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Digitalization of Financial Services in India: A Bibliometric Analysis of Fintech Services

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Abstract

Fintech is a growing concept in the financial sector. It provides alternatives to non-banking financing services and conventional banking. Fintech businesses provide users with safer digital transactions. The benefits of fintech services include ease of usage and reduced operational expenses. India's market for fintech services is expanding at the quickest rate in the world [1]. The purpose of this study is to use bibliometric analysis to gain insight into how FinTech research in India has evolved. The investigation comprised 329 publications published in India between 2015 and 2024. This study analyzed the most prolific authors, journals, sources, institutions, keyword analysis, co-citation analysis etc. Findings revealed a significant growth in publications in this field (50.84%). The most prolific author in terms of citations is Tiwari AK, whereas the most prolific author in terms of publication and index is Rabbani MR. The majority of the articles about fintech were released by "Journal of Risk and Financial Management". India has worked with several nations and published the most articles with the United States (6). This detailed analysis offers insights into the changing field of fintech research in India and is useful for scholars, practitioners, and industry experts. It also encourages more research in this exciting area of study.

Keywords: Fintech, Financial Technology, Scopus, Bibliometric Analysis, India.

Introduction

Financial technology, or fintech, first appeared during the financial crisis of 2007–2008 and has since revolutionised the financial services sector by introducing novel technologies to the market [2]. Fintech combines technology and financial services to provide creative solutions that can replace conventional banking practices. Fintech companies offer new financial goods and services. These include mobile banking, online payments, and digital lending, which have collectively transformed the way individuals and businesses interact with financial institutions [3]. By utilizing modern technologies like artificial intelligence, cloud computing, P2P technologies,

and big data analytics, they want to automate and speed up financial services including payments, lending, and investing [4]. Financial inclusion has been promoted by the incorporation of technology into financial services, which has increased efficiency and opened up access to previously disadvantaged groups [5]. Fintech enhances the user experience and streamlines the operations of financial institutions. Many Fintech businesses, such as Paytm (mobile payments), have been striving to become the one-stop solution for the typical consumer's essential requirements.

The digitalization of financial services in India has brought about significant advancements, but it also faces several challenges that hinder its full potential such as cybersecurity threats, limited digital literacy, inadequate infrastructure, regulatory compliance, language barriers, technical glitches, and consumer trust issues. The risks of data breaches and cyber fraud are growing along with the number of digital transactions. Reports indicate that India faced approximately 13.91 lakh cyber fraud cases in 2022, highlighting the vulnerability of digital financial systems to phishing, malware, and hacking attempts. Many users lack the necessary skills to protect themselves from such threats, exacerbating the issue of cybersecurity in digital finance ("Digital Transformation in the Financial Sector", n.d.). A significant part of the Indian population lacks digital literacy, which is crucial for effectively utilizing digital financial services. This gap is particularly pronounced in rural areas [7]. Most digital payment interfaces are primarily in English, which can alienate non-English-speaking users [8]. Digital payment networks may experience congestion during peak usage times, leading to delays or failed transactions [9]. Financial institutions face difficulties navigating the complicated regulatory environment as they work to comply with regulations pertaining to "Know Your Customer (KYC)" procedures, data protection, and "Anti-money laundering (AML)". The evolving nature of regulations necessitates continuous adaptation by service providers [10]. Many consumers exhibit resistance to adopting new technologies due to trust issues related to security and reliability. Building consumer confidence in digital financial systems is essential for widespread acceptance [11]. For India's digital financial ecosystem to be safer and more inclusive, government representatives, financial institutions, IT firms, and consumers themselves must work in collaboration.

The Indian government has contributed significantly to fostering the digitalization of financial services to achieve the goals of Digital India, and financial inclusion [12]. Initiatives like the "**Pradhan Mantri Jan Dhan Yojana (PMJDY)**" introduced in 2014 with the goal of connecting the public with the official banking system by making it easier for them to create bank accounts and issue debit cards. This program has resulted in the opening of over 53 crore new bank accounts, significantly increasing the volume of bank deposits [6]. The introduction of the "**Aadhaar**" biometric identification system has also streamlined identity verification processes, making it easier for individuals to access financial services [5]. The "**Digital India**" was introduced in 2015, further accelerating this transformation by promoting digital literacy and infrastructure development. It seeks to establish a knowledge economy and digitally empowered society, helping to build the US's estimated \$1 trillion digital economy by 2027–2028 [6]. In 2017, the Indian government announced to limit the issuance of paper money and introduced various successful fintech

products, including “Immediate Payments Service (IMPS), Unified Payments Interface (UPI), Bharat Interface for Money (BHIM), Bharat Bill Pay System (BBPS), and Aadhaar-enabled Payment System (AePS)”[13].

The finance technology sector in India is expanding quickly. China and India had the greatest adoption rates of fintech in emerging nations, at 87%, although the worldwide average acceptance rate in 2019 was only 64% (see Table I below). Furthermore, 96% of digitally engaged consumers in India are aware that fintech services are available for online payments and financial transfers[14].

Table 1: Top Countries in FinTech Adoption

Sr.	Percentage of adoption	Country
1.	87%	India, China
2.	82%	Russia, South Africa
3.	76%	Colombia
4.	75%	Peru
5.	73%	The Netherlands
Average adoption: 64%		

Source: EY Global FinTech Adoption Index 2019

Despite its increasing popularity, there is still a dearth of bibliometric research on fintech in India. Further study is required to offer a solid scientific foundation since, while being a rising aspect of technology, the topic is still in its infancy. Thus, this study analyses worldwide research activity to evaluate the topic's recent state using a bibliometric method. It also acts as a manual for new researchers who are attracted to this topic.

This research gap has led to the formulation of the following research question.

RQ1: What are the main trends and publication patterns in India's fintech literature?

RQ2: In terms of publications, which authors, associations, and sources have the most influence in this field?

RQ3: Which papers receive the most citations and co-citations?

RQ4: What are the most co-occurring keywords?

RQ5. What are the collaboration patterns of papers among various nations ?

Objectives

- To evaluate the patterns, growth, and number of publications.
- To determine the most significant publications, associations, and authors in this discipline.
- To examine the most cited and most co-cited.
- To assess the most co-occurred keywords.
- To analyze the collaborative network of different countries

There are five sections to this study. Materials and procedures are explained in the next section. The data analysis is shown in Section 3, and the results are

compiled and discussed in Section 4. The paper's shortcomings and recommendations for further research are discussed in the last section.

Research Methodology

Bibliometric analysis is the quantitative examination of academic publications using statistical and mathematical techniques to indicate research performance [15]. Compared to Web-of-Science and PubMed, Scopus offers a wider range of journals, and its citation analysis is quicker and encompasses a larger number of articles [16]. For this reason, the study extracts fintech research-related data from Scopus. The data was extracted from the Scopus database using keywords like "fintech" or "financial technology".

The search resulted in 8164 records. We confined our search to only paper belonging to India, yielding 910 documents. Following that 581 documents were excluded on the following exclusion criteria to maintain the quality and consistency. First, articles published in a language other than English. Second, documents other than the final articles and review papers such as a book, book chapter, conference proceedings, editorial, etc. Third, articles published in other than journals. To evaluate the research landscape of fintech in India over a decade, articles published between 2015 and 2024 were taken into account. Once these parameters had been applied, 329 articles were identified and the data was processed for analysis. The search was carried out on September 19, 2024. The bibliometric analysis has been used to evaluate the data using biblioshiny software.

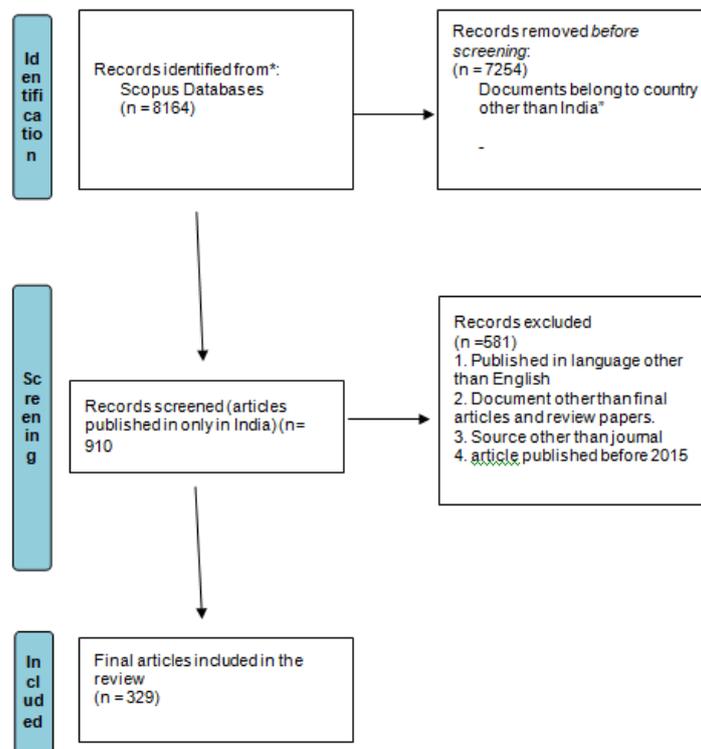


Figure 1: PRISMA framework

Data Analysis

• Descriptive Information

Table 2 represents a detailed overview of the papers that were obtained from the Scopus database. Between 2015 and 2024, 329 documents were published, including 30 review papers and 299 articles. These publications were written by 906 writers and appeared in 196 reputable journals. A paper typically receives 13.85 citations on average. Researchers are becoming more interested in this discipline, as evidenced by the 50.84% yearly growth rate of publications in this field and the 37.39% worldwide co-authorship rate.

Table 2: Descriptive Information

"Timespan	2015:2024
Documents	329
Sources	196
Document Average Age	1.79
Annual Growth Rate	50.84%
Average Citation per doc	13.85
References	19494
Keywords Plus	880
Author's keywords	1130
Authors	906
Single authored docs	28
Authors of single-authored docs	28
International co-authorships	37.39%
Document types	
Articles	299
review	30"

• Scientific production

The estimation of the output of scientific articles from 2015 to 2024 is shown in figure 2. Between 2015 and 2024, Indian authors produced 329 publications on fintech, with an average publication age of 1.79 years. Only two papers were released in 2015 and 2017; however, in 2016 there was not a single fintech-related publication. It gained momentum beginning in 2019. With 91 publications, 2023 and 2024 generated the most articles. It's a trending topic, as evidenced by the 50.84% growth rate of publications in this discipline.

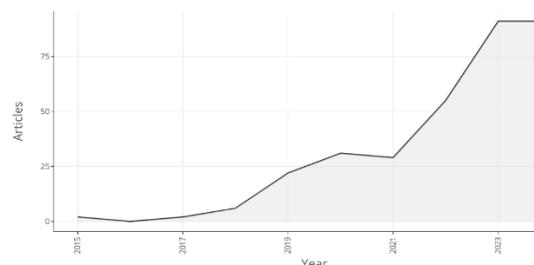


Figure 2: Publication Pattern

- **Author's impact**

The first-ranked author is the one with the most citations. Tiwari AK is the most cited and prolific author with 368 citations. In terms of citations, Tiwari AK was ranked highest. However, he got the second rank for article publications (6), g-index (6), and h-index (6). In contrast, Gupta S and Rabbani MR have contributed the most papers (8) and have the highest G-index (8).

Table 3: Author's Impact

Authors	TC	Articles	H- Index	G Index
Tiwari Ak	368	6	6	6
Abakah Eja	359	5	5	5
Gupta S	340	8	5	8
Modgil S	288	2	2	2
Le Tn-L	275	2	2	2
Singh S	265	5	4	5
Rabbani Mr	229	8	7	8
Rupeika-Apoga R	200	5	4	5
Chauhan Ak	179	1	1	1
Garg P	179	1	1	1

- **Most Relevant Sources**

In order to accurately identify and utilise the most pertinent sources, a comprehensive bibliometric analysis is necessary to guarantee the study's strength and reliability. The term "most relevant sources" in this context refers to a rigorous selection process in which articles from esteemed databases like Scopus were chosen for their direct relevance to the study. The 329 papers under analysis were published in 196 journals. The top sources for publications about fintech in Indian context shown in Table 4. It indicates that the "Journal of Risk and Financial Management" published most articles (10), followed by "Resource Policy" with 8 documents. All the journals indicated here are Scopus-indexed, proving their commitment to conducting high-quality research. These recognized journals give essential information about the latest and most significant information on this issue.

Table 4: Most Relevant Sources

Sources	Articles
"Journal of Risk and Financial Management	10
Resources Policy	8
International Journal of Bank Marketing	7
Technological Forecasting and Social Change	7
Cogent Economics and Finance	6
International Journal of Electronic Finance	6
Journal of Financial Services Marketing	6
Journal of Open Innovation: Technology, Market, And Complexity	6
Indian Journal of Finance	5
International Journal of Innovative Technology and Exploring Engineering"	5

- **Most Relevant Affiliations**

Universities are the most reliable places for supporting and advancing research. Table 5 presents the top ten institutions affiliated with the researchers who have made contributions to this field. The two most notable Indian universities that contribute the highest number of publications related to fintech are Symbiosis International University and Amity University, with 24 and 12 papers respectively.

Table 5: Most relevant Institutes

Affiliation	Articles
Symbiosis International (Deemed University)	24
Amity University	12
Christ (Deemed to Be University)	11
Banaras Hindu University	10
Kingdom University	9
Nirma University	9
University of Bahrain	9
Indian Institute of Management Lucknow	8
Saudi Electronic University	8
University of Delhi	8

- **Top 10 cited documents based on global citations**

Table 6 lists the most notable papers contributing to the knowledge of fintech, with a focus on global citations. “Time and frequency domain connectedness and spill-over among fintech, green bonds and cryptocurrencies in the age of the fourth industrial revolution” is the article that has garnered the most citations (240) and was published in the esteemed journal named “Technological Forecasting and Social Change”. The second most cited paper is “Measuring the Perceived Benefits of Implementing Blockchain Technology in the Banking Sector”. This paper is also published in the same journal and has received 179 citations. Even though both articles were released in 2021, the first paper's total citations per year (60.0) are greater than the second paper (44.75).

Table 6: Top 10 cited documents

Rank	Title of papers	Name of Journal	Publishing Year	TC	TCpy	References
1	“Time and frequency domain connectedness and spill-over among fintech, green bonds and cryptocurrencies in the age of the fourth industrial revolution	Technological Forecasting and Social Change	2021	240	60.00	[17]
2	Measuring the perceived benefits of implementing blockchain technology in the banking sector	Technological Forecasting and Social Change	2021	179	44.75	[18]

3	What drives FinTech adoption? A multi-method evaluation using an adapted technology acceptance model	management decision	2020	166	33.20	[19]
4	Mean-variance portfolio optimization using machine learning-based stock price prediction	Applied Soft Computing (2021)	2021	150	37.50	[20]
5	A decision-making framework for Industry 4.0 technology implementation: The case of FinTech and sustainable supply chain finance for SMEs	Technological Forecasting and Social Change	2022	125	41.67	[21]
6	Has Covid-19 accelerated opportunities for digital entrepreneurship? An Indian perspective	Technological Forecasting and Social Change	2022	109	36.33	[22]
7	Emerging-market consumers' interactions with banking chatbots	Telematics and Informatics	2021	96	24.00	[23]
8	Impact of fintech and green finance on environmental quality protection in India: By applying the semi-parametric difference-in-differences (SDID)	Renewable Energy	2022	78	26.00	[24]
9	Financial technology: a review of extant literature	Studies in Economics and Finance	2020	77	15.40	[25]
10	Blockchain in banking and finance: A bibliometric review	Research in International Business and Finance	2022	72	24.00	(Patel et al., 2022)"

• Co-citation Analysis

One method of bibliometric technique is co-citation analysis, which counts the number of papers that have cited a certain pair of documents [27,28]. The co-citation of authors results "when a researcher cites any work of any given author along with the work of any other author in a new document" [29]. The number of times other researchers jointly cited two or more papers was calculated using the citations from the top 50 articles as a benchmark. Line thickness indicates co-citation counts and is connected with the relevancy of the article. This network's great density is indicative of the attention that several academic sources have given to fintech [30]. It is noteworthy that [31] and [32] work is consistently cited with other publications (Figure 3).

- **Co-occurrence of Keywords**

Keywords are commonly employed as instruments to discern the research content, fundamental themes, and methodology/technology employed within a certain subject (Huang et al., 2020). Co-occurrence networks were used to find and analyze the distribution of words in fintech research in the Indian context. Co-occurrence refers to the statistical link between different terms that appear in the same document. A keyword co-occurrence network, shown as a network map, depicts the relationship between these phrases [33]. The field, network design, normalization, and clustering approach are some of the features that influence the co-occurrence network. The result of the keyword analysis identified 6 clusters. The first cluster (Green) is related to COVID-19, security, and sustainability. The second cluster (yellow) is related to the application of Artificial intelligence in fintech. Cluster 3 (Red) explains the role of fintech in promoting financial inclusion. Cluster 4 (Blue) presents the form of usage of fintech such as raising crowd funding, transferring digital currency, and p2p lending, etc. Cluster 5 is concerned with the adoption of fintech. Lastly, cluster 6 lists review papers published in the field of fintech (See figure4).

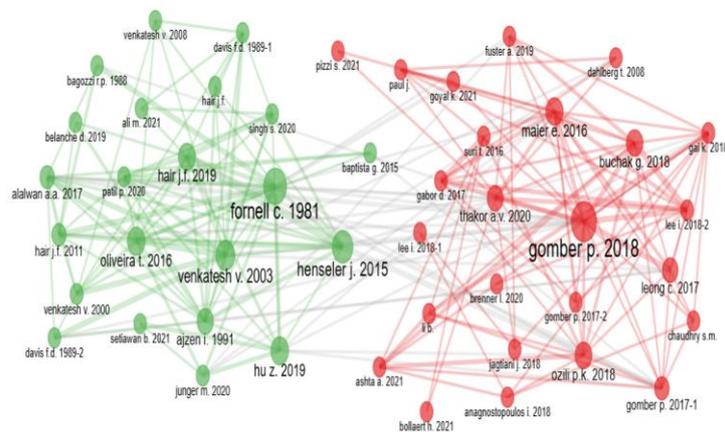


Figure 3: co-citation Network

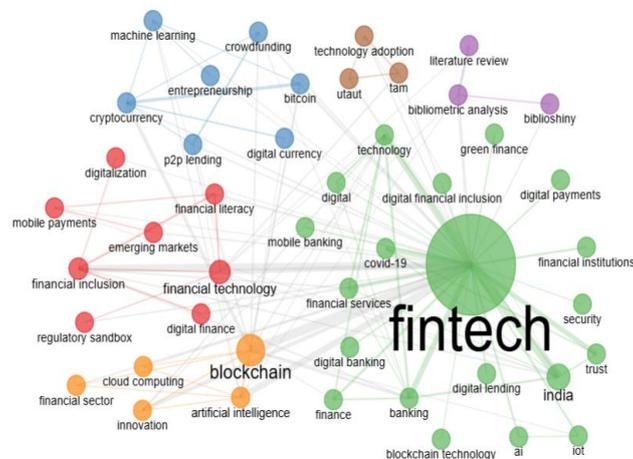


Figure 4: Keywords Co-occurrence Network

• Country Collaboration

This section examines how India has collaborated with different nations in the field of fintech. Country collaboration network shows how nations and cooperate in a certain topic[34]. Figure 5 demonstrates the international cooperation of India. India has collaborated on more publications with the USA than any other country, with 24 articles, followed by Saudi Arabia (21), China (15), and Bahrain (11).

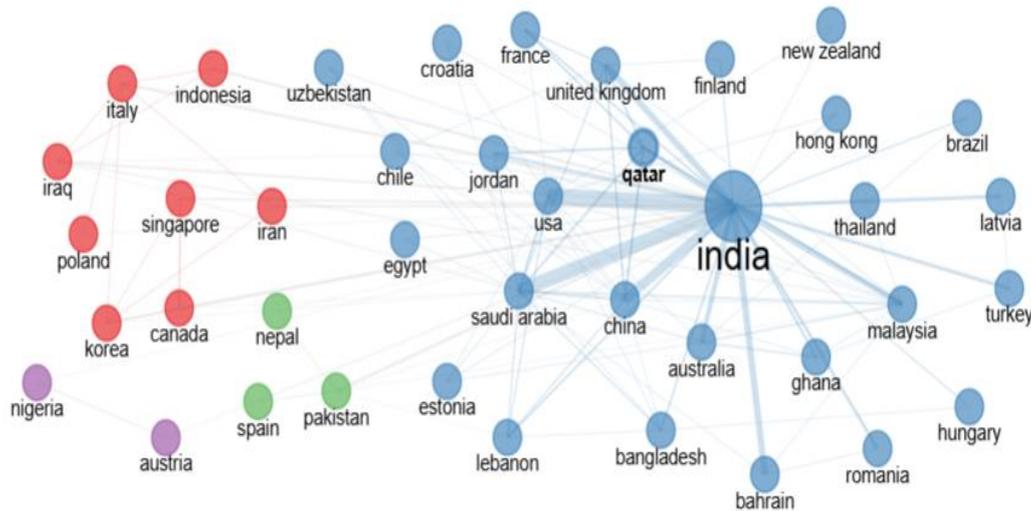


Figure 5: Collaboration Network

Conclusion

The present study advances our understanding of fintech research in India. This research provides a comprehensive summary of the field's publications throughout 10 years, from 2015 to September 2024. The literature on fintech has very few bibliometric studies. Rarely any study has been found that explore the research landscape of fintech in Indian context. Thus this study filled this research gap by conducting a bibliometric analysis to synthesize the literature published on fintech in Indian context. The Scopus database has been used to extract data from 2015 to the present. In the 2019 publication, we saw an increasing trend with a slight drop in 2021, showing a growth rate of 50.84% in fintech related publication in india. The most prolific author in terms of citations is Tiwari AK, whereas the most prolific author in terms of publication and index is Rabbani MR. The majority of the articles about fintech were released by "The Journal of Risk and Financial Management". A paper titled "Time and frequency domain connectedness and spill-over among fintech, green bonds and cryptocurrencies in the age of the fourth industrial revolution" published in the renowned journal "Technological Forecasting and Social Change" in 2021 has received the highest citation globally (240). Symbiosis International (Deemed University) emerged as leading affiliation and published the highest number of articles (24) in this field. India has worked with several nations and published the most articles with the United States (6), followed by Saudi Arabia (21), China (15), and Bahrain (11). Additionally, 2 clusters were identified by co-citation analysis while keyword co-occurrence analysis reveal 6 clusters.

Limitations and Future Directions

One of the paper's shortcomings is that it retrieves data from a single database rather than several sources. Even though Scopus has a vast amount of research articles on the topic, we think that utilizing various databases will result in more thorough coverage. The literature on fintech in this study did not include books, unpublished articles, conference proceedings, or PhD theses. We may have underestimated the value of research done in other languages by evaluating just English-published works. Only Biblioshiny were used for the analysis of this study. For further study, biblioshiny can be used in conjunction with other programs like Bibexcel, vosviewer, Gephi, Bibexcel, Tableau, and CiteSpace II. Additional fintech-related terms could be covered in further studies. The findings could be helpful to future scholars in identifying fintech-related topics that might become more popular in the years to come. Thus, experts and scholars who are interested in doing research in fintech might utilize this study as a starting point.

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