

Artificial Intelligence (AI) for Analysing Trend Digital Banking: A Bibliometric Review

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Abstract: The development of digital banking is not separate from the development of the digital world, which includes Artificial Intelligence (AI). The field of digital banking requires the latest developments in academic research to address intellectual development and scientific performance. This research aims to provide quantitative statistics and a comprehensive overview of current research trends, by visualizing the key influential and intellectual structures of digital banking literature. The research used a quali-quantitative approach of bibliometric citation analysis. This study reviewed 92 document english studies and review papers published in scientific indexed by the Scopus database from 2018-2025. Rstudio, VOSviewer and Excel's software are used to analyse the collected data and apply the bibliometric tests. The results of this research are identified through the presentation of data and visualisation of the interrelationships of a research that has been collected through academic authors, journals or documents, institutions and countries related to digital banking and AI. While the data is limited to the Scopus database of English papers and reviews, it also takes into account papers that are directly related to the field of digital banking and AI.

Keywords: Digitalitation; Banking; Bibliometric; VOSviewer; Rstudio Biblioshiny.

Abstrak: Perkembangan perbankan digital tidak lepas dari perkembangan dunia digital, yang di dalamnya termasuk Artificial Intelligence (AI). Bidang perbankan digital membutuhkan perkembangan terbaru dalam penelitian akademis untuk mengatasi perkembangan intelektual dan kinerja ilmiah. Penelitian ini bertujuan untuk memberikan statistik kuantitatif dan gambaran umum yang komprehensif tentang tren penelitian saat ini, dengan memvisualisasikan struktur kunci yang berpengaruh dan intelektual dari literatur perbankan digital. Penelitian ini menggunakan pendekatan kualitatif-kuantitatif dengan analisis sitasi bibliometrik. Penelitian ini mengkaji 92 dokumen penelitian berbahasa Inggris dan ulasan makalah yang diterbitkan dalam jurnal ilmiah yang diindeks oleh database Scopus dari tahun 2018-2025. Perangkat lunak Rstudio, VOSviewer dan Excel digunakan untuk menganalisis data yang dikumpulkan dan menerapkan uji bibliometrik. Hasil penelitian ini diidentifikasi melalui penyajian data dan visualisasi keterkaitan dari sebuah penelitian yang telah dikumpulkan melalui penulis akademis, jurnal atau dokumen, institusi dan negara yang terkait dengan perbankan digital dan AI. Meskipun data yang digunakan terbatas pada database Scopus yang berisi makalah dan ulasan berbahasa Inggris, penelitian ini juga mempertimbangkan artikel yang terkait langsung dengan bidang perbankan digital dan AI.

Kata Kunci: Digitalisasi, Perbankan, Bibliometrik, VOSviewer, Rstudio, Biblioshiny

Introduction

The Islamic banking industry continues to digitize to align with technological advances in the current industrial revolution era (Maryadi et al., 2024). Artificial Intelligence (AI) has taken on significance in the current digital transformation era. It has a remarkably significant impact on various aspects of human life (Shibuya, 2020). The utilization of Artificial Intelligence (AI) technologies in investment is a crucial aspect of Islamic finance, especially as to how the use of AI will affect Islamic financial growth in Indonesia.

Digital transformation is happening in countries, but the impact on the banking sector is not well-known. This uncertainty becomes even worse if banks start to compete among themselves to get ahead of digital lending and payment platforms (Khan & Khattak, 2024). Through decentralization, enhanced transparency, diversification, improved efficiency, and convenience, digital transformation can have a positive impact and diminish the threat of financial instability.

The industrial world's advancement has now reached a new era known as industrial era 4.0. In this era, the use of digital technology is increasingly strong to make human work more effective and efficient (Mutiasari, 2020). There are many digital platforms that exist in different sectors of life, including social, health, education, business, finance, and religion.

One of the biggest things in Industrial Revolution 4.0 is the Internet of Things (Rafidah & Maharani, 2024). IoT makes it easy for users to communicate and connect to the internet network. The internet makes it easy for users to control their finances regardless of time and place. Artificial intelligence technology is widely used by banks as one of the new technologies. (Artificial Intelligence/AI). Artificial Intelligence (AI) is a branch of computer science that studies the ways in which a combination of hardware and software systems can simulate the behavior of the human brain (Nugraha et al., 2019). The benefits of implementing AI include an increase in revenue in banking that occurs because the services provided become more efficient and effective, thus contributing to obtaining maximum profit (Sulistiyowati et al., 2023). However, in addition to technology adoption, the profitability of Islamic commercial banks in Indonesia remains significantly influenced by optimal liquidity management, solvency, and financing disbursement (Abdushamad et al., 2025).

Based on working paper (Barquin et al., 2019), the application of AI in the banking sector can provide 4 (four) positive benefits for the bank itself, namely increasing profits, large-scale personalisation, tap into the omnichannel market (online shopping), and increase innovation in the company (Barquin et al., 2019). The McKinsey research revealed that nearly 60% of large banks have utilized artificial intelligence in their business systems.

According to Sinta, Kembaren, & Fadli (2021), operating costs include all expenses necessary to run an organisation. While some of these costs can be reduced, there are also those that are not affected by the use of AI. This is supported by Ibrahim dan Nwobilor (2020) which explains that although AI can reduce certain costs, such as employee costs, other operational costs will remain unaffected by the application of AI algorithms. Omodero, Alphaeus, & Ihendinuhu (2016) argue that the level of organisations' investment in human capital has a major effect on their financial performance. Therefore, to improve financial performance, greater investment in human capital is necessary (Banks, 2023).

Tarigan & Paulus (2019) concluded that digital banking services are a breakthrough by utilising information technology in a faster and easier way and are done entirely by the

customer (Tarigan & Paulus, 2019). The implementation of Digital Banking Services by Commercial Banks is regulated through POJK No.12/POJK.03/2018. Banks must adapt to the growth of digital transactions by increasing network capacity, reliability, and security. The use of artificial intelligence technology (AI) is a common technology used by banks.

Definition of Digital Banking Services according to regulation OJK, defined as the bank's business activities include bank services and operations through electronic media with the aim of providing services that are very fast, very practical and easier in accordance with customer transaction needs, which are carried out by customers fully and consider aspects of customer satisfaction, security and comfort in conducting their financial transactions (Yusuf et al., 2022).

Digital banking or AI in banking, is a customer service system that offers banking services through digitalization. The service system provided by AI in banking includes internet banking, mobile banking consumer protection and other artificial intelligence. Operation in managing finances is facilitated, payment services are convenient for customers, compliance work is automated, and customer targeting is improved (Board et al., n.d.). AI minimises the risk and potential for crime in banking activities such as crowdfunding and peer to peer lending. With the help of technology, banks can handle a large number of transactions and operate 24 hours a day through telebanking, ATM, internet banking, mobile banking, dan e-banking (Raihan et al., 2024). AI is indispensable for banking and it is crucial to have it.

The current importance of information technology is in balancing the needs of the wider community with the increasing and diverse demand patterns (Marlius, 2022). The results of a survey conducted by the Indonesian Internet Service Providers Association (APJII) in 2024 reached 221.563.479 people out of a total population of 278,696,200 Indonesians in 2023 (Haryanto, 2024). The banking industry is making a concerted effort to develop a system that combines information technology with the financial system. Banks are increasingly competing to generate the largest number of customers and beat other banks because of the internet's support for AI development (Akob, 2022). E-banking is an example of technology that has been widely utilized by banks.

Indonesia is a country that strongly supports digital transformation in the banking industry. Evidence of this is the growth of a policy framework, specifically the direction of banking development linked to the acceleration of digital banking transformation which is stated in MPSJKI 2021-2025, Pillar 3: Financial Sector Digital Transformation Acceleration and RPI21 2020-2025, Pillar 2: Banking Digital Transformation Acceleration (OJK, n.d.). Digital banking, which was initially an application with standard transaction features, has been changed into an application with a variety of functions (Mufarih et al., 2020).

The scope of digital banking is wider than e-banking, which is all banking services that are fully digitalized through online platforms and applications like QRIS. The use of QRIS in Indonesia is also rapidly growing, with factors such as benefits, convenience, and security being the main determinants of MSME interest in adopting this digital payment standard (Salja et al., 2025). Banks that use digital services and have few or no physical branches, such as Bank Jago, are known as digital banks. There are 3 forms of online banking that are commonly used by most banks, including informational, communicative, and transactional (Sunecher et al., 2024). Customers can enjoy different benefits from these three types of

online banking, including obtaining information and conducting full transactions without visiting a bank branch.

The digital transformation of banking has been transformed by AI-driven innovations. As the industry and technology sectors work together to address the challenges posed by technological innovation, the banking industry, as well as traditional investments, are increasingly recognising the importance of collaborating with technology companies (Johan, 2024).

There is one reason why this study is important, and that is to stay up-to-date with research developments in digital banking. This study has the ability to identify the research gaps and current issues that are widely discussed by researchers worldwide. The focus of our research is on the bibliographic analysis of digital banking, which we employ a modern approach to using statistical software such as VOSviewer and AI for bibliometric review such as biblioshiny.

The contribution of this research is to analyse the trends in digital analytics and AI in banking. The analysis's results will act as a benchmark for future digital banking research and offer future researchers a chance to investigate the topic in greater depth. This study's research findings include:

1. How has the growth of literature trend research on digital banking developed between 2018 and 2025?
2. What are the most authors, organizations, and countries?
3. What are the essential articles regarding digital banking?
4. What are the most relevant authors and the most frequently cited authors?
5. What are the words used to identify authors of occurrences?

Methods

The Scopus database is the basis for our data collection. This option was chosen because it has been used extensively in previous studies (Baker et al., 2019). Besides this reason, we discover the reason why many of these previous studies concentrated on this database backing our choice. The following reason is that the social sciences' peer-reviewed literature database is the largest in the world. It is a database that is highly respected and accessible, with a list of all or most reputable journals. It offers users advanced search capabilities and an easy way to export all relevant data for conducting bibliometric analysis.

Meta-literature review, which encompasses both quantitative (bibliometric) and qualitative (content) approaches, is the method we use to conduct this study. The bibliography matrix approach is employed to identify and comprehend the network of articles by relying on citations. Source of data collection, to collect the data, we rely upon the scopus database. The accuracy of the data collection process is ensured by this methodological section. We explored several queries before deciding on the best way to extract the data.

To analyze the data, the study employs Rstudio and the Bibliometrix package. Biblioshiny, a graphical interface designed to conduct bibliometric tests, is included in this R package and is very user-friendly (Aria & Cuccurullo, 2017). VOSviewer is our tool for building a visualization network. VOSviewer explains the relevance of objects the less/more associated they are. Both programs are widely used and known for their ability to analyze bibliometric data (Baker et al., 2019).

Result and Discussion

According to Woods, customers were initially apprehensive about using the internet banking system, due to a lack of confidence in the system's security features and the fact that the public was relatively unaware of it. Over time AI intelligence in banking has become popular and more people are using it, because users' attitudes towards artificial intelligence have a positive impact on the use of mobile banking (Manser Payne et al., 2018).

Table 1. AI Success Study in the Finance Industry

Metode	Hasil
Chatbot AI	Reduction in service response time by 40%
Data Analysis	Increase in customer satisfaction by 30%
Risk Management Automation	Decrease in operating expenses by 25%

(Source: Artificial Intelligence Center Indonesia (AICI), August 2024)

Table 1 describes the AI tools and technologies used in the financial industry, namely chatbot AI that help reduce response time and increase customer satisfaction, platform data analytics that enables the financial industry to analyse customer and market data more effectively, and Robotic Process Automation. (RPA) that automates repetitive business processes. The utilisation of AI in the banking sector covers various aspects, including in the front office division AI is used to provide voice-based services through voice assistants and support authentication processes using biometric technology. AI is employed in the middle office division to keep track of fraud, compliance, and regulatory risks. In the back office division, AI is involved in analyzing credit underwriting and aiding in the creation of contracts (Ramadhani & Trimuliani, 2024).

Table 2 presents the main features of the input data used for analysis. There are 92 research articles that are linked to 77 journals, books, etc. We noticed that out of 259 authors, only 15 published articles as single-authored.

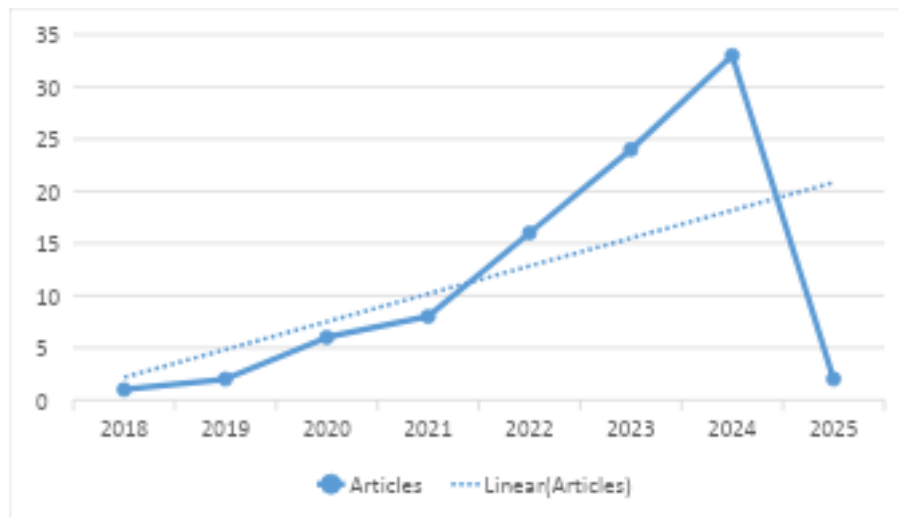
Figure 1 illustrates the year-by-year distribution of all collected literature on digital banking from 2018 to 2025. Considering the current developments, we can conclude that there is a significant increase, particularly in 2022 to 2024. The growing interest of researchers in discussing digital banking is reflected in this situation, which is also supported by the significant development of digital systems. Digital banking research is almost crucial, at least in the articles indexed in the scopus database. Therefore, the research is moving forward at an annual growth rate of 10.41%.

Table 2. General Information

Description	Results
<i>MAIN INFORMATION ABOUT DATA</i>	
Timespan	2018:2025
Sources (Journals, Books, etc)	77
Documents	92
Annual Growth Rate %	10.41
Document Average Age	2.28
Average citations per doc	3.652
References	0

DOCUMENT CONTENTS	
<i>Keywords Plus</i> (ID)	381
Author's Keywords (DE)	308
AUTHORS	
Authors	259
<i>Authors</i> of single-authored docs	15
AUTHORS COLLABORATION	
Single-authored docs	15
<i>Co-Authors per Doc</i>	3.04
International co-authorships %	19.57
DOCUMENT TYPES	
article	29
book	3
<i>book chapter</i>	13
conference paper	36
conference review	6
erratum	1
review	4

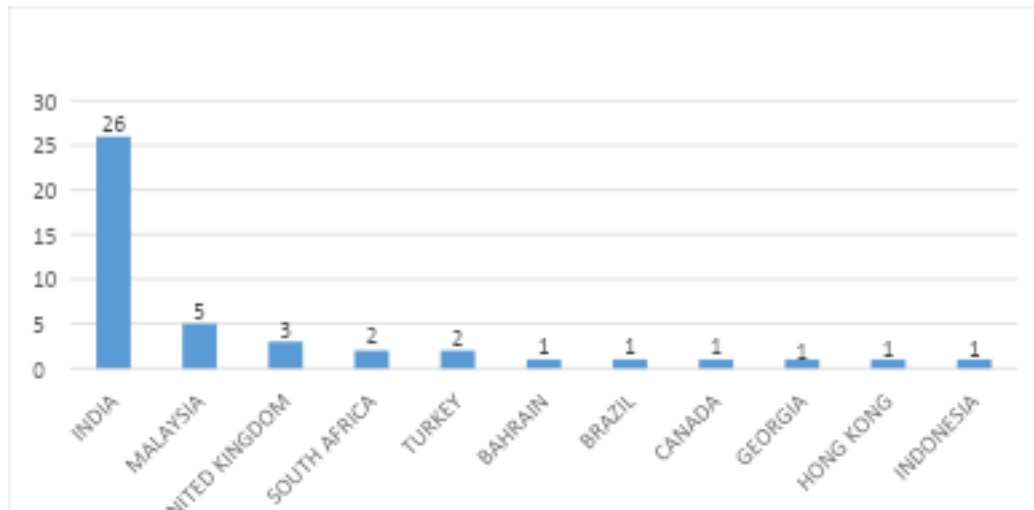
(Sources: Constructed by biblioshiny)



(Source: Research Result)

Figure 1. Growth of Digital Banking Literature

Figure 2 shows the frequency of the most active countries in terms of scientific production during the same period when it comes to geographical contributions. The author's affiliated country at the time of publication is referenced by these countries, which is worth mentioning. Our analysis only takes into account the country of the author who corresponds, which is not an accurate way to identify the most relevant countries, but the best we have available. It was surprising that India had the highest number of 26 articles, Malaysia was second in the number of studies, followed by the United Kingdom, North Africa, Turkey and others.



(Source: Constructed by biblioshiny)

Figure 2. Most Relevant Countries by Corresponding Author

Table 3 presents the most relevant institutions in terms of productivity. We represent the first 10 institutions with the number of articles produced. Researchers saw that there are various kinds of institutions at the university and institute level, including, Uttaranchal University (India), Amity University (India), Graphic Era Hill University (India), National Institute of Technology Jamshedpur (India), Spiru Haret University (Romania), Kazan Federal University (Russia), London Metropolitan University (London), Institute of High Education of The Names of Ukraine (Ukraine), Universiti Putra Malaysia (Malaysia), dan Al Ain University (United Arab Emirate).

India is the country that has the most impact on digital banking research. The emphasis in India is likely to be on digital development. The use of digital technology is on the rise and is evidently being utilized by all sectors, particularly the banking sector. Table 3 presents the most important and relevant articles publishing digital banking. Authors can identify the leading articles in this area by using table 4. We have observed that the articles that are most productive. The types of articles that are the most dominant in the top 10. Our current focus is on a book series with documents, followed by journals with 3 articles, proceedings with 2 articles, and books with a number of pieces. Springer is currently the most dominant publisher.

Table 3. Most Relevant Institutions

Rank	Affiliation	Articles
1	Uttaranchal University	7
2	Amity University	6
3	Grapich Era Hill University	6
4	National Institute of Technology Jamshedpur	6
5	Spiru Haret University	6
6	Kazan Federal University	5
7	London Metropolitan University	5
8	Institute of High Education of The Names of Ukraine	4
9	Universiti Putra Malaysia	4

10	Al Ain University	3
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(Source: Constructed by biblioshiny)

Table 4. Most Relevant Articles

Sources	Articles
Lecture Notes in Networks and Systems	4
Advances In Intelligent Systems and Computing	3
Communications In Computer and Information Science	3
Journal Of Financial Services Marketing	3
2024 Ieee 30th International Conference on Telecommunications, Ict 2024	2
E3s Web of Conferences	2
International Journal of E-Collaboration	2
International Journal of Intelligent Systems and Applications in Engineering	2
Lecture Notes in Electrical Engineering	2
The Ai Book: The Artificial Intelligence Handbook for Investors, Entrepreneurs and Fintech Visionaries	2

(Source: Constructed by biblioshiny)

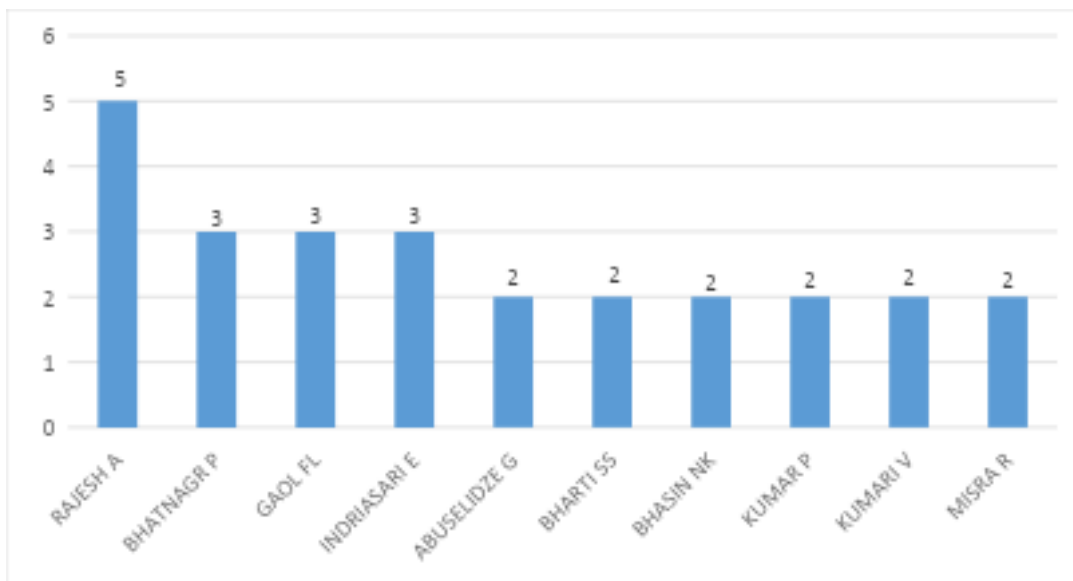
The leading and most productive authors in the field are shown in Figure 2. We select only those documents that are cited during the period of 2018-2025. Table 3 illustrates the author's position in AI and digital banking research. The results of the visibility show Elisa Indriasari BINUS University Indonesia to be the author with the most number of citations in the period 2018-2015 with 46 citations, followed by George Lăzăroiu Spiru Haret University Romania 38 citations, and Feras Mi Alnaser An-Najah National University 28 citations.

We made an effort to examine the discussions written by the authors who had the most citations. Due to space constraints, we will only talk about the top ten documents.

1. Elisa Indriasari et.al (2019). Source title Proceedings - 2019 8th International Congress on Advanced Applied Informatics, IIAI-AAI 2019. Digital Banking transformation: Application of Artificial Intelligence and Big Data Analytics for Leveraging Customer Experience in the Indonesia Banking Sector. This study explores the application AI dan BDA in banking for leveraging customer experience. The paper reveals best practices of global banking and Indonesian banking, in implementation of AI and BDA (Indriasari et al., 2019).
2. George Lăzăroiu et. Al (2023). Source title Oeconomia Copernicana, Artificial intelligence algorithms and cloud computing technologies in blockchain-based fintech management. Fintech development enables organizational innovation by mitigating information asymmetry and financing limitations while providing financial assistance and tax incentives in relation to products and services (Lăzăroiu et al., 2023).
3. Feras Mi Alnaser et. al (2023). Source title Heliyon, does artificial intelligence (AI) boost digital banking user satisfaction? Regarding user segmentation, literacy factors and perceived ease also influence millennials' interest in choosing sharia financial services in the digital age (Desiana & Ihsan, 2023). Integration of expectation confirmation model and antecedents of artificial intelligence enabled digital banking. This research has suggested that policy makers should pay attention

- in improving user expectation confirmation, perceived performance, visual attractiveness, communication quality and corporate reputation which in turn enhance satisfaction and boost digital banking user's confidence to accept artificial intelligence enabled digital banking (Alnaser et al., 2023).
4. N. Jayantha Dewasiri et. al (2023). Source title Transformation for Sustainable Business and Management Practices: Exploring the Spectrum of Industry 5.0, Fusion of artificial intelligence and blockchain in the banking industry: Current application, adoption, and future challenges. This chapter discusses the application of two robotic platforms widely used in banking, chatbots, and Robo-advisors. Chatbots are more like frontline employees of banks who are commonly engaged in customer relationship management, sales, and marketing. In contrast, Robo-advisors are a relatively advanced AI tool involved in investment and portfolio management (Dewasiri et al., 2023).
 5. Chandrima Bhattacharya dan Manish Sinha (2022). Source title Australasian Accounting, Business and Finance Journal, Role of Artificial Intelligence in Banking for Leveraging Customer Experience. The research paper reveals banking features integrated with AI. Chatbot use-cases on banking platforms are ranked based on customer experience. It is proved that there is a positive correlation (0.247) between the two most popular use-cases. The paper proposes IT Architecture and best practices for the digital banking sector (Bhattacharya & Sinha, 2022).
 6. Cao dan Jia Zhai (2022). Source title Journal of Chinese Economic and Business Studies, A survey of AI in finance. The dramatically fast development of financial technology (fintech) has played an important role in the production, delivery and consumption of financial products and services. In this survey, we sum up the primary research discoveries in fintech area, which include the possible evolution of fintech's effect on customer protection, prosperity and the discovery of the asset prices and returns, and the design of digital frameworks in the era of the fintech (Cao & Zhai, 2022).
 7. Richard Baskerville et. al (2020). Source title Law and Economics Yearly Review, Impacts, Challenges And Trends Of Digital Transformation In The Banking Sector. The 2020 year represented a major watershed between the world before and after the pandemic. The health emergency, in fact, has profoundly changed people's way of living, relating, working, training and making financial operations. The year 2021 will be decisive for the integration of digital technologies in the banks, changing both the degree of centralisation/decentralisation of decisions and the management of information and knowledge (Baskerville et al., 2020).
 8. N. Kumar Bhasin dan Anupama Rajesh (2021). Source title International Journal of e-Collaboration, Impact of E-Collaboration between Indian Banks and Fintech Companies for Digital Banking and New Emerging Technologies. Fintech is a new buzzword in the banking and finance industry which has to combine the core traditional banking liability and lending functions with new financial technology. It's a win-win situation for both Indian banks that have a huge customer base and a wide network of branches (Bhasin & Rajesh, 2021).

9. Maurizio Pompella dan Roman Matousek (2021). Source title The Palgrave Handbook of FinTech and Blockchain, The Palgrave handbook of FinTech and blockchain. This is the first multidisciplinary handbook of FinTech and Blockchain covering finance, economics, and legal aspects globally. With comprehensive coverage of the current landscape of financial technology alongside a forward-looking approach, the chapters are devoted to the spread of structured finance, ICT, distributed ledger technology (DLT), cybersecurity, data protection, artificial intelligence, and cryptocurrencies (Pompella & Matausek, 2021).
10. Ravneet Kaur et. al (2020). Source title Smart Innovation, Systems and Technologies, Intelligent Voice Bots for Digital Banking (Kaur et al., 2019).



(Source: Constructed by biblioshiny)

Figure 3. Most Relevant Author

Table 5. Network Visualization of Cited Authors

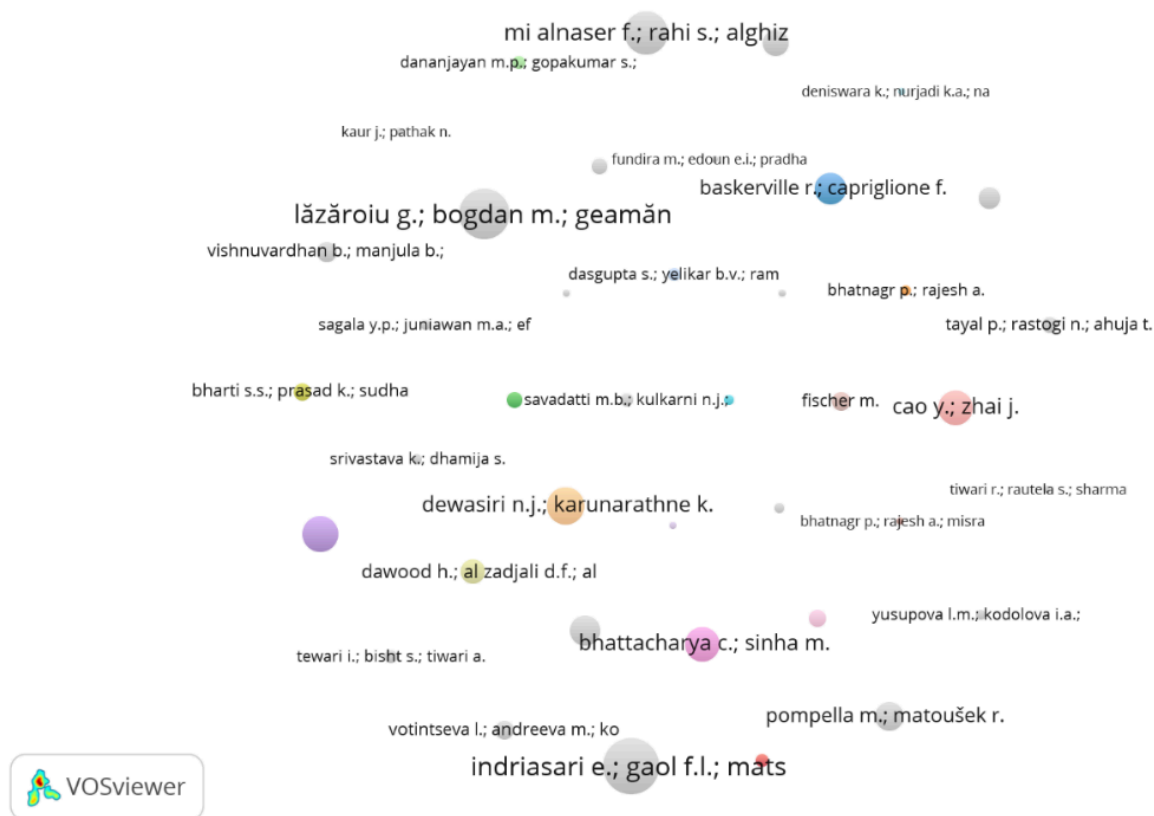
Author Name	Affiliation	Country	Citations
Elisa Indriasari	Binus University	Indonesia	46
George Lăzăroiu	Spiru Haret University	Romania	38
Feras Mi Alnaser	An-Najah National University	Palestine	28
N. Jayantha Dewasiri	Sabaragamuwa University of Sri Lanka	Sri Lanka	21
Chandrima Bhattacharya	Deemed University	India	18
Yi Cao	Xi'an Jiaotong-Liverpool University	China	18
Baskerville R.			15
N. Kumar Bhasin	Amity University	India	15
Maurizio Pompella	University of Siena	Italy	13
Ravneet Kaur	Amadeus Research Lab	India	11

(Source: Constructed by author)

This section is about analyzing the scopus dataset of 92 documents on digital banking using VOSviewer. The researcher used visual mapping to visualize the network visualisation of authors, analyzing keywords/cartography, and analyzing bibliographic coupling. VOSviewer will be utilized to analyze visualization results and explore the relationship between AI and digital banking in the system literature in this section.

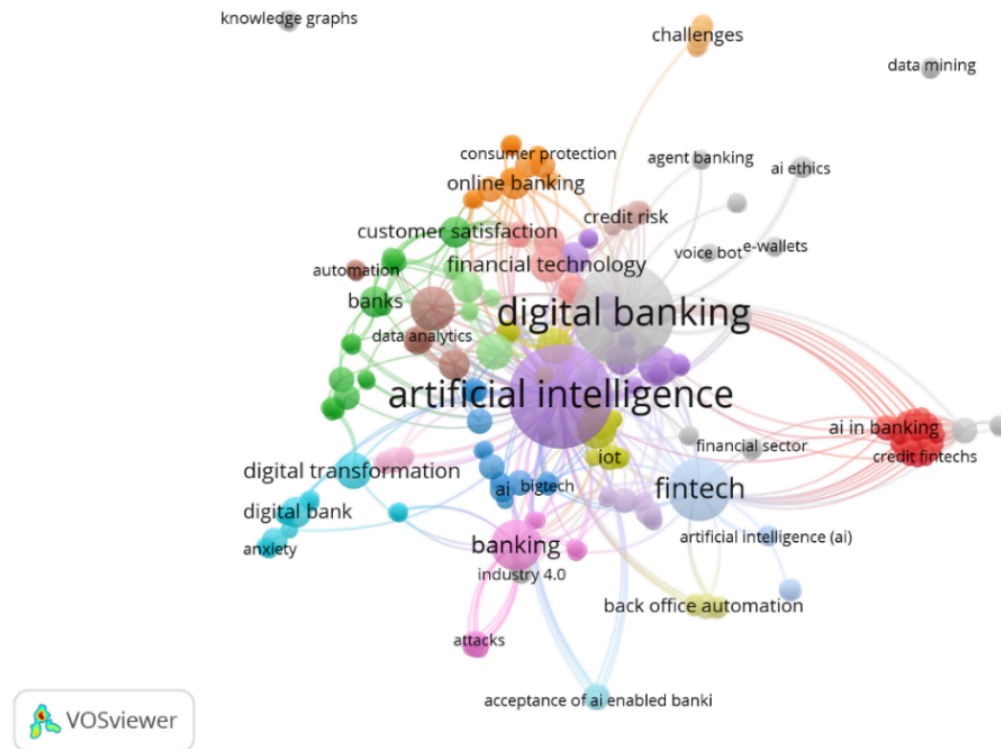
The visualisations in Figure 4 are based on keywords that authors frequently use. The frequencies widely used in this discussion are digital banking 31 times with a total link strength of 137, artificial intelligence 32 times with a total link strength of 155, fintech 12 times with 94 total link strength, machine learning 6 times with 42 total link strength, and banking 8 times with 40 total link strength.

The development of research related to digital banking is directly related to the development of AI as a tool to improve the banking system, as evidenced by this result. Through its varied products, it aims to bring benefits to society in the future.



(Source: Constructed by VOSviewer)

Figure 4. Visualization of Authors Citations



(Source: Constructed by VOSviewer)

Figure 5. Identification Co-Occurrence Authors Keywords

Identifying several directions for future research is made possible by combining bibliometric analysis with content analysis which will not only help to further develop scholarly work on digital banking but also provide policy implications for regulators to bring some structural reforms to level the playing framework of digital banking.

Conclusion

A study's bibliometric approach provides researchers with an overview of literature related to digital banking. Quantitative data results and visualisation presented can be used as discussion material for further research. Scopus was used to obtain the data for this study, which consisted of 92 documents, including articles, books, proceedings, and others, for the period 2018-2025. Researchers used Rstudio and VOSviewer to process the data and generate statistical data and visuals to support the analysis of the literature review using bibliometrics.

The data shows a substantial increase from 2018 to 2024, but due to researchers only focusing on January 2025, there has been no significant increase in the number of articles. India is the country that is most relevant for the corresponding author, with Uttaranchal University following. All types of articles indexed by Scopus, including journals, books, processing, and others, are combined in this research. The Lecture Notes in Networks and Systems book series published by Springer is considered to be the most valuable data source. The authors who have been cited the most often are Anuphama Rajesh from Amity University India and Elisa Indriasari from BINUS University Indonesia. The keywords in this

study that rank Occurrence author as 5 are digital banking, artificial intelligence, fintech, machine learning, and banking.

Author Contributions

The first author (Miftahul Huda) designed the study, wrote the initial draft of the manuscript, provided supervision, and edited the final text. The second author (Muhammad Zen Nasruddin Fajri) conducted a literature review data collection in accordance with the theme. The third author (Violin Ladies Aulia) and the fourth author (Septi Ayumi Hasibuan) analyzed the data and compiled the methodology section. All authors read and approved the final version of the manuscript.

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