017. The source started proliferating in this area of academic research in 2019. From 2019 to 2021, steady exponential growth in the publication number from this source is visible in Figure 6. "Financial Innovation" and "Electronic Commerce Research and Application" started publishing papers in 2014, but their growth rate until 2021 was not steady. "Financial Innovation" published fewer papers in 2018 than in 2017. "Electronic Commerce Research and Applications" had also disposed of a declining growth rate in the number of papers written with "FinTech" and other related keywords in 2016.

4.6. Impact by Countries

Figure 7 depicts the ranking of different countries based on the impact made on the scholarly field of FinTech from 2010 to 2021. The bibliometric analysis suggests that the impact of authors from the USA is the highest. The authors with USA nationality have accumulated a total of 1208 citations. This enormous number of citations, despite being a relatively new academic domain, indicates a rapid development of banking services in the region to integrate financial technologies. Predictively, China's authors also significantly

impacted the field's development, supporting the radical transformation of the Chinese currency and transaction methods. By the end of the mentioned research period, the authors from China had accumulated 1091 citations, the second highest in citation numbers by different countries. However, the notable impact of authors from the United Kingdom has also been identified. These researchers have received 1037 citations, granting it the third position in the ranking. Impacts of other developed countries (e.g., Italy, France, Hong Kong, and Korea) are also visible.
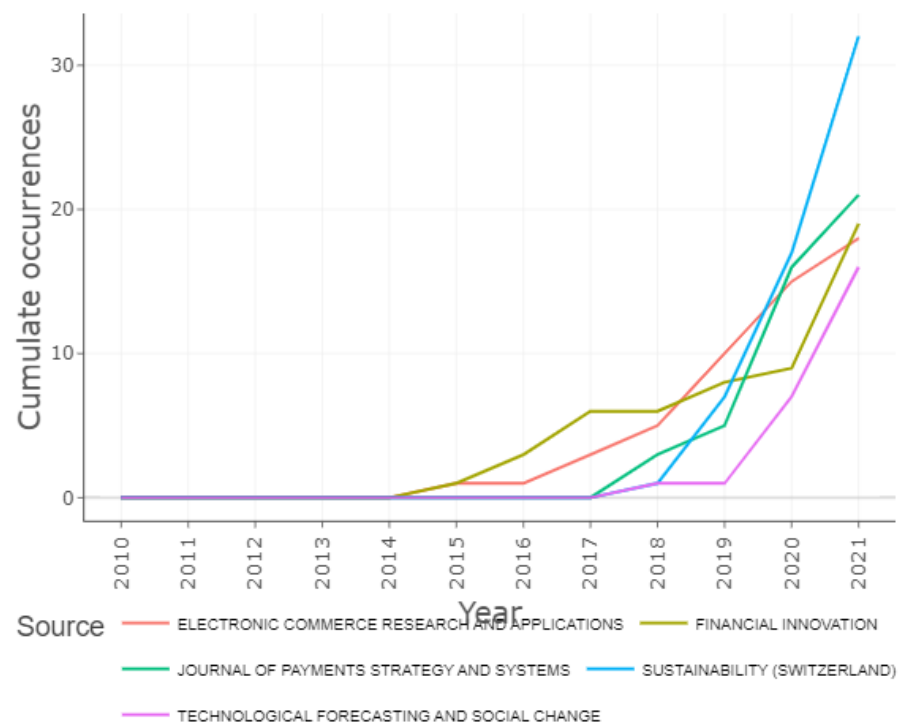
Figure 6. Sources' Dynamics Over Time.
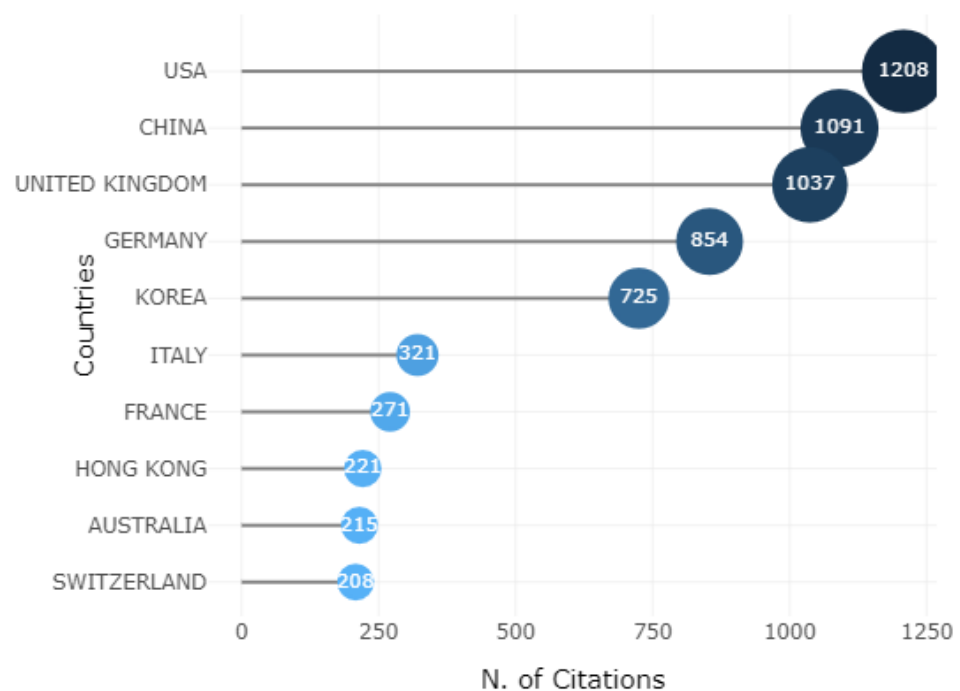
Figure 7. Most Cited Country in FinTech.

Bibliometric analysis has also identified the collaboration between authors from different countries. Figure 8 presents the findings regarding the extent of this collaboration, protruding the most extensive cross-border co-authoring tendency among the researchers from the USA, China, the UK, Germany, and Australia. The USA, the authoring or co-authoring country with the highest number of scholarly papers, has collaborated with the highest number of countries. China, Germany, the UK, and the USA collaborated within themselves and with other countries, even those located on other continents. Despite not having many contributions to the field, Australia collaborated noticeably with the UK. India, South Korea, and Indonesia have also received significant collaboration traffic from countries such as the USA, the UK, and China.
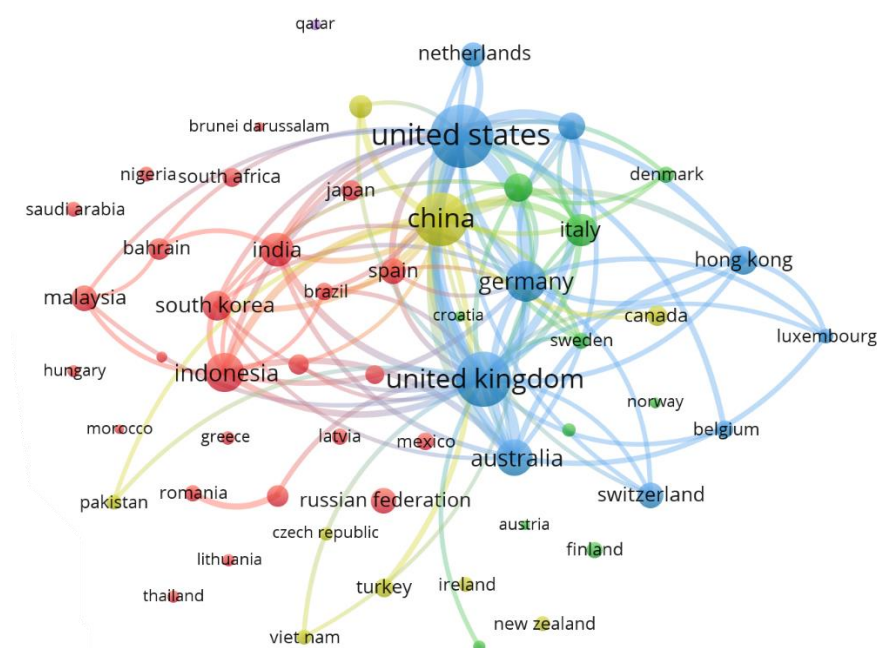
Figure 8. Country Collaboration Mapping.

4.7. Bibliographic Links to Academic Journals

Figure 9 indicates the two research clusters identified through bibliometric analyses. The bigger cluster, colored red in the figure, contains keywords such as financial intelligence, economics, commerce, costs, competitions, information systems, risk assessment, sustainable development, and digitization. Another cluster, colored blue, comprises keywords such as forecasting, learning system, deep learning, electronic trading, financial markets, and predictive analytics. The within-cluster and inter-cluster differences in the keywords are significant. Therefore, the authors failed to describe the focus areas of each cluster using the existing literature, which can also be regarded as a research limitation.

4.8. Average Citations over Time

Figure 10 presents the numbers of total annual citations on FinTech, from 2010 to 2021. As explained earlier in this paper, the scholarly works in the field of FinTech had not majorly started before 2014, which, again, is confirmed by the bibliometric analysis of the annual citation numbers. The proliferation of the citation of the papers written with the keyword "FinTech", and other related ones, started after 2014. The exponential growth in annual citation numbers remained visible from 2014 to 2016. Ensuing from 2016, the growth rate started pivoting towards negative. The annual citation numbers also decreased from 2020 to 2021.
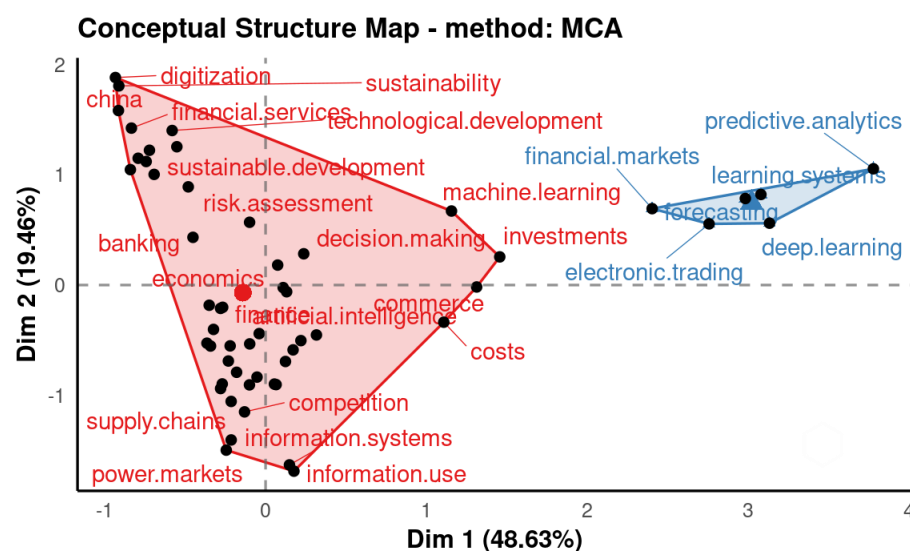
Figure 9. Cluster Analysis in FinTech Research.
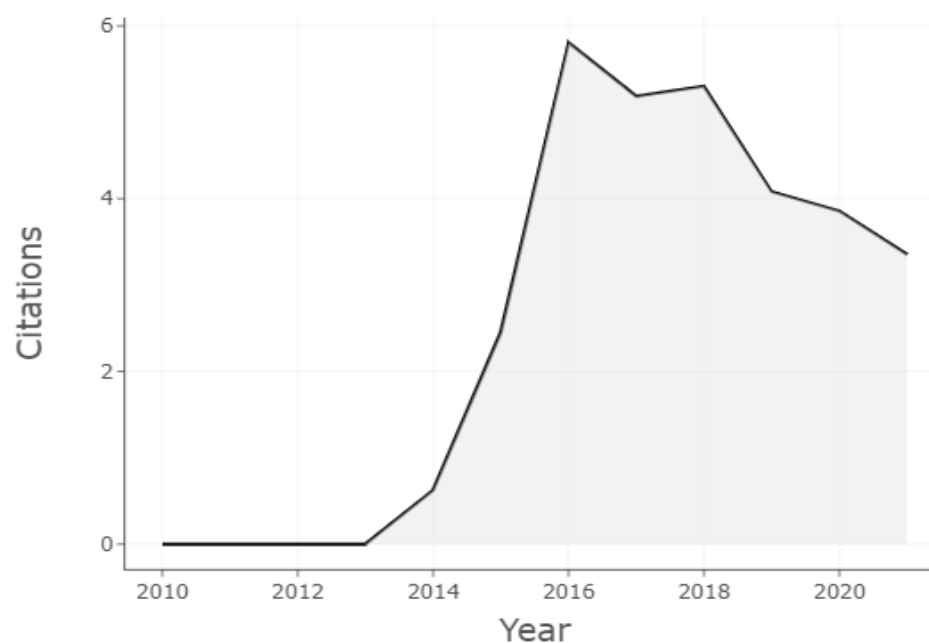
Figure 10. Annual citations on FinTech.

4.9. Relevancy of the Authors in FinTech

Figure 11 illustrates the contributions of different authors found through bibliometric analysis. From 2010 to 2021, Arner DW, Buckley RP, and Wojcik D contributed equally to the field of FinTech by authoring, or co-authoring, 7 papers each. Rabbani MR authored, or co-authored, 6 scholarly papers. Other researchers have also significantly contributed to this field. The contributions of these authors are also evident in the Three Field Analyses discussed in an earlier section of this paper.
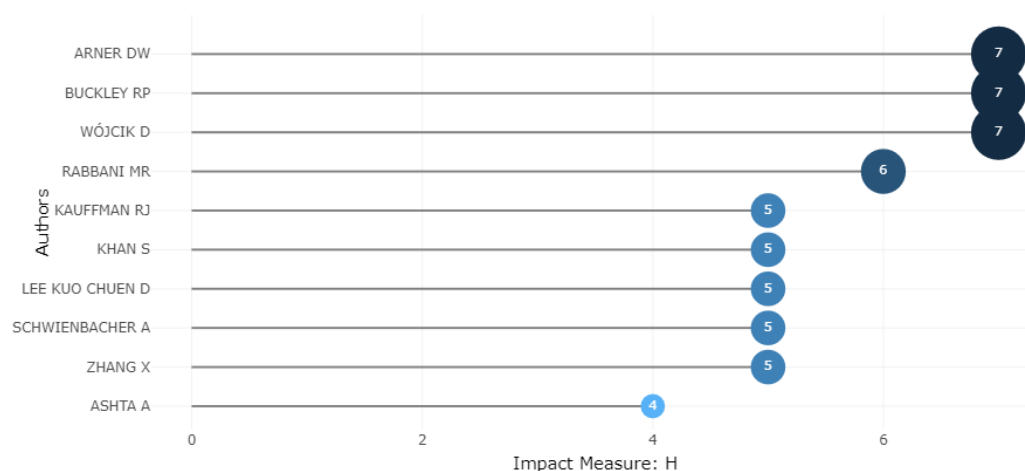
Figure 11. Most Relevant Authors in FinTech.

5. Discussion

This paper presents the bibliometric analysis conducted on the documents published in the field of FinTech from 2010 to 2021. From the Scopus Database, 1359 scientific publications were retrieved. The analysis identified that, in 2015, the first document on this field was published, indicating the recent emergence of the term "FinTech", which is also argued by Tepe, Geyikci [14]. The number of annual publications increased gradually until 2018. Onward from 2019, the field enticed massive research interest, which resulted in an escalation of annual publication numbers (Figure 2). During the same period, the adoption rate of FinTech in financial institutes globally also increases rapidly [14,18]. Hassan, Rabbani [7], Toumi, Najaf [19] argued that the COVID-19 pandemic proliferated the application of technology-laden banking products, which can justify the increased number of publications in this field onward from 2019, revealed by this research. This paper analyzed publications on this field from various bibliometric aspects, and presented the findings through visualized figures and tables.

To start with, terms such as Blockchain and Artificial Intelligence appeared most frequently (Figures 3 and 4), indicating a one-way dependency of FinTech on different technological factors. This dependency on other technological domains has also been suggested by [6,20–24]. Moreover, financial inclusion is the second-most frequently used keyword (Figure 3), which implies a probable strategic shift in the objective of the banking businesses and governments to integrate a wider population within banking facilities. Recent studies conducted by Gabor and Brooks [25], Demir, Pesqué-Cela [26] show that FinTech, as a disruptive technology, has the potential to expedite financial inclusion in all sorts of economic contexts. The recognition of financial inclusion as one of the most used keywords, through the bibliometric analysis conducted for this research, signifies that scholars globally are actively pursuing the materialization of this potential. The bibliometric analyses also revealed the impact of distinct authors with different nationalities on the field (Figure 7). Authors from the USA have accumulated the highest number of citations, indicating the advancement of financial services in the region. Technological advancement in the USA has also been proclaimed by Matousek and Xiang [27]. Further, evidence of international collaboration was identified (Figure 8). Authors from countries such as the United States, the United Kingdom, China, Germany, and Australia have collaborated several times with different nations within the specified research period. Individual authors, namely, Arner D.W., Buckley R.P. and Wojcik D, scored the highest in the case of individual impact measurement. However, the annual citation numbers decreased after 2016, which also experienced exponential growth from 2014 to 2016. The bibliometric analysis has also recognized the publications made through 672 different sources (Figure 5). Among these sources, the Switzerland-based journal, "Sustainability", published the highest number

of scientific papers. This journal and other sources with significant contributions are discerning rapid growth in publication numbers (Figure 6).

The conceptual structure map presented two different research directions in the field (Figure 9). Besides, the three fields and the word CloudAnalysis showed that the keywords Blockchain, Artificial Intelligence, electronic money and trading, Machine Learning, and Financial Inclusion are gradually catching the momentum of being mainstreamed research sub-fields. Regardless of how and where, the annual publication numbers are increasing steadily (Figure 2), indicating the liveliness of the field and the scope for other researchers to contribute. Similar types of research themes in the field have also been revealed by a previous bibliometric study conducted by Li and Xu [13].

This paper shows the current and future research direction that can significantly encourage further scientific enrichment in the academic field of FinTech. However, this paper presented the analysis conducted on the publications listed in the Scopus Database and retrieved using specific keywords, which limits the research span. Future scientific works will be able to integrate more directions for studying the dynamic development of the field.

6. Conclusions

This research conducted a bibliometric analysis of the FinTech field to identify its current state of development, prominent authors, publication trends, and possible future research directions. The findings of the research indicate that FinTech is a dynamic and rapidly expanding field, with significant growth in annual publication numbers in recent years. The analysis also revealed that the field is heavily dependent on various technological domains, with Blockchain and Artificial Intelligence being the most frequently used keywords. Financial Inclusion is another crucial aspect of the field that has gained significant attention in recent years. The research identified the highest contributing authors, countries, and sources, which can facilitate the identification of the most relevant scientific productions, international collaboration, and knowledge transfer in the field. The conceptual structure map showed two different research directions in the field, and the word Cloud Analysis indicated the increasing mainstreaming of sub-fields such as Blockchain, Artificial Intelligence, and Financial Inclusion. The present research contributes to the field by providing insights into the current state of development, prominent contributors, and possible future research directions. Future research can expand on the present study by considering more comprehensive databases and integrating other research methods to enhance the understanding of the field's dynamic development. Overall, the present research provides valuable insights and contributes to the harmonized development of the FinTech field.

7. Implications for Practitioners and Academia

7.1. Managerial Implications

The findings of this study on the evolution of FinTech have several managerial implications: First, the study can provide valuable insights to financial institutions, regulators, and policymakers to make strategic decisions related to the adoption and regulation of FinTech. For instance, understanding the emerging trends in FinTech research can help institutions identify areas of potential growth and investment. Second, the study highlights prolific objects, such as journals, authors, institutions, countries, and regions, and the corresponding cooperative relationship mapping. This information can be used by financial institutions and other stakeholders to identify key players in the FinTech industry, understand their areas of expertise, and establish partnerships for mutual benefit. Third, the study can inform the development of innovative FinTech products and services by identifying emerging technologies and themes in FinTech research. Institutions can use this information to develop new products and services that meet the evolving needs of customers. Fourth, the study can help financial institutions to identify and manage potential risks associated with the adoption of FinTech. For example, the study highlights the ethical

considerations associated with the use of FinTech, such as privacy and security. Institutions can use this information to develop appropriate risk management strategies. Fifth, the study can provide valuable information for talent management in financial institutions, including identifying key researchers and institutions in the field of FinTech, which can help in recruiting and retaining talented employees. Finally, the findings of this research can be used by financial institutions, regulators, policymakers, and other stakeholders to make strategic decisions related to the adoption, regulation, and development of FinTech.

7.2. Theoretical Implications

The theoretical implications of this bibliometric research could be significant in several ways. First, it can provide a better understanding of the evolution of the FinTech research field, including its fundamental issues, characteristics, and trends. This can help scholars to identify new research areas and directions and guide future research in FinTech.

Second, by identifying the most prolific journals, authors, institutions, countries, and regions in FinTech research, this study can help researchers to find potential collaboration partners and networks, as well as understand the dominant research paradigms and research communities in the field. Third, the citation structures analysis can provide insights into the most influential authors, journals, and references in the field. This can help researchers to identify the most relevant and impactful research and understand the evolution of FinTech research over time. Finally, this bibliometric research can contribute to the theoretical development of the FinTech research field by providing a comprehensive overview of the existing literature and identifying areas for future research.

7.3. Practical Implications

The practical implications of this bibliometric research on FinTech are significant. It provides valuable insights for practitioners and decision-makers in the financial industry, including policymakers, regulators, financial institutions, and FinTech startups. First, the analysis of the publication trends can help these stakeholders stay up-to-date with the latest research and developments in FinTech. This can inform their strategic decisions and investment choices in the FinTech space. Second, the identification of the prolific journals, authors, institutions, countries, and regions in FinTech research can help practitioners and decision-makers identify potential collaboration opportunities and build partnerships with relevant stakeholders. Third, the analysis of citation structures can help identify the most influential authors, journals, and references in the FinTech field. This can help practitioners and decision-makers identify and learn from best practices and successful cases. Finally, the discussion of the challenges and future development opportunities in FinTech can inform the strategic planning and innovation strategies of financial institutions and FinTech startups. It can also provide insights for policymakers and regulators to develop regulatory frameworks that foster innovation while maintaining financial stability and consumer protection.

Limitations and Future Research Directions

There are several potential limitations to this research on the evolution of FinTech in research using the Scopus database:

First, the Scopus database is a vast and reputable source of bibliographic information, but it may not include all relevant publications in the field of FinTech. Some articles may be published in other databases or in non-indexed journals, which may not be captured in this study. Second, the study only considers publications in English, which may exclude important research in other languages. Additionally, there may be a publication bias towards more prominent authors or institutions, which may skew the results. Third, while bibliometric analysis can provide an overview of the field, it does not necessarily reflect the quality of the publications included. Some publications may be of higher quality than others, and this may not be captured in the analysis. Fourth, bibliometric analysis is a quantitative approach that does not consider the context or content of the publications. The analysis may not capture important nuances or trends in the field that are not reflected in

the keywords or citations used. Finally, the study only looks at publications from 2010 to 2021, which may not capture the full evolution of FinTech in research. Some important developments in the field may have occurred outside of this time frame, and these may not be reflected in the analysis.

Based on the findings of this bibliometric research on the evolution of FinTech in research, several potential future research areas could be explored: FinTech is a rapidly evolving field that intersects with many other disciplines, such as economics, computer science, and law. Future research could explore the interdisciplinary nature of FinTech and investigate how different fields contribute to its development. It is driven by advances in technology, such as Blockchain, Artificial Intelligence, and Machine Learning. Future research could explore how these emerging technologies are being applied in FinTech, and their impact on the financial industry. The regulatory landscape for FinTech is complex and evolving. Future research could investigate how regulatory frameworks are adapting to the emergence of FinTech, and the potential implications for the financial industry. FinTech is ultimately designed to serve the needs of users, and their adoption and behavior are crucial to its success. Future research could investigate how users are adopting and using FinTech products and services, and how their behavior is changing. FinTech raises important ethical considerations, such as privacy, security, and fairness. Future research could explore how these ethical considerations are being addressed in FinTech, and their potential impact on the financial industry.

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