COUPLING ARTIFICIAL INTELLIGENCE WITH FINTECH AND BANKS: A BIBLIOMETRIC ANALYSIS AND FUTURE RESEARCH AGENDA

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Abstract

The study examines the coupling of artificial intelligence (AI) and machine learning (ML) with fintech and banks for the growth and resilience of the financial sector. This paper deciphers and maps the growth of the intellectual structure of research in the domain of AI and ML for strengthening the financial sector either through fintech or banks. This study examines the development of the literature on AI/ML in finance from 2012 to 2022 using 211 documents from the Scopus database with the goal of identifying key trends and patterns in terms of research focus, publication year, and geographic distribution. This study adds to our understanding of this field by highlighting the themes originating from these trends and patterns. By considering a wide range of subjects, including document types, annual publishing volumes, subject areas, affluent nations, institutions, journals, and authors, we have provided scientific evaluations and findings based on bibliometric analysis. We additionally looked at citation and co-citation networks to offer light on the connections between authors and publications to identify the challenges and growth prospects. We identified four key clusters through content analysis: applications of AI/ML in finance, digital banking, new-era technology in banks, and financial data analytics. In conclusion, this paper provided detailed discussions on the theoretical and practical implications of existing research and future research agenda.

Keywords: Artificial intelligence, Fintech, Machine Learning, Blockchain, Bibliometric Analysis

JEL Classification: B16, B41, C13, C40

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1. **Introduction**

"Fintech, according to the Financial Stability Board (FSB), refers to the utilization of technology to introduce innovative changes in financial services. These changes have the potential to create new business models, applications, processes, or products that significantly impact financial markets, institutions, and the delivery of financial services." Fintech companies are actively operating in various important sectors, including payments and remittances, lending, enterprise financial management, crowdfunding, technology solutions for financial institutions, insurance, personal finance management, wealth management, trading, capital markets, and digital banking (Murinde, Rizopoulos, and Zachariadis, 2022). Fintech companies achieve success through several crucial factors, including the presence of adequate funding, a strong emphasis on customer loyalty, the enhancement of technology and IT infrastructure, cost reduction in operations, and the development of compelling value propositions (Deloitte India, 2017).

Since the global financial crisis in 2008, banks have faced increased regulatory compliance, leading to a competitive disadvantage (Amstad, 2019). Fintech now has a chance to participate in regulatory arbitrage due to the increase in regulatory regulations, intensive legal scrutiny, and higher capital requirements. However, regulatory arbitrage cannot be fully blamed for the expansion of fintech's shadow banks. The market has been disrupted by the development of AI-enabled technology, which has increased client convenience, service experiences, and access to financial services. Due to this, fintech clients are prepared to pay more for online services (Ryu & Chang, 2018; Buchak et al., 2018).

Fintech has revolutionized the financial industry, bringing about a digital transformation facilitated by virtual financial assistants. These assistants have significantly enhanced customer service and enabled real-time interactions (Naimi-Sadigh, Asgari, and Rabiei, 2021). The development of well-designed and user-friendly fintech platforms, which prioritize improving the customer experience through providing financial advice and charging low fees on managed assets, has led to cost savings for investors (Nicoletti, and Weis, 2017). Since 2017, there has been a surge in research exploring the application of artificial intelligence (AI) and machine learning (ML) in the fintech domain. AI has proven to be valuable in various areas, including bankruptcy prediction, stock price forecasting, portfolio management, anti-money laundering, and behavioral finance (Ahmed et al., 2022). Furthermore, AI and ML techniques have proven effective in detecting

financial fraud, such as credit card fraud, insurance fraud, and health-related fraud (Hilal et al., 2022; Milana&Ashta).

The revolutionary effects of AI on India's peer-to-peer (P2P) has led to absence of lock-in periods, lower prepayment fees, and quick loan disbursement, enhanced client experience, and simpler loan applications are the main elements influencing this transition have been explained by Anil & Misra (2022). Through social media networks and digital footprints, AI and ML approaches have the capacity to gather more data. (Jakšič&Marinč, 2019; Mhlanga, 2021). Fintech firms are disrupting the market by providing robo-advisor services that are more affordable than traditional private banking. However, a variety of factors, including investor awareness, risk aversion, and trust, affect the uptake of robo-advisory services (Northey et al., 2022). Ahmed et al. (2022) conducted a bibliometric review on AI and ML in finance, with 348 articles highlighting that popular research topics include bankruptcy prediction, stock price prediction, portfolio management, oil price prediction, anti-money laundering, and big data analytics. However, their study did not limit the subject area to topics related to business, economics, and finance. Goodell et al. (2021) identified the foundational elements and key themes in artificial intelligence and machine learning within the realm of finance using bibliometric review. They concluded that AI/ML is undergoing a radical transformation in shaping investment decisions and has emerged prominently in financial scholarship.

Despite the fact that the application of AI/ML to the finance industry has effectively resulted in substantial changes, a survey of the literature has also revealed potential difficulties and dangers that fintech and banking firms may encounter (Ghandour, 2021). The limitations of ML models for predicting loan failure, algorithmic bias and discrimination, potential job losses due to regulatory hazards, privacy issues, regulatory risks, and ethical issues are just a few of the difficulties. The primary goal of this study is to fill research gaps in the current literature by performing a detailed analysis of the application of AI/ML in fintech and banking. This research paper offers a comprehensive analysis of the breakthroughs in AI-enabled fintech, revealing major areas of attention and addressing the difficulties and opportunities that fintech firms and financial institutions will face in the future. This study provides an in-depth overview of the use of AI/ML in fintech research, making a substantial contribution to the domains of finance, information technology, and social science. Three of the four theme strands connected to the application of AI/ML in finance have been found through extensive content analysis. The report provides both

theoretical and practical value while providing insightful information about possible directions for further study in this area. Regulation of the fintech industry, privacy protection, and ethical considerations should all be given top priority by policymakers. Practitioners will discover useful data and expertise to evaluate the economic consequences and value of financial technology. A complete technical expertise should also be developed by information technology (IT) engineers in order to fulfill future industrial expectations.

With the aim of addressing the deficiencies in current research, this paper endeavors to investigate the understanding of AI/ML applications in fintech and banks, create a literature mapping and propose new research directions and opportunities in this field. To initiate this process, we have developed the following research questions (RQs):

RQ1: How research concerning AI/ML in the realm of fintech has progressed over the last ten years?

RQ2: Identify the intellectual structure, key themes, and emerging topics that are crucial for the development of research in the field of AI/ML in fintech.

RQ3: How does this study contribute to theoretical advancements, practical implications, and future research directions?

2. Methodology

Applying Bibliometric methodology involves the utilization of quantitative techniques for the analysis of bibliometric data and bibliographic information (Pritchard, 1969). In contrast to traditional systematic literature reviews, a bibliometric review possesses the capability to furnish insights within domains characterized by vast quantities of bibliometric and bibliographic data. Furthermore, to provide a comprehensive understanding of the literature, bibliometric analysis is complemented with content analysis. A well-defined search strategy is vital for bibliometric analysis as it influences the search results and should be in tandem with research objectives. Keywords and relevant synonyms are used to broaden the search results. The Boolean operator ("And", "OR") is employed to enhance search precision, as shown in Table 1. The "Scopus" database is utilized for retrieving research articles. Goodell et al. (2021) similarly performed a bibliometric analysis on AI and ML in finance, obtaining data exclusively from the Scopus database. The time frame was restricted to 2012-2022 as studies on AI and ML in the finance field

were scarce, with only single-digit occurrences before 2012.

Data collected from Scopus or any other database may contain inaccuracies in bibliometric and bibliographic details due to the reporting of the original manuscript in subsequent publications (Baker et al., 2021). Therefore, it is important to clean the data from the file. The missing references has been removed from the data file downloaded from Scopus. Bibliometric analysis was conducted using various software tools, namely Bibliosiny, bibliometrix in R, VoSviewer, and Microsoft Excel. Among these, VoSviewer and biblioshiny are considered for their robust visualization capabilities, especially in the areas of co-occurrence, co-citation, and keyword analysis. Akar (2023) employed Biblioshiny in R software for bibliometric analysis. Kirby (2023) elucidated that the VoSviewer software stands out as a widely utilized tool for conducting bibliometric analysis. A sequential approach is employed for content analysis. Initially, VOSviewer software is employed for conducting content analysis. Then, research papers are identified based on the clusters formation, and a comprehensive analysis is carried out on the papers within thematic clusters. The content analysis is applied on 211 articles.

Table 1: Search String Criteria

S.No	Search Query	Results
1.Final Query	TITLE-ABS-KEY (ai OR "Artificial Intelligence" OR "robot advisor" AND fintech OR "Financial Technology" OR banks OR nbfc OR "Non banking finance Company" OR "P2P LENDING" OR "PEER TO PEER LENDING" OR "SOFT INFORMATION") AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (SUBJAREA , "BUSI") OR LIMIT-TO (SUBJAREA , "ECON")) AND (LIMIT-TO (PUBYEAR , 2022) OR LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2015) OR LIMIT-TO (PUBYEAR , 2014) OR LIMIT-TO (PUBYEAR , 2013) OR LIMIT-TO (PUBYEAR , 2012))	214
2.Cleaning	Results after Removing the missing references	211

Source: Authors findings

3. Findings

In order to answer the RQ1, we have shown the general information and conducted a performance analysis which contains annual scientific production, Annual Publications with total citations count, Corresponding authors' countries, relevant affiliations, and relevant sources, and Collaboration network among the countries.

3.1 General Description and Performance Analysis

In our dataset, we included 211 documents covering the period from 2012 to 2022. The average citation per document was 15.72, whereas the average citation per year was relatively low at 2.79. We identified a total of 558 authors across the 211 documents, indicating a collaboration index of 2.76. This implies that, on average, each paper involved 2.76 authors.

3.1.1 Annual Scientific Production

Fig.1 illustrates the distribution of the literature from 2012 to 2022. The domain of Artificial Intelligence (AI) and Fintech has experienced remarkable growth in annual publications between 2012 and 2022. Initially, there were only two publications in 2012 and 2013, with no publications specifically related to AI/ML in finance or fintech in 2014. However, a noticeable upward trend in publications emerged starting from 2017. Since then, there has been a significant increase in AI/ML-related publications in the fintech field. The annual growth rate of publications stands at 42.49%, and the average citation per document is 15.72.

Fig.1 Annual Growth in Literature from 2012 to 2022
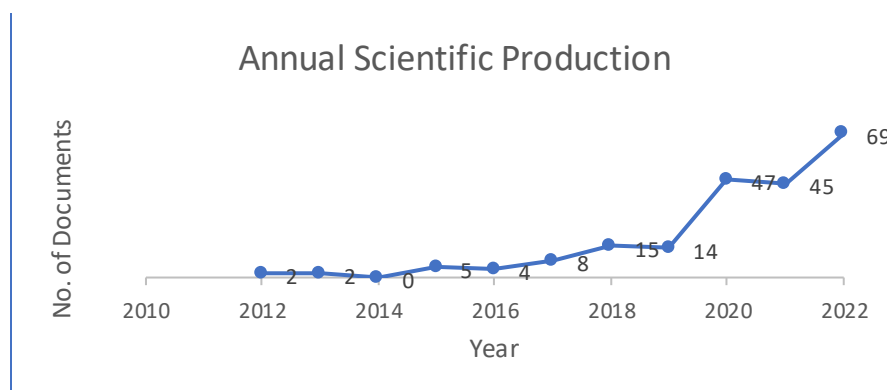
Source: Authors compilation

3.1.2 Annual Publications with Total Citations Count

The recent years have witnessed a surge in publishing activity. Fig. 2 visualizes the annual publication and citation counts, revealing a noticeable upward trend in the number of documents over the observed time frame. Specifically, between 2017 and 2021, a total of 198 documents were published, generating 2734 citations. These findings indicate that AI/ML in the finance domain is a relatively new research area that has garnered significant attention in recent times.

**Fig.2 Annual Publications and Total Citations**
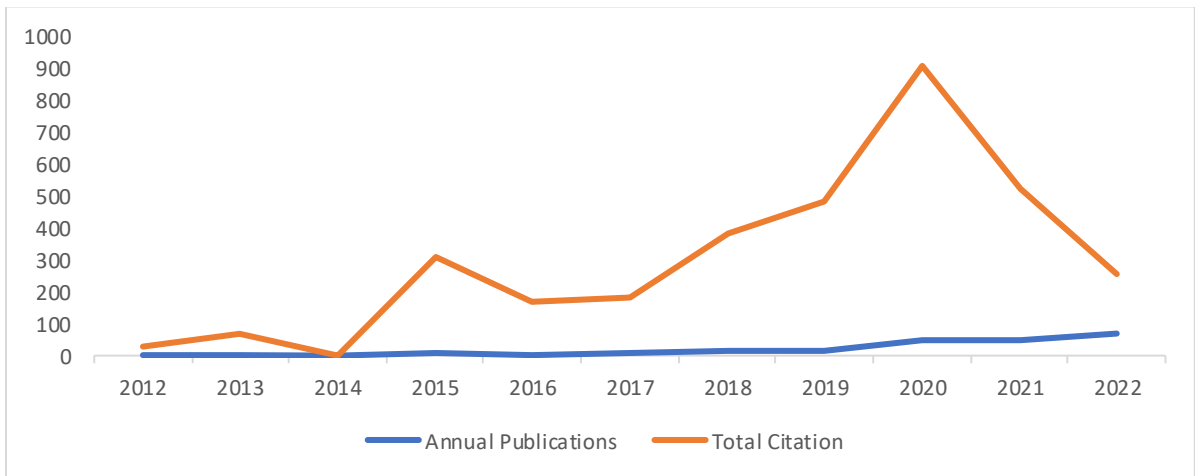
Source: Authors compilation

**3.1.3 Corresponding Authors' Countries, Relevant Affiliations, and Relevant Sources**

Figure 3 illustrates the frequency of the countries with the highest number of corresponding authors in the dataset. Additionally, it showcases the ratios of publications involving multiple countries publications (MCP) versus those involving single country publications (SCP). Figure 4 presents the research institutions that exhibit the highest level of activity in the field.

Fig.3 Corresponding Authors' Countries   Fig.4 Total production in the Field and Affiliations
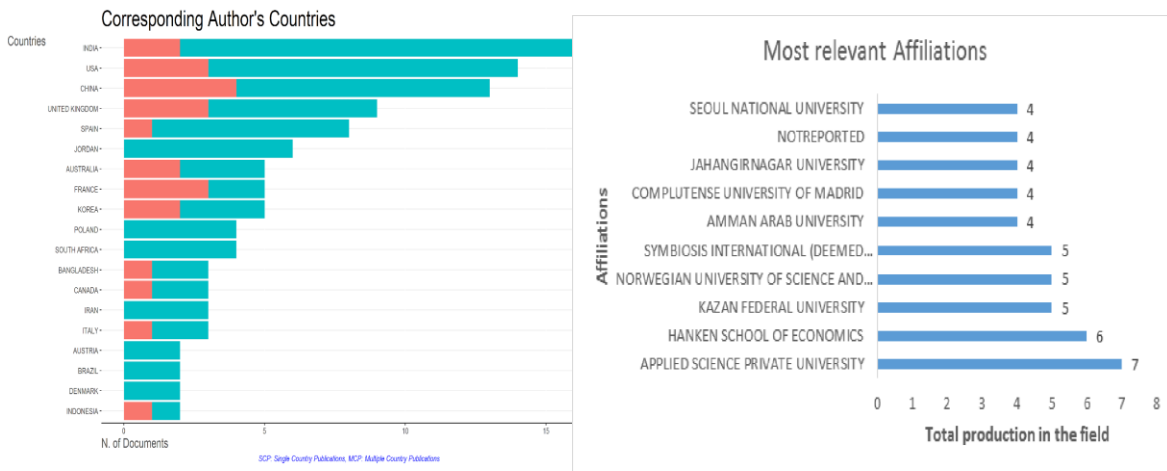
Source: Authors compilation

Fig. 5 Most relevant sources
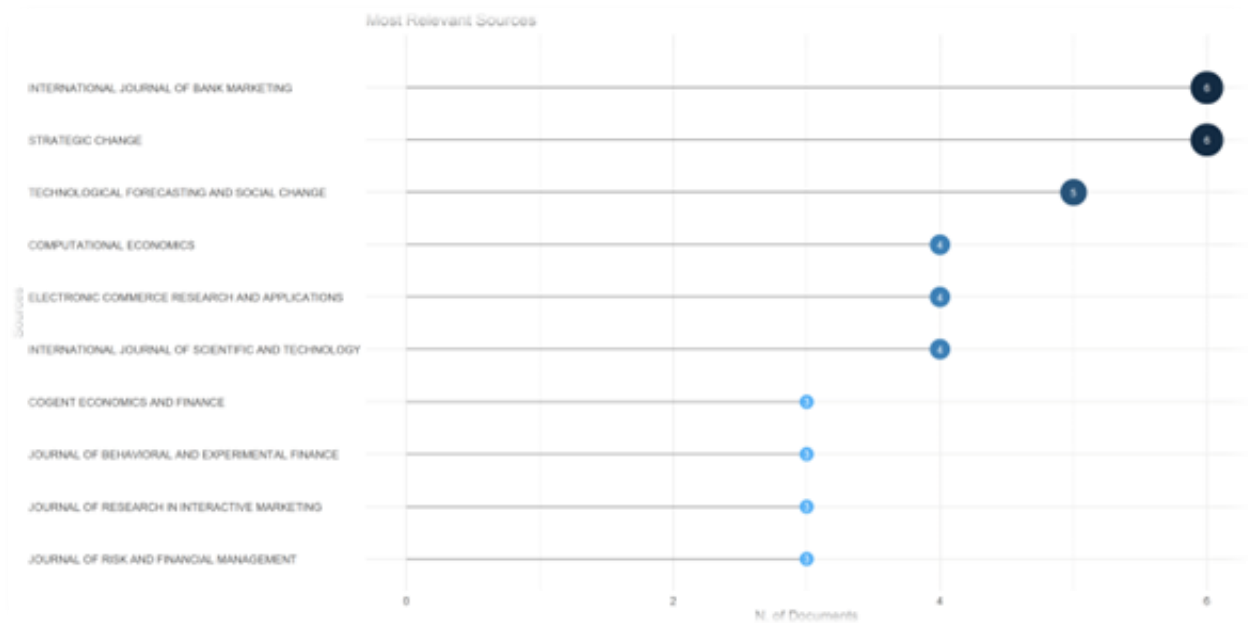
Source: Authors compilation

This information is valuable for funding organizations, early career researchers, and students seeking postgraduate programs in this particular area. The ranking shows that Applied Science Private University holds the top position, followed by Hanken School of Economics University

and Kazan Federal University. Figure 5 displays the journals that have published the highest number of articles in the field of AI and ML literature in the context of Fintechs and Banks.

This information is valuable for researchers as it assists in identifying prominent sources in this area and locating relevant documents based on their specific interests.

3.1.4 Collaboration Network among Countries.

Fig. 6 depicts the collaborative network among countries/regions, showcasing the closest collaborations among 18 selected countries/regions out of a total of 68. To establish this network, a minimum threshold of 5 documents per country was set. The countries/regions are categorized into eight distinct groups, represented by different colors. In the figure, the nodes represent countries/regions, with their sizes reflecting the number of publications. The connection lines between nodes indicate collaborative relationships between the respective nations, with stronger linkages representing increased collaboration. We observe that the most collaborative countries/regions include China, the U.S., the U.K., India, Italy, and France, etc.

Fig. 6 Collaboration network among countries
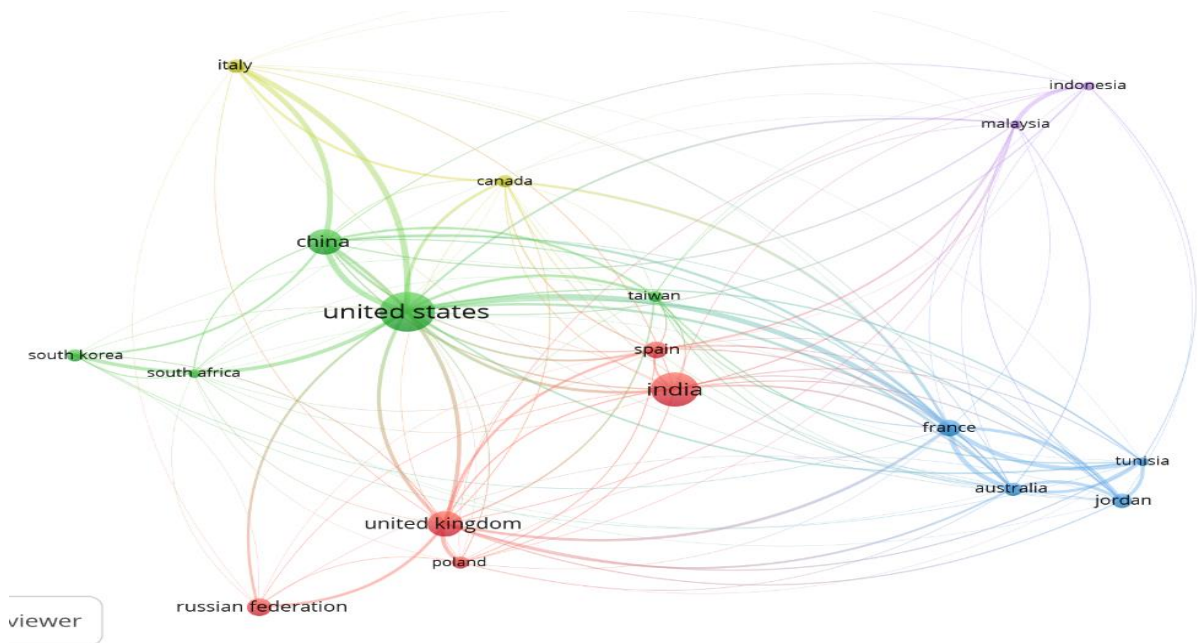
Source: Authors compilation

As Fig. 6 illustrates, universities play a crucial role in fostering international research collaboration. In spite of the tense political relations between the US and China, their network of collaboration is still strong. This can be traced to the historical presence of Chinese students and scholars engaged in cross-border higher education mobility, which has long been a feature of US-China Science and Technology cooperation (Suttmeier, 2014). Furthermore, the enrollment of Chinese students has witnessed a remarkable surge over the past four decades, as evidenced by data from the Institute of International Education (IIE, 2020).

The People's Bank of China has unveiled its fintech growth strategy for 2022 to 2025, with a focus on capitalizing on fintech expansion prospects, developing cutting-edge apps, adopting critical regulatory measures, and eventually improving fintech governance. Cloud services experienced a substantial average growth of approximately 32% during the period spanning from 2016 to 2020 (china-briefing, 2022). With an astounding 87% acceptance rate, India is ahead of the rest of the world in fintech adoption, compared to the global average of 64%. After the United States and China, India's third-place position in digital payments demonstrates its ascension (ET, 2023). This is accompanied by a remarkable surge in mobile and Internet banking transactions per 1,000 adults, soaring from 183 in 2015 to 13,615 in 2020 (EY India, 2022). On the other hand, in the United States, the fintech sector demonstrates vitality, with a robust count of 8,775 fintech startups in 2021. The digital payment segment takes the lead, valued at a staggering $1.2 trillion in 2021. Moreover, the U.S. fintech market foresees a projected Compound Annual Growth Rate (CAGR) of 11% from 2023 to 2028 (Mordor Intelligence Research & Advisory, 2023).

According to the Fintech Adoption Index report of 2019, China and India are at the forefront with the highest adoption rates of 87%. The United Kingdom follows closely with a fintech adoption rate of 71%, while the United States lags behind with a rate of 46%.

3.2 Co-Citation Analysis

To answer RQ2, we conducted co-citation analysis, specifically Journal Co-citation analysis (JCA) and Author co-citation analysis (ACA). These analyses helped us uncover the intellectual structure of AI/ML research within the fintech domain. Additionally, we performed keyword analysis combined with theme cluster analysis (content analysis) to identify the crucial and emerging themes in this area.

Fig. 7 Co-citation Network of Journals
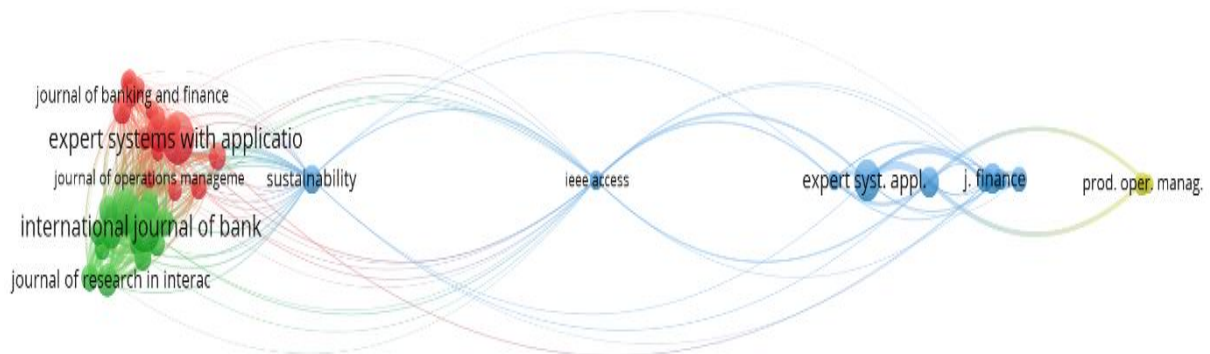
Source: Authors compilation

3.2.1 Co-citation Analysis of Journals

Co-citation analysis operates on the concept that if two journals are consistently co-cited, it signifies a strong and meaningful relationship between them (Kusakunniran et .al, 2018). Figure 7 illustrates a notable cluster consisting of journals such as the Journal of Banking and Finance, Journal of Finance, International Journal of Financial Economics, Strategic Change, Journal of Economic Perspectives, and Harvard Business Review. Upon closer examination, it was discovered that research papers published in these journals primarily concentrate on AI/ML applications in the financial aspects of fintech and banks. These finding sheds light on the specific focus areas of these influential journals and their contribution to the understanding of AI/ML in the fintech and banking domains. The articles featured in these journals centered on topics such as AI-driven credit risk evaluation, the interplay between fintech and financial stability, the influence of AI techniques on corporate default prediction and subsequent impact on bank's capital requirement, the utilization of AI in equitable lending underwriting and pricing, and the forecast of credit ratings via deep learning methodologies. In essence, the primary emphasis lay on credit risk assessment, capital demands, and financial stability evaluation.

The second cluster comprises journals such as the Journal of Bank Marketing, Journal of Marketing, Journal of Service Marketing, and Journal of Marketing Research. This cluster indicates that these journals have published studies investigating the impact of fintech services on

consumer adoption, awareness, and behavior. In other words, these journals have focused on examining how the implementation of AI/ML in fintech and banks influences customer behavior, adoption rates, awareness levels, and overall customer experience. This insight gained from co-citation analysis highlights the specific research area within the domain of AI/ML in fintech and banks that has been explored and discussed in these journals.The primary impediment in the adoption of robo-advisors is lack of awareness about financial technology, ignorance on customer's part (Kraiwanit et al., 2022) and mapping of requirements without biases. Adding further, the customer is less likely to rely on AI-enabled technology for high involvement decision situation, one of the major factor is trust that influences customer's behavior (Northey et al., 2022). Cluster 3 exhibits the co-citation of journals such as Decision Support Systems, Review of Financial Studies, Sustainability, and Expert System Applications. This co-citation pattern suggests the emergence of interdisciplinary research in the domain of AI/ML in fintech. These journals indicate a convergence of various disciplines, showcasing the collaborative exploration of AI/ML applications in the context of finance and sustainability. Quijano-Sanchez & liberatore (2022) explained how decision support system can be used by the managers to reach the customer to achieve the designed target.

3.2.2 Co-Citation Analysis of Authors

Author Co-citation analysis aims to uncover the connections between co-cited authors and map the knowledge domain (McCain, 1990). In Figure 8, the network of authors and their co-citation relationships is depicted. Through ACA, we have identified two distinct intellectual structures that have emerged in the AI/ML domain of fintech and banks. The authors represented by green nodes are associated with research on the adoption of AI in banking services and customer acceptance of AI. On the other hand, the authors represented by red nodes are interconnected through their work on credit risk management and analysis in banks and fintech, the application of deep learning models in forecasting financial market trends, and the exploration of risks and challenges posed by artificial intelligence. This analysis provides meaningful insights into the intellectual landscape of AI/ML research in the context of fintech and banks based on author co-citation patterns.

Fig. 8 Author Co-Citation Analysis
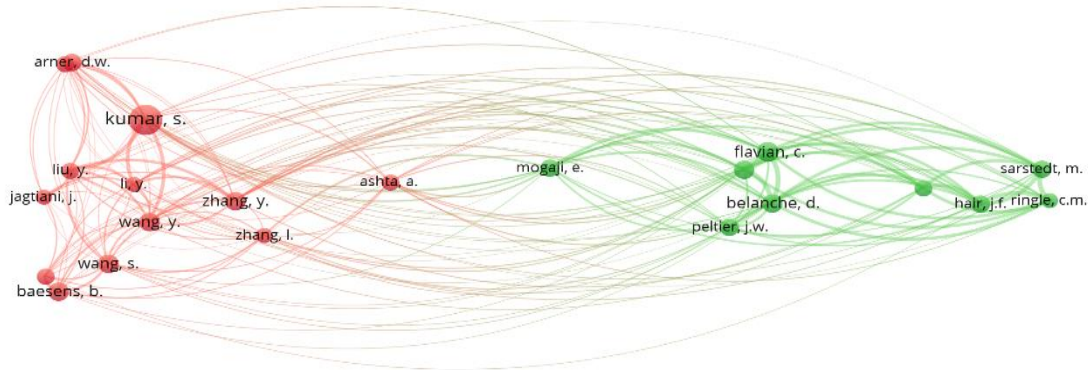
Source: Authors compilation

3.2.3 Word Cloud Analysis

A word cloud is a visual representation that depicts the frequency of words in a given text. The size of each word in the image corresponds to its frequency in the analyzed material. Word clouds serve as a tool to identify the central themes in written text. In bibliometric studies, utilizing a word cloud allows researchers to assess the most prominent words, indicating the areas where most research efforts are concentrated. Moreover, smaller-sized words in the cloud suggest potential directions for future studies.

Figure 9 displays the most prominent words, such as Machine Learning, Risk Assessment, and Finance, which indicate the concentration of research in these areas. Conversely, smaller words like Credit Risk, Robotics, Decision Making, Banking Industry, and Financial Systems represent potential research areas that warrant further exploration.

Fig.9 Most Prominent Words

Source: Authors compilation

The findings from Fig. 10 indicate that the most popular research topics in the field of Artificial Intelligence and Machine Learning in finance are fintech, digital transformation, financial services, and credit risk. Currently, there is a notable trend favoring research in fintech, with digital transformation being the next prominent area of focus. Credit risk assessment and the impact of AI/ML on commercial banks are areas that are currently under-researched, but they hold significant potential for future exploration and scholarly attention. Further research papers and studies dedicated to examining credit risk assessment methodologies and the transformative effects of AI/ML on commercial banks would contribute to the maturation and advancement of these areas in the academic literature.

Fig.10 Most Trending Topics
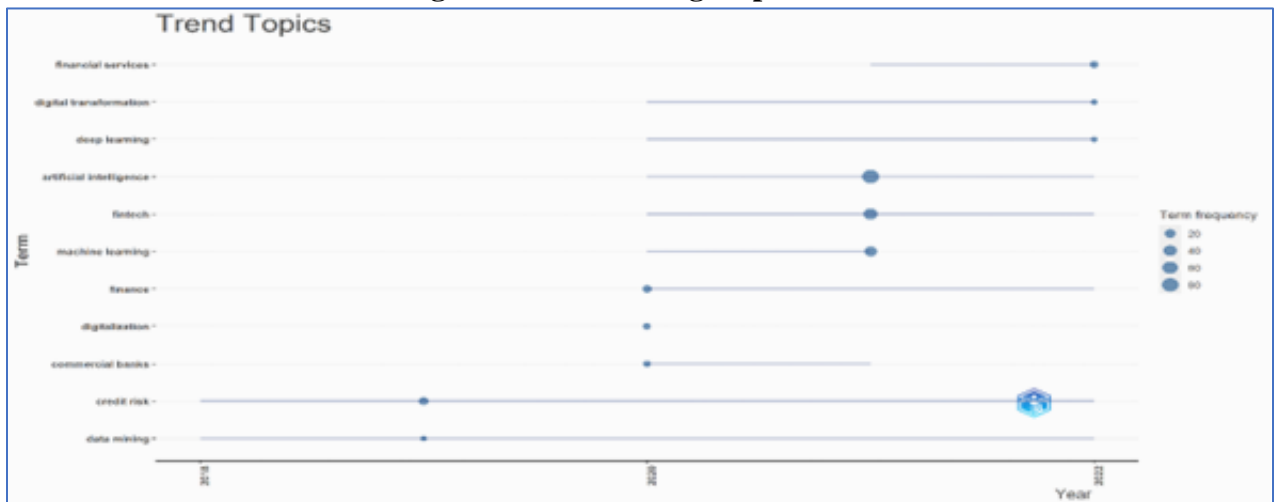
Source: Author compilation

3.2.4 Theme Cluster Analysis

We generated a visual representation using a minimum threshold of 5 for keyword co-occurrence. In the figure, each node represents a keyword, and its size corresponds to the frequency of its occurrence. Keywords are connected by lines if they appear together in an article, with the thickness of the lines indicating the frequency of their co-occurrence.

Fig. 11 Network of co-occurrence based on Author Keywords
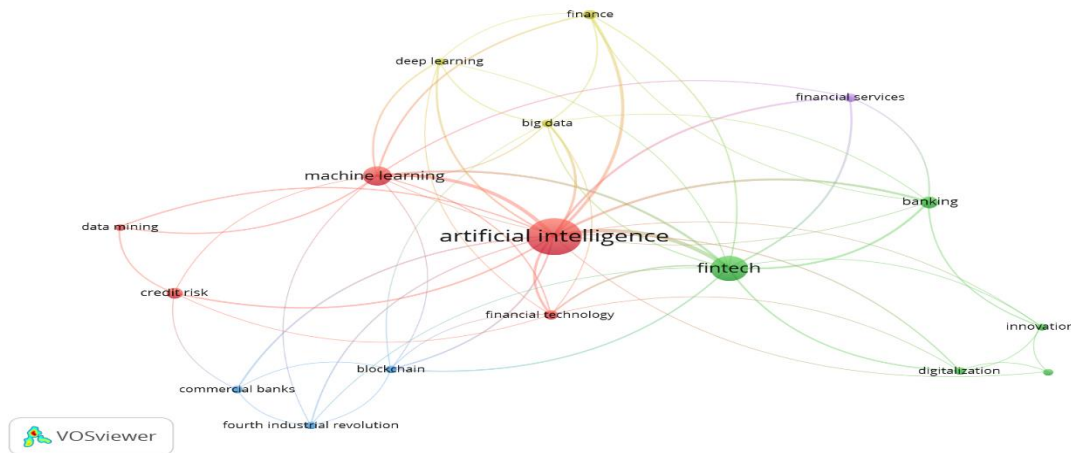
Source: Author compilation

Cluster 1: Applications of AI/ML. In recent years, there has been considerable amount of research on credit risk management in fintech and banks and credit default prediction using AI/ML techniques such as support vector machine, light gradient X-boost model, Soft voting fusion model, neural networks and decision tree. Furthermore, the ability of AI/ML to incorporate the alternative data i.e. soft information available from social media platforms has gained relevance in default prediction. Several research papers have highlighted Robo-advisor financial services, and AI-Chat bots are applications of AI in fintech companies.

Table 1. Cluster of Applications of AI/ML

Cluster 1	Typical Keywords	Purpose of the Study	Source
Applications of AI/ML in finance	Artificial Intelligence Credit risk Data mining	To propose an explainable Artificial Intelligence model that can be used in credit risk management and, in particular, in measuring the risks that arise when	Bussmann et al. (2021)

	Financial Technology Machine Learning	credit is borrowed employing peer to peer lending platforms	
		To apply machine learning techniques to predict the probability of recovery of credit transactions, providing a list of defaulting clients with greater potential for regularization of their operations.	Lopes et al. (2017)
		To examine from commodity portfolio managers' point of view the performance of liquidity adjusted risk modeling in assessing the market risk parameters of a large commodity portfolio and in obtaining efficient and coherent portfolios under different market circumstances.	Al Janabi (2022)
		To investigate the impact of machine learning and artificial intelligence in credit risk assessment using review approach and conceptual analysis.	Mhlanga (2021)
		To predict the credit ratings for the banks in Gulf Cooperation Countries. The quarterly dataset of the macro and bank specific variables was used for a period that spanned between the years 2010 to 2018.	(Li et al., 2020)

Source: Author findings

Cluster 2: Digital banking. Over the past decade, there has been a substantial increase in digital platforms globally, driven by internet accessibility and smartphone usage. This has facilitated the digitization of services and given rise to the concept of the digital economy. The financial services sector has experienced disruptions due to innovative advancements and a shift towards digital service delivery. Digital banking has become a more cost-effective and convenient option.

Table 2. Cluster of Digital Banking

Cluster 2	Typical Keywords	Purpose of the Study	Source
Digital banking	Banking Digital transformation Digitalization Fintech Innovation	To explore pertinent literature on digital servitization, service-dominant logic, and disruptive innovation.	Manser Payne et al. (2021)

		To Outline the implementation of digital transformation and strategies to respond to disruption in an Iranian specialized bank (Bank Maskan) using Delphi technique.	Naimi-Sadigh et al. (2021)
		To develop a realistic decision-support model by combining cognitive mapping and the decision-making trial and evaluation laboratory (DEMATEL) to deal with the challenges of incorporating artificial intelligence (AI), digital transformation and cybersecurity into the banking sector	Rodrigues et al. (2022)
		To understand the current stream of technology-based financial innovations and their main drivers, as well as discuss major strategic issues and its impacts	Gąsiorkiewicz et al. (2020)

Source: Author findings

Cluster 3. New age technology in banks. The rise of private cryptocurrencies has brought the term 'blockchain' into the spotlight. These crypto platforms are built on blockchain technology, which has gained significant importance due to its groundbreaking features and extensive applications for commercial banks and audit firms. Furthermore, the fourth industrial revolution has become increasingly relevant in sectors such as manufacturing, healthcare, and the financial services industry. IR 4.0 has reduced the cost of operation, improved business efficiencies, and created competitive advantage in various industry.

Table 3. Cluster of new age technology in banks

Cluster 3	Typical Keywords	Purpose of the study	Source
New age technology in banks	Blockchain Commercial banks 4th Industrial revolution	Examine the impact of Industry 4.0 technologies on consumer well-being across key sectors: healthcare, education, financial services, manufacturing, and retail. How AI integrates financial data with tech capabilities, speeding up the digital	Boninsegni et al. (2022)

		transformation of finance and accounting, potentially fostering a safer business and economic environment by minimizing human errors using blockchain technology	Mosteanu & Faccia (2020)
		How new and emerging technologies can contribute to achieving the financial goals of the private commercial banking sector in Bangladesh.	Rahman & Abedin (2021)

Source: Author findings

Cluster 4: Financial data analytics. The big data has offered abundance of information which can be used in financial areas. Text mining and social networks analysis can be used to predict the future trends in the area of finance. Deep learning is an advanced technique of machine learning and has gained significant importance in recent years. Deep learning applications are image recognition, audio-visual representation. In finance, deep learning model artificial neural networks are useful in stock market prediction, oil market price prediction and portfolio management. The most used author's keywords are Artificial Intelligence followed by fintech, machine learning, banking and finance. This indicates that most of the research so far is centered on AI, ML and its impact on fintech and banking. The keywords with the lowest usage include e-service quality, risk assessment, bankruptcy prediction, regtech, cyber security, and microfinance. This highlights the areas that lack sufficient research attention. Particularly, there is a noticeable scarcity of studies focusing on the role of AI in the fields of regtech and microfinance, as well as bankruptcy prediction. Future research efforts should be directed towards exploring how AI can effectively address cyber security risks and enhance e-service quality.

Table 4. Cluster of Financial Data Analytics

Cluster 4	Typical Keywords	Purpose of the study	Source
Financial data analytics	Big data Deep learning	To assess the application of AI to financial areas using news data over last three years of 2017 to 2019 to predict new opportunities in financial area with technologies in AI such as text mining.	Go et al. (2020)

	Finance	Applying newly developed deep learning (DL) networks addresses the challenge of handling complex financial data that traditional models may struggle with. To predict the credit ratings for several IT companies in India based on their Financial risk, Business risk, Industrial risk, and Macroeconomic environment using various neural network models (Deep Learning Models)	Huang et al. (2021) Pol & Ambekar (2022)

Source: Author findings

4. Discussion

The bibliometric analysis offers an all-encompassing examination of the scholarly research pertaining to the advancement of AI/ML in the domains of fintech and banks. The findings of this study has significant theoretical and practical implications within this field. In this section, we will provide the answer to our final research question (RQ).

4.1.1 Theoretical Implications

Our research has produced several significant theoretical implications. Firstly, this study contributes to the existing literature on the integration of artificial intelligence in fintech and finance. Specifically, it examines the application of AI/ML within the context of fintech and banks and traces its emergence in finance and business management journals. The bibliometric analysis focuses on the noteworthy developments that have occurred between 2012 and 2022. Furthermore, the current body of research primarily revolves around the rise of AI applications such as Chatbots, robo-advisor financial services, credit risk assessment in P2P lending platforms, accounting fraud detection, as well as the associated risks and challenges faced by fintech platforms.Hence, future research is required in exploring the broader implications and potential disruptions brought about by AI applications in the fintech landscape. This could encompass investigations into the long-term societal and economic impacts of AI-driven fintech, the ethical considerations surrounding AI decision-making, the optimization of AI-powered customer experiences, and strategies for mitigating risks associated with AI-enabled financial services.

Second, the current body of research primarily centers on the implementation of AI in fintech companies. However, we propose that there should be a greater emphasis not only on exploring

the applications of AI/ML in financial services but also on empirically measuring the impact of AI/ML on the real economy and jobs related to financial sector.This entails exploring not only the various applications of AI/ML within financial services but also conducting rigorous empirical studies to quantify and assess the tangible effects of AI/ML on the overall economy and the specific job roles within the financial industry.Furthermore, understanding the potential disruptions caused by AI/ML adoption, identifying avenues for upskilling and reskilling the workforce, and formulating strategies to mitigate any adverse impacts on employment should be central to future research endeavors in this field.

Third, from a methodological perspective, the bibliometric analysis is a proficient method of dealing with large amount of literature data, however, it falls short in terms of deeply engaging with the primary literature, which is an important advantage of the literature review method. On the other hand, literature review method has its limitations in handling large amount of literature data. Integrating the bibliometric analysis with a systematic literature review presents a superior approach to uncovering the most significant theoretical gaps in the current literature and identifying potential avenues for bridging these gaps.Further exploration is needed to refine the techniques for seamlessly combining these approaches, allowing for a more comprehensive understanding of the literature landscape. By doing so, researchers can better identify critical theoretical gaps and formulate more targeted avenues for future research, thus contributing to a more robust and insightful advancement of knowledge in the field.

4.1.2 Implications for Policy Makers

Our findings offer valuable insights that hold considerable importance for policymakers.In the past decade, there has been a notable expansion in fintech platforms and the digitalization of financial services. It is crucial for governments to prioritize digitalization and leverage it as a tool to promote financial inclusion and bridge the gap between households and small and medium enterprises (SMEs).

The rapid expansion of fintech platforms places an increased responsibility on the government, necessitating the establishment of a regulatory framework to oversee and supervise these platforms. The absence of proper regulations may result in exponential growth in fintech platforms (Crypto currency and P2P lending platforms) which may make the financial system more fragile. The commercial banks need to undergo a transformative shift in their traditional business model to keep pace with the rapidly evolving fintech platforms. Bank should use

machine learning techniques to identify fraudulent transaction, mitigate the negative consequences of asymmetric information and ultimately creating more value for the customers and stakeholders.

4.2 Future Research Directions

Our work serves as a valuable guide for researchers who are interested in conducting research related to AI/ML in the field of finance. Four theme clusters are obtained through content analysis. Hot themes are identified in Table1-4 and Fig. 9. We have also identified the research gaps in the present literature. Our research findings are expected to motivate researchers to delve into the challenges encountered by banks in adopting AI technology. Additionally, we encourage further investigation into the potential applications of blockchain technology in banks to prevent accounting manipulations and impact of crypto currency platforms on financial stability of an economy. Furthermore, exploring the monetary implications of AI technology in financial institutions is another area that warrants research attention. Also, the future research should be on investigating role of fintech firms in promoting financial inclusion in emerging and less developed economy for overall economic development. Further investigation by scholars is necessary to explore the efficacy of financial data analytics utilizing deep learning techniques for accurate prediction of oil prices, stock market indices, and firm bankruptcy.

4.3 Limitations of the study

Every study inherently possesses limitations, and this research is no exception. Firstly, it retrieves bibliometric data solely from Scopus, limiting the inclusiveness of the findings. Employing multiple databases enhances the robustness of results. Secondly, the sequential nature of the content analysis approach may lead to the oversight of intricate patterns and introduces a potential bias.

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