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The Fintech and Digital Transformation Trends in the Banking Industry: A Bibliometric Analysis

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ABSTRACT

The integration of financial technology (Fintech) is catalyzing significant digital transformation in global banking; this research employs bibliometric analysis to map the academic discourse over the past two decades. Utilizing a dataset of 1040 articles from Scopus and Web of Science, the study applies bibliometric techniques to assess scientific productivity, key authors, influential papers, prominent institutions and nations, keyword co-occurrence, thematic mapping, co-citations, and collaboration patterns. Findings indicate that 2023 is the peak year for publications (201 articles), China leads in productivity, Southwestern University of Finance and Economics is the foremost institution, the International Journal of Bank Marketing is the most influential journal, Finance Research Letters and Sustainability are the most productive journals, and "The Economic Effects of Technological Progress: Evidence from The Banking Industry" is the most cited paper, alongside the identification of four core thematic clusters. The study outlines the current research landscape and suggests future research avenues in Fintech and digital banking.

***Keywords**: Fintech, Digital Transformation, Banking Sector, Bibliometric Analysis, Digital Banking*.

Introduction

Technology has become essential to modern business, enhancing service delivery, reducing costs, and improving efficiency (Abdullah et al., 2011; Wen & Altankhuyag, 2019). Fintech innovations like blockchain and digital payments are pushing traditional banks to reassess their models in a rapidly evolving digital landscape (Gomber, 2017). To stay competitive, banks must embrace digital transformation through tools such as AI, big data, cloud computing, and mobile banking, which have redefined customer engagement by enabling personalized services (Fernández-Rovira et al., 2021). These technologies also strengthen efficiency, cost control, and risk management (Rajagopal, 2010; Vergallo& Mainetti, 2022). The COVID-19 pandemic accelerated this shift, with changing consumer preferences driving adoption of online services and expanding financial inclusion, especially in rural and underserved areas (Karthika, 2022).

Fintech, AI, and ML have transformed banking by enabling greater personalization, efficiency, and real-time decision-making. AI applications in credit scoring, fraud detection, and risk management have improved accuracy and reduced operational costs, while boosting customer satisfaction (Ngai et al., 2011; Rani & Kumar, 2023). The rise of Fintech has sparked increased academic interest in digital transformation, emphasizing its strategic role in market disruption, financial inclusion, and regulatory challenges (Lee & Shin, 2018; Thakor, 2020). Fintech integration has also strengthened risk management and liquidity, enhancing banks' ability to support the broader economy (Fang et al., 2023).

Background of Fintech and digital transformation in banking industry

FinTech, a fusion of finance and technology, refers to the integration of advanced technologies such as big data, blockchain, cloud computing, and artificial intelligence. Services like e-banking and digital banking fall under its broader scope. As noted by Drasch and Schweizer (2018), traditional banks increasingly collaborate with FinTech firms to develop digital banking solutions, streamline payment systems, and offer real-time services. FinTech plays a crucial role in enhancing operational efficiency and

fostering economic growth. It has attracted considerable attention from researchers, industry stakeholders, and the public (Goldstein, 2019; Thakor, 2020). With its rapid expansion, the banking sector—especially the capital market has significantly increased investments in FinTech initiatives (E. Li et al., 2023). To keep pace, banks must cultivate an innovation-driven culture and remain agile in adapting to changing market conditions (Naimi-Sadigh, 2022). Emerging technologies like AI, big data, cloud computing, natural language processing, chatbots, and data analytics are now central to banking operations, helping institutions become more data-driven and customer-focused (Indriasari et al., 2022).

Research gap

Research on Fintech and digital transformation in the banking sector remains limited in scope. For instance, Raval and Desai (2024) conducted a bibliometric analysis using 574 Scopus-indexed articles from 2011 to 2022, but their study focused solely on one database. Similarly, Asif et al. (2024) explored the impact of Fintech, but restricted their analysis to risk-related aspects. In contrast, the present study adopts a broader approach, incorporating diverse Fintech-related keywords and examining the evolution of financial technology across multiple time periods. By utilizing both Scopus and Web of Science databases, this research offers a more comprehensive overview of Fintech and digital transformation trends in the banking sector.

Bibliometric Research Methodology

- **Defining the Appropriate Search Terms**

This study integrates two interdisciplinary domains: Financial Technology (FinTech) and the Banking Sector. To ensure comprehensive literature coverage, it was essential to include keywords representing both fields. Table 1 presents the keywords and search strings used for retrieving documents from the Scopus and Web of Science databases. Following a preliminary analysis, the author identified relevant FinTech-related terms such as Fintech, Financial Technology, e-banking, Digital Finance, Internet Finance, Digital Banking, Mobile Banking, Digital Innovation, and Digital Transformation. For the banking sector, keywords included Commercial Banks, Banking Industry, and Banking Sector.

Table 1: Article Inclusion and Exclusion Criteria

Filtering Criteria	Scopus		Web of Science	
	Exclude	Include	Exclude	Include
Criteria Search Date: 25-08-2024 Search Engine: Scopus & WOS Database Search Term: ["Fintech" OR "Financial Technology" OR "e-banking" OR "Digital Finance" OR "Internet Finance" OR "Digital Banking" OR "Mobile Banking" OR "digital innovation" OR "Digital transformation"] AND ["commercial bank " OR " commercial banks" OR "banking industry" OR "banking sector"]	-	1,772	-	426
Publication type: Journal only	652	1,120	11	415
Year 2000 – 2024	1	1,119	-	-
Document type: Articles only	51	1,068	42	373
Language: English Only	31	1,037	2	371
Publication Stage: Final Only	50	987	-	371
Total Articles (Scopus + WOS)	987 + 371 = 1,358			
Duplicate Articles removed	1,358 – 310 = 1,048			
Quality Screening: Include documents in journals ranked “A*”, “A” or “B” in the Australian Business Deans Council (ABDC) 2022 Journal Quality List only	1,048 – 407 = 641			
Final Articles Selected	**N = 641**			

Note(s): This table presents the systematic method used to identify the final corpus of (641) papers that are considered for evaluation.

- **Data Collection**

This study conducted a bibliometric analysis using data from Scopus and Web of Science (WoS)two leading databases for peer-reviewed research. Data was collected on September 5, 2024, using keywords related to Fintech (e.g., *Fintech, Digital Finance, Mobile Banking*) and the banking industry (e.g., *commercial banks, banking sector*), yielding 987 papers from Scopus and 371 from WoS. After limiting results to English-language publications, and merging datasets in R-Studio, 310 duplicates were removed. The final dataset comprised 641 journal articles published between 2000 and 2024. For analysis, the study used VOSviewer, a Natural Language Processing-based tool, to generate bibliometric

maps through keyword co-occurrence and author/journal co-citation, providing visual insights into research patterns and thematic structures.

- **Selection of Technique for Analysis**

This study applied bibliometric analysis, a quantitative approach that provides deeper insights than traditional literature reviews (Donthu et al., 2021). Following Donthu's four-stage framework scope definition, method selection, data collection, and reporting the research traced the evolution of digital banking in Fintech. Key techniques included co-word analysis for topic mapping (Andersen, 2021; Cheng et al., 2018; Pattnaik et al., 2020; Zupic&Čater, 2015), co-citation analysis to identify core literature (Small, 1973; Klavans & Boyack, 2016), and bibliographic coupling for detecting thematic clusters (Andersen, 2021; Waltman, 2010). The Louvain algorithm (Blondel et al., 2008) was used to measure modularity (Q), which reflects the strength of cluster separation within a network. High modularity ranging from -0.5 to +1 indicates strong internal cohesion and weak external links, especially valuable in weighted networks such as citation or keyword co-occurrence.

$$Q = \frac{1}{2}\sum_{ij}\left[A_{ij} - \frac{k_i k_j}{2m}\right]\delta(ci, cj)$$

Where; A_{ij} is the weight between nodes *i* and *j*; k_i is the total weight connected to node *I*; c_i and c_j represent the community assignment of nodes *i* and *j*; $\delta(ci,cj)$ is an indicator function (1 if nodes are in the same community, 0 otherwise)and $m = \frac{1}{2}\sum_{ij} A_{ij}$, the total sum of all edge weights.

The Louvain method, which is commonly used for detecting communities in large networks, works by initially assigning each node its own community. Then, it iteratively evaluates the change in modularity (QΔQ) as nodes are moved between communities to maximize modularity.The change in modularity is calculated using:

$$\Delta Q = \left[\frac{\sum_{in} + 2_{i,in}}{2m} - \left(\frac{\sum_{tot} + k_i}{2m}\right)^2\right] - \left[\frac{\sum in}{2m} - \left(\frac{\sum tot}{2m}\right)^2 - \left(\frac{k_i}{2m}\right)^2\right]$$

Where$\sum_{in}$ is the total weight of the links within the community; $\sum_{tot}$ is the total weight of links to the community nodes; k_i is the degree (total weight of links) of node*i*; $k_{i,in}$ is the sum of weights connecting node iii to nodes in the same community. Modularity helps in identifying communities within a network, and algorithms like the Louvain method are designed to progressively optimize modularity by iteratively adjusting community assignments based on maximizing the modularity score.

Findings

- **Performance analysis of Fintech and Digital Transformation in Banking Sector**

Figure 1 illustrates the growth of academic publications on Fintech and digital transformation in banking from 2000 to 2024. The analysis indicates a bimodal pattern with limited publications prior to 2018, peaking at 37 annually from 2010 to 2017. A significant increase in productivity occurred after 2018, reaching a high of 201 publications in 2023. This shift is divided into two periods: a pre-pandemic phase (pre-2019) with minimal scholarly activity and a post-2019 phase driven by the COVID-19 pandemic, which accelerated digital payment innovations. Subsequent peaks in publications were observed (2022: 171; 2021: 103; 2020: 100; 2019: 70), with 182 publications noted by Q3 2024, constituting 91% of 2023's output and reflecting ongoing research vigor.

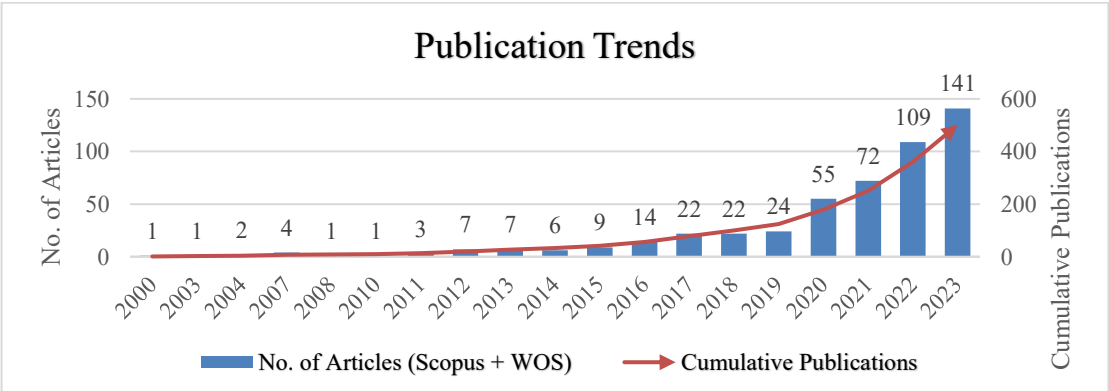

Figure 1: Publication trends of Fintech & Digital Transformation in banking sector

- **Top authors, institutions and countries of Fintech in Banking sector**

Table 2 highlights key contributors to Fintech and banking-sector digital transformation research, ranking authors, institutions, and countries by impact and output. Berger A leads in citations (335), followed by Yadav M (306), while Wonglimpiyarat J is the most prolific with three publications. Among institutions, Southwestern University of Finance & Economics (China) and Texas A&M University (USA) stand out with 552 and 306 citations, respectively. Xi'an Jiaotong University (China) is the most productive, contributing seven articles to the field.

Table 2: Most Influential authors, Institution and countries of Fintech in Banking Sector

TC	Author	TP	TC	Institution	TP	TC	Country	TP
335	Berger A	1	544	Texas A&M University (U.S.A)	1	1772	U.S.A.	14
306	Yadav M	1	336	Southwestern Univ Finance & Econ. (China)	4	815	Lebanon	9
283	Kolodinsky J	1	306	University Lahore (Pakistan)	3	609	France	9
261	Al-Jabri I	1	306	University Minnesota (U.S.A)	1	446	China	110
242	Kou G	1	306	University Of Bradford (England)	1	411	Viet Nam	21
232	Singh S	2	283	Federal Reserve Board (U.S.A)	1	381	Finland	7
178	Garg P	1	283	Xi AN Jiao Tong Univ (China)	7	294	South Korea	12
162	Lee C	1	266	King Fahd Univ Petr & Minerals (Saudi Arabia)	2	290	Turkey	6
150	Farah M	1	257	Istanbul Medipol University (Turkey)	2	286	Taiwan	14
149	Cheng M	2	242	KOC University (Turkey)	1	267	Italy	21

Note(s): TC=Total Citations; TP= Total No. of Article(s) Publication. In this table, the research constituents (author, institution, and nation) are arranged based on the total number of citations.

- **Most Influential Journal for Fintech Development in Banking Sector**

Table 3 ranks the top journals in banking-sector FinTech research by citation impact and publication count. The International Journal of Bank Marketing leads with 1,104 citations, followed by Financial Innovation at 556. By output, Financial Research Letters and Sustainability each publish 25 articles. A temporal assessment shows that 85% of these high-profile journals carry 'A*', 'A', or 'B' grades in the 2019 ABDC list, highlighting strong scholarly engagement with digital banking topics (Baker, 2021; Pattnaik et al., 2020). Overall, these patterns signal a mounting academic emphasis on FinTech-driven banking transformation.

Table 3: Most Influential Journal for Fintech Development in Banking Sector

Journal	TC	ABDC	Fin.	TP	2000-08	2009-16	2016-24
International Journal of Bank Marketing	1104	A	x	21	2	1	18
Financial Innovation	556	B		11	-	1	12
Sustainability	354	B		25	-	-	26
Journal of Money, Credit and Banking	335	A*	x	1	1	-	-
Technological Forecasting and Social Change	310	A		4	-	1	3
Journal of Marketing	306	A*		1	1	-	-
Finance Research Letters	288	A	x	25	-	-	25
Journal of Electronic Commerce Research	261	B		1	-	1	-
Research In International Business and Finance	260	B	x	15	-	-	15
International Review of Financial Analysis	238	A	x	11	-	-	11

Note(s): ABDC= Australian Business Dean Council 2022 Ranking List, TC=Total Citations; TP= Total number of article(s) publications; Tech.= x if journal is classified as "Technology", Fin.= x if journal is classified as "Finance" by the 2022 Academic Journal Guide

- **Top articles on Fintech and Digital Transformation in Banking Industry**

Table 4 shows the top-cited articles on fintech and digital transformation in the banking industry.The most significant and influential paper is Berger (2003)'s article "The Economic Effects of Technological Progress Evidence from The Banking Industry", which has the most citations in both Scopus and WOS (335). Yadav (2007) is the second most influential article, with 306 citations.Berger (2003) investigated how developments in financial technologies and information technology (IT) have affected lending capacity, costs, and overall productivity in banking using statistical analysis, case studies, and microeconomic analysis.

Table 4: Top articles on Fintech and Digital Transformation in Banking Industry

Author	Title	TC
Berger 2003	The Economic Effects of Technological Progress Evidence from The Banking Industry	335
Yadav, 2007	Managing The Future CEO Attention and Innovation Outcomes	306
Kolodinsky, 2004	The Adoption of Electronic Banking Technologies by US Consumers	283
Al-Jabri 2012	Mobile Banking Adoption Application of Diffusion of Innovation Theory	261
Kou 2021	Fintech Investments in European Banks A Hybrid IT2 Fuzzy Multidimensional Decision-making Approach	242
Garg 2021	Measuring The Perceived Benefits of Implementing Blockchain Technology in The Banking Sector	178
Lee 2021	Does Fintech Innovation Improve Bank Efficiency Evidence from China's Banking Industry	162
(Farah, 2018)	Mobile-banking Adoption Empirical Evidence from The Banking Sector in Pakistan	150
(Cheng 2020)	Does Bank Fintech Reduce Credit Risk? Evidence from China	145
(Singh 2018)	Predicting The Intention to Use Mobile Banking in India	132

Note(s): TC=Total Citations

- **Top reference on Fintech and Digital Transformation in Banking Sector**

Based on both local and global citations, Table 5 identifies the top references for Fintech and digital transformation research articles in the banking industry. It will provide us a chance to highlight important papers that might have skipped our initial search because they covered specific topics or subjects not related to fintech.Local citations show the frequency with which another article in the banking sector's Fintech and digital transformation research cites a certain article.global citations, on the other hand, show how frequently an article appears that might not be related to Fintech or the digital transformation of the banking sector.

Table 5: Top reference on Fintech and Digital Transformation in Banking Sector

LC	Author	Title	GC	LC/GC Ratio (%)	Normalized LC	Normalized GC
3	Aldiabat, (2019)	The Effect of Mobile Banking Application on Customer Interaction in The Jordanian Banking Industry	22	13.64	70.00	0.87
1	Lee,(2023)	Fintech Development and Commercial Bank Efficiency in China	15	6.67	195.00	2.26
1	Diener, (2021)	Digital Transformation in Banking: A Managerial Perspective on Barriers to Change	79	1.27	99.00	2.98
1	Wadesango,(2020)	The Impact of Digital Banking Services on Performance of Commercial Banks	14	7.14	96.00	0.81
1	Al-Jabri, (2012)	Mobile Banking Adoption Application of Diffusion of Innovation Theory	356	0.28	15.00	10.11

Note(s): LC= Local Citations; TC=Total Citations; GC=Global Citations

With three citations, Aldiabat, (2019) is the most influential author among the top local cited articles. In terms of global citations with 356 citations, Al-Jabri and Sohail (2012) is the most influential author.

- **Knowledge foundations of Fintech & Digital Transformation in Banking Sector through co-citation analysis**

Co-citation analysis uncovers semantic links between studies to reveal a field's core knowledge base (Donthu et al., 2021; Small, 1973). In digital banking, however, few studies address practical barriers to adopting disruptive technologies. To fill this gap, Diener and Špaček (2021) conducted interviews with German bank managers, using inductive content analysis and best practice reviews. They identified four primary barriers strategy and management, technology and regulation, customers, and employees and three secondary ones market knowledge, stakeholder participation, and public benefit. A co-citation map further revealed four key research clusters, led by Venkatesh and Alalwan (red), Davis, Pikkarainen, Luarn, and Rogers (purple), Buchak and Hu (green), and Buchak (pink), each reflecting a distinct FinTech-banking research stream.

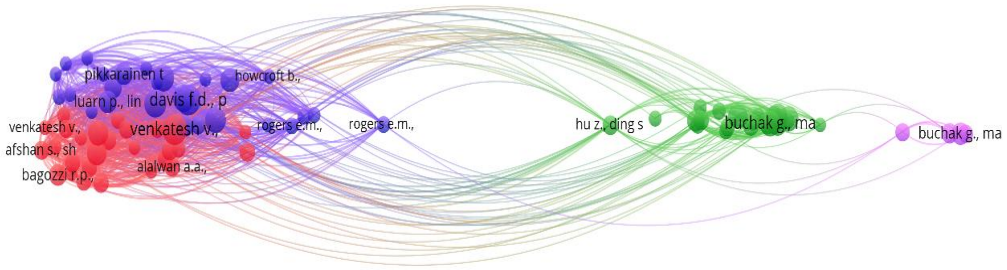

Figure 2: Co-citations of references cited by articles on Fintech & Digital transformation in Banking Sector

- **Thematic and influence structure analysis through bibliographic coupling**

Cluster 1 focuses on the influence of digital finance and Fintech on bank performance, combining empirical evidence across key dimensions. Li et al. (2023) find that digital finance lowers financial barriers especially for SMEs and private firmsby reducing friction and information asymmetry, thus improving access to both internal and external funding. Hu et al. (2019) highlight that factors like user innovation, government support, and brand image promote Fintech adoption by building trust, while perceived risk undermines it.

Figure 3: Co-citations of references cited by articles in Fintech and digital transformation in banking sector

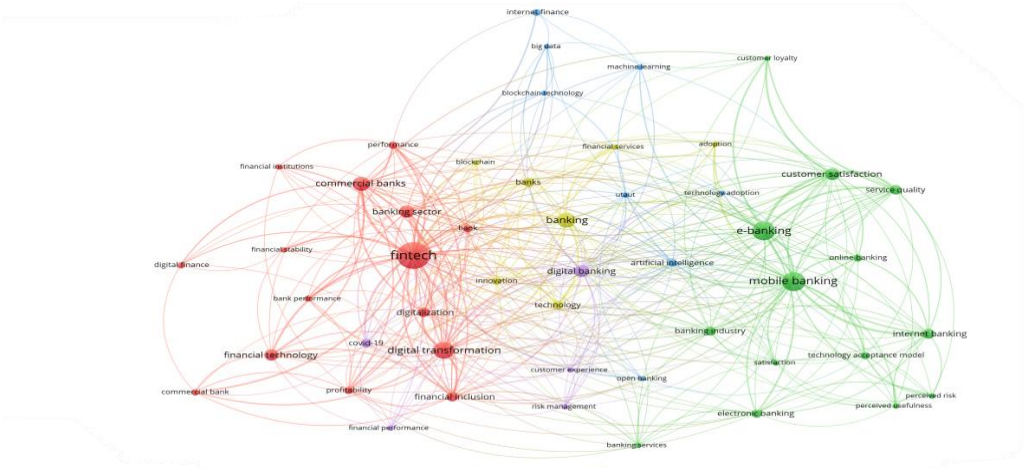

Table 6: Thematic Cluster of Fintech & Digital Transformation in Banking Sector

Theme	Author(s)	Title	TC
Impact of Digital Finance & Fintech on Bank Performance	C. Li (2023)	Digital Finance and Enterprise Financing Constraints Structural Characteristics and Mechanism Identification	54
	Hu et al. (2019)	Adoption Intention of Fintech Services for Bank Users an Empirical Examination with An Extended Technology Acceptance Model	174
E-Banking & Customer Satisfaction	Kolodinsky (2004)	The Adoption of Electronic Banking Technologies by Us Consumers	283
	Jahangir (2008)	The Role of Perceived Usefulness Perceived Ease of Use Security and Privacy and Customer Attitude to Engender Customer Adaptation in The Context of Electronic Banking	113
Artificial Intelligence &Technology Adoption	Lee & Chen (2022)	Exploring Users Adoption Intentions in The Evolution of Artificial Intelligence Mobile Banking Applications the Intelligent and Anthropomorphic Perspectives	81
	Rahman (2023)	Adoption Of Artificial Intelligence in Banking Services an Empirical Analysis	34
Blockchain & Adoption of Financial Service	Garg et al. (2021)	Measuring The Perceived Benefits of Implementing Blockchain Technology in The Banking Sector	178
	Khalil, (2022)	The Adoption of Blockchain Technology in The Financial Sector During the Era of Fourth Industrial Revolution a Moderated Mediated Model	43

Note(s): TC=Total Citations

Cluster 2 explores the drivers of e-banking adoption and factors shaping customer satisfaction. Kolodinsky et al. (2004), using U.S. data from 1999–2003, identified that higher education and income levels significantly increased the likelihood of adopting phone banking, PC banking, and automated bill payment (ABP). ABP saw quicker adoption than PC banking due to its simplicity and lower perceived effort. Overall, technologies perceived as easy to use and low-risk experienced greater acceptance.

Cluster 3 focuses on AI adoption and technological innovation in banking. Lee & Chen (2022), using the SOR framework and data from 451 users, found that AI features like anthropomorphism and perceived intelligence boost adoption by enhancing trust and task-technology fit, while reducing perceived risks and costs. Rahman et al. (2023) highlighted AI's strategic role in Malaysian banks for risk control, fraud prevention, and customer service. However, challenges like skill shortages, privacy concerns, and regulatory issues hinder adoption, with perceived usefulness and social influence emerging as stronger adoption drivers than ease of use.

Cluster 4 centers on blockchain and its role in financial service adoption within banking. Garg et al. (2021) propose a structured framework to help banks assess blockchain's impact prior to implementation, emphasizing benefits such as faster, more secure transactions, improved compliance, and enhanced risk management. Khalil et al. (2022) examine how blockchain mediates the link between digital strategy, process innovation, and financial performance in Pakistani banks. Their findings show that blockchain adoption, especially when supported by strong IT alignment, significantly boosts innovation and financial outcomes.

Table 7: Methods of measurement of Fintech and digital transformation in banking sector

Technique	TP	TC
Text Mining	18	101
Sentiment Analysis	3	13
Content Analysis	12	185
No. of Patents	11	158

Note(s): NP = Net Publications, TP = Total Citations

Table 8 presents a cross-tabulation of frequently examined Fintech and digital transformation techniques to solve various banking sector problems.findings from the previous sections are used to identify the issues in Table 8.

Table 8: Fintech and digital transformation techniques used to solve various issues of banking sector

Topic	TP	TC	Fint.	ML	AI	Big Data	Blockchain	Cloud Com.	Chatbot
Banking Services	850	11,144	187	18	12	12	15	4	2
Lending/Credit	47	602	22	3		2	1		
Customer Satisfaction	40	641	1	1	1			1	2
Covid-19	35	359	7						1
Internet Finance	19	337						1	
Cyber Security	3	10			1				
ESG	2	5	2						
Fraud Detection	2	0		1	1				

Note(s) TP = Total Publications, TC = Total Citations, Fint. = Fintech ML=Machine Learning, Cloud Com.=Cloud Computing, ESG = Environment Social Governance

Suggestions for future research

- **Fintech, Artificial Intelligence, blockchain and banking services**

Fintech's integration of cloud computing, blockchain, and artificial intelligence is transforming financial services by enabling scalable, secure, and efficient solutions (Renduchintala et al., 2022). Analysis of publication trends (Table 8) reveals 85 banking-related studies, with Fintech dominating (187 publications), followed by machine learning (18), AI (12), big data (12), blockchain (15), cloud computing (4), and chatbots (4).. However, research remains limited on these technologies, particularly regarding AI/ML's impact and blockchain's diverse applications. Recent studies confirm AI in banking services as an emerging priority, spanning robotics, NLP, chatbots, neural networks, machine learning, and data mining.

- **Fintech and Lending and Credit**

Table 8 indicate that total 47 articles are published for lending and credit out of which 22 are based on fintech, 3 on machine learning, 2 on big data and 1 is on blockchain technology. It indicates that new technologies are working in the field of banking sector to offer better lending services. Further research is required to ascertain various risk associated such as liquidity risk, credit risk, operational risk, market risk in lending through financial technology platforms. More research is required to find out the liquidity creation capacity of fintech platforms.

Table 9: Statistical techniques used for fintech and digital transformation in banking sector

Technique	Logistic Regression	Panel Data	GMM	Linear Regression	Machine Learning	Deep Learning
Credit Risk		1	1			
Fintech		23	7	5		
Covid-19		3	2		1	
Market Risk		1	1			
Financial Inclusion		3	6			
Fraud Detection				1	3	
Digital Transformation		3	4	2	2	
Banking Services	1	2		2		
Sustainable Development						1
Finance		4	2	2		
ESG		1		1	1	
Customer Satisfaction	2			3	1	
Digital/Internet Finance		3	2	1	1	
Financial Performance		2		1		
Lending/Credit		3	1	1	3	
Mobile Banking	1	1		1	3	1
Crowd Funding				1		
Artificial Intelligence					2	
E-Banking	1	3		2	5	1

Note(s):GMM = Generalized Methods of Moments

Conclusion

Bibliometric analysis can provide insights into the creation of collections, characterize the citation patterns and strengths of institutional scholarship, and identify clear networks of schools of thought that are co-cited.The research trends, theme evolution, and significant fintech and digital transformation studies in the banking industry have all been visually represented in this study. The largest database of biographies, Scopus and Web of Science, were used for data extraction and analysis. The research development and themes of fintech and digital transformation research in the banking sector for different periods have been presented in the study. The research journey of fintech and digital transformation in the banking sector, as well as future research directions for researchers, are discussed in this article.To provide policymakers and practitioners better insights, researchers can conduct a study on the emerging field of fintech and digital transformation in banking sector. The current study has so helped to clarify the development of fintech and digital transformation research in the banking industry, in addition to its newly emerging disciplines and future research directions.

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