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Review

A bibliometric analysis of financial technology: unveiling the landscape of a rapidly evolving field

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Abstract
Technology is paving innovative ways to provide financial services and improve the efficiency of financial systems. Since it is a dynamic field of research, it is important to look back on the ever-changing field of financial technology. This paper aims to analyse the existing research on financial technology through a bibliometric approach. The data were gathered from the Scopus database using secondary sources, and the analysis is presented descriptively along with science-mapping techniques. This paper offers an overview of the influential journals, authors, and organizations contributing to financial technology research. The study focuses on citation, cocitation, bibliographic coupling, and coauthorship analysis within the collected corpus. It is worth noting that this study is limited by the use of only one database, Scopus and excludes grey literature, this could lead to skewed results but this can be an arena for future research.

Keywords Technology · Finance · Bibliometric · Fintech · Artificial intelligence

1 Introduction

In the new era of digitalization, technology is disrupting traditional systems. One such disruption was coupled with the introduction of technology to the age-old field of finance. The intersection of finance and technology has given rise to a ground breaking phenomenon known as financial technology or fintech [1–5]. This transformative field has revolutionized how we manage, invest, and transact in finance, introducing innovative solutions that harness the power of cutting-edge technologies such as artificial intelligence, blockchain, and mobile applications [6–9]. As the fintech landscape continues to evolve astonishingly, there is a growing need to comprehend its vast scope, track its progress, and identify emerging trends and research directions [10, 11].

In response to this need, bibliometric analysis, an empirical methodology that employs quantitative indicators to evaluate scholarly publications, has emerged as a valuable tool for understanding the research landscape within a particular domain. Bibliometric analyses provide a comprehensive overview of a field's intellectual structure and knowledge flow, guiding researchers, policymakers, and industry practitioners in navigating complex terrain by examining publication patterns, citation networks, and collaboration trends.

This review article presents a meticulous bibliometric analysis of the Financial Technology domain, offering a panoramic view of the field's growth, influential contributors, and prominent research themes [12, 13].

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Furthermore, this paper delves into the geographic distribution of research activity in fintech, revealing regional hotspots and identifying potential areas for international collaboration and knowledge exchange [14–16]. By understanding the global landscape of fintech research, policymakers and industry stakeholders can foster an environment conducive to innovation, regulatory frameworks, and strategic partnerships [17–19]. This bibliometric analysis serves as a valuable resource for researchers, policymakers, industry professionals, and academicians interested in the vibrant world of financial technology. The subsequent sections of the paper provide a detailed account of the study's objectives, research methodology, findings, conclusion, and references.

2 Objectives of the study

1. To identify the most influential sources, organizations, and countries that published documents on finance technology.
2. To analyse the development of foundational themes and present research development on finance technology.
3. To recognize coauthorship between authors, organizations, and countries and its research trends in financial technology.

3 Research methodology

The two basic methods used in bibliometric analysis are science mapping and performance analysis [20–22]. The former examines the fundamental aspects of the data, such as year, nation, author, funding, etc., and describes the physical traits of the research participants [23–25]. The latter is science mapping, which can be performed using citation analysis, cocitation analysis, bibliographic coupling, or coauthorship analysis. Subsection 3.1 discusses a descriptive study of the gathered literature, and subsection 3.2 discusses the outcomes of scientific mapping.

3.1 Research software

VOSviewer is a software tool utilized for creating, displaying, and examining bibliometric networks. These networks can include authors, organizations, sources, etc. [19–22] VOSviewer enables the visualization of these networks with unprecedented speed and scalability, surpassing what can be accomplished manually. The study employs VOSviewer version 1.6.18 for these purposes.

3.2 Data sources and search strategy

The literature on financial technology was extracted from the Scopus database (https://www.scopus.com/). The following search strategy was formulated using the query string:

TITLE-ABS-KEY ("Fintech" OR "Finance Technology" OR "Financial Technology").

This query aimed to identify relevant documents that contained these key terms in their title, abstract, or keywords. A total of 1073 documents were initially extracted from the search. The inclusion criterion was applied to narrow the selection, limiting the document type to only articles. To ensure consistency and language accessibility, an exclusion criterion was applied to exclude documents written in languages other than English. Any documents labelled "in the press" were also excluded from the final selection: the selected documents and the literature on financial technology. A specific time frame limited the collection of documents, and all articles available from 1988 to 20222 were included.

4 Analysis and findings

Bibliometric analysis encompasses two primary methods: descriptive analysis and performance analysis Descriptive analysis focuses on exploring the essential characteristics of the data, such as the year of publication, country of origin, authorship, funding sources, and other relevant factors that describe the attributes of the research participants

[17–20]. On the other hand, performance analysis involves science mapping techniques, which include bibliometric coupling, coword analysis, coauthorship analysis, citation analysis, and cocitation analysis [12].

4.1 Descriptive analysis of the collected documents

(a) Year wise classification

The publication timeline of the collected documents is depicted in Fig. 1. The analysis reveals that the documents span from 1998 to 2022. Among the collected documents, the highest number (385 documents) were published in 2022. It is important to note that the year 2023 was excluded from the analysis because the study was conducted before the completion of that year. Furthermore, the data indicate a noticeable increase in the number of documents published since 2016. This suggests a growing interest and focus on the topic of the study, as reflected in the rising volume of publications in subsequent years.

(b) Countrywise distribution

From the collected data, China and the United Kingdom were the top publishing documents on Financial Technology, followed by the United States, Indonesia, Malaysia, South Korea, Italy, and India; Fig. 2 illustrates the countrywise distribution of the documents.

(c) Sponsors

Research requires significant time and funding. Securing funding is competitive, with researchers seeking support from various sources. In the studied field, the National Natural Science Foundation of China sponsored the highest number of researchers (43). These funding bodies recognized the research's value and provided financial support. Other sponsors mentioned in Fig. 3 include the Horizon 2020 Framework Programme National Office for Philosophy and Social Sciences, the European Commission, the European Research Council, and the Economic and Social Research Council [1]. These organizations have contributed to the field, showcasing diverse funding sources for the studies conducted.

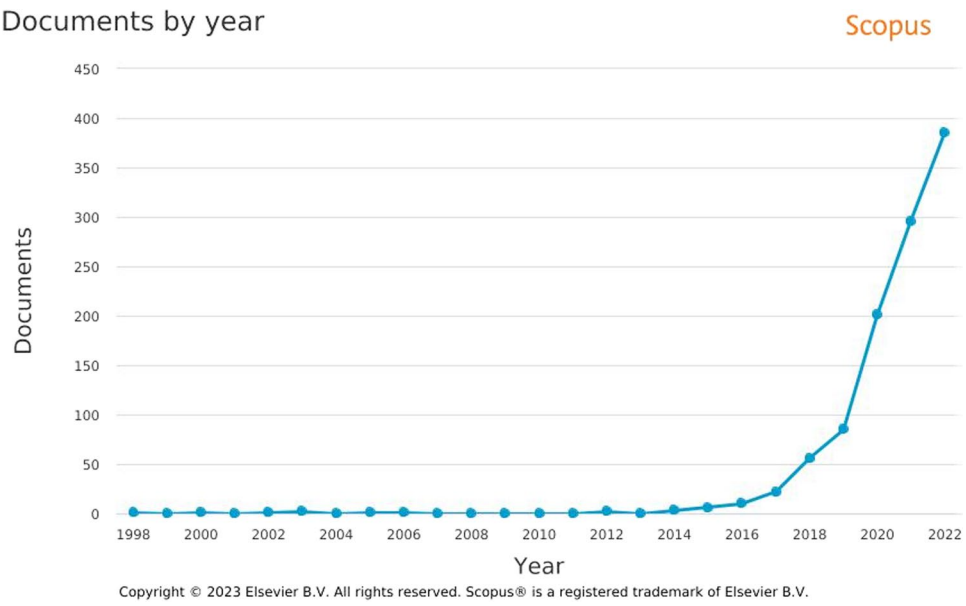


Fig. 1 Year wise distribution of documents. Source: Scopus

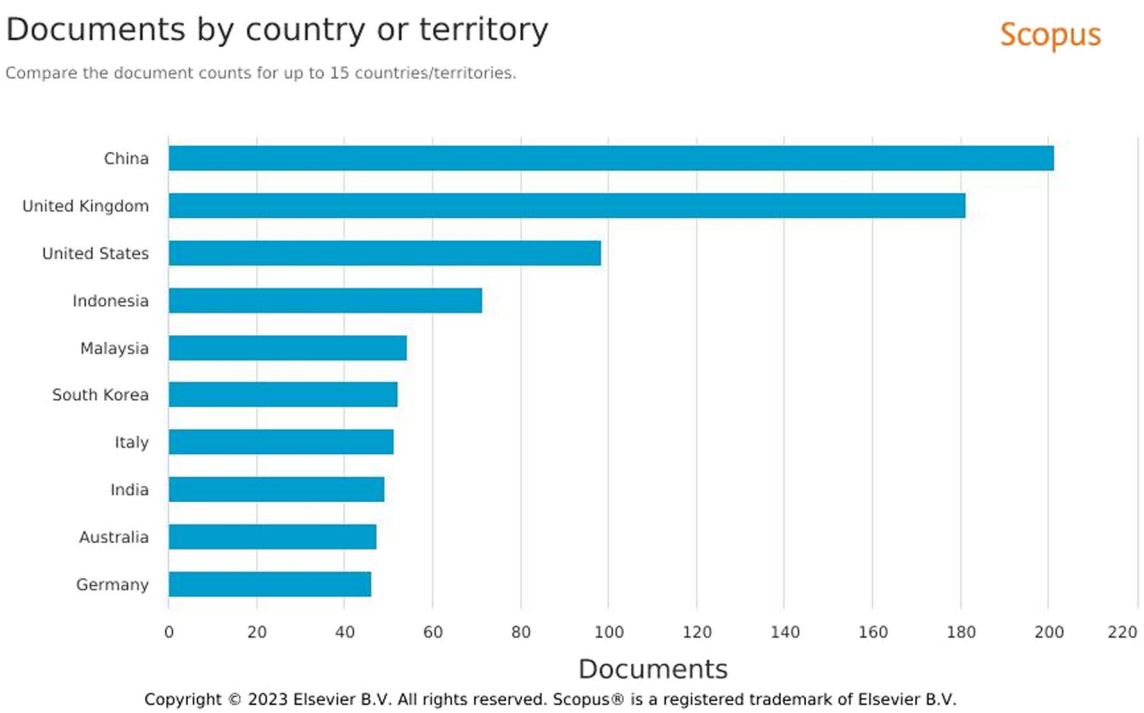
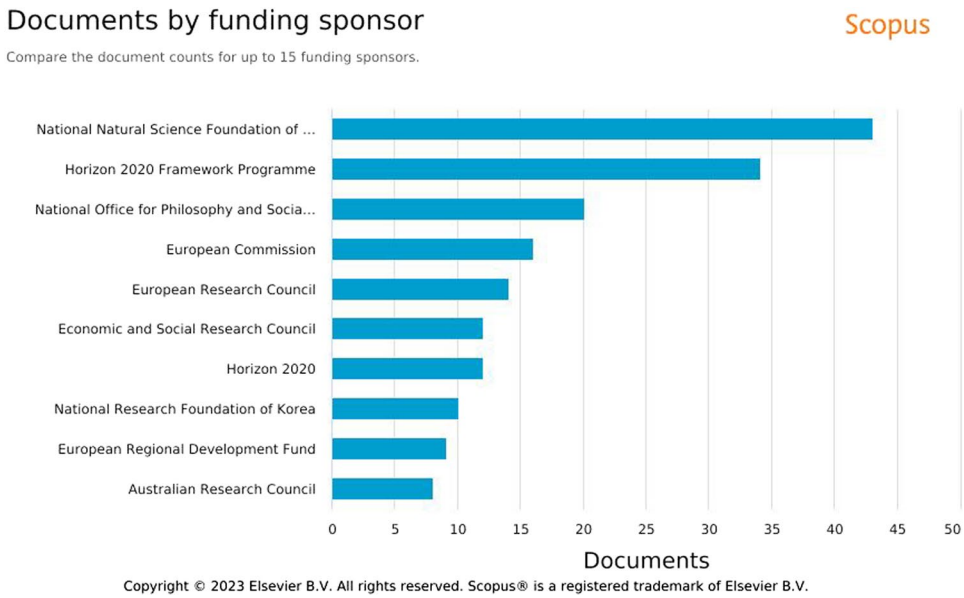


Fig. 2 Countrywise document distribution. Source: Scopus

Fig. 3 Documents by funding sponsor. Source: Scopus



4.2 Science mapping

The following subsections present the science mapping of the collected corpus using citation analysis, cocitation analysis, bibliometric coupling, coword occurrence, and coauthorship analysis.

4.2.1 Citation analysis

(a) Source

If we assume that citation is the only parameter for calculating the impact of a source, then IEEE Access, with a total of 858 citations, can be crowned the same way. Other sources with high citations include Sustainability (Switzerland), 825 citations, and Technological Forecasting and Social Change (795 citations). These sources are the most influential in the domain of financial technology (Fig. 4).

(b) Authors

When the authors are taken as the frame of reference, the most cited author is the document "*On the Fintech Revolution: Interpreting the Forces of Innovation, Disruption, and Transformation in Financial Services",* authored by Peter Gomber, Robert J. Kauffman, Chris Parker, and Bruce W. Weber has the highest citation count of 505, followed by the document *Integration: the key to implementing the Sustainable Development Goals* authored by David J Griggs, Owen Gaffney, Farooq Ullah, Belinda Reyers, Norichika Kanie, Bjorn Stigson, Paul Shrivastava, Melissa Leach, and Deborah A. O'Connell, with a citation count of 448 (Fig. 5).

(c) Countries

A total of 107 countries were involved in studies on financial technology. A minimum threshold of fifteen documents was set to establish eligibility, resulting in 30 countries meeting the exclusion criteria. The United Kingdom was the most cited organization with 5443 citations, followed by China with 3173 citations. A comprehensive analysis

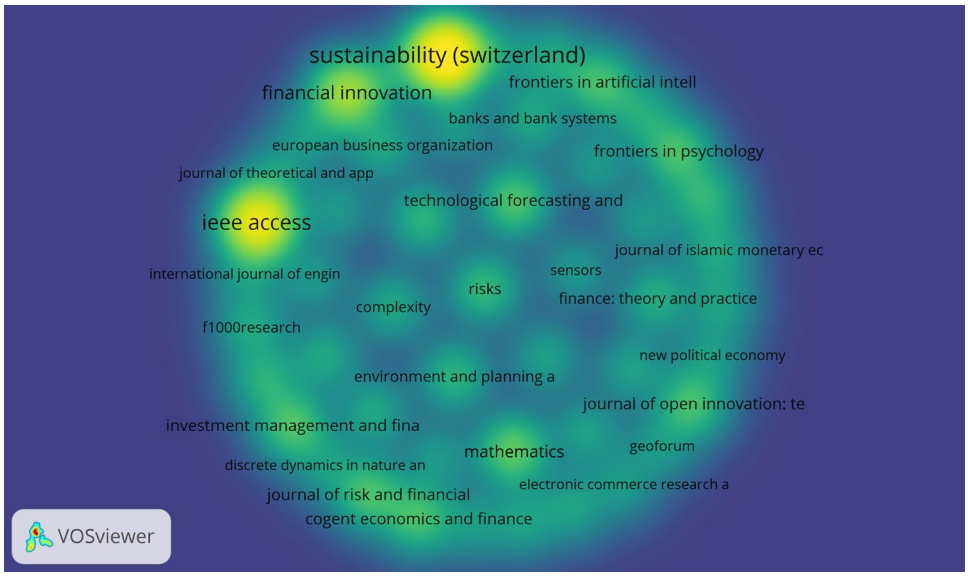


Fig. 4 Citation analysis of the source as a unit

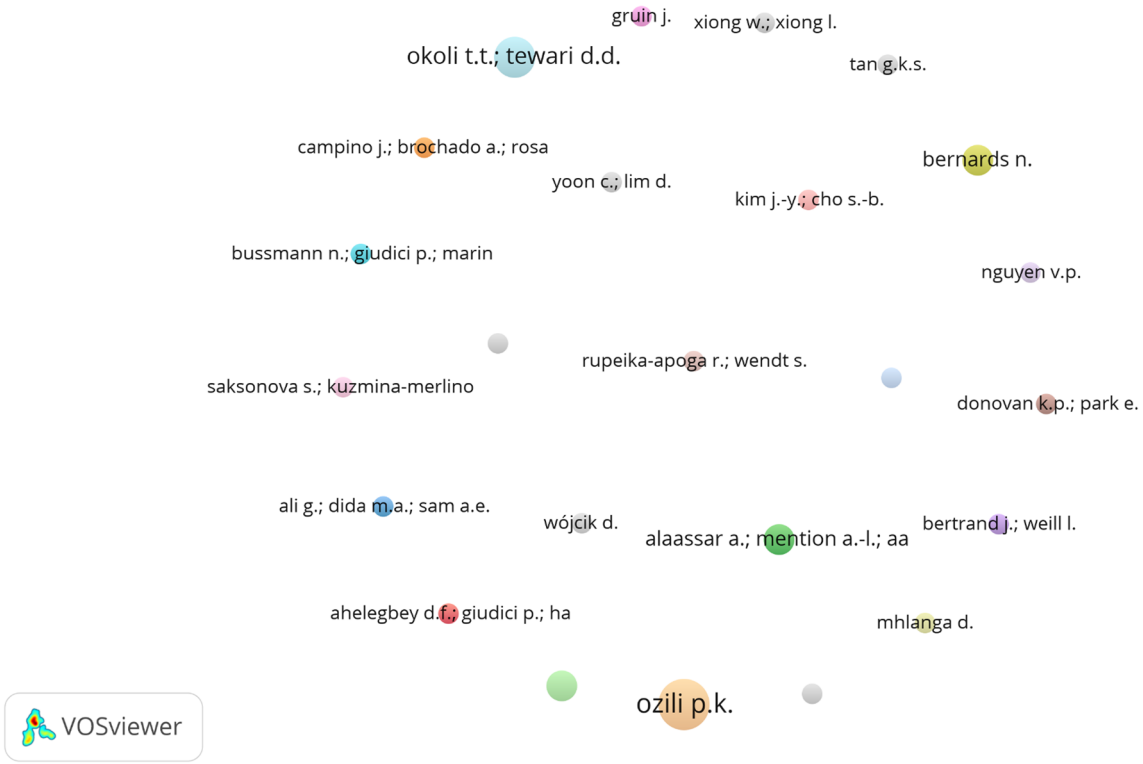


Fig. 5 Citation analysis of the source as a unit

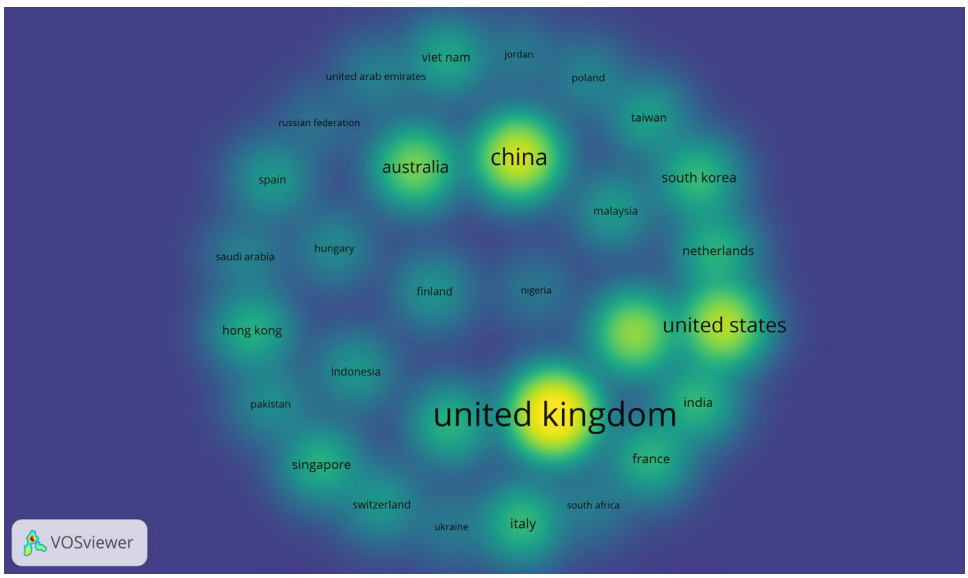


Fig. 6 Citation analysis of countries as units (refer to Table 2, appendix)

of the number of citations and document representation can be found in Table 1 (Appendix). Therefore, based on these data, it can be concluded that the United Kingdom is the most influential country in publishing documents on financial technology. Figure 6 provides a network visualization representing a country as a unit of measurement in citation analysis.

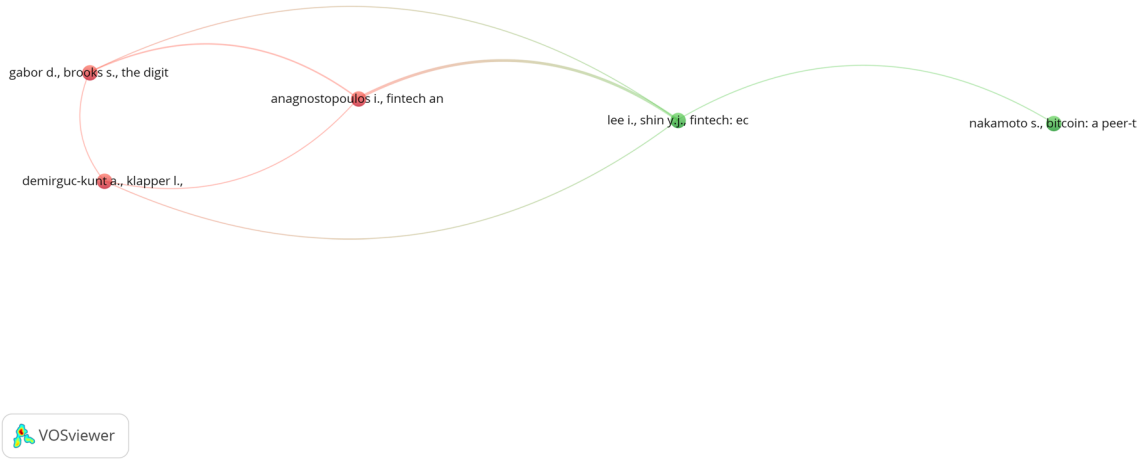
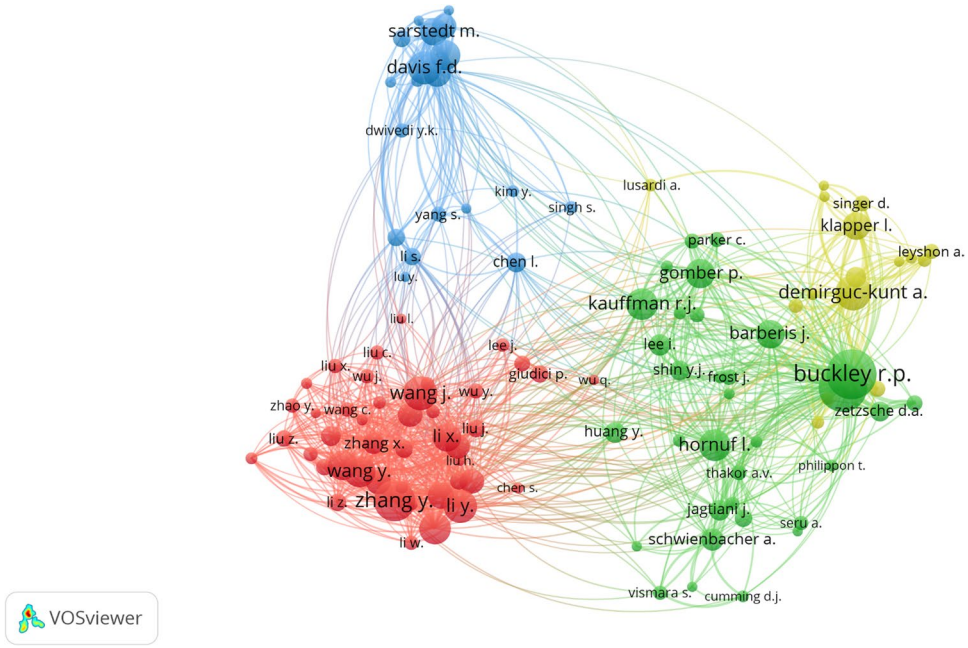


Fig. 7 Cocitation analysis of cited references

Fig. 8 Cocitation analysis of authors of publications (refer to Table 3, appendix)



4.2.2 Cocitation analysis

(a) Cited references

Now, considering the cocitation analysis of sources, it is important to understand that the documents were cited together in another document. Figure 7 shows that there are two main clusters of sources of publications on financial technology. The documents with the highest link strength are *Fintech and Regtech: Impact on Regulators and Banks (Link strength = 10, citations = 24),* authored by Ioannis Anagnostopoulos. Another prominent document is *Fintech: Ecosystem, Business Models, Investment Decisions, and Challenges* (Link strength = 10, citations = 22) by In Lee and Yong Jae Shin. These two documents can be attributed mostly to building foundational knowledge in financial technology.

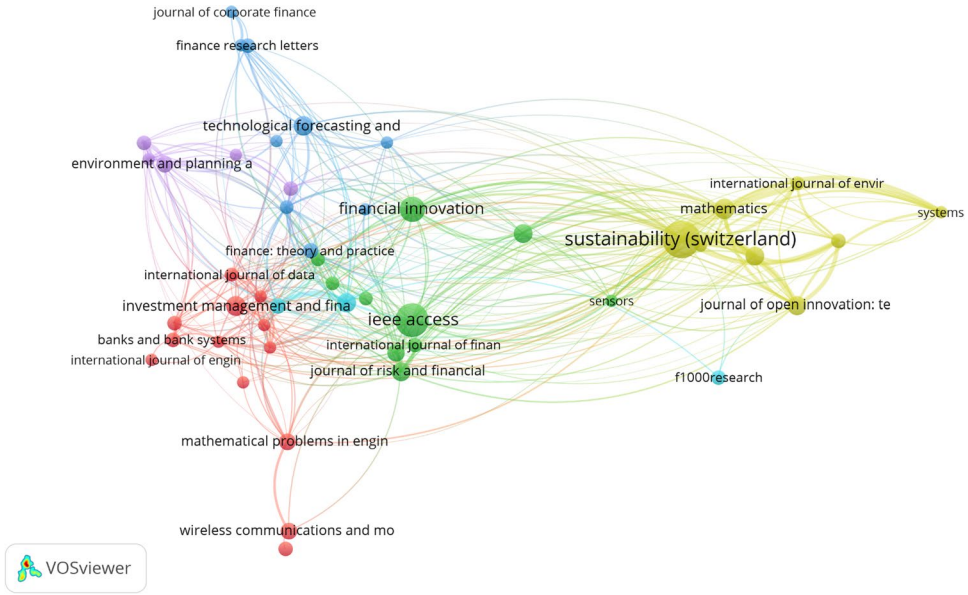


Fig. 9 Citation analysis of countries as units (refer to Table 2, Appendix)

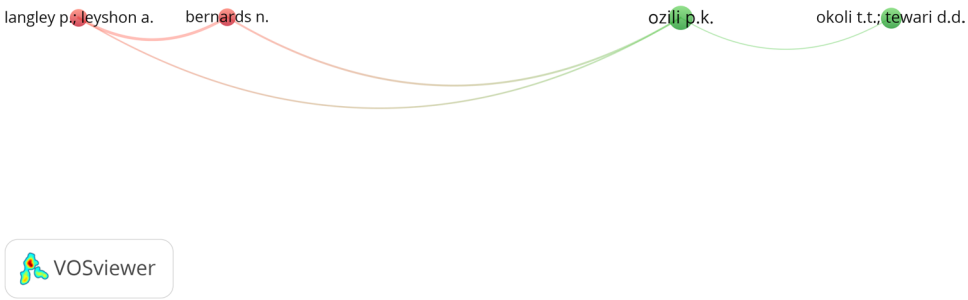


Fig. 10 Bibliographic coupling of the source as a unit (refer to Table 4, appendix)

(b) Authors

Cocitation analysis involves examining the authors of publications cited together in another source. Figure 8 shows the presence of four main clusters of authors focusing on financial technology. Among these authors, R. P. Buckley.

stands out with the highest link strength, which measures the number and quality of citations he has received (link strength = 241.36, citations = 262). Based on the analysis, several notable authors associated with research on financial technology are R. P. Buckley, D.W. Arner (link strength = 235.72), and Y. Zhang (link strength = 200.88).

4.2.3 Bibliographic coupling

(a) Sources

Sources trace the origin of an article, book, or editorial to the publisher. By examining a map from the combination of these sources, it becomes clear that Sustainability (Switzerland) is the publisher that has recently released documents on financial technology (refer to Fig. 9). Sustainability, an open access journal published by the MDPI, is a scholarly publication that encompasses the environmental, cultural, economic, and social aspects of human sustainability. This international and cross-disciplinary journal serves as an esteemed platform for exploring sustainability and sustainable development. With a semimonthly online release, it offers an advanced forum for research in this field, employing a peer-review process to ensure the quality of its content.

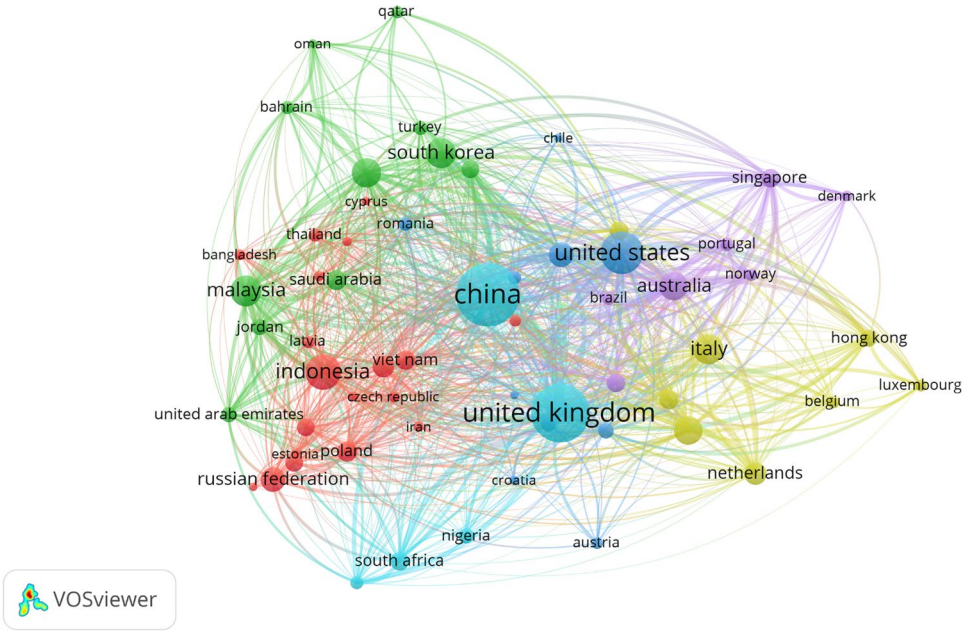


Fig. 11 Network visualization of author keyword co-occurrence

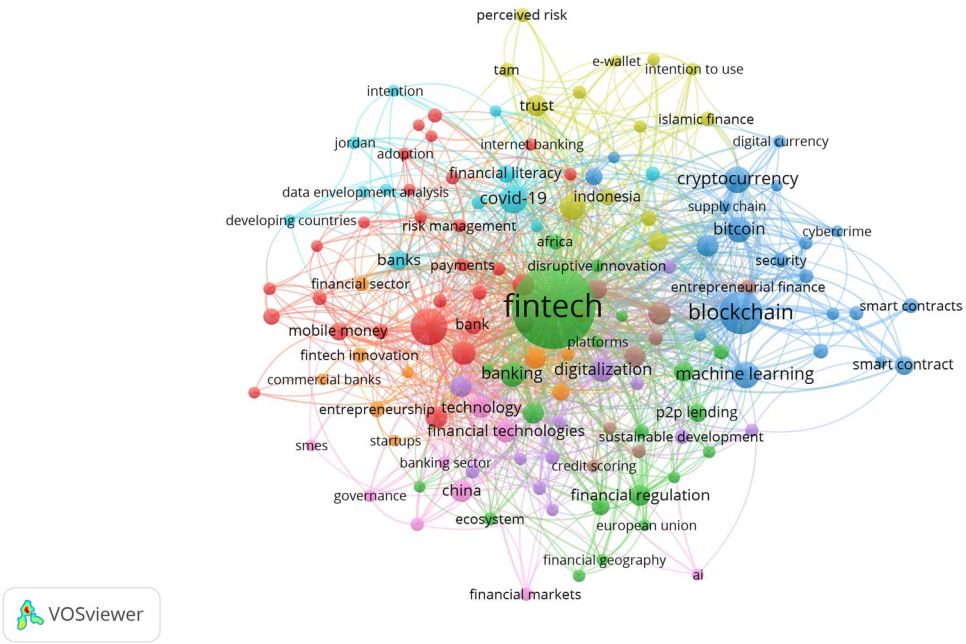


Fig. 12 Bibliographic couplings of authors as units

(b) Authors

Bibliographic coupling refers to mapping authors who have been cited together in the references of a single document. This approach assumes that references cited together share thematic connections. This coupling method aims to identify authors who have conducted research in a specific domain, such as financial technology. In this study, a minimum of three documents was set as the eligibility criterion for each author, resulting in the selection of 4 out of 1036 authors. Figure 10 visually represents the density of bibliographic coupling, focusing on the four specific authors. Among them, N. Bernards has the highest link strength, determined by the number of connections with other authors (link strength = 29) and the number of citations received (83). Other noteworthy authors in this network include P. Langley, A. Leyshon, P. K. Ozili, and D. D. Tewari.

(c) Country

Similarly, in this case, bibliographic coupling represents the scientific mapping of the countries that have been cited together in the references of a single document. The assumption is that references that are cited together have thematic connections. The motive behind this coupling is to find the authors who have indulged in the research on a specific domain, i.e., financial technology. To filter the 107 countries, a minimum of 5 documents were considered eligible. Figure 11 depicts the mapping of the bibliographic coupling of the eligible 60 countries. The country with the highest link strength is the United Kingdom (link strength = 14974, citations = 5443). Other significant countries involved in this research are China, the United States of America, Australia, Germany, Malaysia, India, Singapore, Spain, and Finland [3, 11].

4.2.4 Coword analysis

A coword analysis operates under the assumption that academic publications primarily describe their study material through author-defined keywords. This analysis uncovers the main areas of interest within a research topic by examining the relationships between cooccurring terms. When two relevant keywords appear together in the same document, this suggests a bibliometric association between the subjects related to those keywords. In this study, the search was conducted in the Scopus database with a specific focus on 'financial technology', which explains why it has emerged as the most frequently cooccurring keyword.

Initially, 703 documents contained a total of 2941 author keywords. A minimum occurrence threshold of 5 was applied to narrow the analysis, resulting in the selection and mapping of 137 keywords. The network visualization of these 137 words is presented in Fig. 12. The keyword 'financial technology' takes the lead, with 463 occurrences and a link strength of 792. Other significant keywords in the network include 'blockchain,' financial inclusion,' 'cryptocurrency,' 'bitcoin,' 'innovation,' and 'COVID-19.' Network visualization revealed nine distinct thematic clusters. The first cluster, containing 27 items, mainly focuses on the social benefits of financial technology and thus includes matters such as inclusion, sustainable development, poverty, insurance, and microfinance. The second cluster pertains to the stability of financial systems. Words such as 'financial regulation', 'risk', and 'stability' can be observed within this cluster.

On the other hand, the fourth and fifth clusters revolve around emerging innovations in the field of financial technology, such as blockchain, cryptocurrency, artificial intelligence, machine learning, and smart contracts. The fifth and sixth clusters focus on the impact of COVID-19 on financial systems worldwide. This can be inferred from keywords such as 'pandemic', 'digital transformation', and 'digitalization.' The last three clusters are engaged in the general way in which financial technology has the capability to transform financial institutions and services worldwide.

4.2.5 Coauthorship analysis

Coauthorship analysis examines the connections among researchers, focusing on how they collaborate. Understanding academic collaboration is important because coauthorship is a formal way for researchers to collaborate on ideas. In the context of the field of 'financial technology", we utilize coauthorship analysis to identify notable academic collaborations

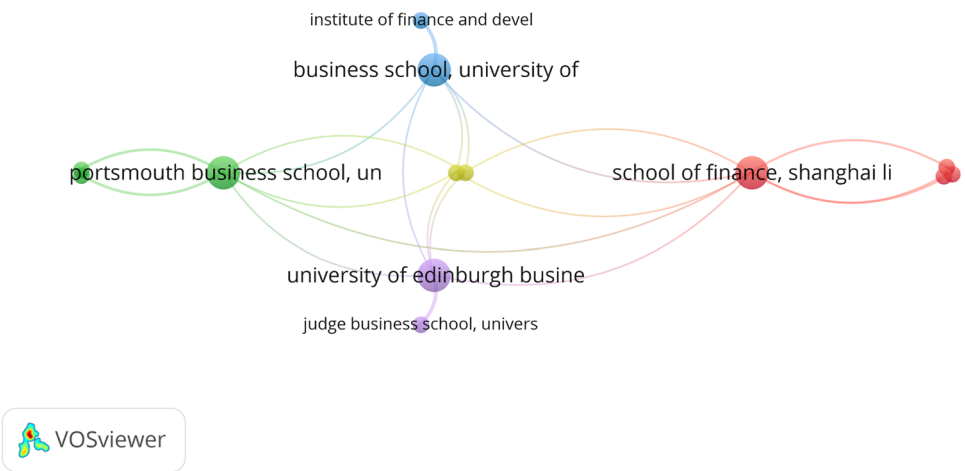


Fig. 13 Network visualization of coauthorship between organizations

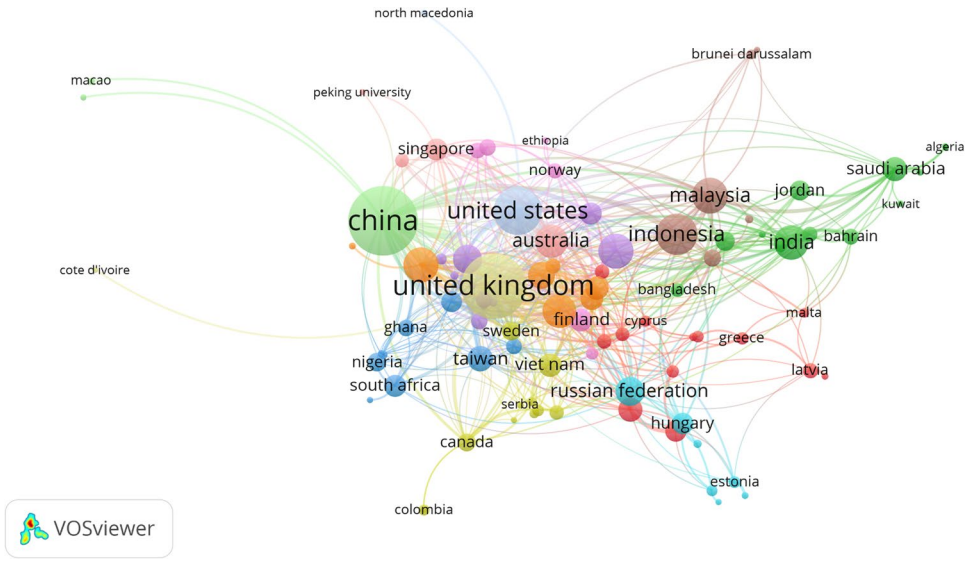


Fig. 14 Network visualization of authorship between countries

among organizations and countries. Figure 13 illustrates all the organizations involved in the 1073 documents, with 5 clusters of authors collaborating. Notable collaborating organizations include the Chinese Academy of Social Sciences, the University of Aberdeen Business School, and the University of Edinburgh Business School.

Another group of collaborating institutes includes Montpellier Business School, Portsmouth Business School, Institute of Finance and Development, Nankai University, Judge Business School, and University of Cambridge. Figure 14 depicts the academic network among countries. Furthermore, countries such as China, the United Kingdom, the United States of America, Australia, Finland, Indonesia, and Malaysia are prominent in coauthorship activities.

5 Discussion

The bibliometric analysis sheds light on the arena of sociocultural reactions to financial technology around the globe. The volume of publications increased to a large extent beginning in the year 2020; this newfound interest can be attributed to the unprecedented COVID-19 pandemic, which elevated the significance of hands-free transactions. In 2020, just fewer than 100 documents were published, but this number jumped to approximately 400 documents in 2021. Regarding country-wide distribution, China and the United Kingdom are the lead researchers on financial technology. Additionally, an increasing trend of Asian countries devoting their research to this domain can be observed.

Moreover, the collaborations between countries are balanced. For instance, Asian, European, and North American countries collaborate via established academic networks. The bibliographic coupling reveals that certain European countries, such as the Netherlands, Italy, Belgium, and Luxembourg, produce research on similar topics. It is also noteworthy that although China is crowned for producing most of its literature, the United Kingdom marches ahead regarding citations. This shows that the latter's work is comparatively more influential. Future research could revolve around blockchain, DeFi, AI, financial inclusion, regulation, and interindustry integration. Policymakers, scholars, and industry professionals should focus more on this field and tap into its promising potential. Anyhow, this study is limited to the literature extracted from one database, Scopus this could lead to an overall bias. Other factors that contributes to potential biases would be the not considering corpus published after 2023. However, these could be avenues for future reviews.

6 Conclusion

The primary aim of this study was to gain a comprehensive understanding of the quantity and characteristics of research conducted in the field of financial technology. Bibliometrics helps measure the impact and influence of sources and documents and identify coauthorship relationships among authors, organizations, and countries. The

study showed that the most influential sources, countries, and authors publishing documents on financial technology were IEEE Access, the United Kingdom, Peter Gomber, Robert J. Kauffman, Chris Parker, and Bruce W. Weber, respectively. In the past, significant contributions came from *Fintech and Regtech: Impact on Regulators and Banks* authored by the Ioannis Anagnostopoulos document and R. P. Buckley as an author. More recently, impactful contributions were made by the country, the United Kingdom, the source, Sustainability (Switzerland), and N. Bernards as the author.

Future research trends in financial technology were identified to be focused on areas such as financial inclusion, regulation, sustainability, and digitalization. Academic collaboration in financial technology was observed primarily among countries such as China and the United Kingdom, organizations such as the Chinese Academy of Social Sciences, and the University of Aberdeen Business School. Some suggestions to surpass the weaknesses of this study would be to use multiple databases and to include grey literature. While doing that, one would be able to arrive at results which are universal in nature.

Author contributions Original draft, writing: Hannah Biju, Jaheer Mukthar K.P Data Collection and methodology fixing: Amir Dhia, Doris Padmini, JK Singh, Sanjay Singh Funding acquisition: amir Dhia prooofing and second draft: Jaheer Mukthar K.P, Amir Dhia

Data availability No datasets were generated or analysed during the current study.

Declarations

Competing interests The authors declare no competing interests.

Appendix

See Tables 1, 2, 3, 4, 5 and 6

Table 1 Citation analysis with the author as the reference

Source	Documents	Citations
Ieee Access	42	858
Sustainability (Switzerland)	57	825
Technological Forecasting And Social Change	13	795
Journal Of Economics And Business	6	673
Financial Innovation	24	602
New Political Economy	5	410
Small Business Economics	6	377
Environment And Planning A	9	327
Journal Of Open Innovation: Technology, Market, And Complexity	12	320
International Journal Of Environmental Research And Public Health	6	298
European Business Organization Law Review	7	202
Electronic Commerce Research And Applications	5	201
International Review Of Financial Analysis	5	185
European Journal Of Finance	8	184
Frontiers In Artificial Intelligence	12	151
International Journal Of Economics And Business Administration	6	139
Journal Of Theoretical And Applied Electronic Commerce Research	5	137
Finance Research Letters	7	127
Investment Management And Financial Innovations	13	122
Mathematics	15	122
Risks	10	121
International Journal Of Financial Studies	7	108
Frontiers In Psychology	12	104
Information (Switzerland)	7	80
Journal Of Corporate Finance	5	80
Geoforum	5	79
Journal Of International Financial Markets, Institutions And Money	5	67
Journal Of Cultural Economy	7	66
Heliyon	5	62
Journal Of Innovation And Knowledge	5	61
Computers, Materials And Continua	5	58
International Journal Of Engineering And Technology(UAE)	5	58

Table 1 (continued)

Document	Citations
Gomber P.; Kauffman R.J.; Parker C.; Weber B.W. (2018)	505
Stafford-Smith M.; Griggs D.; Gaffney O.; Ullah F.; Reyers B.; Kanie N.; Stigson B.; Shrivastava P.; Leach M.; O'connell D. (2017)	448
Ozili P.K. (2018)	418
Dutta P.; Choi T.-M.; Somani S.; Butala R. (2020)	364
Buchak G.; Matvos G.; Piskorski T.; Seru A. (2018)	339
Gabor D.; Brooks S. (2017)	289
Berger A.N. (2003)	289
Adhami S.; Giudici G.; Martinazzi S. (2018)	269
Haddad C.; Hornuf L. (2019)	224
Park J.H.; Park J.H. (2017)	192
Tseng J.-H.; Liao Y.-C.; Chong B.; Liao S.-W. (2018)	184
Chang V.; Baudier P.; Zhang H.; Xu Q.; Zhang J.; Arami M. (2020)	180
Anagnostopoulos I. (2018)	175
Leong C.; Tan B.; Xiao X.; Tan F.T.C.; Sun Y. (2017)	165
Egbu C.O.; Hari S.; Renukappa S.H. (2005)	162
Kou G.; Olgu Akdeniz Ö.; Dinçer H.; Yüksel S. (2021)	153
Hu Z.; Ding S.; Li S.; Chen L.; Yang S. (2019)	149
Esmat A.; De Vos M.; Ghiassi-Farrokhfal Y.; Palensky P.; Epema D. (2021)	149
Nabipour M.; Nayyeri P.; Jabani H.; Shahab S.; Mosavi A. (2020)	139
Jagtiani J.; Lemieux C. (2018)	130
Cai C.W. (2018)	128
Gimpel H.; Rau D.; Röglinger M. (2018)	128
Kshetri N.; Voas J. (2018)	126
Le T.N.-L.; Abakah E.J.A.; Tiwari A.K. (2021)	126
Muganyi T.; Yan L.; Sun H.-P. (2021)	119
Huynh T.L.D.; Hille E.; Nasir M.A. (2020)	116
Arner D.W.; Buckley R.P.; Zetzsche D.A.; Veidt R. (2020)	111
Mensi W.; Hammoudeh S.; Al-Jarrah I.M.W.; Sensoy A.; Kang S.H. (2017)	111
Gozman D.; Liebenau J.; Mangan J. (2018)	106
Zhou G.; Zhu J.; Luo S. (2022)	98
Borovkova S.; Tsiamas I. (2019)	98
Demir A.; Pesqué-Cela V.; Altunbas Y.; Murinde V. (2022)	96
Rolffs P.; Ockwell D.; Byrne R. (2015)	93
Platanakis E.; Urquhart A. (2020)	90
Senyo P.K.; Osabutey E.L.C. (2020)	90
Jamil F.; Iqbal N.; Imran; Ahmad S.; Kim D. (2021)	89

Table 1 (continued)

Document	Citations
Langley P.; Leyshon A. (2017)	87
Drasch B.J.; Schweizer A.; Urbach N. (2018)	86
Su Y.; Li Z.; Yang C. (2021)	86
Chen Z.; Li Y.; Wu Y.; Luo J. (2017)	86
Mhlanga D. (2020)	85
Hua W.; Jiang J.; Sun H.; Wu J. (2020)	84
Barbu C.M.; Florea D.L.; Dabija D.-C.; Barbu M.C.R. (2021)	81
Pizzi S.; Corbo L.; Caputo A. (2021)	80
Demertzis M.; Merler S.; Wolff G.B. (2018)	80
Kang J. (2018)	76
Li K.; Kim D.J.; Lang K.R.; Kauffman R.J.; Naldi M. (2020)	75
Li Y.; Spigt R.; Swinkels L. (2017)	73

Table 2 Citation analysis with country as the reference

Country	Documents	Citations
United Kingdom	176	5443
China	200	3173
United States	96	2614
Germany	47	2053
Australia	46	1708
South Korea	51	981
Italy	51	968
India	49	919
France	22	854
Sweden	15	851
Netherlands	30	830
Singapore	21	792
Hong Kong	18	787
Vietnam	23	649
Taiwan	28	546
Malaysia	54	489
Spain	35	483
Switzerland	23	454
Indonesia	71	435
Finland	22	404
Pakistan	20	350
Hungary	19	305
Poland	25	260
Saudi Arabia	24	232
United Arab Emirates	16	228
South Africa	21	188
Ukraine	19	174
Jordan	17	173
Nigeria	15	162
Russian Federation	35	122

Table 3 Cocitation analysis with the author as the reference

Author	Citations	Total link strength
Ajzen I	88	81.1
Allen F	62	59.1
Alt R	58	56.09
Ansar S	50	49.87
Arner D.W	254	235.72
Bagozzi R.P	56	54.38
Barberis J	148	137.34
Barberis J.N	80	77.77
Beck T	81	75.7
Berger A.N	88	62.79
Brooks S	52	51.1
Buckley R.P	262	241.36
Chen H	56	55.15
Chen J	67	64.92
Chen L	101	96.55
Chen S	56	55.43
Chen X	127	123.49
Chen Y	127	123.92
Chen Z	64	61.46
Cumming D	51	46.33
Cumming D.J	58	51.58
Davis F.D	174	158.32
Demirguc-Kunt A	186	167.97
Dorfleitner G	61	58.52
Dwivedi Y.K	71	62.9
Frost J	81	74.67
Gabor D	55	53.33
Gambacorta L	58	54.76
Giudici P	88	45.49
Gomber P	151	148.36
Guo Y	54	51.78
Haddad C	54	53.8
Hair J.F	143	134.47
Henseler J	51	49.25
Hess J	52	51.69
Hornuf L	164	157.85
Hu Z	52	51.89
Huang Y	105	100.57
Jagtiani J	103	94.34
Kauffman R.J	163	127.34
Kim Y	60	57.45
Klapper L	140	127.93
Langley P	65	58.16
Lee I	108	107.43
Lee J	68	63.05
Lemieux C	66	64.44
Levine R	64	59.56
Leyshon A	77	61.35
Li H	87	83.45
Li J	163	151.95
Li S	89	88.32

Table 3 (continued)

Author	Citations	Total link strength
Li W	69	63.69
Li X	146	143.06
Li Y	174	164.87
Li Z	87	82.83
Lin M	51	48.71
Liu C	73	71.69
Liu H	50	49.54
Liu J	88	86.68
Liu L	50	49.3
Liu X	70	69.12
Liu Y	152	144.48
Liu Z	83	79.76
Lu Y	52	51.57
Lusardi A	63	44.16
Morris M.G	50	49.66
Nakamoto S	68	55.91
Oliveira T	61	59.18
Ozili P.K	71	63.17
Parker C	76	75.49
Philippon T	57	54.38
Piskorski T	51	48.95
Puschmann T	64	61.73
Ringle C.M	126	114.04
Sarstedt M	144	129.86
Schwienbacher A	112	103.32
Seru A	69	58.97
Shin Y.J	100	98.91
Siering M	76	75.31
Singer D	78	76.29
Singh S	64	61.27
Sun Y	78	74.31
Suri T	53	46.45
Thakor A.V	74	69.85
Venkatesh V	153	141.88
Vismara S	69	59.94
Wang C	71	69.58
Wang H	132	126.72
Wang J	177	155.82
Wang L	58	54.19
Wang S	100	97.97
Wang X	123	120.24
Wang Y	162	153.05
Wang Z	69	67.15
Weber B.W	75	73.5
Weber M	61	59.4
Wojcik D	103	65.25
Wu J	69	66.06
Wu Q	51	50.88
Wu Y	75	72.89
Xu X	89	87.22
Yang S	77	76.48

Table 3 (continued)

Author	Citations	Total link strength
Yang Y	52	51.74
Zetzsche D.A	101	93.85
Zhang H	87	81.36
Zhang J	124	120.78
Zhang L	85	83.3
Zhang X	110	106.62
Zhang Y	215	200.88
Zhang Z	55	52.62
Zhao Y	72	67.61
Zhou Y	61	59.63

Table 4 Bibliographic coupling with the source as the unit

Source	Documents	Citations	Total link strength
Sustainability (Switzerland)	57	825	694
Mathematics	15	122	293
Journal Of Open Innovation: Technology, Market, And Complexity	12	320	275
Journal Of Theoretical And Applied Electronic Commerce Research	5	137	185
Information (Switzerland)	7	80	173
Systems	5	17	171
Frontiers In Psychology	12	104	158
Cogent Economics And Finance	12	28	128
Journal Of Risk And Financial Management	12	48	111
Environment And Planning A	9	327	102
New Political Economy	5	410	96
Small Business Economics	6	377	94
Journal Of Cultural Economy	7	66	93
European Journal Of Finance	8	184	90
Journal Of Innovation And Knowledge	5	61	83
International Journal Of Environmental Research And Public Health	6	298	82
Ieee Access	42	858	79
Financial Innovation	24	602	78
Sensors	5	34	77
Journal Of Economics And Business	6	673	69
Frontiers In Artificial Intelligence	12	151	65
Cogent Business And Management	5	26	60
International Journal Of Economics And Business Administration	6	139	56
International Journal Of Data And Network Science	6	39	53
Business: Theory And Practice	5	31	52
International Review Of Financial Analysis	5	185	50
International Journal Of Financial Studies	7	108	45
Risks	10	121	44
Mathematical Problems In Engineering	9	29	43
Investment Management And Financial Innovations	13	122	39
European Business Organization Law Review	7	202	37
Technological Forecasting And Social Change	13	795	31
Finance: Theory And Practice	8	33	29
Journal Of International Financial Markets, Institutions And Money	5	67	29
Heliyon	5	62	26
Journal Of Islamic Monetary Economics And Finance	7	43	24
Banks And Bank Systems	7	51	21
Finance Research Letters	7	127	20
Discrete Dynamics In Nature And Society	5	9	12
Electronic Commerce Research And Applications	5	201	12
Geoforum	5	79	12
Journal Of Banking Regulation	5	57	12
Wireless Communications And Mobile Computing	9	30	12
Journal Of Corporate Finance	5	80	8
Computational Intelligence And Neuroscience	6	5	4
F1000research	7	1	3
Complexity	7	43	2
International Journal Of Engineering And Technology (UAE)	5	58	2
Computers, Materials And Continua	5	58	0

Table 5 Bibliographic coupling with the author as the unit

Author	Documents	Citations	Total link strength
Bernards N	3	83	29
Langley P.; Leyshon A	3	162	26
Ozili P.K	5	514	18
Okoli T.T.; Tewari D.D	4	7	3
Alaassar A.; Mention A.-L.; Aas T.H	3	52	0

Table 6 Bibliographic coupling with country as the unit

Country	Documents	Citations	Total link strength
United Kingdom	176	5443	14974
China	200	3173	10631
United States	96	2614	7420
Australia	46	1708	6342
Germany	47	2053	5341
Malaysia	54	489	5212
India	49	919	4380
Singapore	21	792	3719
Spain	35	483	3546
Finland	22	404	3388
Italy	51	968	3323
Pakistan	20	350	2826
South Korea	51	981	2822
Hong Kong	18	787	2778
Netherlands	30	830	2738
Saudi Arabia	24	232	2606
France	22	854	2562
Indonesia	71	435	2451
Norway	10	136	2435
South Africa	21	188	2425
Sweden	15	851	2286
United Arab Emirates	16	228	2278
Viet Nam	23	649	2208
Poland	25	260	2034
Switzerland	23	454	2013
Ghana	12	60	1850
Portugal	11	195	1832
Turkey	13	423	1747
Russian Federation	35	122	1659
Canada	14	632	1576
Taiwan	28	546	1541
Bahrain	11	245	1474
Hungary	19	305	1377
Belgium	10	193	1360
Jordan	17	173	1317
Luxembourg	9	286	1276
Denmark	8	308	1200
Czech Republic	8	50	1070
Oman	5	189	1046
Brazil	12	98	995
Ireland	9	101	953
Thailand	11	36	921
Bangladesh	8	38	866
Romania	12	154	812
Japan	12	562	772
Estonia	6	32	696
Greece	7	161	667
Ukraine	19	174	667
Slovakia	7	198	659
Nigeria	15	162	645
Austria	9	96	636

Table 6 (continued)

Country	Documents	Citations	Total link strength
Qatar	10	262	569
Lithuania	6	77	564
Chile	5	70	562
Latvia	10	164	548
Cyprus	5	67	535
Croatia	6	78	471
Iran	7	214	418
Kazakhstan	5	23	259
Colombia	5	43	122

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