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Article

The blockchain in the banking industry: a systematic review and bibliometric analysis

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The blockchain in the banking industry: a systematic review and bibliometric analysis

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ABSTRACT

Blockchain technology has become a highly relevant concept, capturing the attention of the younger generation. In the current era of information banking management, characterized by global interconnectedness and sustainability, the adoption of blockchain technology has brought about substantial changes in the banking sector. Despite the growing interest in blockchain's applications within banking industry, both from academics and professionals in banking, finance, and fintech, there is a noticeable absence of a comprehensive review that offers a holistic understanding of the historical, current, and future trends of blockchain in banking. Existing reviews on blockchain in banking have primarily focused on conceptual aspects, such as constructing theoretical frameworks, or contextual elements, such as examining cryptocurrencies and distributed ledgers. Consequently, these reviews offer a limited and incomplete understanding of the entire field. To bridge this gap, the present review takes a different approach by conducting a comprehensive bibliometric analysis of 133 articles on blockchain published in Scopus-indexed journals from 2015 to May 2023. This methodology allows for a more extensive exploration of the literature, providing a more robust and comprehensive overview of blockchain's application in the banking sector. Consequently, this comprehensive review uncovers significant trends in article performance, author contributions, country involvement, journal impact and theme within the field of blockchain research in banking. From the connected clusters of keywords, authors derive four cluster/themes such as transforming the banking sector through financial technology innovation, blockchain and artificial intelligence: the future of supply chain management, decentralized finance and 4.0 IR turns finance industry into digital.

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1. Introduction

Blockchain technology is the fundamental component of Industry 4.0, which has grown over the past ten years. In 2008, Nakamoto unveiled Bitcoin, the initial iteration of Blockchain applications (Nakamoto, 2009). The term 'Blockchain Technology' was first used in 2008 to refer to Nakamoto's 'chain of the block', a ledger (Gomathi et al., 2021; Khan & Rabbani, 2022). Blockchain technology is a decentralized ledger that is not controlled by a single institution but instead is kept up to date by multiple user groups. This technology is different from conventional scenarios in which the main theme is in charge of and maintains track of all data (Chowdhury et al., 2018). Blockchain technology holds promise for removing intermediaries, enhancing transaction transparency and traceability, ensuring efficiency and security, and strengthening, streamlining, and streamlining conventional business processes (Hassani et al., 2018).

In any economy, banks are among the biggest and oldest financial intermediaries. In order to enhance performance, customer service, bookkeeping, MIS, and AIS reporting, the banking sector has undergone

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a number of significant improvements. As a result, the banking industry has periodically adopted new technologies, including local area networks (LAN), automated teller machines (ATM), electronic fund transfers (ETF), electronic clearing services (ECS), and real-time gross settlement (RTGS) (Gupta & Gupta, 2018; RBI, 2017). Gupta and Gupta (2018) stated that artificial intelligence, blockchain technology, robotic process automation, and cyber security are the major developments that will alter banking in the future. Blockchain technology, which is the most cutting-edge phenomenon and is seen as a major driver for upheaval worldwide, is being used by banks to advance their digitalization efforts (Bhattacharyya & Pradhan, 2017; Gupta, 2017).

The utilization of blockchain technology extends beyond the banking sector, encompassing various other industries such as asset management, tourism, and traceability systems. The integration of Blockchain technology in the tourism sector is progressively materializing through the introduction of innovative business models (Prados-Castillo et al. 2023). He also highlighted that the sectors within tourism embracing blockchain technology more extensively are those pertaining to marketing, logistics, and intelligent business models, as indicated by findings from the analysis.

Similarly, Truong et al. (2023) delve into the potential of blockchain in asset management and repairs, emphasizing its capacity to offer secure and transparent record-keeping for the maintenance and repair histories of assets (Rodríguez-Espíndola et al. 2022). Feng et al. (2020) and Demestichas et al. (2020) concentrate on the utilization of blockchain in traceability systems, which holds significant relevance for supply chain management, food safety, and other sectors where monitoring the origin and flow of products is crucial. Furthermore, Loukil et al. (2021) underscore that the swift advancement of blockchain technology has impacted numerous sectors, including finance, healthcare, and supply chain operations. Recently, the application of this technology has expanded to the education sector due to its distinctive attributes like decentralization, reliability, and security.

Blockchain technology offers the banking and financial services industries many enticing benefits. Without a centralized computer or single point of failure, these systems are resilient and capable of functioning as decentralized networks. In the banking and financial services sector, blockchain technology can produce safe, dependable archives of engagements and transactions while streamlining administrative processes (Treleaven et al., 2017). By 2022, blockchain technology will cut the cost of the global banking industry by up to \$20 billion (Accenture, 2018). The World Economic Forum (World Economic Forum, 2019) forecasted that by 2025, blockchain technology will have raised GDP by 10%, with a significant contribution from the financial sector, including the banking system. According to Ito et al. (2017), blockchain is projected to significantly alter the current internet-based financial system. As a result, demand for blockchain technology is steadily rising across the globe. Besides, according to Cision (2022), the global blockchain technology industry was predicted to grow from its estimated USD 3.3 billion in 2021 to USD 60 billion by 2028, with a compound annual growth rate (CAGR) of roughly 44.5% between 2022 and 2028. Thus, it is impossible to dispute the significance of blockchain technology (Kleinaki et al., 2018; Lemieux, 2016). Blockchain has several challenges, including scalability, security, privacy leakage, energy consumption, laws and regulations, cybercrime, etc., despite its promise to improve the efficiency of the financial industry (Upadhyay, 2020; Attaran, 2022).

Studies on the advantages and drawbacks of blockchain technology as well as its application in the financial or supply chain have been done (Garg et al., 2021; Janssen et al., 2020). Since there has not been any consensus on how to implement blockchain technology in the banking sector (Ku-Mahamud et al., 2019; Zachariadis et al., 2019), this study shows the future research direction to conduct bibliometric analysis to identify the factors that influence blockchain adoption and visualize the development of the literature for future studies. Due to the lack of bibliometric analyses of blockchain adoption in banking (Kuzior & Sira, 2022; Pandey et al., 2022), the bibliometric analysis needs to be conducted and it is crucial for providing a progressive perspective, understanding how the literature has evolved from conceptual ambiguity to theory examination, and for defining the key constructs and their relationships (Zainuldin & Lui, 2021; Pérez-Pérez et al., 2019).

By looking at blockchain's application in the banking industry, this paper intends to close the research gap. The objective is to showcase how blockchain technology can benefit various industry verticals in the context of the fourth industrial revolution (IR 4.0), while also emphasizing the research characteristics specific to this sector. The research evaluates the intellectual structure of the topic and publishing

productivity using a bibliometric content analysis approach. In line with previous bibliometric studies (Kumar et al., 2021a, 2021b, 2021c; Lim et al., 2022b) and the goals of the article, this study addresses the following research questions:

- What are the bibliometric trends (performance) of blockchain in banking research?
- What are the most noteworthy articles about blockchain technology in banking?
- What are the most prominent authors on blockchain in banking?
- What are the most hot-button issues and themes surrounding blockchain in banking?

2. Methodology

This paper conducts a critical analysis of previous studies on the application of blockchain technology in the banking industry. A thorough assessment of the literature can be accomplished by a variety of techniques, including thematic analysis, bibliometric analysis, content analysis, and meta-analysis (Lim et al., 2022a). A bibliometric approach is used in this study to evaluate the literature. A bibliometric analysis basically uses statistical and quantitative techniques to look through the literature (Donthu et al., 2021). This approach is selected due to its ability to handle a substantial amount of literature and its capacity to minimize bias by relying on objective measures (statistics) for analysis (Mukherjee et al., 2021). The review process adheres to the PRISMA approach, as outlined in Table 1. The subsequent sections elucidate the data collection and analysis procedures employed in this systematic literature review, utilizing bibliometric analysis.

2.1. Data collection (corpus curation)

The data collection process consisted of two stages: assembling, also known as identification, and arranging, which involved screening and eligibility assessment. To assemble or identify relevant studies, this research utilized specific search keywords that pertained to the use of blockchain in the banking industry (e.g., 'blockchain in banking'). These keywords were determined through a brainstorming session with experts and consultation with existing literature (Musigmann et al., 2020). Subsequently, a search was conducted in the Scopus database, which is a vast scientific database containing bibliographic data. The search was performed in the fields of 'article title, abstract, and keywords,' resulting in a total of 133 documents.

Table 1. Review procedure.

SPAR-4-SLR (PRISMA)	Consideration	Decision
Assembling (Identification)	Search focus	Blockchain technology in banking industry
	Search keywords	('blockchain' AND * banking')
	Search database	Scopus
	Search field	Article title, abstract, and keywords
	Search result	817 documents
Arranging (Screening and Eligibility)	Search period	2015 until May 2023
	Subject area	'Business, Management and Accounting,' 'Economics, Econometrics and Finance,' and 'Social Sciences' 291
	Document type	'Article' 153
	Publication stage	'Final' 142
	Source type	'Journal' 139
	Language	'English' 133
	Search result	133 documents
Assessing (Inclusion)	Performance analysis	<ul style="list-style-type: none"> • Publication trend • Most impactful articles (citation) • Most productive journals (publication) and impactful • Most productive (publication) and impactful (citation) contributors (authors, institutions, countries)
	Science mapping	<ul style="list-style-type: none"> • Co-occurrence-keyword analysis (major themes) • Bibliographic coupling (major themes) • Trend analysis (trending theme and topics)

For the arranging stage, the search period of this study encompassed the period from 2015 until May 2023, aiming to include a wide range of relevant articles (referred to as the search period). The subject areas were restricted to 'Business, Management and Accounting,' 'Economics, Econometrics and Finance,' and 'Social Sciences' as they were deemed the most pertinent domains for this study. To capture conceptual research within the field, the document type was limited to 'article,' excluding other types such as 'editorial' and 'note' as they do not undergo peer review. Additionally, the publication stage chosen was 'final' to ensure replicability, as 'in press' articles may be assigned to subsequent years. To ensure the reliability and comprehensiveness of the sources, the study restricted the source type to 'journal.' This decision was based on two main factors: firstly, the presence of a peer-review process, which adds credibility to the research; and secondly, journals typically present full-fledged research findings. Conversely, other source types such as 'Conferences' were excluded as they often represent ongoing research, while 'book chapters' tend to focus more on explanatory rather than exploratory aspects. Furthermore, the language criterion was set to 'English' to align with the proficiency of the authors. Consequently, after applying these filtering criteria, a total of 133 documents were included, while 684 documents were excluded from the study.

2.2. Data analysis (corpus analysis)

In the final stage, referred to as the assessment or inclusion stage, the data analysis encompassed two types of bibliometric analysis: performance analysis and science mapping. Regarding the performance analysis, this study scrutinized the publication and citation patterns to assess the productivity and impact of both journals and authors. It aimed to identify trends in publications and citations to gauge the productivity of journals and authors in the field. Additionally, the study identified the most influential articles based on global and local citations, as well as the most prolific journals based on the number of publications. Furthermore, this analysis shed light on the most productive authors, institutions, and countries based on their contributions in terms of publication output. This comprehensive performance evaluation aligns with previous bibliometric reviews that have focused on citation analysis to evaluate impact.

This study employed science mapping techniques, specifically co-word analysis and bibliographic coupling analysis, to explore the landscape of research in the field. Co-word analysis was utilized to identify and analyze the main themes within the literature by clustering frequently occurring keywords. By examining the clustering patterns of these keywords, the study aimed to uncover the prevalent themes present in the research. On the other hand, bibliographic coupling analysis focused on clustering articles that shared common references, revealing thematic connections among the literature (Donthu et al., 2021). By employing both of these analytical approaches, the study adopted a triangulation method to validate and corroborate the major themes identified in the literature. This combination of methods enhances the reliability and robustness of the findings by cross-verifying the themes through multiple analyses (Lim et al., 2022b). Furthermore, a trend analysis was conducted to trace the evolution of themes and topics within the blockchain in the banking industry. This analysis aimed to map the changes and developments over time, providing valuable insights into the dynamic nature of research in this domain.

3. Results

3.1. Documents by years

A total of 133 publications about blockchain technology in banking that were published between 2015 and May 2023 have been reviewed. The progression of blockchain in banking papers is depicted in Figure 1, which shows the area's study interest. The number of articles increased over the first four years, from 2017 to 2020, with 6, 10, 19, and 31 being added in 2017, 2018, 2019 and 2020, respectively. Despite using 2015 as our study's baseline year, our chosen database does not contain any research publications prior to 2017. However, this developing trend shows that 2020 has the highest number, indicating that during times of crisis like the COVID-19 pandemic, researchers concentrated more on disruptive technology like blockchain (Botene et al., 2021). The number of articles had decreased to 21 the following year from 31 but had increased to the highest number 35 in 2022. This is consistent with

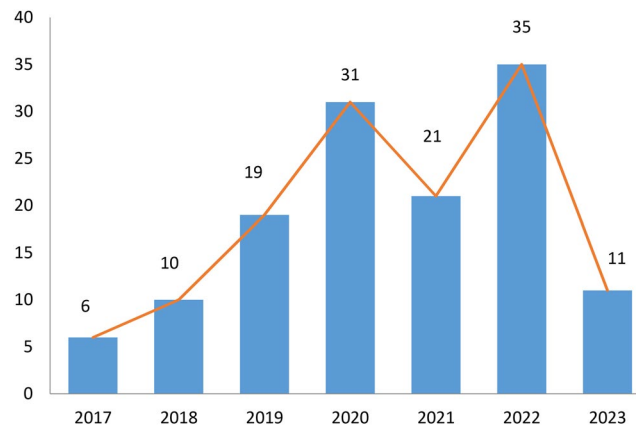


Figure 1. Documents by year between 2006 and 2020.

Source: Generated by authors from Scopus Database.



Figure 2. Most productive and impactful institutions.

Source: Generated by authors from Scopus Database.

the general direction of academic research in 2020, which saw an exponential rise in scholarly publishing as a result of the COVID-19 epidemic (Botene et al., 2021). The period from 2020 to 2021 and to 2022 contains moderate volatility. It might be argued that following the epidemic, academics lost interest in the subject in 2021 (Elsaid, 2021), but they later understood the value of blockchain in the financial industry (Sahabuddin et al., 2023). There have been 11 research publications published on this topic as of May 2023; therefore, it is reasonable to assume that a significant number of articles will be published on this subject in 2023.

3.2. Most productive and impactful institutions for blockchain in banking industry

The following Figure 2 shows the top ten affiliated institutions that produced the number of publications. Symbiosis International deemed university; Hindustan Institute of Technology and Science and Kazan Federal University produced the highest number of publications (3) in blockchain in banking during our observing period. Of these three universities, two are from India and others from Russia, it

can be assumed that during this period these countries were more focused on blockchain in the banking sector whereas India has already been allowed to adopt blockchain in the banking industry (Patki & Sople, 2020). On the other hand, the other seven institutions published only 2 research articles on blockchain in banking. However it does not indicate that these institutions countries are not focusing on blockchain adoption in the banking industry because Russia and USA's institutions are in them and they also adopted blockchain in a few banking institutions (Rijanto, 2021; Shovkhalov & Idrisov, 2021).

3.3. Most productive and impactful countries for blockchain in banking industry

The following Figure 3 represents the most productive and impactful countries for blockchain in the banking industry. In terms of total articles, India has the highest number of articles (28). The United States of America (United States) has 19, the Russian Federation has 15 and Italy has 10 published articles on this topic. Particularly, only these five nations have more than ten research articles. However, out of these 10, five are Western nations (the United States, the United Kingdom, Italy, Spain, and Germany), whereas only India and China are in Asia, and Iran and the Russian Federation are in the Middle East. While all other nations from other locations contribute 59 articles, the five Western nations produce 52 articles collectively. It highlights that Western nations are concentrating on the roll-out of blockchain technology in the banking business (Cao et al., 2017) and are more focused on cutting-edge technology (Kalenov et al., 2019). It is gratifying to see a mix of Eastern and Western nations among the top 10 most productive nations by the number of articles but depressing to see no emerging nations there. It also implies that developing or low-income nations are not paying much attention to disruptive technologies like blockchain technology (Gupta & Kumar, 2021).

3.4. Top cited articles in blockchain in banking

Table 2 exhibits the 10 most-cited CE articles by 133 blockchain-in-banking articles retrieved from Scopus for the period between 2015 and 2023. With 300 citations, Dai and Vasarhelyi (2017) article received the greatest attention in the corpus of articles on blockchain in banking. The authors of the paper start by giving a quick rundown of blockchain technology, its salient characteristics, and its possible uses. The potential advantages of blockchain for accounting and assurance are then covered, including improved security, efficiency, and transparency. The authors also go over some of the issues that must be resolved before blockchain is extensively used in assurance and accounting, like the requirement for standards and compatibility.

With 220 citations, Thakor (2020) was the second-most referenced article in the corpus. The paper offers a thorough analysis of the fintech market and its effects on the banking industry. He contends that fintech companies are upending the banking industry in a number of ways, such as by offering lower-cost services, making financial services easier to obtain, utilizing technology to enhance customer service, and creating new financial goods and services.

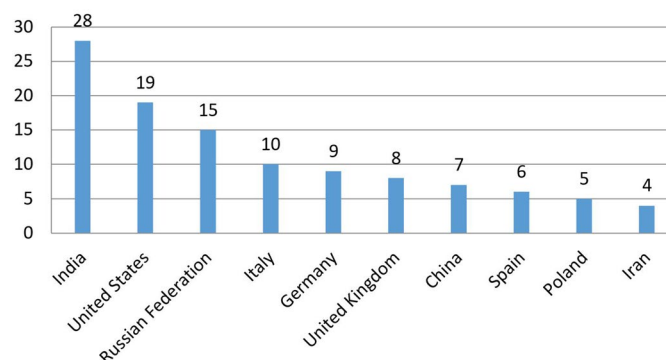


Figure 3. Most productive and impactful countries.
Source: Generated by authors from Scopus Database.

Table 2. Top ten cited articles with impactful authors.

Rank	Authors	Title	Year	Journal	Sources
1	Dai J.; Vasarhelyi M.A.	Toward blockchain-based accounting and assurance	2017	Journal of Information Systems	300
2	Thakor A.V.	Fintech and banking: What do we know?	2020	Journal of Financial Intermediation	220
3	Schuetz S.; Venkatesh V.	Blockchain, adoption, and financial inclusion in India: Research opportunities	2020	International Journal of Information Management	153
4	Dierksmeier C.; Seele P.	Cryptocurrencies and Business Ethics	2018	Journal of Business Ethics	110
5	Ahluwalia S.; Mahto R.V.; Guerrero M.	Blockchain technology and startup financing: A transaction cost economics perspective	2020	Technological Forecasting and Social Change	92
6	Chen Z.; Li Y.; Wu Y.; Luo J.	The transition from traditional banking to mobile internet finance: an organizational innovation perspective - a comparative study of Citibank and ICBC	2017	Financial Innovation	84
7	Kimani D.; Adams K.; Attah-Boakye R.; Ullah S.; Frecknall-Hughes J.; Kim J.	Blockchain, business and the fourth industrial revolution: Whence, whither, wherefore and how?	2020	Technological Forecasting and Social Change	67
8	Cuccuru P.	Beyond bitcoin: An early overview on smart contracts	2017	International Journal of Law and Information Technology	66
9	Garg P.; Gupta B.; Chauhan A.K.; Sivarajah U.; Gupta S.; Modgil S.	Measuring the perceived benefits of implementing blockchain technology in the banking sector	2021	Technological Forecasting and Social Change	65
10	Zetzsche D.A.; Arner D.W.; Buckley R.P.	Decentralized finance	2020	Journal of Financial Regulation	61

Source: Generated by authors from Scopus Database.

The third-most cited paper, Schuetz and Venkatesh (2020), had 153 citations. The article investigates how blockchain technology can help India's problem with financial exclusion. The study suggests that blockchain technology can improve the efficiency, transparency, and cost-effectiveness of the financial sector. In addition, the study lists other problems that need to be fixed before blockchain is applied broadly in this scenario.

Dierksmeier and Seele (2018) paper, which focuses on business ethics using blockchain technology, is the fourth-most-cited article. They discovered that cryptocurrencies can improve company ethics by boosting accountability and transparency, giving people more power, and encouraging innovations. Ahluwalia et al. (2020) is the fifth most cited article. The potential of blockchain technology to enhance startup finance is examined by the authors of this paper. According to the study, blockchain technology can lower the costs and risks related to startup funding, making it simpler for entrepreneurs to raise money.

While the total number of citations for the top ten articles is 1218, the other top cited articles jointly produce 343. The review paper 133 has received 1889 total citations, compared to an average of 14.20. It is concerning that seminal publications have relatively low citation averages, which provides a conflicting insight in comparison to the high global citations seen in Hollebeek et al. (2022). However, our comprehensive literature evaluation on blockchain in banking should help to address this issue. In other words, it is intended that future studies on blockchain in banking would benefit from the ground-breaking studies discussed here to show a better reflection of blockchain technology research.

3.5. Most productive/prolific journals

The following Table 3 indicates the top 10 journals that have published at least one blockchain article in banking. The top four journals in terms of blockchain in banking articles published is the International Journal of Scientific and Technology Research (6 articles), Technological Forecasting and Social Change (4 articles), Sustainability Switzerland (4 articles), International Journal of Recent Technology and Engineering (4 articles). All other four journals have published at least three articles; the other three journals published at least 2 articles and the last considered journals have published 1 article on blockchain in banking topic. Based on the number of articles published, we ranked the journals where total rank is 1 to 5. On the other hand, considering the total citation of journals as per Scimago, 2020, the highest citation goes to Sustainability Switzerland (52787) and second highest goes to Technological Forecasting and Social Change (10016) and the third highest citation goes to the International Journal of Scientific and Technology Research (1456). From this can assume that the most cited journals also focus on this blockchain in banking topic.

Table 3. Top 10 prolific Journals for blockchain in banking.

Rank	Sources	Articles
1	International Journal of Scientific and Technology Research	6
2	Technological Forecasting and Social Change	4
2	Sustainability Switzerland	4
2	International Journal of Recent Technology and Engineering	4
3	Journal of Money Laundering Control	3
3	Journal of Financial Stability	3
3	International Journal of Business And Globalization	3
3	Financial Innovation	3
4	Technology Analysis and Strategic Management	2
4	Quality Access to Success	2
4	Opcion	2
5	Journal of Technology Management and Innovation	1

Source: Generated by authors from Scopus Database.

However, there is interesting thing is that six journals here are the technology, and globalization journal that indicates blockchain in banking is the blessing of the technology sector which works for financial sustainable welfare. But sustainability, and financial innovation-related journals are also here that indicate that blockchain is also generating importance it in the financial sector like the banking sector.

3.6. Science mapping

The co-occurrence keyword network in the accompanying envisions is divided into five clusters (red, blue, green, purple, and light-blue). First, a blockchain cluster is combined with supply chain management, fintech, banking, and smart contracts. As a result, the notion of disruptive technology that explains how banking system activities work is starting to show interest in technology adoptions in order to increase competition (Dauda & Lee, 2015). To put it another way, banks may concentrate on artificial intelligence (AI) to make human-free services more affordable (Wuenderlich & Paluch, 2017). Second, the fintech cluster is connected to banking, technology adoption, innovation, and technology as a driver to speed up the transition to a financial environment that is more hospitable to technology and improves consumer satisfaction (Setiawan et al., 2021).

3.7. Thematic cluster of blockchain in banking via bibliographic data driven network of co-occurrence keywords

Using a technique called bibliographic coupling, we critically assess the corpus of research on blockchain and financial technology (fin-tech) in the banking industry. Bibliographic coupling depends on quoting publications to clarify the state of the art, in contrast to co-citation analysis, which concentrates on highly cited articles and represents foundational knowledge in the field (Donthu et al., 2021; Kleminski et al., 2022). This method covers a broad spectrum of information, including recent, specialized, and seminal publications. Thus, it draws attention to works that might not have been cited frequently and are probably going to be missed in a co-citation analysis (Donthu et al., 2021). Bibliographic coupling has gained recognition as an established technique for conducting bibliometric reviews in the field of fin-tech research, as demonstrated by the studies conducted by Kumar et al. (2022) and Gupta et al. (2023).

Table 4 gives a summary of the four theme clusters that form the foundation of the knowledge structure of blockchain and fin-tech research in banking as discovered through bibliographic coupling:

- **Cluster 1 (Red):** Transforming the Banking Sector through Financial Technology Innovation (banking takes center stage)- (Financial technology, banking, banking sector, financial services, fin-tech, innovation, technology, technology adoption).
- **Cluster 2 (Blue):** Blockchain and Artificial Intelligence: The Future of Supply Chain Management (blockchain takes center stage)- (Blockchain, artificial intelligence, blockchain-chain, blockchain, smart contracts, supply chain management.)

Table 4. Thematic cluster of blockchain in banking industry.

Theme	Author(s)	Title	Sources
Transforming the Banking Sector through Financial Technology Innovation	Thakor and (2020)	Fintech and banking: What do we know?	220
	Garg et al. (2021)	Measuring the perceived benefits of implementing blockchain technology in the banking sector	65
	Osmani et al. (2021)	Blockchain for next generation services in banking and finance: cost, benefit, risk and opportunity analysis	42
	Harris et al., (2019)	Blockchain platform and future bank competition	18
	Saheb and Mamaghani (2021)	Exploring the barriers and organizational values of blockchain adoption in the banking industry	15
Blockchain and Artificial Intelligence: The Future of Supply Chain Management	Kimani et al. (2020)	Blockchain, business and the fourth industrial revolution: Whence, whither, wherefore and how?	67
	Naimi-Sadigh et al., (2021)	Digital transformation in the value chain disruption of banking services.	41
	Shoaib et al. (2020)	An integrated framework to prioritize blockchain-based supply chain success factors	32
	Hooper and Holtbrügge (2020)	Blockchain technology in international business: changing the agenda for global governance	27
Decentralized Finance	Firica & Oana (2017)	Blockchain technology: Promises and realities of the year	17
	Cuccuru and (2017)	Beyond bitcoin: An early overview on smart contracts	66
	Zetsche et al. (2020)	Decentralized finance	61
	Holotiuik et al. (2019)	Radicalness of blockchain: an assessment based on its impact on the payments industry	27
	Albrecht et al. (2019)	The use of cryptocurrencies in the money laundering process	26
	Fauzi et al., (2020)	Bitcoin and cryptocurrency: Challenges, opportunities and future works	24
4.0 IR turns finance industry into digital	Schuetz and Venkatesh (2020)	Blockchain, adoption, and financial inclusion in India: Research opportunities	153
	Dierksmeier and Seele (2018)	Cryptocurrencies and Business Ethics	110
	Chen et al. (2017)	The transition from traditional banking to mobile internet finance: an organizational innovation perspective - a comparative study of Citibank and ICBC	84
	Kimani et al. (2020)	Blockchain, business and the fourth industrial revolution: Whence, whither, wherefore and how?	67
	Khalil et al., (2020)	The adoption of blockchain technology in the financial sector during the era of fourth industrial revolution: a moderated mediated model	16

Source: Generated by authors from Database.

- **Cluster 3 (Green):** Decentralized Finance: Revolutionizing the Future of Money (bitcoin takes center stage)-(Crypto-bitcoin, cryptocurrencies, distributed ledger technology, financial system)
- **Cluster 4 (Light-blue):** Technology is transforming the finance industry (finance takes center stage)-(Finance-finance, banking sector, technology adoption, AI, fintech, and blockchain)

Cluster 1: transforming the banking sector through financial technology innovation

Cluster 1 consists of 45 articles on transforming the banking sector through financial technology innovation that has been cited 492 times according to Scopus. The top three cited articles in this cluster are Thakor (2020), Garg et al. (2021) and Osmani et al. (2021) with 220, 65, and 42 citations, respectively.

Notably, the cluster illuminates how the banking industry is changing by incorporating financial technology like blockchain to enhance the financial sector's performance (Varma et al., 2022) and by including or improving quality data for improved performance (Sheetal & Rathinam, 2022). The cluster also suggests that scalability, the accessibility of user-generated web data, and the lack of global standards and infrastructure to measure the effectiveness of financial systems are the main obstacles to improving the performance of financial systems (Anagnostopoulos, 2018; Pandey et al., 2022).

This study's in-depth analysis reveals that the majority of the publications in this cluster are focused on financial technology innovation's potential to transform the banking industry. Thakor (2020) thorough assessment of the fintech sector and its effect on banking is available. The author describes Fintech in the first sentence as a 'technologically enabled financial innovation that could result in new business models, applications, processes, or products with an associated material effect on financial markets and institutions, as well as the provision of financial services.' The authors assert that fintech can upend the banking industry in several ways. Fintech businesses, for example, can use technology to lower costs, increase efficiency, and draw in new customers. The potential advantages of blockchain technology for the banking industry are well-explained by Garg et al. (2021). According to the survey's findings, participants had a very positive outlook on blockchain technology's potential advantages for the banking industry. The advantages of

blockchain technology that are most frequently cited are lower transaction costs, higher security, more transparency, increased efficiency, and new business prospects. The study conducted by Osmani et al. (2021) highlights the potential advantages of blockchain technology for the banking and finance industry. These benefits include heightened transparency, decreased costs, improved efficiency, and improved security. The writers also go over the possible drawbacks of blockchain technology, such as the requirement for a sizable upfront infrastructure investment and the possibility of security lapses.

Additionally, this study also uncovers that this cluster focuses on the costs, advantages, risks, and opportunities (Osmani et al., 2021), as well as the most significant obstacles, such as organizational and environmental, top managers' lack of understanding, adherence and legal requirements, and promotional efforts noise for blockchain in the banking industry (Saheb & Mamaghani, 2021), which offers greater openness to information and visibility, more swiftly execution, and the ability to transfer checks and money (Cucari et al., 2022).

Cluster 2: blockchain and artificial intelligence: the future of supply chain management

A total of 16 articles in Cluster 2—which has received 185 citations according to Scopus—focus on blockchain technology and artificial intelligence as the future of supply chain management. The top three cited articles in this cluster are Kimani et al. (2020), Shoaib et al. (2020), Hooper and Holtbrügge (2020) with 67, 32, and 27 citations, respectively. The studies in this cluster have found that Blockchain and Artificial Intelligence (AI) play significant roles in the supply chain (Alam et al., 2020), and that Artificial intelligence and Blockchain technology improve the effectiveness of the supply chain (Tsolakis et al., 2022). However, many researchers have noticed that in the supply chain, many stakeholders are hesitant to share their personal information (Govindan, 2022), as doing so increases the feeling of vulnerability and risk.

In particular, Kimani et al. (2020) consider the challenges and risks associated with blockchain technology, such as security and privacy concerns. The authors do not shy away from discussing the potential security and privacy concerns that could arise from the use of blockchain. They also acknowledge that blockchain technology is still in its early stages of development and that there are many unanswered questions about its long-term impact. This level of honesty and transparency is refreshing and will be appreciated by readers who are considering adopting blockchain technology. Shoaib et al. (2020) identified 11 key success factors for blockchain-based supply chains, accessibility, overall efficiency, security, traceability, transparency, trust, compliance, sustainability, innovation, governance and culture. The authors also identify several challenges that organizations face when implementing blockchain technology which is in line with (Attaran, 2022; Malhotra et al., 2022). These challenges include technology adoption, integration, security, governance, and culture. Authors provide some additional themes like, the importance of collaboration between supply chain partners, the need for a clear understanding of the benefits of blockchain technology, the importance of planning and preparation before implementing blockchain technology, and the need for ongoing monitoring and evaluation of blockchain technology. These themes suggest that blockchain technology has the potential to significantly improve the efficiency and effectiveness of supply chains. However, organizations need to be aware of the challenges involved in implementing blockchain technology and take steps to mitigate these challenges. Hooper and Holtbrügge (2020) stated that blockchain could lead to a more decentralized and distributed system of governance, as it could reduce the need for intermediaries and central authorities. The authors also stated that blockchain is still a relatively new technology, and it is not yet clear how it will be fully adopted and implemented in the global economy. However, the potential benefits of blockchain are significant, and it is likely to have a major impact on international business in the years to come. The rise of blockchain could lead to a more decentralized and distributed system of governance. This could have a number of positive implications, such as increased transparency and accountability, reduced corruption, and improved efficiency.,

On closer inspection, this study also reveals that this cluster focuses on the problem of privacy as a barrier to the supply chain and how to deal with the privacy paradox during the decision-making process (Yadav et al., 2023) and provide solutions for this like data privacy and information privacy laws and regulations (Saxena et al., 2023), leveraging blockchain to advance business operations, increase efficiency, and lower operational costs (Kimani et al., 2020).

Cluster 3: decentralized finance

The 19 papers in Cluster 3 on decentralized finance have received 289 citations. Cuccuru (2017), Zetzsche et al. (2020), and Holotiuk et al. (2019) had the highest number of citations in this cluster—66, 61, and 27 respectively. Decentralized Finance, or DeFi for short, is ‘an umbrella term for financial applications that use decentralized technologies, such as blockchains and smart contracts, to operate without a central authority.’

It has been noted that in this cluster, the distributed ledger allows each node to get equal information, maintaining information symmetry (Aune et al., 2018; Guo et al., 2022). In fact, it might be difficult for law enforcement to find out who the illicit users are and what they are doing (Irwin & Turner, 2018).

DeFi, according to Zetzsche et al. (2020), has the ability to boost efficiency, save costs, and promote financial inclusion. They also point out that DeFi is a novel and unproven technology and that there are a lot of obstacles to overcome, such as user education, regulatory uncertainties, and security issues. DeFi, in the opinion of the authors, has the potential to completely transform the financial sector. They do admit that DeFi has a lot of difficulties, though. The authors acknowledge that the future of DeFi will depend on how these challenges are addressed. Cuccuru (2017) mentioned that there has been a growing trend toward the development of decentralized finance (DeFi) applications, which are built on top of smart contracts and also focus primarily on the legal implications of smart contracts in the context of the United States. The legal implications of smart contracts may vary in other jurisdictions. Cuccuru (2017) identify three main themes: the history of smart contracts, the key features of smart contracts, and the legal implications of smart contracts. Holotiuk et al. (2019) offer their opinions on several important issues, including the degree of development of blockchain technology, its possible advantages for the payments sector, and the obstacles that must be removed before blockchain becomes extensively used. The findings imply that although blockchain technology is still in its infancy, it has the potential to have a big influence on the payments sector.

After careful examination, this study learns that the most popular publications in this cluster focus on decentralized finance (Chen & Bellavitis, 2020), eliminating intermediaries (Albrecht et al., 2019), creating safe assets in financial institutions (Chen & Volz, 2021; Nabilou & Prüm, 2019), and overcoming the mistrust of fiat money (Auer & Tercero-Lucas, 2022), even though de Caria (2019) argues that public law may change as a result of the significant threat that blockchain-based money poses to state sovereignty at the moment.

Cluster 4: 4.0 IR turns finance industry into digital

Cluster 4 consists of 19 articles on 4.0 IR that turns finance industry into digital that have been cited 483 times according to Scopus. The top three cited articles in this cluster are Schuetz and Venkatesh (2020), Dierksmeier and Seele (2017) and Chen et al. (2017) with 153, 110, and 84 citations, respectively.

4.0 IR involves the integration of technologies like blockchain, artificial intelligence, robotics, the Internet of Things (IoT), big data, cloud computing, and more (Rymarczyk, 2020). It is noteworthy that the cluster provides information on how 4.0 IR can speed up the development of the digital finance sector (Singh et al., 2022) and how to include or improve quality services for improved performance (Alaloul et al., 2018). The cluster also suggests that the delivery and consumption of financial services have undergone radical change as a result of the Fourth Industrial Revolution (Mhlanga et al., 2023). Modern technology integration has improved access to, efficiency with, and security of finance, opening the door to a more inclusive and linked digital finance ecosystem (Chen & Fu, 2023; Chishti & Barberis, 2016).

Schuetz and Venkatesh (2020) develop a research agenda that will help to fill the gaps in our understanding of how blockchain technology can be used to promote financial inclusion in India. The authors argue that blockchain could help to overcome the four main challenges to financial inclusion in India: geographical access, high cost, inappropriate banking products, and financial illiteracy. However, it is important to note that blockchain is not a silver bullet. It is a technology that can be used to address these challenges, but it is not the only solution (Kumar et al., 2020). Dierksmeier and Seele (2017) argues that blockchain have the potential to both improve and harm business ethics, depending on how they are used. On the one hand, blockchain can promote transparency and accountability. Because all transactions are recorded on a public blockchain, it is much more difficult to engage in fraudulent or unethical behavior. Chen et al. (2017) argue that traditional banks need to embrace organizational innovation in order to compete with FinTech startups. This means adopting a more agile and customer-centric approach to business, as well as investing in new technologies and data analytics. The authors also argue

that traditional banks need to develop strong partnerships with FinTech companies and need to invest in new technologies and data analytics in order to compete with FinTech startups.

The study also reveals that this cluster focuses on technological innovations (Artemenko & Zenchenko, 2021; Rabbani & Khan, 2020), improved efficiency (Artemenko & Zenchenko, 2021), promoting financial inclusion (Kirchner, 2020), and gaining insightful knowledge about customer behavior, preferences, and risks (Trivedi et al., 2021), even though these transformations also bring about new challenges that need to be addressed to fully harness the potential of these innovations (Martinčević et al., 2022).

Interestingly, the above four cluster are certainly related with decentralization (blockchain) fintech. From the Figure 4, bibliographic coupling, the most daring node among those clusters is the blockchain node, which is followed by the fintech and banking nodes. It shows that the most frequently occurring keyword is 'blockchain,' which is closely related to the second-and third-most frequently occurring keywords, 'fintech' and 'banking.' This indicates that fintech and blockchain are important terms that are closely tied to one another in the financial sector (Vives, 2017), allowing the banking system to become more competitive, reliable, affordable, and convenient (Kumari & Devi, 2022).

Bibliographic coupling analysis: Bibliographic coupling happens when two papers use the same reference (Kleminski et al., 2022). To identify the ongoing, active research in a field, an evaluation of bibliographic coupling is conducted (Zhao & Strotmann, 2008). It offers a dynamic way to investigate a field's intellectual landscape (Koseoglu et al., 2016). According to bibliographic coupling of nations, groups of nations frequently cite one another's works as shown in Figure 5. The colors blue, light-green, dark-red, red, purple, orange and yellow represent the seven groups of nations. The bold circle represents more coupling with that country.

In these seven clusters:

- Cluster 1 (Red): India, China, Nigeria, Bahrain and Malaysia
- Cluster 2 (Dark-red): USA, Singapore and Sri-Lanka
- Cluster 3 (Purple): Russia Federation and Belgium
- Cluster 4 (Blue): Canada and Saudi-Arabia

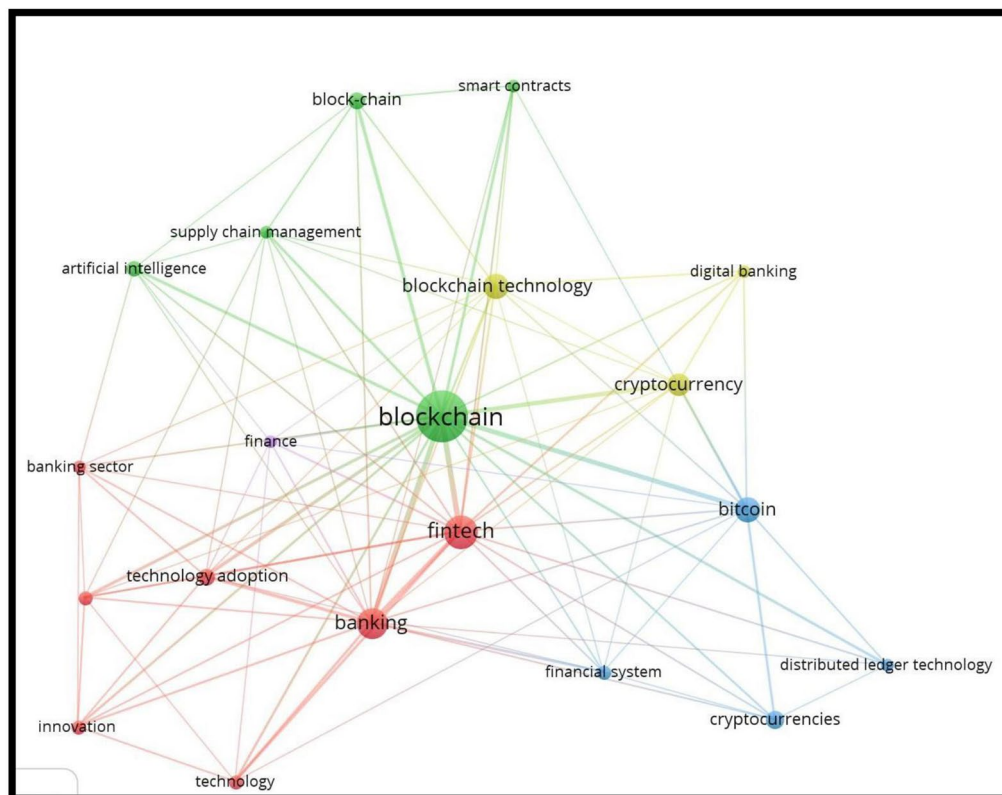


Figure 4. Bibliographic data driven network of co-occurrence keywords.
Source: Generated by VOSViewer from authors' data.

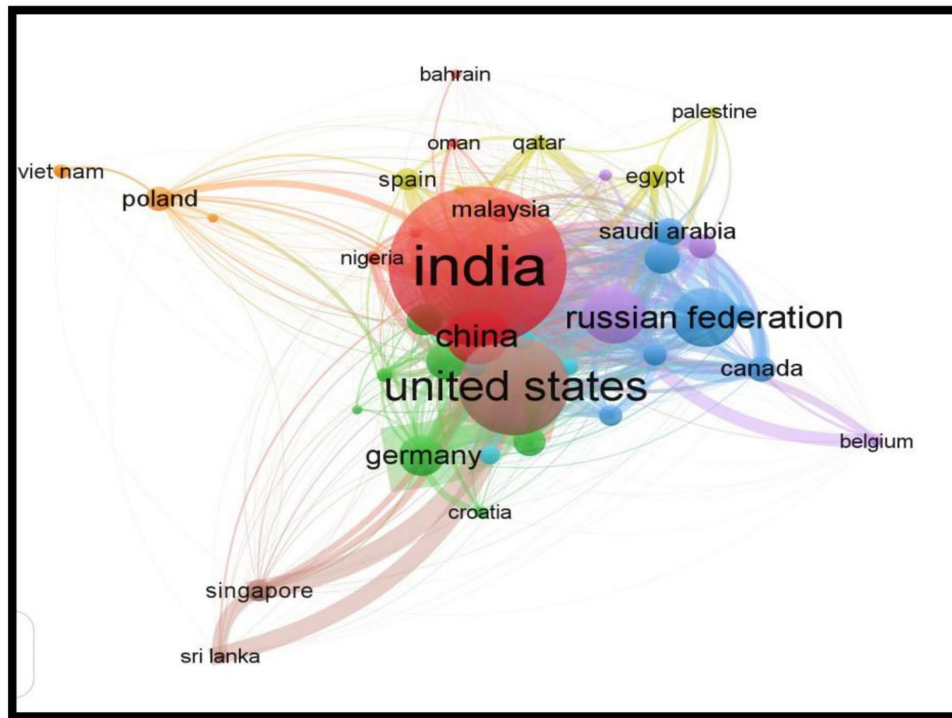


Figure 5. Bibliographic coupling of countries.

Source: Generated by VOSViewer from the authors' given data.

- Cluster 5 (Light-green): Germany and Croatia
- Cluster 6 (Orange): Vietnam, Poland and Oman
- Cluster 7 (Yellow): Qatar, Palestine and Spain

The USA, China, and the Russian Federation are in close proximity to India at the network's core. The countries of China, the USA, Malaysia, Spain, Nigeria, Egypt, Qatar, Oman, Bahrain, and Saudi Arabia have joined India's network in a distinct category with more coupling to related papers. In comparison to Malaysia, China and India have more publications with coupling that are bibliographically tied. From this illustration can conclude that India has more coupling with China, USA, and Russian Federation and they are focusing more on blockchain in banking industry and India has already allowed blockchain in their many banking operations (Patki & Sople, 2020; Shah & Jani, 2018).

Figure 6 illustrates a network map based on bibliographic data created using keywords from publications. There are seven significant clusters, as indicated by its colours. The colors blue, light-green, dark-red, red, purple, orange and yellow represent the seven clusters. The bold circle represents more frequently occurring terms.

In these seven clusters:

- Cluster 1(Green): Blockchain, electronic money, commerce, banking sector, digitalization, technology adoption and financial technologies.
- Cluster 2 (Red): IoT security, privacy, banking and finance
- Cluster 3 (Dark-red): Peer-to-peer network, open banking, self-sovereign identity, cloud computing, peer to peer network
- Cluster 4 (Light-green): verification process
- Cluster 5 (Blue): Banking and finance, fault tolerance, public key infrastructure, digital certificates, digital wallet, data security
- Cluster 6 (Purple): Financial services, risk, mining regulation, risk management and smart cities
- Cluster 7 (Orange): Trust and cryptocurrency

The map displays a network of significant terms, with blockchain at the center, connected to other terms on the map. Among the related terms identified, the top ten central themes include blockchain,

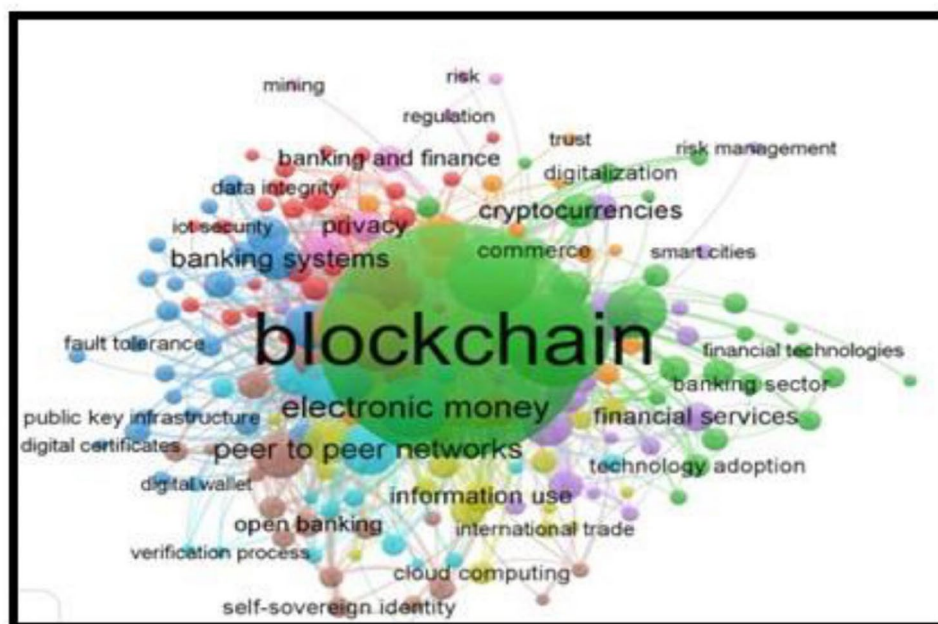


Figure 6. Bibliographic data driven network map.
Source: Generated by VOSViewer from the authors' given data.

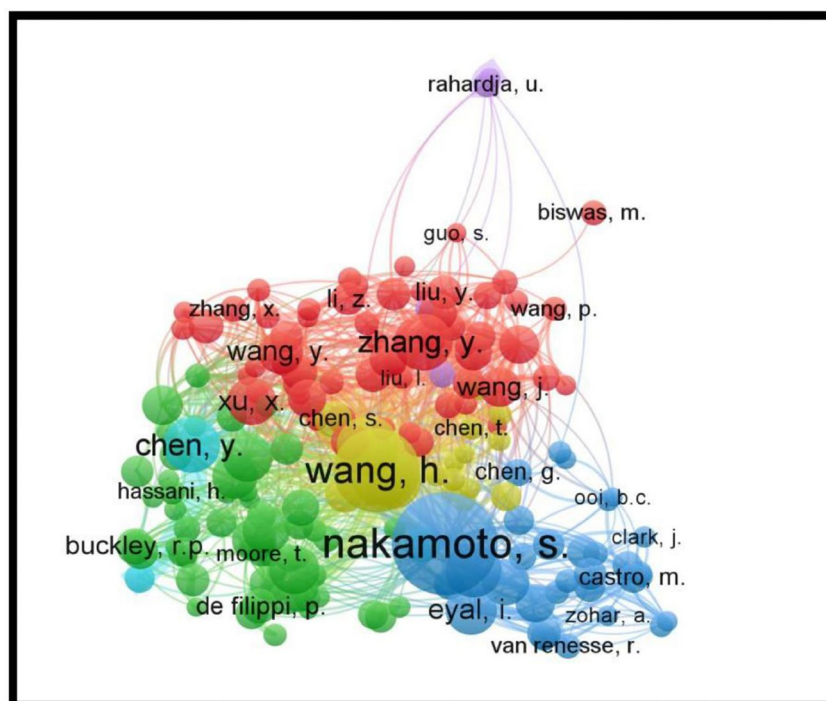


Figure 7. Co-citation networks of authors.
Source: Generated by VOSViewer from the authors' given data.

banking system, commerce, electronic money, cryptocurrencies, financial services, banking sector, financial technologies, peer-to-peer networks, and technology adoption. However, the all highly bold circles are focusing on a decentralized system like blockchain, cryptocurrency and peer-to-peer network and focusing on digital business-like electronic money, and e-commerce. Thus, most of research articles focused on blockchain and banking systems.

Figure 7 shows the co-authorship analysis-based network mapping of authors. The colors show that there are four important clusters. Zhang, Y., is included in the red cluster since they both have

competence in finance and blockchain. Authors with knowledge of the banking system, open banking, global trade, and digital wallets are also included in this cluster. The authors featured in the lighter blue cluster, such as Nakamoto and Eyal, I, Clark, J., Castro, M., Zohar, A., Chen, G., Can Renesse, R., and Ooi, b, C., are experts in blockchain technology and cryptocurrencies. The authors: Moore, T., Hassani, H., Buckley, R. P., and De Filippi are grouped in a green region related to cryptocurrencies and blockchain technology. Intriguingly, research on cryptocurrencies and blockchain technology may be conducted in reputable sectors like banking, finance, and digital services. Wang, H., along with authors Chen, G., and Chen, S., is part of the yellow cluster and share expertise in fintech, financial economics, behavioral finance, and blockchain. These findings can aid prospective researchers, IT professionals, financial service providers, banking executives, and practitioners in finding the right specialists to consult with and seek other services from.

4. Constraints and tips for further research

Using bibliometric analysis techniques, the goal of this study is to identify research trends and demonstrate the coherence of blockchain research in the banking sector (Choi & Siqin, 2022; Zainuldin & Lui, 2021). However, as noted by Riahi et al. (2021) it is crucial to recognize the limits related to the descriptive and prescriptive nature of bibliometric studies (De Bakker et al., 2005). Firstly, due to the inclusion of various types of bibliometric analyses in this study, the discussion may not provide extensive interpretations for each analysis. Future bibliometric research could focus on specific analyses to generate more comprehensive findings with considering the generated theme future research questions (See Table 5). Nevertheless, the intention of employing different analysis types in this study is to offer a broader perspective on

Table 5. Future research questions on blockchain in banking research.

Theme	Future research question	Sources
Cluster-1: Transforming the Banking Sector through Financial Technology Innovation	<ul style="list-style-type: none"> How can blockchain technology be effectively integrated into the banking sector to enhance security, transparency, and efficiency in financial transactions? What are the potential benefits and risks of implementing artificial intelligence and machine learning algorithms in banking operations, such as risk assessment, fraud detection, and customer service? How can banks leverage big data analytics to gain insights into customer behavior, preferences, and needs, and tailor personalized financial products and services accordingly? 	Glaser et al. (2017); Brunmeier et al. (2018); li-Huumo et al. (2016)
Cluster-2: Blockchain and Artificial Intelligence: The Future of Supply Chain Management	<ul style="list-style-type: none"> How can blockchain technology be integrated with artificial intelligence to enhance supply chain visibility, traceability, and transparency, thereby reducing fraud and counterfeiting? What are the potential applications of machine learning algorithms in optimizing supply chain operations, such as demand forecasting, inventory management, and route optimization, when combined with blockchain technology? How can blockchain and artificial intelligence technologies be used to address sustainability and ethical concerns in supply chain management, such as verifying fair labor practices, responsible sourcing, and carbon footprint reduction? 	Tse & Lau, (2018); Li et al. (2018); Yao et al. (2020)
Cluster-3: Decentralized Finance	<ul style="list-style-type: none"> What are the key challenges and opportunities in the adoption of decentralized finance (DeFi) protocols and how can they be overcome to enable widespread usage and integration with traditional financial systems? How can decentralized finance platforms leverage interoperability and cross-chain functionality to facilitate seamless and efficient transactions across multiple blockchain networks? What are the potential risks and vulnerabilities associated with decentralized finance, such as smart contract bugs, hacking, or regulatory compliance, and how can they be mitigated to ensure the security and stability of DeFi ecosystems? 	Lu et al. (2021); Chuen et al. (2021); Mankabady et al. (2022)
Cluster-4: 4.0 IR turns finance industry into digital	<ul style="list-style-type: none"> What are the emerging technologies that have the potential to transform the finance industry, and how can they be effectively integrated into existing financial systems and processes? How can artificial intelligence and machine learning algorithms be leveraged to enhance risk assessment, fraud detection, and personalized financial advisory services in the finance industry? What are the implications of blockchain technology on the security, transparency, and efficiency of financial transactions, and how can its adoption be accelerated in the finance industry? 	World Economic Forum (2019); Gartner. (2020); PwC. (2020).

Source: Author generated based on the information.

intellectual progress and knowledge structure, mitigating this limitation to some extent. Secondly, incorporating other methodologies like meta-analysis and systematic literature review alongside bibliometrics could provide a wider range of analyses and offer a more detailed exploration of blockchain implementation in the banking sector. Thirdly, the methodology employed in this study may be subject to subjectivity when visualizing scientific mapping (Kuzior & Sira, 2022). Thus, bibliometricians should develop more reliable and valid measurements to ensure consistent results and interpretations in bibliometric analyses.

Furthermore, the current research is exclusively grounded in the Scopus database. Broadening the scope of the investigation to encompass additional scholarly databases like the Web of Science and IEEE Xplore could offer a more comprehensive and varied perspective on the study of Blockchain in the banking sector. Consequently, this could be perceived as a constraint warranting further exploration in future research endeavors. Moreover, longitudinal inquiries are essential to scrutinize the enduring effects of Blockchain implementation within the banking industry. These inquiries may delve into how Blockchain influences operational efficacy, security protocols, transparency measures, and customer contentment in the extended term. Furthermore, they can probe into the transformation of customer attitudes and regulatory frameworks as technology advances. Ultimately, it would be intriguing to explore how the amalgamation of Blockchain with nascent technologies such as artificial intelligence can enhance banking efficiency. For instance, research could investigate how the amalgamation of machine learning and predictive analytics with Blockchain's transparency and security features could enhance fraud detection, risk mitigation, and customer care.

5. Conclusion

This study employed bibliometric and network analysis techniques to provide a comprehensive overview of the existing literature on blockchain adoption in the banking industry. The findings reveal that prominent research topics within this domain include blockchain technology, fintech, financial systems, security, and privacy. The identified research trends highlight significant studies centered around the adoption of technology in the financial sector, fintech applications, blockchain frameworks for the banking industry, and related themes.

The analysis uncovered notable potential research avenues for the banking sector, such as exploring the role of blockchain in education, examining blockchain adoption in emerging economies, investigating consumer awareness and perceptions of blockchain practices, and evaluating the use of blockchain by governments to enable financial systems. Furthermore, the research collaboration patterns indicated a concentration of literature from developing country markets, with notable contributions from India, Malaysia, and other nations.

The thematic evolution analysis revealed that the blockchain theme has emerged as a significant driver for banks to embrace technology adoption and fintech initiatives. The findings suggest that banks are leveraging blockchain technology to enhance the efficiency of their services and meet stakeholder expectations, potentially leading to improved financial performance. Moreover, blockchain activities have become intertwined with regulatory measures aimed at ensuring reliable service delivery to stakeholders. Additionally, there has been a growing focus among banks on international and Islamic banking through the implementation of blockchain technology, garnering substantial interest from scholars worldwide.

6. Managerial implications

This bibliometric research provides an in-depth examination of how blockchain technology has evolved in academic literature, with a particular emphasis on its applicability to the banking sector. The growing importance of blockchain in banking underscores the necessity for academic works to understand the technology's development and provide relevant directions for further investigation. Through descriptive analysis, which provides vital narrative information and statistical data based on the volume of publications, the study accomplishes its main goal. For aspiring researchers, bankers, and regulators, the results regarding the top ten journals, authors, affiliations, and nations are invaluable resources. For example, bank executives can read relevant journals to gain a deeper grasp of blockchain in the banking sector, while aspiring academics can go to seasoned authors in the field for guidance or prospects for collaboration.

The outcomes of various analyses, including co-word, co-citation, and bibliographic coupling, provide insights into the research themes, impact, and directions of blockchain studies in the banking field. Additionally, the results from co-authorship and co-citation analyses reveal collaboration patterns among countries and authors. Several noteworthy research and collaboration trends are identified and warrant further investigation. To begin with, the network analyses focus on a specific set of words: blockchain, fin-tech, peer to peer network, privacy, data integrity, cryptocurrency, and banking sector. These words highlight the current issues related to blockchain within the banking industry, as evidenced by previous studies (Al-Ajlouni et al., 2018; Scardovi & Scardovi, 2016). Future research could consider these aspects when formulating hypotheses, correlations, or propositions for further testing. Furthermore, the findings from these research trends can be valuable for bank executives and regulators, aiding them in enhancing their blockchain practices. This may involve decentralizing activities, utilizing distributed ledger technology, employing cryptography, and other measures aimed at reducing costs, increasing efficiency, and fostering trust and integrity in banking services.

From the thematic analysis found four clusters where first cluster (Transforming the Banking Sector through Financial Technology Innovation), second cluster (Blockchain and Artificial Intelligence: The Future of Supply Chain Management), third cluster (Decentralized Finance) and four cluster (4.0 IR turns finance industry into digital) consist of 45 articles with 492 times citations, 16 articles with 185 times citations, 19 articles with 289 times citations and 19 articles with 483 times citations respectively.

The material that is now available emphasizes how the issue of 'Transforming the Banking Sector through Financial Technology Innovation' has broad ramifications for the banking sector. A study by Iyer et al. (2020) found that through increasing operational effectiveness, cutting expenses, and improving customer experience, fintech innovations have the potential to drastically alter the existing banking sector. Digital payment systems, blockchain, and artificial intelligence are just a few of the technologies that banks may use to automate repetitive work, improve customer service, and streamline operations. By targeting previously underserved populations, this transformation not only improves customer happiness but also promotes financial inclusion (Demirgüç-Kunt & Klapper, 2017). The report also highlights how fintech technologies can improve fraud detection, risk management procedures, and compliance systems, all of which contribute to the overall stability and resilience of the banking industry. Therefore, the topic of financial technology innovation in banking has enormous potential to positively improve the industry as a whole, empowering banks and clients equally.

The theme of 'Blockchain and Artificial Intelligence: The Future of Supply Chain Management' carries significant implications for the field, as supported by existing literature. According to Lacity and Willcocks (2020), the use of artificial intelligence (AI) and blockchain technology into supply chain management has the potential to improve stakeholder trust, efficiency, and transparency. Blockchain technology ensures safe and transparent transactions across the supply chain by providing a decentralized and irreversible record (Zheng et al., 2019). By leveraging AI capabilities, such as machine learning and predictive analytics, organizations can gain valuable insights from vast amounts of supply chain data, enabling real-time decision-making and optimization (Hofmann & Rüsch, 2020). This fusion of blockchain and AI can facilitate end-to-end traceability, minimize counterfeit products, automate processes, and enable efficient inventory management. Furthermore, this integration promotes collaboration among supply chain participants, fostering greater trust and reducing disputes. Therefore, the theme underscores the immense potential of blockchain and AI in revolutionizing supply chain management, offering improved visibility, efficiency, and resilience.

Existing research supports the notion that 'Decentralized Finance' (DeFi) has important ramifications for the financial sector. The phrase 'decentralized finance' (DeFi) describes the use of smart contracts and blockchain technology to build decentralized financial systems that function without middlemen. According to research by Kostova and Hübner (2020), DeFi has the power to completely transform conventional financial institutions by promoting efficiency, improving transparency, and facilitating financial inclusion. DeFi platforms provide open access to financial services by utilizing the decentralized characteristics of blockchain technology. This enables those who do not have access to traditional banking services to engage in a range of financial activities, including lending, borrowing, and investing (Zheng et al., 2019). Moreover, DeFi provides greater transparency by recording transactions on a public ledger, ensuring accountability and reducing the risk of fraud. The use of smart contracts automates the execution of agreements, eliminating the need for intermediaries and reducing costs (Panarello et al., 2021).

However, it is important to note that DeFi also presents challenges such as regulatory compliance, security vulnerabilities, and scalability issues that need to be addressed (Makarov & Schoar, 2022). Nevertheless, the theme of DeFi signifies the potential disruption of traditional financial systems, offering a more accessible, transparent, and efficient framework for financial services.

The theme of '4.0 IR turns finance industry into digital' carries significant implications, as supported Bose and Pal (2021) and emphasizes that the rapid advancements in technology, such as artificial intelligence, big data analytics, blockchain, and mobile applications, are reshaping the finance industry. These technological innovations are revolutionizing various aspects of finance, including banking, investment, insurance, and payments. For instance, the integration of AI enables automation of routine tasks, personalized customer experiences, and improved risk assessment and fraud detection (Said et al. 2021). Big data analytics enables financial institutions to extract valuable insights from large volumes of data, leading to more informed decision-making and enhanced customer targeting (Ngai et al., 2020). Blockchain technology offers increased transparency, security, and efficiency in transactions, revolutionizing areas such as cross-border payments and trade finance (Iansiti & Lakhani, 2017). Mobile applications provide convenience and accessibility, allowing customers to manage their finances on-the-go (Ngai et al., 2020). These technological transformations bring benefits such as cost reduction, improved operational efficiency, and enhanced customer experiences. However, they also present challenges related to cybersecurity, privacy, and regulatory compliance (Said et al., 2021). Overall, the theme highlights the profound implications of technology in transforming the finance industry, paving the way for innovation and disruption.

The findings of the study may be utilized by banking executives for the purpose of making well-informed decisions regarding the implementation of Blockchain. This utilization encompasses the evaluation of potential advantages like cost reduction, enhanced security, and heightened transparency within financial dealings. It might be appropriate to provide a concise reference. The demonstration of exemplary methodologies through the analysis of specific cases, which includes instances of financial institutions that have effectively integrated Blockchain technology, could be pertinent. For instance, financial organizations such as Santander and HSBC have embraced Blockchain technology to enhance transparency and efficacy in international transactions.

Furthermore, the results indicate the need for researchers and institutions involved in blockchain research within the banking industry to foster collaboration between established and emerging markets. By establishing such collaborations, the research community in the blockchain field can strengthen and expand existing knowledge, ultimately driving transformative advancements (Wang et al., 2019; Zhu et al., 2021). Additionally, the advancement of blockchain studies in various key areas such as business, finance, economics, accounting, social science, and management highlights the significant contributions made by leading authors in academic research. Regulators and bank managers can benefit from studying the works of these research authors to enhance their current guidelines, frameworks, and standards pertaining to blockchain in the banking sector.

Authors' contribution

S.M. Masudur Rahman: Writing – original draft, Conceptualization, Methodology, Formal analysis.

Kwang-Jing Yii: Writing – original draft & editing, Methodology, Conceptualization.

Eryadi K. Masli: Writing – review & editing, Data curation, Conceptualization.

MungLing Voon: Writing – review & editing, Conceptualization.

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Data availability statement

The data underlying this bibliometric analysis were derived from the Scopus database. The search query used to retrieve the articles analyzed in this study is provided in the manuscript. The full list of articles included in the analysis, along with their metadata (authors, titles, abstracts, keywords, citations, etc.), can be made available upon reasonable request to the corresponding author (emasli@swin.edu.au)

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