

Digital Financial Services: A Bibliometric and Systematic Analysis

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Abstract: *The proliferation of digitalization has resulted in the worldwide integration of digital finance across all economic sectors. The government is launching policies for the integration of the digital world with the financial sector through many yojanas like PMJDY (Pradhan Mantri Jan Dhan Yojana, Pradhan Mantri MUDRA Yojana (PMMY), and Social Security Scheme, but then also the people are underserved and it brings a need for the researchers to look into the gap. What are the factors which is affecting the adoption of digital financial services. The paper aims to provide a comprehensive review and analysis of the theme of digital financial services (DFS) adoption. It mainly underpins the evolution of the digitalisation of the financial system. The main drivers for the rapid change in technology in the financial system are COVID-19, smartphone penetration, and government aid, which promoted the digital financial sector. The research paper aims to analyse the publications related to digital financial services in India. The time frame of the study was set up as 2015-2025 as these years actually witness the evolution of the financial sector. The data have been collected from the Scopus database for the analysis. 2,216 documents were selected for the analysis and were done by using BiblioShiny and VOSviewer. In the study, the average scientific production, average citations per year, trending topics, influential articles and significant themes and keywords in DFS adoption were analyzed. The result shows that the interest of researchers is increasing in fintech, innovation, digitalisation, digital financial services, and financial inclusion and also focuses on interdisciplinary topics which is interconnected to the digital world. The findings of the study will help the stakeholders, researchers and policymakers to counter challenges and opportunities and will give future directions within digital financial services*

Keywords: Digital financial services, bibliometric, mobile banking, fintech, financial inclusion

1. Introduction

The Indian financial services industry has gone through a dramatic digitalisation shift in a few years, driven by the success of Digital Public Infrastructure and customer behavioural change exacerbated by COVID-19. As financial knowledge rises and efforts to cater to various segments of the population increase, the Indian banking process has been proven correct by considerably reshaped by digitalisation. With the rapid evolution of emerging technology in all domains, the research for each segment has increased tremendously. Following demonetisation and the COVID-19 pandemic, the way people conduct financial activities and the entire financial system have undergone significant changes, and they are adopting new methods for financial transactions. They are more inclined towards digital services rather than availing the traditional services that were offered earlier. Digital financial services are more convenient and prompt to use; they are also more secure, saving time and energy. Nowadays, people avoid going to banks for financial work; instead, they use their mobile phones and laptops to access the services. According to the GSMA 2025 report, 58% of the world's population used mobile internet, equating to 4.7 billion users, representing a 2.2 billion increase since 2015. Using mobile phones and the internet at such a maximum rate simply indicates the adoption level of digitalisation. Mobile phones, laptops, and tablets are only the medium through which the population is adopting the new technology. According to the GOI's (Ministry of Statistics and Programme Implementation) [1] report, in the 15-29 age group, approximately 95.5 percent

of persons who own a mobile phone (including smartphones) in rural areas own a smartphone. In urban areas, about 97.6 percent of people are in the same age group. About 99.5 percent of people reported having the ability to perform online banking transactions through UPI, which indicates the omnipresent penetration of mobile phones (Sahi, A. M., Khalid, H., Abbas, A. F., & Khatib, S. F., 2021). and internet users in the economy, and knowingly or unknowingly, we are all becoming a part of this new normal economy. Because of the surge in the usage of mobile phones and the internet, the system is experiencing an exponential growth in the usage of digital financial services(DFS), which strengthens the impact of digitalisation. The adoption of new technologies has been a huge development on a global scale, and governments spare no effort to promote technological innovation (Danquah et al., 2017). These services bring advantages not only for their users but also to banks, financial institutions, and almost any organisation that operates with digital payments. (Chawla & Joshi, 2019). Digital Financial Services encompasses all financial services that are delivered through digital channels. Digital financial services are an essential component of the banking, insurance, and finance industry.

As per the Deloitte report, it depicts the trend, where significant progress has been observed since the previous edition in 2022, with 9 of 12 Indian banks now recognised as Digital Champions. Transfers and payments have improved significantly, increasing by 2.4 percentage points in the last two years. This is significantly more than the global average growth of one percentage point. The increase is mostly

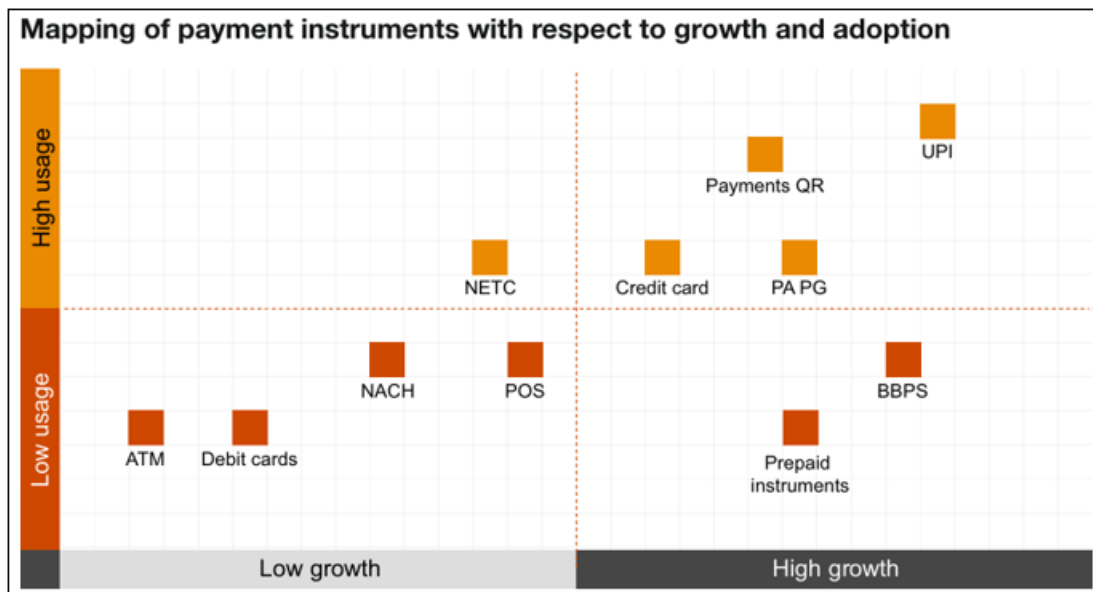
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credited to the Digital Champion banks, who have launched novel features, such as future-dated transfers, real-time payments, application messenger service-based banking, payment notification/alerts, and the development of virtual cards for online shopping. Digital financial services are a part of digital finance, which involves the financial services, including making payments, deposits, availing loans and advances, transferring, and investing money. Broadly, financial services are of four types, which are digital banking, digital payments, digital lending, and digital insurance (Gomber, P et al., 2017). The banking industry has matured by refocusing its attention from developing new features to improving existing ones after a period of fast digital innovation and improving user experience and digital accessibility. Instead of creating new features, efforts are now focused on refining current ones and raising the calibre and accessibility of services. Banks are concentrating on advising services to better meet their financing and investment needs as consumers increasingly switch from "savings" to "investing." Investment requirements, in recent years, have seen a notable increase in the use of PFM features such as goal-setting, account management, budget notifications, subscription management, savings facilitation, security alerts, etc. According to pwc report (The Indian Payments Handbook - 2024-2029), over the last eight years, India's digital payments market has grown remarkably. By FY 2028-29, the industry is expected to have more than tripled in size, from 159 billion

transactions in FY 2023-24 to 481 billion. The market is planning to triple its value of payment transactions from INR 265 trillion to 593 trillion Indian rupees over the same time frame. [6] Indian financial products are gaining popularity due to new industry, increased participation from banks, NBFCs, and FinTech companies, integration with digital systems and marketplaces, and enhanced security features. Both customers and businesses are increasingly adopting solutions for their ease of use, dependability, efficiency, and cost-effectiveness. With a growth of more than 50%, the Unified Payments Interface (UPI) has seen the biggest expansion. Solutions for merchant acquisition, such as online and offline choices like Payment Aggregators, Payment Gateways (PA PG), and QR codes, also saw significant expansion of over 25% as a result of new players, high QR penetration, and regulatory pressure. Additionally, because of the rising demand, credit card use increased by about 20%. The inclusion of new billers and more payment choices for clients through third-party application providers (TPAPs) has contributed significantly to the 25% growth in Bharat Bill Payments Solution (BBPS), and toll tags for new cars are still being used; the National Electronic Toll Collection (NETC) has increased by over 10%. The growing Indian start-up ecosystem, which is producing innovative solutions to meet the needs of a wide range of customers, is another factor contributing to the country's surge in digital payments.



Digital lending platforms have also grown to the next level by creating buzz for both good and bad reasons. Good reasons are that it offers convenient, fast, and easily accessible loans, which traditional banks were unable to offer, and bad reasons are for security and safety concerns. A study conducted by Majeti et al. (2022) [7] revealed that out of 87 lending apps (both regulated and unregulated) tested, more than 95% were unsecured and had a minimum of 10 security weaknesses. The average vulnerability score was 5.08 and 7.27 for regulated and unregulated apps, respectively (on the scale of 0 to 10, 0 being the least and 10 being the highest). Digital lending is

defined by the RBI as "A remote and automated lending process, largely by use of seamless digital technologies for customer acquisition, credit assessment, loan approval, disbursement, recovery, and associated customer service". The objective of Digital lending is to deliver customer-centric financial services that enable borrowers to leverage digital data and perspectives, thereby enhancing operational efficiency. For better services, financial service providers typically offer self-service loan applications (apps), instant loan approval, and digital disbursement. These loans are highly unsecured, small-value loans for customers from low- to middle-income

groups. These services are provided through mobile or web-based digital lending apps (DLAs) including consumer durable loans, scan and pay, Buy Now Pay Later (BNPL), and others. According to the Centre for Advanced Financial Research and Learning's (CAFRAL, 2023) reports, NBFCs accounted for 60.53% of all digital lending, compared to banks' 5.53% share in FY 2020.

2. Objectives of the Study

With the growing interest in digitalisation and digital financial services, a variety of researchers are becoming increasingly engaged in emerging topics related to this area. However, understanding the scope, trends, and key findings is a challenge due to the interdisciplinary nature and fast-evolving technology. A bibliometric analysis and systematic review can help by revealing patterns in the annual publication of

documents, citations per year, and trends in research within a particular area. The objective of this bibliometric analysis is to provide a comprehensive overview of the determinants influencing the adoption of digital financial services.

Specifically, the study aims to:

- 1) To identify the number of publications each year.
- 2) To identify the geographical distribution of publications and research collaborations by different countries.
- 3) What are the most notable and influential journals for Digital Financial Services (DFS)?
- 4) What are the most influential articles on Digital Financial Services (DFS)?
- 5) What is the frequency of keywords over time?

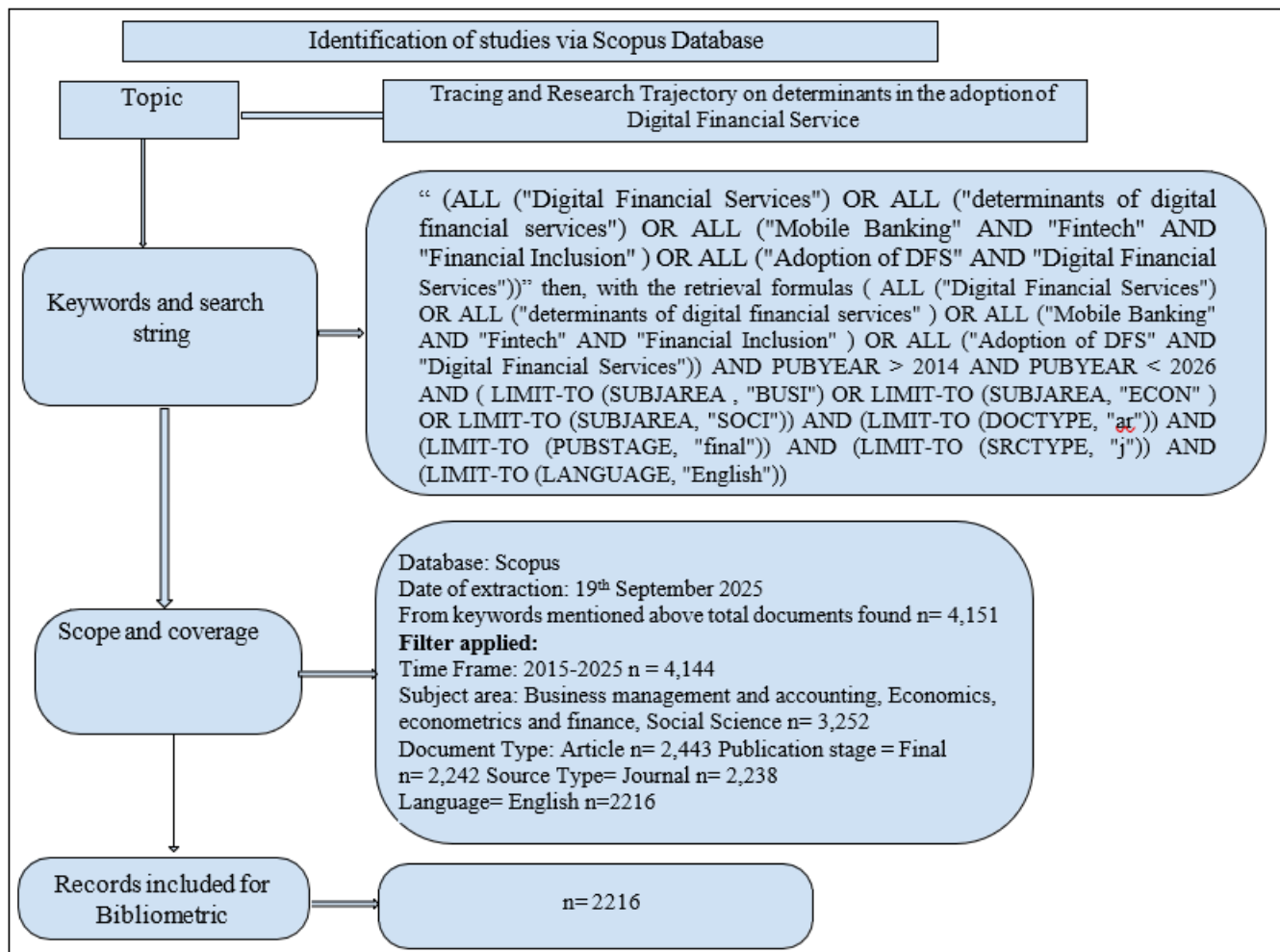


Figure 1: Author's own work; adapted from Manoharan, A. A., & Rangaswamy, G. (2024) [1]

3. Methodology

Bibliometric analysis is mostly used to evaluate research on a specific topic over time by employing quantitative analysis such as keyword analysis, source analysis, and citation analysis. Bibliometric analysis is a continuous and rigorous approach for evaluating vast amounts of scientific data (Donthu

et al.,2021) [11]. In bibliometric analysis, it manifests mainly three types of analysis which is Performance analysis, Science mapping, and Network analysis.

- 1) Performance analysis is descriptive in nature which denotes the performance of different research constituents like authors, institutions, journals, countries. It comprises of analysis of publication related metrics, citation related

metrics (like no. of contributing authors, total publications, h index, and g index).

- 2) Science mapping analyse the intellectual interaction and structural connection among research variables. This technique involves citation analysis, co-citation analysis, bibliographic coupling, co-word analysis, and co-authorship analysis.
- 3) Network analysis is used to enrich the evaluation of the bibliometric analysis, it focuses on the importance of research constituents which may not be access through publications and citations. This analysis includes network metrics, such as degree of centrality, and clustering methods like multidimensional scaling, as well as visualization tools like Bib Excel, Sci2, and VOSviewer.[11] **Search String:** This study primarily focuses on the technique of science mapping, along with some domains of performance analysis and network analysis. The source of this data extracted is from Scopus database with the keywords “ (ALL ("Digital Financial Services") OR ALL ("determinants of digital financial services") OR ALL ("Mobile Banking" AND "Fintech" AND "Financial Inclusion") OR ALL ("Adoption of DFS" AND "Digital Financial Services"))” then, with the retrieval formulas (ALL ("Digital Financial Services") OR ALL ("determinants of digital financial services") OR ALL ("Mobile Banking" AND "Fintech" AND "Financial Inclusion") OR ALL ("Adoption of DFS" AND "Digital Financial Services")) AND PUBYEAR > 2014 AND PUBYEAR < 2026 AND (LIMIT-TO (SUBJAREA , "BUSI") OR LIMIT-TO (SUBJAREA , "ECON") OR LIMIT-TO (SUBJAREA , "SOCI")) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (PUBSTAGE , "final")) AND (LIMIT-TO (SRCTYPE , "j")) AND (LIMIT-TO (LANGUAGE , "English")))

Criteria for Article Search

The search string in Scopus includes the following keywords and utilizes Boolean operators (AND, OR) for more precise and focused results. Boolean operators are words and symbols, such as ‘AND’, ‘OR’, or ‘NOT’, that help narrow or expand the search parameters when using a database or search engine. Using Boolean operators in conjunction with keywords will refine the research to yield the most relevant results. (Dixit, V., & Kumari, N. (2025) [9])

The search strategy in Scopus involved the following keyword queries: ALL FIELDS (“Digital Financial Services”) ALL FIELDS (“determinants of digital financial services”) ALL FIELDS (“Mobile Banking” AND “Fintech” AND “Financial Inclusion”) ALL FIELDS (“Adoption of DFS” AND “Digital Financial Services”)

The systematic data filtering process was as follows:

Step 1: Initial search results yielded 4,151 documents.

Step 2: Filtering period 2015-2015, results remaining were

4,144 documents

Step 3: Subject areas were chosen only (Business management and accounting, Economics, econometrics and finance, Social Science), reducing the result to 3,252 documents.

Step 4: Applying a filter for document type (Article) yields 2,443 documents.

Step 5: Selection of the publication stage as final and language as English, which gives a result of 2,216 documents.

According to (Ramos-Rodríguez & Ruíz-Navarro, 2004) [13] scope of study in bibliometric should generally be large enough to warrant the analysis because it is designed to handle large volumes of bibliometric data. So, in this study a total of 2,216 documents were collected for analysis purpose.

4. Results

4.1 Analysis conducted using Biblioshiny

The analysis began with the use of the Biblioshiny web application, which is designed to simplify the bibliometric process. This tool essentially extracts data and converts it into a visualisation of complex research data for better examination and understanding of trends in the academic literature. By leveraging the application capabilities, our research explores the environment of financial inclusion and FinTech, revealing insightful information and promoting a better comprehension of how digital financial services are influencing and reshaping the financial sector.

4.1.1 Annual scientific production

“Annual scientific production” refers to the number of articles published over a period of time, from 2015-25. The X-axis (horizontal) denotes the number of years, whereas the Y-axis (vertical) denotes the number of articles published or the scientific output. In the context of social commerce, an examination of annual scientific production uncovers publishing trends that indicate a growing interest in the field, notably after 2013. This measure provides a useful overview of research activity and growing patterns across several disciplines.[14] Interpretation of Figure 3: In the initial years (2015-18), the number of publications was relatively low, only showing a slight increase each year. While in the middle years, i.e., from 2019-21, there was a notable upward trend with the increase in publication count, which simply denotes the growing interest in the research area. COVID-19 gave researchers ample opportunities to study the problem and try to find a solution for the same. Digital financial services are also a solution over traditional services. A high-speed growth of publications was seen after 2021, reaching a peak in 2024, which was almost 600 articles, which simply denotes the high adoption of digital technology and increased awareness about the research.

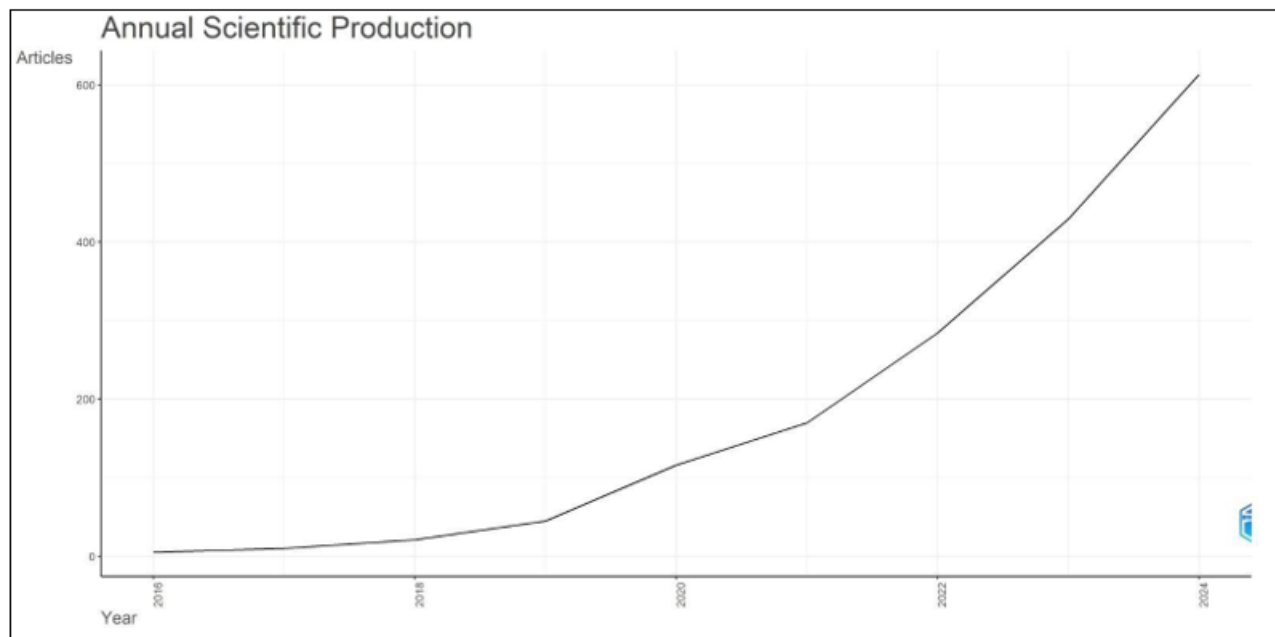


Figure 3: Research annual scientific production Source: Biblioshiny

Year	No. of Publications
2025	519
2024	613
2023	429
2022	284
2021	170
2020	116
2019	45
2018	21
2017	10
2016	5
2015	4

Source: Scopus Data

4.1.2 Average Citations per year

“Average Citations per year” depicts the trend of citations received on the published articles. A citation simply means to

give a reference or source of the information from which the author gets the data. Research simply means to search again, so searching the existing knowledge again is research by using different methods. For a researcher, it is very important to give a reference of the base from where he had started or from where he got the initial information for the authenticity of the research. Citation per year simply denotes the number of times an author’s work has been used by different authors for their further search. The graph (figure 4) notes an increase, which shows the growing interest in Fintech and digital financial services which resulting in increased citations, and this sharp increase till 2018. After 2018, it started to stabilize, and then after 2023 it declined. The recent decline in citations is because new articles need more time to collect citations, and it is a very common phenomenon in bibliometric studies; it is not necessarily due to poor quality.

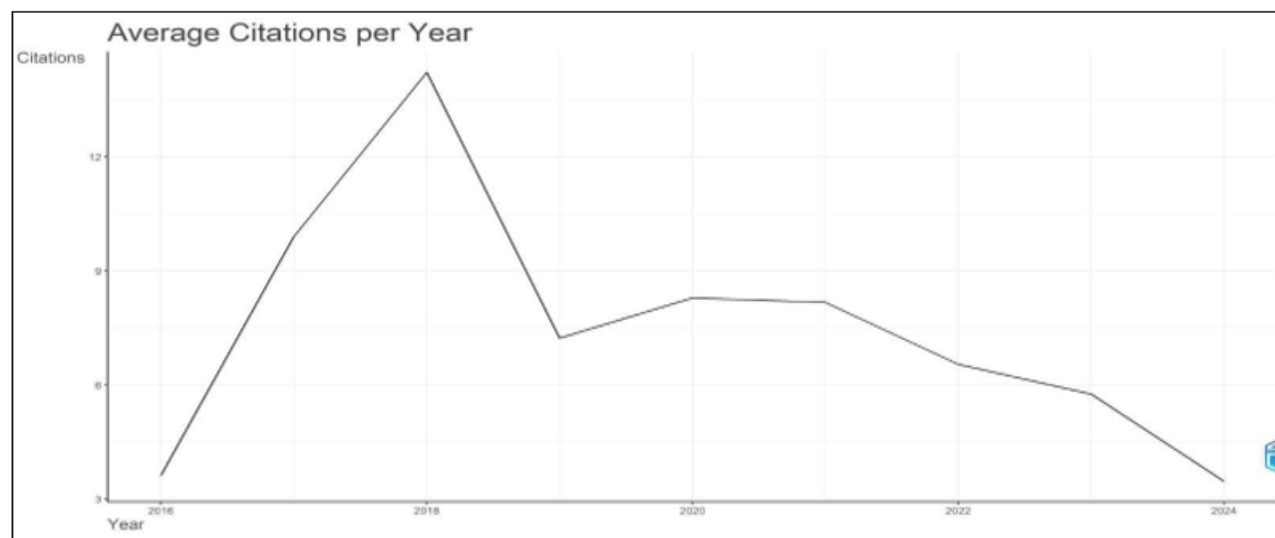


Figure 4: Average citation per year Source: Biblioshiny

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4.1.3 Most influential research paper:

The bibliometric analysis of the most influential research paper, shown in Table 1 reveals that the interest in digital financial services had increased at a high-speed during COVID-19, particularly in 2020, which records the highest number of publications and citations. The most cited paper, "Impact of digital surge during COVID-19 pandemic: A viewpoint on research and practice," published in the *International Journal of Information Management* (2020), got 764 citations, showing the influence of the pandemic on digital adoption. The *International Journal of Information Management* (IJIM) is a leading outlet for high-impact

research in the information systems (IS) field. It embraces an inclusive range of topics, levels of analysis, and perspectives, reflecting all facets of information systems globally. (IJIM) [15]. Other influencing journals are *Economic Modelling*, *International Journal of Bank Marketing*, and *Finance Research Letters*. The publications mainly focus on digital payment adoption, digital banking, mobile banking, financial lending and financial inclusion. The overall study shows that COVID-19 was proven to be the turning point in the financial landscape and from there the adoption of digital financial services and financial industry changed and also explore itself in more interdisciplinary areas.

Table 1

Title	Source title	Year	Cited by
"Impact of digital surge during COVID-19 pandemic: A viewpoint on research and practice"	International Journal of Information Management	2020	764
"The impact of digital finance on household consumption: Evidence from China"	Economic Modelling	2020	620
"Understanding consumer adoption of mobile payment in India: Extending Meta-UTAUT model with personal innovativeness, anxiety, trust, and grievance redressal"	International Journal of Information Management	2020	589
"Consumer attitude and intention to adopt mobile wallet in India" "An empirical study"	International Journal of Bank Marketing	2019	324
"How perceived value drives the use of mobile financial services apps"	International Journal of Information Management	2019	263
"Adoption of digital payment systems in the era of demonetization in India: An empirical study"	Journal of Science and Technology Policy Management	2019	258
"Digital payment and banking adoption research in Gulf countries: A systematic literature review"	International Journal of Information Management	2020	235
"Banking goes digital: The adoption of FinTech services by German households"	Finance Research Letters	2020	228
"Role of government to enhance digital transformation in small service business"	Sustainability (Switzerland)	2021	216
"Fintech, Cryptocurrencies, and CBDC: Financial Structural Transformation in China"	Journal of International Money and Finance	2022	209
"The Global Findex Database 2017: Measuring Financial Inclusion and Opportunities to Expand Access to and Use of Financial Services"	World Bank Economic Review	2020	202
"Digital banking, customer experience and bank financial performance: UK customers' perceptions"	International Journal of Bank Marketing	2018	180
"Digital banking in northern India: The risks on customer satisfaction"	Risks	2021	177
"Digital transformation and strategy in the banking sector: Evaluating the acceptance rate of e-services"	Journal of Open Innovation: Technology, Market, and Complexity	2021	168
"Fintech in the time of COVID 19: Technological adoption during crisis"	Journal of Financial Intermediation	2022	157

4.1.4 Trend Topics

Graph figure 5 shows the trending topics analysis in the digital financial services area over the year from 2019 to 2024. The Y axis shows the topics which are appearing the most in the research corpus, whereas the X axis shows the years. The bubble sizes indicated the frequency of each term to appear, with the sizes for 100,200, and 300 occurrences. 100 term frequency shows the foundation topics like mobile money services, regtech, and economic development, M-Pesa, which will give birth to broader themes like fintech and digital finance, and 200 term frequency denotes the mid-term growth topics like financial system, financial services, and sustainable

development, which shows a shift towards the digital changes in the financial domain. 300 term frequency shows the emerging and dominant topics, like financial inclusion and fintech, which simply reveals that in the year around 2022-23, the research in fintech and its connection with financial inclusion were the most trending topics or areas for research. There exists a clear growth in interdisciplinary topics like sustainable development, fintech, and financial inclusion. The increasing term frequency bubble shows that the digital financial services research is moving from a foundational base to global and interdisciplinary frameworks.

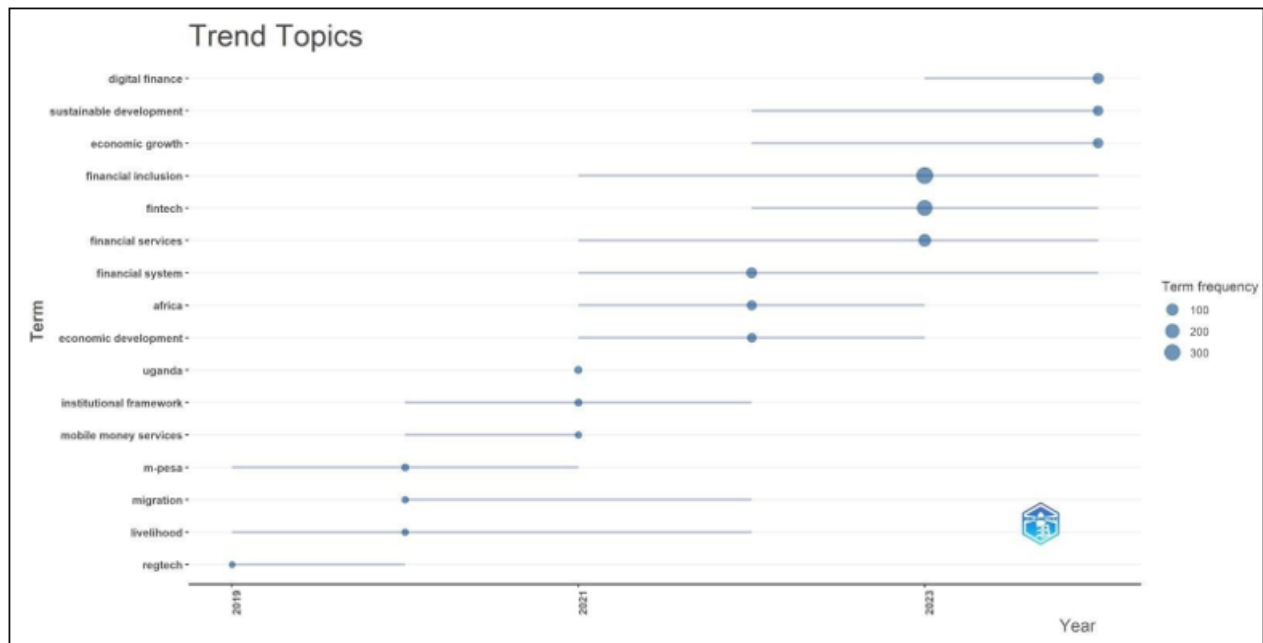


Figure 5: Trend topics Source: biblioshiny

4.1.5 Clusters by Documents Coupling

Cluster by documents coupling manifests the strategic clustering analysis that maps documents and research topics across the key dimensions. The horizontal axis (x-axis) denotes centrality, whereas the vertical axis (y-axis) denotes the Impact. The chart in Figure 6 demonstrates three different clusters showing the impact and centrality matrix. Left cluster

denotes low centrality and low impact, which means that the topics are at the foundation level and initially possess low impact. Center cluster denotes high centrality and high impact and shows that the topics are highly interrelated. The right cluster denotes high centrality and high impact, and it shows that the topics are emerging and high-impact themes with the document work.

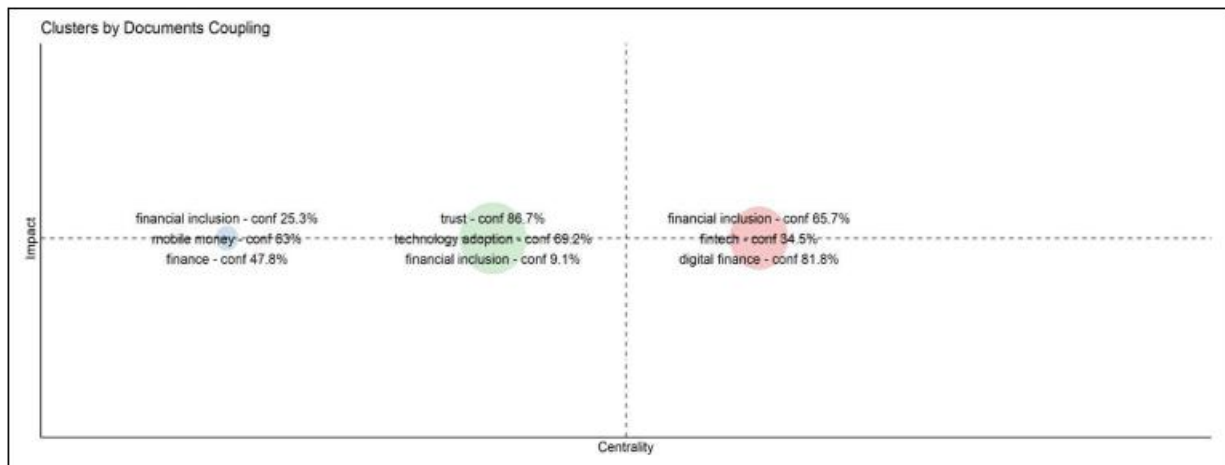


Figure 6: Clusters by document coupling source: Biblioshiny

4.1.6 Most relevant words

The chart shows the frequency of keyword occurrences. The horizontal lines show the number of times a single keyword has been used in the research. The x-axis (horizontal line) shows the number of occurrences for each keyword, whereas the y-axis (vertical axis) shows the main keywords of the research. Figure 7 reveals that the financial inclusion word has been used 343 times, which indicates the importance of the keyword in the research. The second important word, as per

the chart, is fintech, which has 268 mentions, and it denotes the interdisciplinary approach as it a combination of finance and technology that leads to fintech. Other highly cited terms or keywords are financial services, having 126 occurrences, finance with 120 occurrences, mobile money with 93 occurrences, and many more. The big-sized bubbles, like financial inclusion and fintech, denote the main themes of the study on which research is based.

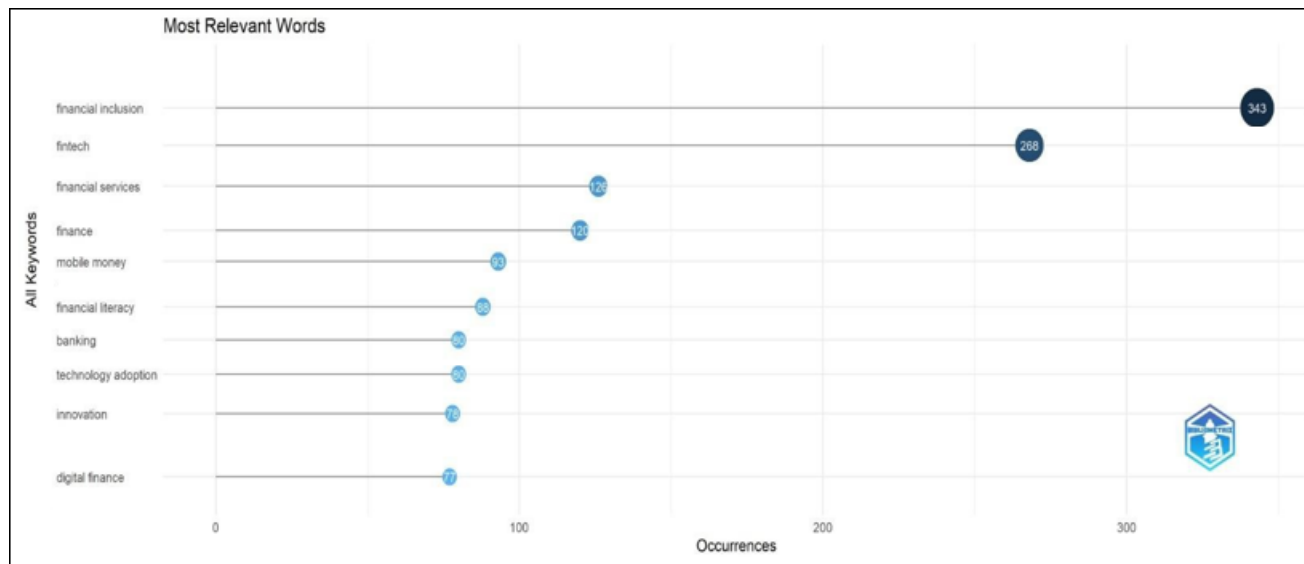


Figure 7: Most Relevant Words

4.1.7 Most Global Cited Document

The chart shows horizontal lines that indicate the research paper, document, or article received the maximum number of citations in the global portion. The x-axis shows the total number of citations for each document, and the y-axis shows the reference to documents (author name, year, journal name).

The number mentioned in the bubble shows the total of citations. The most cited document is from **PK, 2018, BORSA ISTANB. REV.**, [16] which has been cited 1104 times. The next highest is **LW, 2020, INT. J. INF. MANAG.**, with **605 citations**, and the remaining documents have citations ranging from 400 to 300.

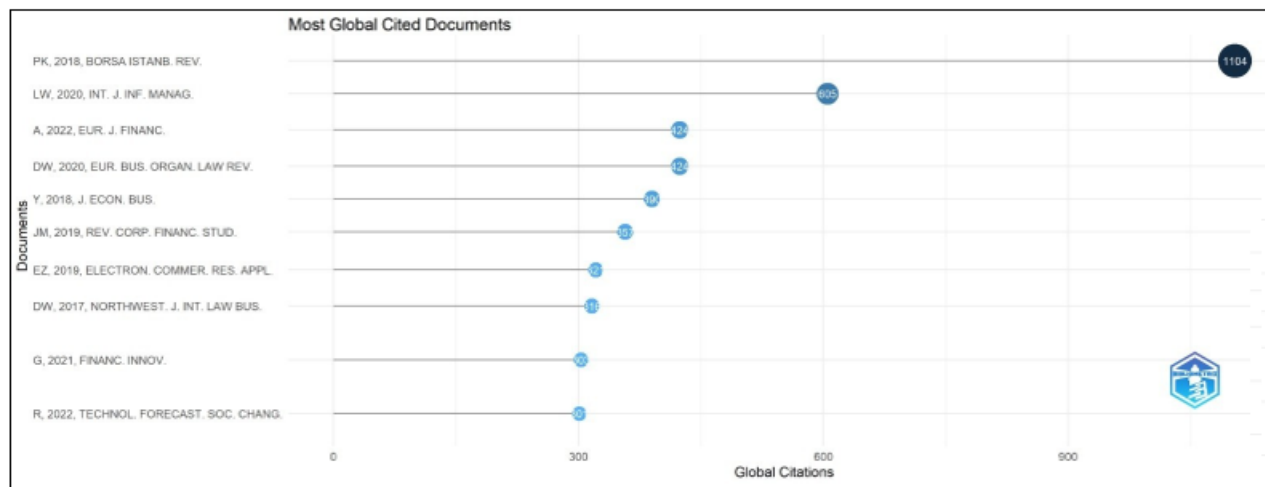


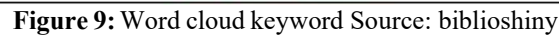
Figure 8: Most Global Cited Documents Source: Biblioshiny

4.1.8 Word Cloud Keyword

Figure 9 is a word cloud of keywords that show or visualize the frequent keywords found in the research related to digital financial services. The keyword size shows the frequency of words repeated or used in the research. The larger the size, the higher the importance of the word in the research, and the words are arranged in a way that the most common and important keywords of the research are in the middle of the image for the main focus or center of attention. Financial Inclusion and fintech are the most commonly used keywords

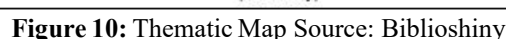
in the research of digital financial services; they are the dominating themes of the research on which the whole research is constructed. There are many other keywords like financial services, mobile banking, mobile money, and financial literacy, which are also important themes, but are at the foundation stage, which will eventually grow and increase the research.

4.1.9 Thematic Map



1) **Motor theme:** The Motor theme is highly dense and highly centered. These topics are the heart of the research on which the whole theme lies and stands.[21] In this map, figure 10, the motor themes are finance, innovation, digital finance, financial inclusion, financial services, and mobile money. Based on these themes, the research is moving

- 2) **Niche theme:** The Niche theme is low-centered but highly dense, which means that these topics are deeply scrutinized but are not directly connected with the domain. The niche themes are human, artificial, female, cryptocurrency, and global system for mobile communication.
- 3) **Basic theme:** The Basic theme is highly centered but low in density, which means that the topics are important but are at their initial stage and have not been explored much. The basic themes are fintech, financial literacy, and technology adoption.
- 4) **Emerging or declining theme:** The emerging or declining themes are the themes that are low in centrality and low in density. These are the topics that are either explored widely and are at their declining stage or have just been initiated, which are much newer and have less connection with the research theme. The emerging or declining themes are trust, technology acceptance model, and perceived usefulness.



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4.1.10 Keywords Tree Map

The tree map represents the different proportions of different topics or keywords of the research theme by using colourful boxes, and the size of the box denotes the count or significance of the topic. The topic or keyword which has been used maximum times are represented with large size boxes and small size boxes denote that these keywords are either at their foundation level or have been used mostly in past research which have less impact in current research. From figure 11, tree map represents that financial inclusion is a topic or keyword which has been used maximum time by the researchers in their research. Which is around 343 mentions and about 12% of total. Fintech and financial services are also main themes of this research study which actually combines the technology and financial system. Other notable words

include finance (4%), mobile money (3%), financial literacy (3%), banking (3%), and technology adoption (3%), digital finance (3%), innovation (3%), china (3%). Some of the keywords which are at their foundation level but have an impact on research are financial technology (2%), digital financial inclusion (2%), covid-19 (2%), India (2%), financial system (2%), mobile banking (2%), digital financial services (2%), sustainable development (2%), economic growth (2%), sustainability (2%) and some words with least significance are electronic money (1%), developing world (1%), trust (1%), digitalization (1%), block chain (1%), adoption (1%), technology (1%), Ghana (1%), UTAUT (1%), poverty (1%), artificial intelligence (1%), Kenya (1%), perceived usefulness (1%), technology acceptance model (1%), microfinance (1%).



Figure 11: Tree Map Source: Biblioshiny

4.2 Analysis by VOS Viewer

Further analysis was done by using the VOSviewer web

application, which the authors commonly use for doing bibliometric analysis. This tool primarily includes co-authorship analysis, citation analysis, cocitation analysis, and

co-occurrence analysis of keywords.[18] VOSviewer is a software that uses the VOS mapping technique to visualize graphic maps in a simple manner [17]. VOSviewer is very commonly used as it is very easy to use and downloaded freely without any coding [19]. VOSviewer is a program for creating and displaying bibliometric networks. VOSviewer (Visualization of Similarities Viewer) was created by **Nees Jan van Eck and Ludo Waltman** at Leiden University's Centre for Science and Technology Studies (CWTS) in the Netherlands. VOSviewer is essential for conducting thorough and methodical literature reviews because it allows researchers to examine vast amounts of scientific data from databases such as Dimensions, Web of Science, and Scopus. [25].

- **Co-authorship:** Co-authorship means the network under which the authors are writing on the same theme, directly or indirectly.
- **Co-occurrence:** It denotes the keywords that occur frequently.
- **Citation:** Citation means to give a reference or to give the name of the publisher whose work has been used by the author for further study.
- **Co-citation:** Co-citation means when the same work is cited by two or more different authors in their work. It defines the

relationship based on the papers being cited together

- **Bibliographic coupling:** It defines the relationship based on the paper citing the same source.[23][24]

4.2.1 Bibliographic Coupling

'Bibliographic Coupling' was first introduced by M.M. Kessler in 1963. [24] Bibliographic coupling can be defined as the analysis that occurs when the bibliography of two books includes one or more common references. The more the reference list matches, the stronger their relationship exists. Authors citing the same work is called coupling. The colour cluster denotes the group of authors who cite similar references frequently, depicts the research interest and network. Size of bubble shows the impact of reference within the dataset which shows the number of publications coupling with other dataset. Bubble closeness depicts the strength of the connection of authors. The more the proximity of bubble shows high degree of shared connection and the bubbles who are at distance shows less connection. Connecting lines shows the coupling links which are interconnected. Notable authors like "ozili (2018)" and "wong (2020)" and "demir (2022)" and "arner (2020)", have large bubble which shows the highest impact within the cluster.

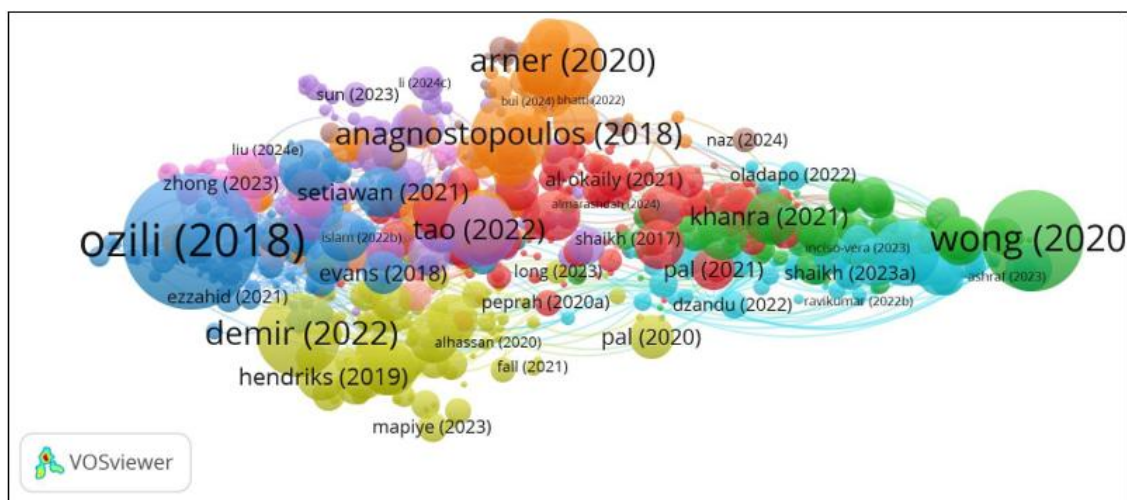


Figure 12: Bibliographic Coupling

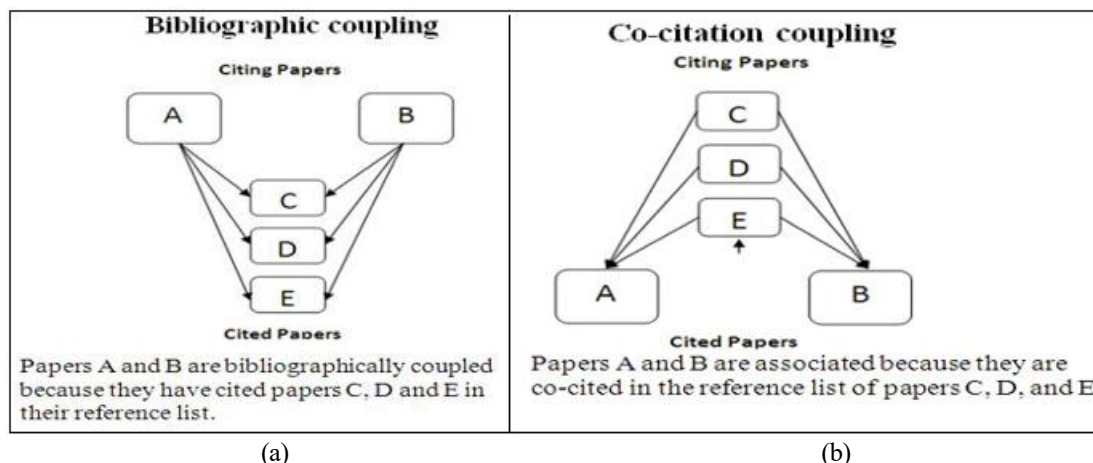


Figure 15: (a) Bibliography Coupling (b) Co-citation coupling

4.2.2 Co-authorship Country-wise

Co-authorship country-wise defines the area of research from different countries. Co-author means when two or more authors are involved in writing a paper together. Country-wise co-authorship means when the different authors writing a paper are from different countries, then they are internationally co-author. This graph of country-wise co-authorship clearly shows the countries working together and leading in global research.

Bubble in the graph denotes the countries and the same colour links shows the connection among the authors who are connected through academic publications. Colors of bubbles and links denotes closed connecting authors and dark lines mean the stronger and frequent collaboration. In figure 13 we can see that countries like India, China, Indonesia, South Africa, and Malaysia are in large-sized bubble indicating a strong role in international collaboration.

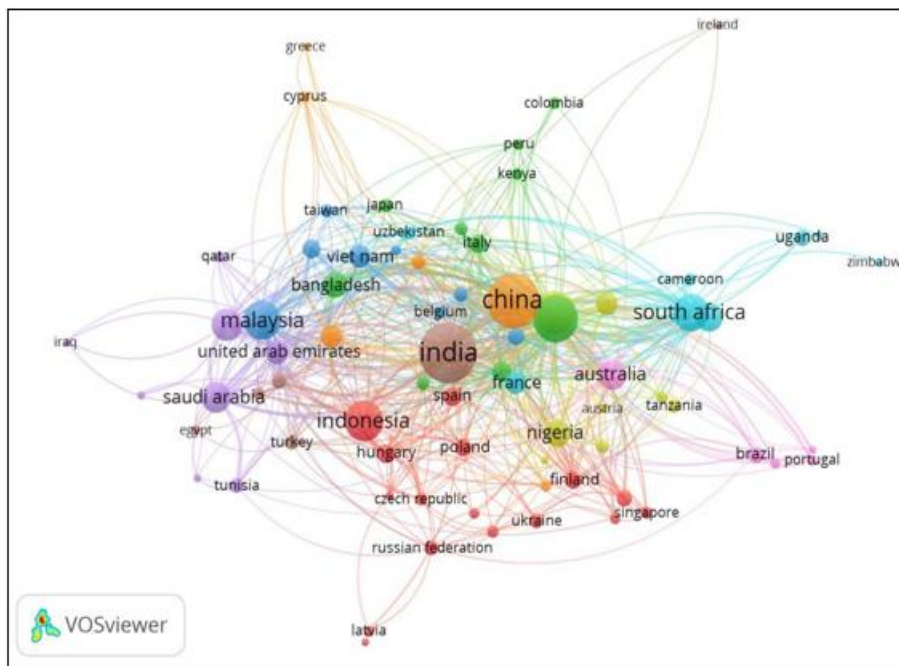


Figure 13: Co-authorship country-wise

4.2.3 Authors Co- Citation Analysis

Authors Co-citation analysis can be explained as the work that is frequently cited together in the literature. Since its introduction by White and Griffith in 1981, author co-citation analysis (ACA) has been a crucial technique in bibliometrics research.[26]. Authors' Co-citation is a process where the same author's name has been cited in different papers. For example in Figure 15(b) Authors A and B have been cited in papers C, D, and E. The bubble (circle) represents the authors and more the authors are cited the bigger the size of circle

becomes. The similar colour in the graph figure 14 represents the group of authors working on the same theme and frequently cited together. Links connect the authors and depict the strength of the relationship, thickness of lines denotes high impact and influence publications between authors. Authors like “aker”, “anderson” “aner” and “ahmad” have larger size circle which means that there work is most influential in this network. The colourful lines shows the cocitation relationship among the authors.

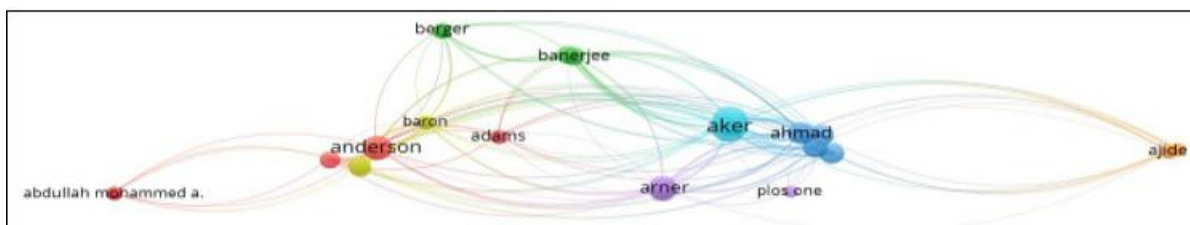


Figure 14: Authors Co-citation

4.2.4 Citation with author

Citation with respect to the author is defined as the number of times a specific author's name has been cited in a research paper or publication. Each bubble (circle) denotes the author and cited work, and the size depends on the frequency of citation (no. of times the author's name is cited); the bigger the

bubble means more citations. The colour of the bubble ranges from year 2020 to 2023 (blue to yellow). Proximity of bubbles indicates that the topics are related and have joint citation. In figure 15 maximum citations have been received by “ozili (2018)” which means the work of author “ozili 2018” have been cited by many other authors. Citation analysis describes

the work of an author that has been cited in other papers, helping to identify the main theme and indicate important

research topics. The map is a concise summary of research showing most influential authors.

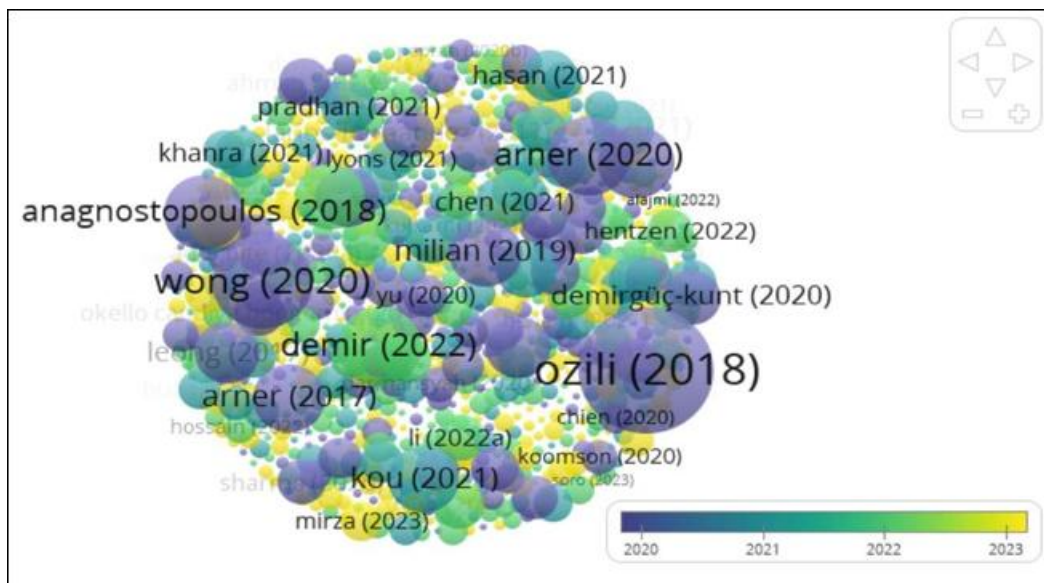


Figure 15: Citation with Authors

4.2.5 Co-occurrence

Co-occurrence define as the same appearance of two words in same article or paper is said to be co-occurrence. This method under VOSviewer helps to explain the relationship and patterns among words, and identify main themes. In figure 16 Co-occurrence shows the visualization of keywords which is related to the main theme of paper. In this paper the main theme or main concept is “Financial Inclusion” and “fintech” and “financial services” they are most important and influential keywords for the literature.

Green cluster denotes fintech related keywords like “electronic money”, “mobile money” and “finance” whereas red cluster

denotes financial services related keywords which actually the central theme and most important area like “banking”, “innovation” “digitaliation” “sustainability” and blue cluster denotes geographical and developmental aspects like “digital finance”, “china”, “economic development”, “africa”. Yellow cluster denptes consumer education like “financial literacy”, “mobile banking”, “financial technology”. The links and lines are interconnected which shows the co-occurrence or simantaneous appearance of keywords in the research documents or article. The map gives the overview of all the keywords which are interconnected and it helps to identify the key theme, trending theme and most impacting keyword of digital financial services.

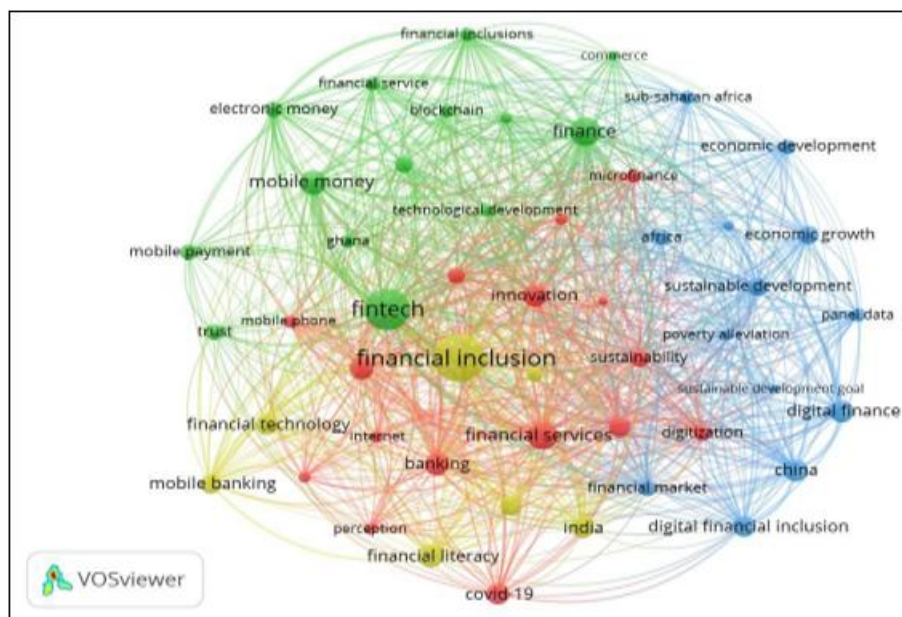


Figure 16: Co-occurrence

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5. Conclusion

The paper mainly focuses on the evolution of determinants in adoption of digital financial services. There are mainly factors which have boosted the adoption of fintech and digital financial services but then also there exist a lot of people who are underserved and are not able to get benefit from the services which are provided by government. A systematic and bibliometric analysis was done on the data which is been extracted from scopus database and the results shows that the most influential themes under this topic is financial inclusion, financial services, mobile banking, internet usage, technological advancement, and innovation. The researchers and scholars are more interested in these themes, as the financial system have evolve a lot. The financial system have witness a tremendous change from the traditional banking to the digitalised banking services. The fintech is not only confined to banking services it has also covered the whole financial system including the digital payment, digital banking, digital lending, digital finance and many more. Government policies and covid 19, both act as a catalyst which accelerate the digital shift and bring new domains and themes to the research. Biblioshiny and VOSviewer application is used to analyse the data and it simply depicts that the theme of digital financial services is currently the most influential theme and researchers are also showing keen interest in the theme.

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