Dark side whitewashes the benefits of FinTech innovations: a bibliometric overview

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Abstract

Purpose – The current study focuses on many risk categories that have emerged in the digital ecosystem of the financial technology industry, which has dramatically changed traditional financial systems as a result of innovations in financial technology.

Design/methodology/approach – The Web of Science Core Collection database was used to find a data set of 719 pertinent papers on the subject encompassing the year 2015–2023. The sample procedure was carried out utilising the PRISMA approach. The keywords were first gathered relating to technological risks in banking sectors and after confirming the keywords, the authors performed the search by the "topic" which covers "title" in the search bar. On February 15, 2023, the Web of Science database was searched using the terms "Cyber security risk OR data theft OR financial crimes OR financial stability risk OR operational risk OR default risk OR money laundering OR financial terrorism AND FinTech AND banking sector". Two-step approach is applied in this study. First, descriptive analysis is applied using RStudio to highlight prominent authors, countries and affiliations. Furthermore, relationship among authors, countries and keywords is shown by using three fields plot. Second, using VOSviewer, co-occurrence of keyword analysis is used to determine the most influential themes.

Findings – The findings show that 2,611 documents have been published from 2016 to 2023. Year 2021 is the most productive year in terms of number of publications. The results also show that WANG XC is tied for the position of most prolific contributing author. In a similar vein, the United States leads the world in publication output. Furthermore, Southwestern University of Finance and Economics in China is leading the list with 15 articles. The results from the co-occurrence of keywords reveal that "default risk", "operational risk", "money laundering", "credit risk", "corporate governance", "systematic risk", "financial stability risk", "risk management" and "crises" are the frequently keywords.

Originality/value – The results of this study are beneficial to academia and industry in order to advance their current understanding of FinTech and associated concerns. This work expands the understanding of the technology hazards facing the banking industry from a broad perspective.

Keywords FinTech, Risks, Bibliometric analysis, VOSviewer, RStudio, Banking sector

Paper type Research paper

1. Introduction

The global revolution in financial technology (FinTech) is in full force. Although technology has been a part of the financial services industry since the 1850s, the term "FinTech" is now frequently used to describe technological developments that may have the potential to alter

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the way that financial services are provided and spur the creation of new business models, applications, processes and products, as well as result in benefits for consumers (Arner *et al.*, 2015; Feyen *et al.*, 2021; Sironi, 2016). The banking industry has seen extensive technological and regulatory changes throughout the same time period, largely as a result of deregulation and liberalisation, improvements in Information Communications Technology (ICT), creative ways to save and conduct transactions, and advancements in cyber security and digitisation (Murinde *et al.*, 2022).

FinTech frequently uses software that is incorporated in platforms or mobile applications and uses machine learning, algorithms and data mining to offer consumers automated and improved financial services (Belozyorov *et al.*, 2020). Nearly all aspects and divisions of the financial services industries have been touched by financial technology. FinTech advances enable customers to interact with financial institutions through increasingly automated channels (Milian *et al.*, 2019). FinTech investments have grown significantly during the last few decades. There are a staggering number of financial start-ups globally (Lu *et al.*, 2021).

The banking sector relies heavily on technology to conduct its operations, and while technology has revolutionised banking and made it more efficient, it also poses various risks such as cyber security risk, data theft, financial crimes, financial stability risk, operational risk, default risk, money laundering, financial terrorism etc. The focus of the current study is on how advancements in financial technology have drastically changed conventional financial systems. In the digital ecosystem of the financial technology sector, we concentrate on a number of risk categories that have appeared. The authors of the current study used the PRISMA approach to carry out bibliometric analysis. In order to further analyse how digitalisation in finance has benefited this industry, with an emphasis on the numerous hazards that have arisen as a result of this digitisation. The purpose of this study is to provide answers to the following research queries.

RQ1. What are the types of risks in FinTech that were identified in this study?

RQ2. What is the annual scientific production in research on the risks associated with FinTech?

RQ3. Who are the most productive authors, countries and institutions relating to research in dark sides of FinTech?

RQ4. What are the primary themes that go through the literature on risks and FinTech?

RQ5. What are the future directions in FinTech?

This study is structured as follows to answer the stated questions. Section 2 provides background information about earlier studies on financial risks that have been popped up due to technology in the financial sector. The data and methodology used in this study are summarised in Section 3. Section 4 presents the findings of bibliometric analysis. Finally, the main conclusions are presented in section 5.

2. Background

The largest social benefit of FinTech is financial inclusion, which has provided financial services to many small and medium-sized firms and low-income individuals (Bavoso, 2020; Jain *et al.*, 2023). Currently, individuals use these technologies a lot, especially when buying things because digital payment methods are convenient, rapid and available. FinTech also encourages financial inclusion, boosts the economy, encourages innovation and makes it simpler to access financial services (Clemente and Marano, 2020). Global economic and financial processes have changed as a result of the development and application of digital

financial technologies, but they have also exposed people, systems and administration to new risks that jeopardise the effectiveness of protocols and existing norms (Ashta and Herrmann, 2021).

Terms like "cyber security" and "cyber banking" are used to refer to methods, procedures and technology that defend networks, computer systems and data from cyber attacks. Financial terrorism has taken on more and more common forms, including the cyber security threat. The safeguarding of clients' personal information has proven to be the most difficult part of contemporary cyber banking. An approach for stopping cyber attacks in cyberspace is called cyber security (Ghelani *et al.*, 2022; Panja *et al.*, 2013). Money laundering is the practise of hiding the source of funds obtained by unethical means and making them appear as though they were obtained legitimately (Mekpor *et al.*, 2018). Together with other forms of organised crime like the trafficking of people, narcotics and weapons, money laundering has increasingly increased (Raweh *et al.*, 2017). It is understood that money laundering fuels crime (A Rahman, 2015).

Operational risk is the chance of suffering losses as a result of failed, ineffective or defective systems, people and processes, including internal or external occurrences. All goods, services, procedures and business strategies used in the banking industry are inherently operationally risky (Khalil and Alam, 2020). Operational risk was acknowledged as one of the most significant hazards following the 2008 financial crisis because the models used to identify it failed due to the very qualitative nature of the risk information at hand (Peña *et al.*, 2018).

In a number of areas, this study adds to the body of literature on the negative effects of FinTech on the banking industry. First, this study has focussed primarily on publishing trends patterns based on annual scientific production (Faraji *et al.*, 2022; Liu *et al.*, 2022), most productive authors (Caputo *et al.*, 2023; Kalia *et al.*, 2022), most productive countries (Soni *et al.*, 2022; Wang *et al.*, 2022), most relevant affiliations (Hammerschmidt *et al.*, 2023), relationship among authors, countries and keywords (Aslanci and Bayrak, 2023) and frequently used keywords (Bernatović *et al.*, 2022; Goswami and Goswami, 2023). Despite the fact that these studies offer insightful information, they do not map the dark sides of FinTech in banking sector. Therefore, by using descriptive and network analysis, the current study aims to close this knowledge gap and improve comprehension of the conceptual framework of technological risk in the banking sector. Second, the previous studies on dark sides of FinTech mainly focussed on the Scopus database (Jain *et al.*, 2023; Wasiq *et al.*, 2023). The present study focuses on Web of Science (WoS) database, which aggregates top-tier academic journals, books, conference materials etc. The WoS database is widely acknowledged as one of the most popular and trustworthy databases (Analytics, 2020; Liu *et al.*, 2022; Norris and Oppenheim, 2007). Third, the results of this study will give a complete picture of the state of the research on technology threats in the banking industry. It will also open the door for future research by pointing up areas that need more investigation. Table 1 shows the key risks found in the papers examined for this investigation.

3. Materials and methods

Scientometrics looks into the tools, findings and organisational structure used in the creation of new knowledge and methods. Therefore, being a subdivision of the Scientometrics, bibliometrics utilises scientific methods to scientific literature and to investigate the action of a specific scientific field. In the middle of the 20th century (Garfield, 1988), established the science of science. Subsequently, it has now become more often used for appraising scientific studies. Furthermore, bibliometric analysis facilitates to assess information across several scientific fields (Bhattacharya, 2018; Garfield, 1988). It offers insightful information on how research and innovation are related. In such manner, bibliometrics has been enlarged from the manifestation of scientific development and the accessibility of various databases

Type of risk	Description	Sources
Cybersecurity risk	It has the ability to undo all of our professionals' hard work	Huang and Pearlson (2019)
Money laundering risk	It promotes corruption. It affects Govt. Revenues and increases tax evasion	Ofoeda *et al.* (2022) and Yeoh (2020)
Operational risk	It may damage internal and external events	Khalil and Alam (2020)
Default risk	Digital lending is more dangerous as compared to traditional lending	Arkanuddin *et al.* (2021), Mallekoote and Balraadjsing (2022) and Mascarenhas *et al.* (2021)
Financial stability risk	The entire financial system in an economy becomes unstable as a result of financial innovations	Jain *et al.* (2023) and Monkiewicz and Monkiewicz (2020)
Systematic risk	Due to use of technology, large stock of user data and offer a range of services are posing risks for systems	Chaudhry *et al.* (2022)
Corruption	Innovative activities might get affected by corruption due to lack of resources or lack of trust in institutions	Mahagaonkar (2010)
Crimes	FinTech channels are far more likely to experience fraud because it is easier to assume fraudulent identities online	Hollanders (2020) and Šapkauskienė and Višinskaitė (2020)
Fraud	Frauds in banking sector are rapidly growing due to new innovations	Bhasin (2016)

Table 1.
Risks faced by FinTech

Source(s): Authors' own creation

accessible to the researchers. At the same time, bibliometrics is an essential instrument for top management for decision-making to plan novel research projects. The studies based on bibliometrics boost comprehension and justification of the dynamics of activity and scientific output (Abad-Segura *et al.*, 2020).

To put it more precisely, the techniques and mechanisms hunt recognition of information included in numerous publications and realise the awareness of methods when they were unveiled. The research activity in this method begins with characterising the study subjects, developing research questions, gathering data, producing results, and drawing conclusions. This dynamic makes research one of the mechanisms for innovation (Abad-Segura *et al.*, 2020).

Bibliometric analysis utilises indicators to illustrate the development of science. For this purpose, activity indicators are used to gather information on the scope and impact of research efforts and relationship indicators are used to gauge relationships between researchers and theme areas are employed in that order to monitor the outcomes of scientific activity. To answer the research questions, descriptive statistical analysis and co-occurrence of keywords analysis techniques used in this study. Identification of the contributing affiliations, authors and countries is made possible by the descriptive statistical analysis (Liu *et al.*, 2020). Furthermore, relationship among authors, countries and keywords is shown by using three fields plot. The intellectual processes and structure of study topics are revealed by co-occurrence of keywords analysis, on the other hand, and it can also be used to forecast the course of future research (Leung *et al.*, 2017; Tan Luc *et al.*, 2020; Walter and Ribière, 2013). Based on the co-occurrence of keywords analysis, the keywords frequently occurred together are identified (Arroyo Esteban *et al.*, 2022).

3.1 Data collection and processing

The prime objective of this study is to identify the technological risks in banking sector. Therefore, bibliometrics analysis technique is performed to meet this objective. Most recently,

this technique has promoted the revision of various schools of scientific knowledge. In this regard, economics, finance and management scientists have used this technique (Belmonte-Urena *et al.*, 2020; Chen and Yang, 2021; Sitenko and Yessengeldin, 2019). We used the WoS Core Collection database, which aggregates top-tier academic journals, books, conference materials, etc., to extract articles. It is commonly recognised that one of the most widely used and reliable databases is the WoS database (Analytics, 2020; Liu *et al.*, 2022; Norris and Oppenheim, 2007). The WoS database has 50,000,000 papers and over 15,000 high-quality journals organised into 251 subject areas and 151 research domains (Merigó and Yang, 2017). As a result, the WoS database was chosen as our data source in order to guarantee the calibre of the research samples.

The choice of keywords is essential to get complete and representative samples (Liu *et al.*, 2022). Considering that our research objectives include risks, technology and banking sector. The keywords were first gathered relating to technological risks in banking sectors and after confirming the keywords, we performed the search by the "topic" which covers "title" in the search bar. On February 15, 2023, the WoS database was searched using the terms "Cyber security risk OR data theft OR financial crimes OR financial stability risk OR operational risk OR default risk OR money laundering OR financial terrorism AND FinTech AND banking sector". There were 2,611 total results in the database. The maximum search period was set from 2015 to 2023. The topic areas selected for the study were "business finance", "business", "economics" and "management". The search strategy was also limited to only journal articles. For a thorough analysis, only journal publications were considered. Furthermore, documents written in languages other than English were removed. Finally, 719 articles met the inclusion criteria of this study. Figure 1 presents the inclusion and exclusion criteria of final articles.

There are numerous software programmes available for visualisation, such as Bibexcel, CiteSpace, BiblioMaps, CitNetExplorer, SciMAT, Sci2 Tool and VOSviewer (Cobo *et al.*, 2011; Moral-Muñoz *et al.*, 2020). In this study, to conduct descriptive analysis, Biblioshiny (Aria and Cuccurullo, 2017; Chambers and Hastie, 1992; Elia *et al.*, 2022) is employed. On the other hand, co-occurrence of keywords analysis identification of main themes is performed using VOSviewer (Eck and Waltman, 2009).

4. Results

4.1 Annual scientific production

Figure 2 displays the annual trend of the articles used in the current investigation. The number of publications in this discipline is clearly on the rise. In 2020, researchers became more engaged with FinTech research (104 articles which is 15%). There were just 87 (12%) and 94 (13%) studies in 2018 and 2019, respectively. The years 2021 and 2022 are credited with 101 (14%) and 102 (14%), respectively, of the 719 scholarly papers that have been analysed. This is because FinTech innovations in the financial sector received more attention at that time in terms of their characteristics, application and research.

4.2 Most productive authors

Figure 3 shows the writers who contributed between 2015 and 2023. More than three articles have been written by 10 different authors. Among these scholars, WANG XC published the most papers (7) while Ali S, BATTISTON S, MASCIANDARO D and MIGUEIS M published five papers each. Moreover, five authors including COHEN RD, LI JP, TEICHMANN FM, ZHANG X AND ZHANG Y published 4 articles each.

4.3 Most productive countries

Technology hazards in the banking sector appear to be a topic that is widely discussed globally, as shown by all the publications relevant to the topic by top nations in Table 2 and

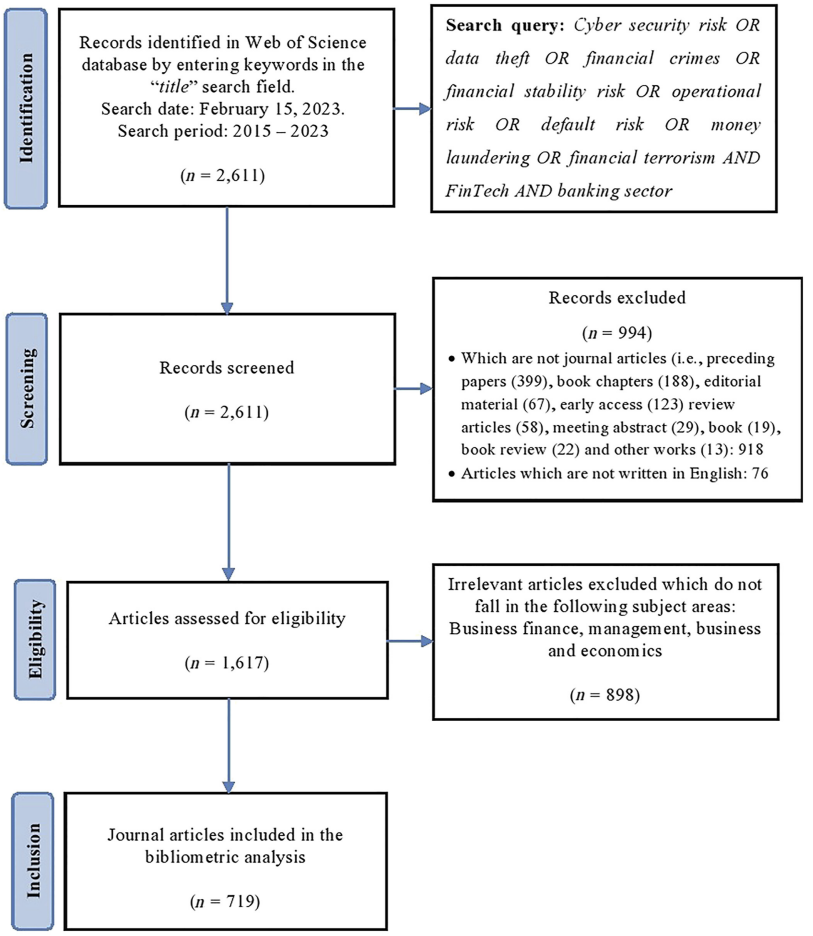

Figure 1.
PRISMA flowchart

Source(s): Authors own creation

Figure 4. The study determined the output from the different countries in the data set. We conducted this analysis with an emphasis on "the most productive countries", and the results show that the United States is at the top of the list with 116 publications altogether, including 88 single country publications (SCP) and 28 multiple country publications (MCP). Based on this analysis, publications on "technological risks in banking sector" mainly produced by USA (116), followed by China (111), United Kingdom (54), Germany (44), Australia (37), Italy (35), Canada (29), Spain (19), Switzerland (19) and Korea (14). USA seems the most linked country (28 MCP), followed by China and United Kingdom. According to the data, the most productive nations are also the most cooperative.

4.4 Most relevant affiliations

Figure 5 shows a list of the institutions that have made the largest contributions and are the most active. Southwestern University of Finance and Economics in China is leading the list, followed by the University of International Business and Economics in China with 15 and 14

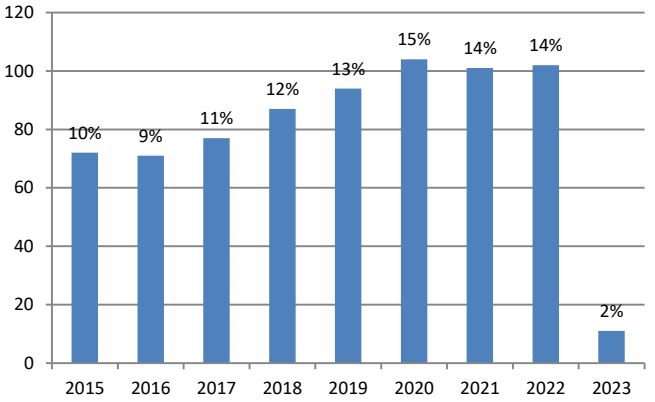

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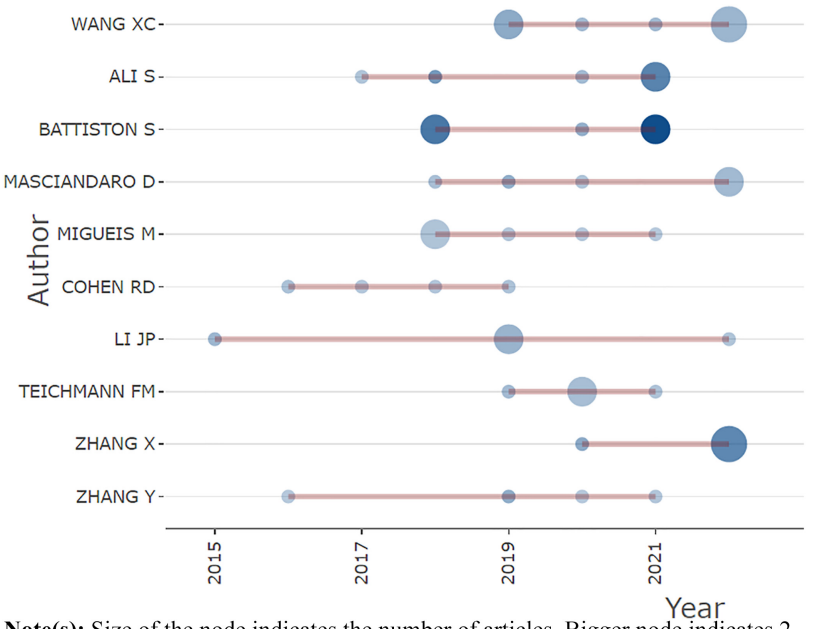
Figure 2.
Annual scientific production



Note(s): Size of the node indicates the number of articles. Bigger node indicates 2 articles and smaller node indicates 1 article

Source(s): Authors own creation using RStudio

Figure 3.
Most productive authors

published articles respectively. Among the top 10 institutions, these two institutions account for more than 29% of all reported and published papers on the subject of technological risks in the banking sector. Additionally, Bocconi University is ranked third on the list with 10 articles or 10% of the top contributors. The Hong Kong Polytechnic University, Macquarie University and University of Zurich are leading institutes with 9 publications each.

Country	Articles	SCP	MCP	MCP ratio
USA	116	88	28	0.24
CHINA	111	83	28	0.25
UNITED KINGDOM	54	29	25	0.46
GERMANY	44	37	7	0.16
AUSTRALIA	37	21	16	0.43
ITALY	35	21	14	0.40
CANADA	29	17	12	0.41
SPAIN	19	14	5	0.26
SWITZERLAND	19	12	7	0.37
KOREA	14	10	4	0.29

Source(s): Authors' own creation using RStudio

Table 2. Most productive countries

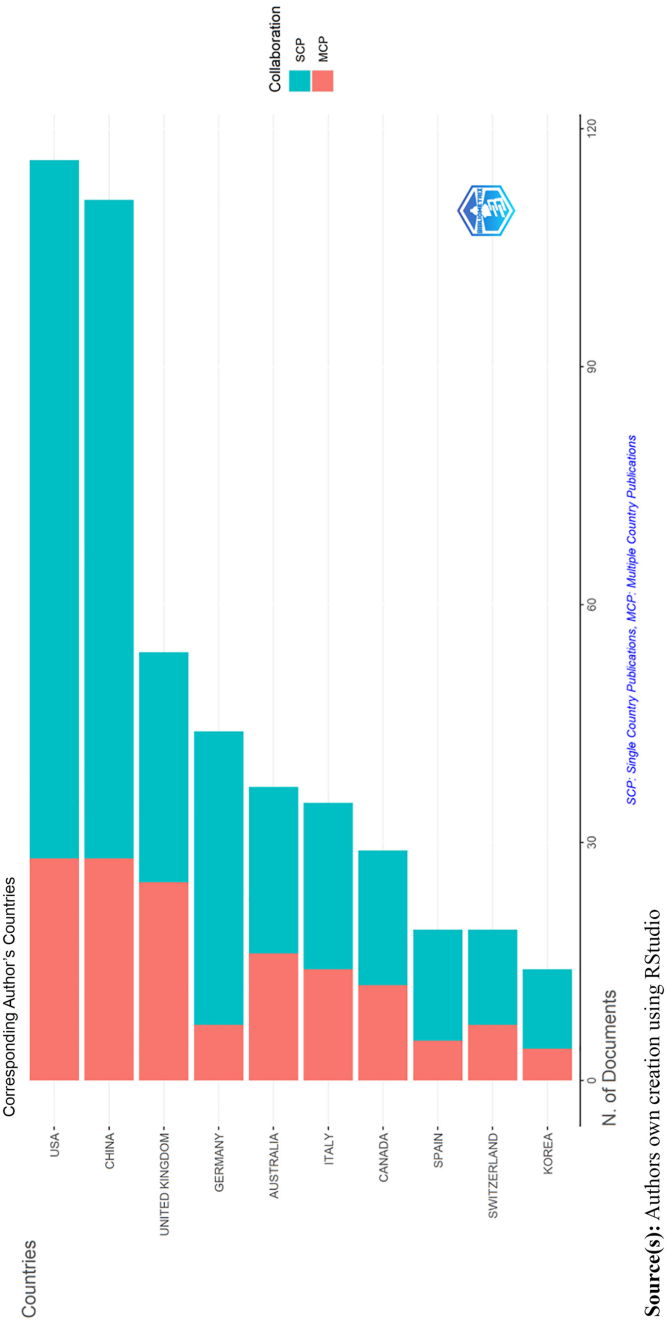
4.5 Relationship among authors, countries and keywords by using three fields plot

An illustration of three elements authors countries and keywords is shown in three fields plot given in Figure 6. The elements of three fields plot are plotted with grey linkages that represent their relationship with each other. This relationship starts from the author countries, followed by the author and then author is associated with the keywords. The number of papers connected with the element indicated by the size of each rectangle in the list. On the left side of this plot is the author country. There are top countries expressed in this three fields plot having published papers on the topic of technological risks in banking sector and the top country that published the maximum articles on this topic is China, which is connected with several authors namely.

Li jp, Zhu xq, Wang xc, Chiu wc and Liu b. In this three fields plot, the second element is author's name, which is situated in the middle of the plot. Most of the authors such as Li jp, Zhu xq, Wang xc, Curti f and Ghosh sk are most productive authors. All of the authors are linked with frequently used keywords, which are appeared on the right side of three fields plot. The third element consists of most repeated keywords in the sample articles. Sixteen keywords are listed in the plot and keywords which are most repeated are "operational risk", "default risk", "financial stability" and "money laundering" as revealed by their size of rectangles dominated the other rectangles. It is clear that the topic of "risk" is used by almost all the authors.

4.6 Co-occurrence of keywords analysis

The co-occurrence of keywords analysis in the selected articles was examined by VOSviewer. From the title field, the words were extracted and 3,204 words in all were discovered. As soon as the co-occurrence threshold limit was established at 5 which is default setting in the software, 205 terms satisfied it. Authors set minimum number of occurrence of a keyword 15; only 42 keywords met the threshold out of the 3,204 keywords. It was discovered that several of the terms were not related to the current study. Finally, the co-occurrence of 42 terms was examined after these were omitted from the co-occurrence of keywords analysis. Four clusters were found using the network. The justification for clustering is that phrases from one cluster frequently mirror themes from a different cluster's studies. "Default risk" appeared in 244 publications, "operational risk" in 125 articles and "determinants" in 223 articles. The top 20 terms examined in the co-occurrence of keywords analysis are shown in Table 2 along with their frequency and total link strength. The number of articles with two key terms appearing together is a measure of link strength (Van Eck and Waltman, 2017) (Table 3).



Source(s): Authors own creation using RStudio

Figure 4.
Most productive countries

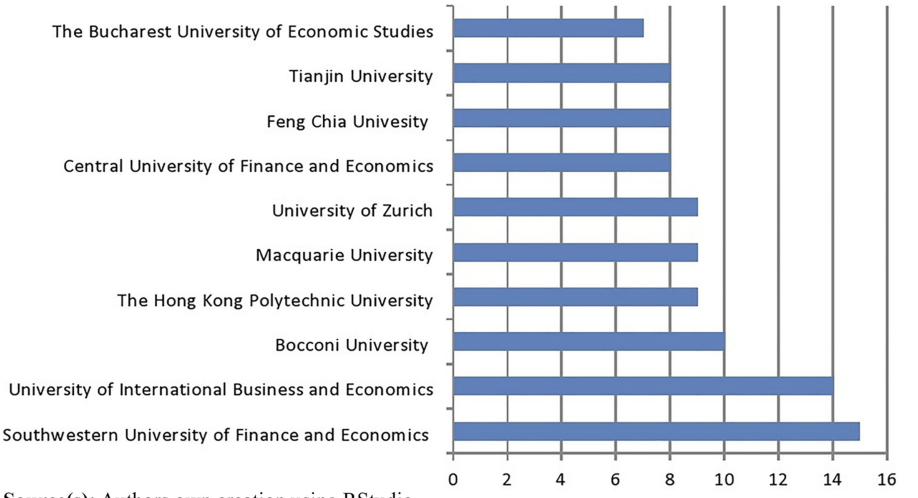


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Figure 5.
Most relevant affiliations

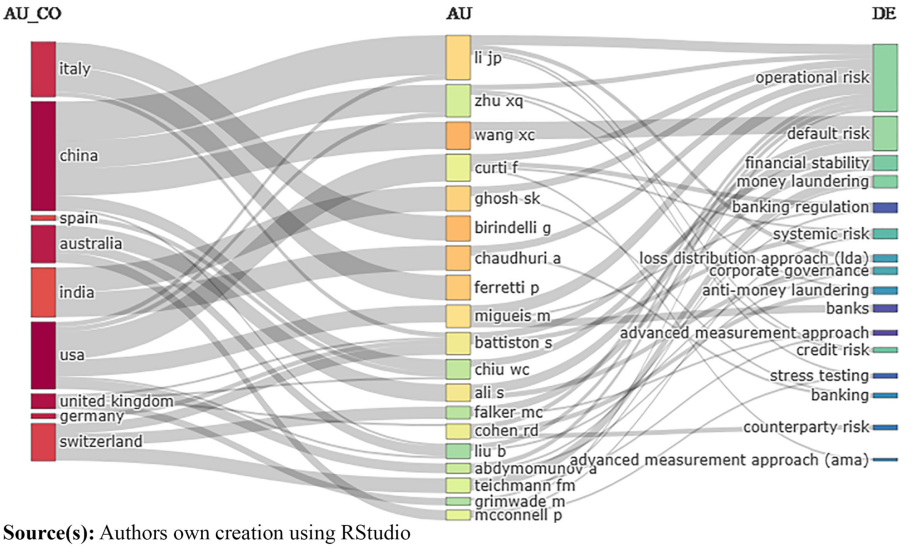

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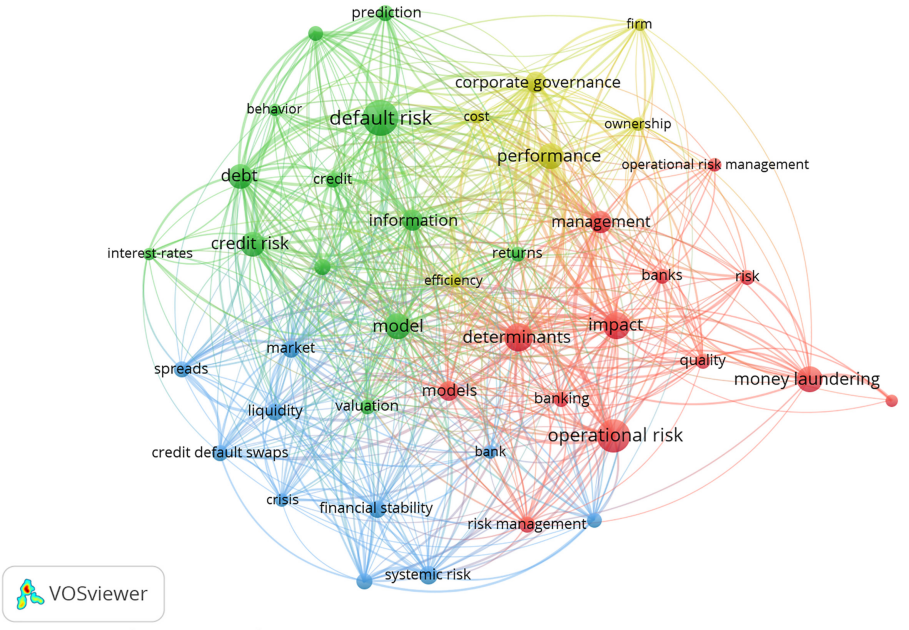
Figure 6.
Relationship among authors, countries and keywords

Figure 7 displays a visualisation of the term co-occurrence network depending on how frequently a certain keyword appears in the title of several articles. The size of the circles depicts the frequency with which particular keyword occurs. When the circle gets bigger, a word will be used more frequently in publications. Circles of the same colour show that the publications' subjects are similar (Guo *et al.*, 2019; Jain *et al.*, 2023). A greater association will exist between two terms if they are used together more frequently in publications. In the network, terms that co-occur more frequently and have stronger correlations are nearer to one

Rank	Keyword	Cluster	Occurrence	Total link strength
1	Default risk	2	114	244
2	Operational risk	1	100	125
3	Determinants	1	72	223
4	Impact	1	65	174
5	Performance	4	61	172
6	Model	2	61	123
7	Money laundering	1	59	58
8	Debt	2	57	155
9	Credit risk	2	57	117
10	Management	1	47	106
11	Corporate governance	4	42	146
12	Information	2	38	126
13	Models	1	34	70
14	Systematic risk	3	30	79
15	Market	3	27	96
16	Liquidity	3	27	92
17	Financial stability	3	27	66
18	Credit default swaps	3	24	65
19	Risk management	1	24	53
20	Investment	2	23	74

Source(s): Authors' own creation

Table 3.
Co-occurrence of terms



Source(s): Authors own creation

Figure 7.
Co-occurrence of keywords analysis

another than phrases that co-occur less frequently (Mbeng *et al.*, 2021). Based on how similar the themes within each cluster, the network is divided into four clusters.

4.7 Cluster analysis of co-occurrence of keywords

4.7.1 Cluster 1 (Red): Money laundering in banking sector. The term "money laundering" describes the processing of criminally obtained money to conceal its illicit source (Yeoh, 2020). Beginning in the early 1930s, money laundering became a recognised idea in the USA. In reality, Al Capone and Bugsy Moran's Chicago launderettes are where the phrase "money laundering" first appeared by giving their dirty money a clean image in the 1920s (Al Sabri Halawi, 2019; Morcos, 2006). A crucial component of the reporting and compliance requirements for banking and financial services all over the world is anti-money laundering (AML) regulation. The administrative and resource costs of AML compliance, however, have been steadily rising, which is proving to be a burden on the banking industry (Naheem, 2020).

4.7.2 Cluster 2 (Green): Financial technology risks in banking sector. Because of distributed ledger technology, the financial sector has seen technical developments that make it possible for businesses all over the world to obtain sufficient finance. Investments in technology advancements are crucial to the growth of the banking sector. Even in the banking sector, technological improvements have opened up new research possibilities (Jain *et al.*, 2023; Zveryakov *et al.*, 2019). Financial technology companies unquestionably contribute significantly to the expansion of banks. This technology has benefited the banks as well as their customers. However, they have created a number of brand-new risks, and the key challenge is fostering collaboration between banks and financial technology companies (Pu *et al.*, 2021). FinTech businesses need to be managed and monitored to ensure financial stability (Li, 2022; Nabilou, 2020).

4.7.3 Cluster 3 (Blue): Systematic risks in FinTech. The global financial sector has clearly profited from technological advancements, but they also present significant systematic risks (Bavoso, 2020). As a result, many individuals are concerned about a variety of issues, such as issues with privacy, system dependability, cyber security, and the possibility of cyberattacks (Duran and Griffin, 2021). New stability challenges for the financial system could arise as a result of systemic risks and technology (Chaudhry *et al.*, 2022). Data exploitation and regulatory uncertainty are two additional serious risks in the digital banking sector (Hua and Huang, 2021).

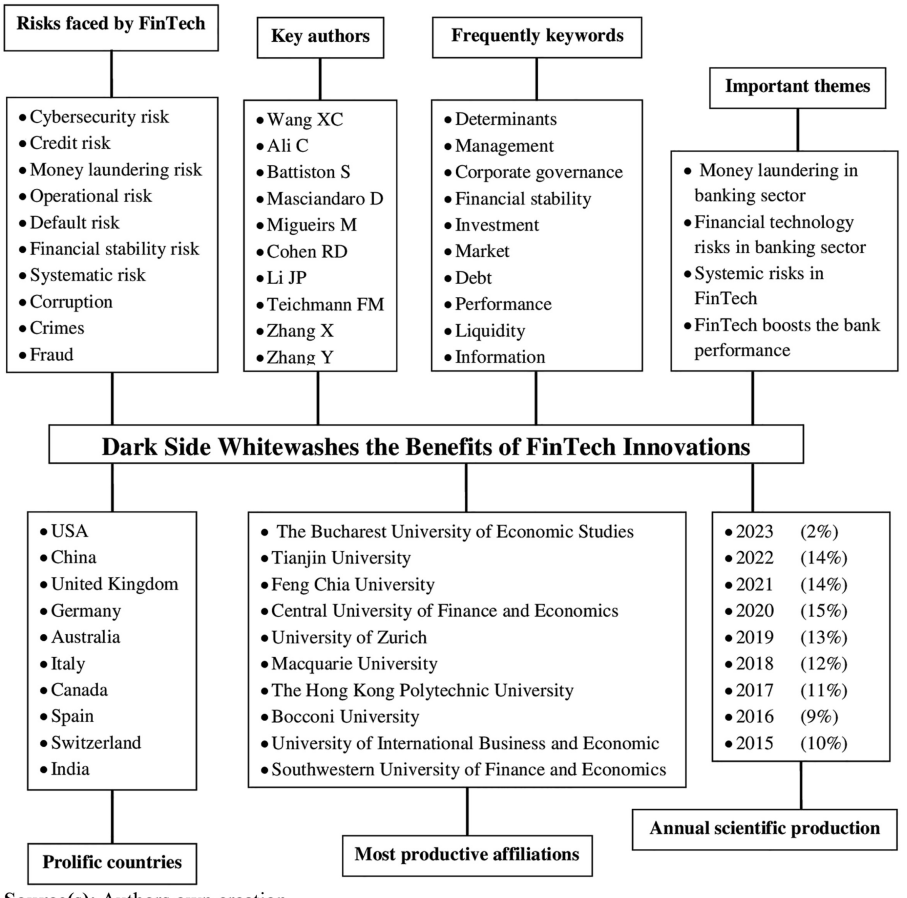
4.7.4 Cluster 4 (Yellow): FinTech boosts the bank performance. The benefits of collaborating between banks and FinTech companies are numerous. For banks, such as relationship might result in significant benefits for the creation of new consumer categories, products, and services. It might also lead to the development of new skills, access to new technology, and market expansion that creates new revenue streams and boosts productivity (Anagnostopoulos, 2018; Ky *et al.*, 2019). Moreover, FinTech may gain from new infrastructures and financial sources as well as from the goodwill of banks (Drasch *et al.*, 2018). Mobile money, which encourages financial inclusion, is one example of a digital innovation that has given the banking industry fresh motivation to strengthen customer relationships and perform better (Hirt and Willmott, 2014).

5. Conclusions

In order to assess technical hazards in the financial sector from 2015 to 2023, this study looked at trends in global scientific output and research. To do this, a bibliometric analysis of a sample of 719 papers taken from the WoS database has been created. Essentially, the development of annual scientific production of articles, the most productive authors, countries and affiliations have been identified in addition to current and future lines through the co-occurrence of keywords analysis. The amount of yearly scientific production has significantly increased in 2020, with 104 publications published, or 15% of all contributions

on the topic of technology threats in the banking sector. There's no denying that while physical crimes have decreased because to technology but cybercrime has soared. This study found that FinTech companies face a number of other risks in addition to cyber security issues, including money laundering, operational risk, default risk, financial stability risk, systematic risk, corruption, crimes, and frauds. Government support is massive for creating FinTech systems, especially for small enterprises. The majority of these funds must be used by these companies to improve compliance with legal standards. Modern risk management techniques must be strengthened urgently, and financial institutions' operational stability must be increased. To protect financial institutions from losses caused by such risks and to provide compensation for those losses, additional measures must be devised.

We observed that the writers with the most publications were WANG XC, Ali S, BATTISTON S, MASCIANDARO D, and MIGUEIS M. They discussed their opinions on the threats brought on by technology in the banking industry. Co-occurrence of keyword analysis reveals that operational risk, systematic risk, financial stability risk, credit risk and default risk are most frequently keywords. Examining the scientific output by nation reveals that the USA is leading the list with 116 articles (Figure 8).



Source(s): Authors own creation

Figure 8.
Science mapping

Based on the bibliometric analysis conducted, it is evident that risks related to cyber security, credit, money laundering, operational, default, financial stability, systematic, corruption, crimes, and fraud have been widely studied and discussed in the literature. These risks pose significant threats to individuals, organisations, and society as a whole and their impact can be felt at various levels, ranging from the economic to the social. The studies reviewed in this analysis provide a comprehensive understanding of the nature and scope of these risks and highlight the need for robust risk management frameworks to mitigate their effects. It is therefore essential for policymakers, regulators, and practitioners to take into account these risks and develop effective strategies to address them. Further research is needed to explore the interdependencies between these risks and their impact on different stakeholders, as well as to identify emerging risks that may require attention in the future.

Based on the analysis of the frequently used keywords in the literature, it is evident that several factors influence the determinants, management, corporate governance, financial stability, investment, market, debt, performance, liquidity, and information in various industries and contexts. These factors can be both internal and external, such as organisational structure, policies, regulations, economic conditions, and market trends. Effective management and corporate governance practices are crucial in mitigating risks and ensuring financial stability and performance. Liquidity management is essential in maintaining the financial health of organisations and avoiding financial distress. Adequate information is also necessary for decision-making and managing risks effectively. Investment decisions are critical in creating value for stakeholders and achieving organisational objectives. Market trends play a significant role in shaping investment decisions and influencing the performance of organisations. Debt management is critical in ensuring financial stability and avoiding default risks. It is essential to understand the interrelationships between these factors and how they affect the performance and stability of organisations. Future research should focus on exploring these interrelationships and identifying new determinants and factors that influence organisational outcomes.

The analysis of the most productive countries based on the number of publications and citations indicates that the United States, China, the United Kingdom, Germany, Australia, Italy, Canada, Spain, Switzerland, and India are the top contributors to research in various fields. These countries have established robust research infrastructures and funding mechanisms, which have contributed to their high productivity in terms of publications and citations. The United States and China, in particular, are leading in terms of the number of publications and citations, reflecting their dominance in research and innovation. The productivity of these countries has contributed significantly to global knowledge production, shaping the research agenda and informing policy and practice. However, it is important to note that the distribution of research productivity is not evenly spread across the world, and there is a need to address the existing disparities and improve research capacity in developing countries. Moreover, it is essential to foster international collaboration and exchange of knowledge to address global challenges and achieve sustainable development. Further research is needed to explore the factors that contribute to research productivity in these countries and identify strategies for improving research capacity in other regions.

The analysis of the most productive affiliations based on the number of publications and citations reveals that the Bucharest University of Economic Studies, Tianjin University, Feng Chia University, Central University of Finance and Economics, University of Zurich, Macquarie University, The Hong Kong Polytechnic University, Bocconi University, University of International Business and Economic, and Southwestern University of Finance and Economics are among the top contributors to research in various fields. These affiliations have established strong research programmes, centres, and collaborations, which have contributed to their high productivity in terms of publications and citations. Their contributions have significantly shaped the research agenda and informed policy and

practice in their respective fields. It is important to note that the distribution of research productivity is not evenly spread among all affiliations, and there is a need to address the existing disparities and improve research capacity in less productive institutions. Moreover, international collaboration and exchange of knowledge among affiliations can contribute to addressing global challenges and achieving sustainable development. Further research is needed to explore the factors that contribute to research productivity in these affiliations and identify strategies for improving research capacity in other institutions.

The analysis of the literature on banking sector reveals several important themes related to money laundering, financial technology risks, and systemic risks in FinTech. Money laundering has become a major concern for banks worldwide, as criminals use sophisticated techniques to hide their illegal activities. It is crucial for banks to implement robust AML policies and practices to prevent financial crimes and maintain the integrity of the financial system. On the other hand, the adoption of financial technology (FinTech) in banking has brought new opportunities and risks. While FinTech has the potential to improve efficiency and reduce costs, it also poses challenges such as cyber security threats, operational risks and systemic risks. Banks need to manage these risks effectively and adopt appropriate risk management frameworks to mitigate their effects. Moreover, the literature suggests that FinTech can boost the performance of banks, especially in terms of customer satisfaction, revenue growth and innovation. Banks can leverage FinTech to offer new products and services, enhance customer experience and improve operational efficiency. However, it is important to note that the benefits of FinTech may not be evenly distributed, and there is a need to address the digital divide and ensure that FinTech is accessible to all. Further research is needed to explore the interrelationships between these themes and identify emerging risks and opportunities in the banking sector.

The analysis of the annual production of articles indicates that the majority of publications were published in the past five years, with the highest percentage in 2020 (15%), followed by 2021 (14%) and 2019 (13%). This trend reflects the growing interest in research and innovation in various fields and the increasing availability of research data and tools. The percentage of publications in previous years gradually decreases, with the lowest percentage in 2016 (9%). This trend suggests that research topics and methodologies may change over time, reflecting the evolving needs and challenges of society. It is important to note that the distribution of annual publications may vary across disciplines and regions, and further research is needed to explore these variations and identify their underlying factors. Additionally, it is essential to ensure the quality and reproducibility of research, as well as promote open access and collaboration to facilitate knowledge exchange and accelerate scientific progress. Overall, the analysis of the annual production of articles provides insights into the research landscape and highlights the need for continuous monitoring and evaluation of research trends and practices.

This study made an effort to offer a thorough summary of the body of literature. As a result, more recent and specialised subjects like machine learning and artificial intelligence (AI) dangers are not sufficiently covered. By resolving this paper's shortcomings and delving more into the cluster analysis-identified themes, future research may build on its findings.

5.1 Limitations

This study has certain limitations; this research provides the groundwork for some potential future research areas. First, we have only taken the bibliographical information from the WoS database; future studies can use multiple databases to cover this limitation. Second, theoretical frameworks and hypotheses are typically not the main focus of bibliometric analyses as such (Paul and Criado, 2020). A systematic literature review or meta-analysis that shows meaningful relationships could be the solution in the future. Third, we examined

numerous publications where a profusion of themes, subtopics and ideas could result in knowledge overload (Krishen *et al.*, 2021).

5.2 Future research directions

In conclusion, our bibliometric study has illuminated the risks posed by FinTech in the banking sector, including security threats, operational dangers and regulatory issues. There are various crucial future directions for FinTech that scholars and business professionals should take into consideration. First, it is crucial to investigate how coronavirus disease 2019 (COVID-19) affects FinTech risks and any potential long-term consequences the pandemic may have on the sector. Second, it is crucial to evaluate how well these frameworks are working to reduce risks associated with FinTech as they continue to change. Third, future studies should look into the dangers posed by cutting-edge FinTech innovations like blockchain, AI and quantum computing. Fourth, it is important to research the dangers related to international FinTech operations and transactions. Finally, given the growing cooperation between banks and FinTech companies, it is crucial to research the advantages and drawbacks of these alliances and create risk management plans. We may better comprehend the dangers posed by FinTech in the banking sector and create future risk management strategies by concentrating on these potential areas.

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