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Article

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Emerging dimensions in Fintech: Insights from bibliometric analysis

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ABSTRACT

Fintech has emerged as a transformative force in the financial industry, promoting inclusivity and efficiency. This study aims to conduct a comprehensive bibliometric analysis of 1416 articles sourced from the Scopus database to map the evolution of fintech research. Employing the PRISMA methodology and VOS viewer software, we identify influential authors, key citations, and leading journals in this domain. Our findings indicate a significant increase in fintech research output since 2015, with China and the UK being the foremost contributors. Notably, the UK leads with the highest average citations per article, underscoring its research quality. Prominent journals identified include *Sustainability (Switzerland)* and *IEEE Access*. Despite this growth, our analysis reveals critical gaps in literature regarding financial inclusion, digital finance, and sustainability, which are vital for serving underbanked populations and advancing green finance initiatives. Furthermore, research on emerging technologies such as AI, blockchain, and robo-advisors remains limited, presenting substantial opportunities for future exploration. This study highlights the globalization of fintech research through contributions from diverse countries and outlines key trends shaping the field. It not only assesses the current landscape but also raises pertinent research questions to guide future investigations. While limited to articles from Scopus, this analysis serves as a crucial roadmap for future research directions.

1. Introduction

The digitalization of the financial service industry has spurred on a vast variety of modern technologies and solutions which has transformed consumer experience and transactions in distinct ways. With the large number of new digital financial platforms that are available for customers to use today, featuring a wide range of brand-new products and services such as online banking, mobile payments and crowdfunding platforms, the ways people live, work and spend their money have been revolutionized. The infusion of technological advancement in the financial service sector has offered the modern society with a form of digital revolution in the financial sector, a phenomenon popularly known as “Fintech”. The term Fintech stems from two emerging terminologies viz., Finance and technology (Geetha & Biju, 2024), the amalgamation of which has instituted new business models that have reshaped the financial landscape and disrupted the traditional services offered by financial institutions. It is a strategic amalgamation of finance and IT (Thakor, 2020) that enables organizations to yield an effortless consumer experience simultaneously rendering financial services at judicious operational costs (Rabbani et al., 2020), comprehensively

leading to enhanced service quality (Gai et al., 2018). It is now acknowledged as a quintessential term covering futuristic technologies employed for the delivery of financial services (Gai et al., 2018).

The Fintech companies in emerging markets are flourishing at a magnifying rate with those from Europe and America accountable for raising a combined value of \$70 billion in 2021 in contrast to \$29.3 billion in 2020 (Silicon Valley Bank, 2021). Industry players are growing at a far much higher rate in areas such as Southeast Asia and Africa due to the need for financial solutions and the uptake of mobile devices. Emerging markets are driving this growth through M-Pesa in Africa and Grab Financial Group in SE Asia which are offering meaningful financial solutions that the lower part of the pyramid needs. The worldwide growth of this sector makes it pellucid that Fintech has now become a predominant character in the world of finance. The rising momentum of Fintech 3.0 holds cryptocurrency and blockchain as swiftly growing fintech sectors around the world (Silicon Valley Bank, 2021), with record-breaking investments worth \$30.2 billion in 2021 (KPMG, 2021). The global statistics reflect significant growth in terms of both the value of investment accounting for \$226.5 billion in 2021 and revenue generated from the sector which is expected to reach US \$179.70 billion

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in 2024 (Statista, 2022).

Technologies like AI, big data, and blockchain are pivotal to Fintech's disruption of financial services, streamlining processes and enhancing user experience (Mention, 2019). While Robo-advisors, driven by these technologies, have garnered significant attention in academic literature, research primarily focuses on their design, legal complexities, and risk management (Belanche et al., 2019). However, studies examining user adoption and continuous usage of Robo-advisors remain limited. This innovative sector has attracted substantial investments, amounting to US\$210 billion in 2021, compared to US\$125 billion in 2020 (KPMG, 2021), and is recognized for its potential to create a more comprehensive, flexible, and effective financial system (Carney, 2017).

Market expectations concerning innovation, the need for cost-efficiency, and surging consumer demands have paved the way for fintech to grace as a trending subject matter. However, the complexities arising out of intersecting fields, technically empowered integrated systems, and divergent demands of end-users have made its acceptance and usage laborious. On that account, precise knowledge and awareness of Fintech among researchers, practitioners, and academicians is a burning need (Gai et al., 2018). While some consider fintech as a booming domain posing a threat to the traditional banking industry, others are of a firm belief, that this is a new ultimatum that will enhance the functioning of the banking industry, thereby, acting as an opportunity for financial development (Romanova & Kudinska, 2016; Seik & Sutanto, 2019; Elsaid, 2021; Muganyi et al., 2022). The interconnection between financial development and fintech is an emerging area in literature addressed by researchers globally (Demir et al., 2022; Muganyi et al., 2022). Increasing digitalization of the financial markets and development of new technologies – big data, cloud computing, AI, create conditions for building modern financial services products that are simple, fast and economically accessible.

Researchers in the past have highlighted distinct horizons of the Fintech revolution, while some touched upon the disruptive effects on financial intermediaries and the financial services industry (Arjunwadkar, 2018; Bussmann, 2017; Cai, 2018; Geranio, 2017; Liu, 2021) others investigated developmental effects in terms of financial development (Demir et al., 2022; Gabor & Brooks, 2017) economic growth, impact on Gross domestic product (GDP) of emerging economies (Gabor & Brooks, 2017; Sadigov et al., 2020; Yang et al., 2021; Kanga et al., 2022;) infrastructure growth opportunities (Xu & Xu, 2019; Yermack, 2018) foreign direct investments Inflow (Lai & Samers, 2021) and fintech start-ups and business models (Gimpel et al., 2018; Lee & Shin, 2018).

Grab, originally a ride-hailing app, has successfully expanded into digital payments and financial services, significantly enhancing financial inclusion across Southeast Asia by providing accessible solutions to unbanked populations. M-Pesa, a pioneering mobile money service in Kenya, has transformed financial transactions for millions, enabling users to send money and access banking services via their mobile phones. Paystack simplifies online transactions for Nigerian businesses, facilitating easier access to financial services and contributing to the growth of e-commerce in the region. Meanwhile, Ovo leads Indonesia's digital payment landscape, promoting financial inclusion through various financial services. Kiva connects lenders with borrowers through microloans, fostering entrepreneurship and providing access to underserved communities globally.

The adoption of Fintech and related digital technologies has been widely studied in conformity with the Technology acceptance models (TAM) and the Unified theory of acceptance and use of technology (UTAUT). Chuang et al., 2016 focused their research on how brand and service trust influences the behavioral intention of users to employ fintech services. Hu et al., 2019, ameliorated the TAM on similar grounds by incorporating factors that enhance trust in fintech services. Singh, Sahni, & Kovid, 2020, extended the same using a multi-method approach, by connecting sub-constructs to study the use and adoption

of Fintech and unveiled a moderated relationship caused by the awareness level and Internet experience. Xie et al., 2021, extended the UTAUT model by inculcating perceived value and risk, to study fintech's acceptance on internet wealth management platforms. Previous investigations also explicate why relationship banking is an important ingredient to the success of the banking business since the abolishment of the same might affect customer satisfaction (Boot, 2017; Jaksic & Marinc, 2019; Navaretti et al., 2018).

Prior bibliometric studies have provided a valuable addition to the knowledge of multiple facets of Fintech. However, these literature reviews and systematic literature reviews have been limited to certain subfields or interrelated realms of the topic. For example, Barroso and Laborda (2022), highlighted the application of new financial technologies in financial and investment activities. Hanafizadeh & Gerami Amin, 2023, systematically reviewed the transformative potential of fintech in banking services. Sanga & Aziakpono, 2023, followed a structured approach to consolidate the empirical research findings concerning the effectiveness of Fintech in meeting SME's financing needs. On the other hand, Firmansyah et al., 2022, conducted a systematic literature review to highlight the adoption of fintech. While Jain et al., 2023 successfully uncovered the risk aspects that have emerged in the fintech ecosystem, Sanga & Aziakpono, 2023, highlighted the emerging challenges and trends in fintech through a structured approach.

Even though all these works offer insights into these specific fields, none of them is a large-scale bibliometric study that will embrace the topic of Fintech in its entirety. Such a comprehensive analysis is crucial for defining the overall trends, finding research areas and topics, and, in general, acknowledging the leaders in the given scientific domain in terms of authors, institutions, and countries. Due to a limited mapping of the existing literature without a sole focus on "Fintech", some gaps could easily go unnoticed, and this affects the direction of research. For the professionals and managers in the Fintech industry, this gap might lead to the lack of timely innovation, the slow adoption of the best practices, and the continuation of the models that are no longer relevant in the context of the FinTech field's evolution.

On that account, the present study conducts a bibliometric analysis of the previous research publications concerning Fintech. With that aim in view, the data is extracted from the Scopus database, which is further analyzed and scientifically mapped using the Vos viewer software.

This bibliometric analysis of Fintech research provides critical insights beyond merely identifying trends and gaps, contributing significantly to the theoretical landscape of the field. First, the study highlights the rapid rise in Fintech publications, particularly since 2015, demonstrating the growing importance of financial technology in global economic systems. While areas like Blockchain and digital finance dominate the discourse, emerging topics such as sustainability, green finance, and financial literacy remain underexplored. This gap suggests the need for broader research into how Fintech can contribute to socio-economic challenges, such as environmental impact and financial inclusion.

The analysis also underscores the increasing convergence of finance and technology, with specific focus on the roles of AI, machine learning, biometric authentication, and digital payments. Although these technologies are transforming financial services, the study reveals a lack of comprehensive research on the ethical, legal, and regulatory implications of their widespread adoption. This points to the need for expanding traditional models of technology adoption, such as the Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT), to address Fintech-specific challenges, especially concerning regulatory frameworks and data privacy.

By identifying these gaps, the analysis contributes to a deeper understanding of Fintech ecosystems and the interplay between technology and finance. It calls for future research to move beyond technological innovation and explore the broader impacts of Fintech on society, including sustainability, ethical considerations, and regulatory oversight, ultimately helping to shape a more holistic and responsible approach to Fintech development.

This study seeks to answer the following research question:

RQ1. What are the emerging trends and research gaps in the field of Fintech, and how can they inform future research directions?

Also, for better understanding the detailed theme based research question is provided in Table 1. By conducting a bibliometric analysis, the study aims to map the existing literature, identify key contributors and influential works, and uncover areas in need of further exploration, particularly within financial inclusion, digital finance, and sustainability. This approach allows for a detailed understanding of how Fintech research has evolved and what gaps persist in the current body of knowledge.

The study has identified the following theme-based research questions:

After the introduction part the research paper is structured with the headings as methodology, analysis, future research directions, findings and Implications, policy recommendations and conclusion and limitations.

2. Methodology

The study is conducted using literature from the Scopus database, which covers multidisciplinary aspects (Burnham, 2006) and is renowned for its extensive and regional range of scientific journals, comprehensive books, and interdisciplinary conferences. (Baas et al., 2020). Considering its reliability and robustness in application in fields like marketing (Donthu, Kumar, Mukherjee, et al., 2021; Faruk et al., 2021; Valenzuela Fernandez et al., 2019), finance (Dosso & Aysan, 2022; Fahim & Mahadi, 2022; Tepe et al., 2021), supply chain (El Baz & Iddik, 2022; Rejeb et al., 2020; Rejeb et al., 2021), and healthcare (Filsler et al., 2017; Jimma, 2023; Nti et al., 2023; Rachid & Jamal, 2024) this study employs it as a primary source.

PRISMA is a widely recognized guideline designed to enhance the transparency and quality of systematic reviews and meta-analyses. In the context of FinTech, applying PRISMA ensures that researchers comprehensively report their findings regarding the impact of financial technologies on various aspects such as financial inclusion, efficiency, and innovation. The PRISMA statement includes a 27-item checklist that guides authors in reporting essential components of their review, including the rationale for the review, methods used for literature search, selection criteria, and synthesis of findings. This structured approach is particularly important in FinTech research, where rapid technological advancements necessitate clear documentation of existing literature to inform future studies (Moher et al., 2009).

SALSA is a systematic review methodology that emphasizes a structured approach to literature reviews through four key phases: Search, Appraisal, Synthesis, and Analysis. In FinTech research, SALSA can be applied to identify relevant studies that explore the intersections between technology and financial services. The appraisal phase critically evaluates the quality of selected studies, ensuring that only robust research informs the synthesis phase where findings are integrated to derive insights about trends in FinTech adoption or regulatory impacts. This methodology aids researchers in systematically addressing gaps in the literature regarding emerging technologies like blockchain or AI in finance Booth et al., 2021).

2.1. Research framework

Fig. 1 depicts the research framework adopted to systematically curate the data. The research has been carried out in four phases that delineate a structured approach to conduct a bibliometric analysis of Fintech research.

2.1.1. Identification

A systematic approach was carried out to validate the search string employed to extract data from the Scopus database. First, to gather a

Table 1
Theme Based Research Questions.

S-No	Theme	Research Questions
I	<i>AI and ML in Fintech</i>	<ol style="list-style-type: none"> 1.What are the specific ethical and regulatory challenges posed by AI and ML in the fintech sector, and what strategies are most effective for addressing them? 2.To what extent does bias exist in AI algorithms used in fintech, and how do these biases impact various investor groups? 3.What are the potential long-term implications of the increasing integration of AI and ML in the broader financial market?
II	<i>Digital Payment Systems:</i>	<ol style="list-style-type: none"> 1. What inherent risks are associated with digital payment systems, and what cybersecurity strategies can effectively mitigate these risks? 2. How can comparative research on the economic and social impacts of transitioning to cashless societies deepen understanding of digital payment systems? 3. How can digital payment adoption be encouraged and its effectiveness improved in underserved communities globally?
III	<i>Robo-Advisors:</i>	<ol style="list-style-type: none"> 1. What biases are present in the algorithms of robo-advisors, and how do they affect investment outcomes for different types of investors? 2. What methods can be used to study and improve trust and acceptance of robo-advisors across different user demographics and regions? 3. What underexplored biases exist in robo-advisor algorithms, and how can addressing these biases improve the platforms' effectiveness?
IV	<i>Peer-to-Peer (P2P) Lending:</i>	<ol style="list-style-type: none"> 1. How stable are P2P lending platforms during economic downturns, and what risk management practices can enhance their resilience? 2. What types of regulatory measures would support the inclusion and growth of the P2P lending market? 3. How do traditional banks continue to operate in the era of P2P lending, and what are the broader consequences for the financial sector?
V	<i>Insurtech:</i>	<ol style="list-style-type: none"> 1. How can the processes of standardization and overcoming obstacles in Insurtech improve the efficiency of the global insurance market? 2. How does Insurtech enhance the availability and affordability of insurance services, and what impact does this have on the insurance market worldwide? 3. What are the regional differences in Insurtech adoption, and what insights can be gained from a comparative analysis?
VI	<i>Regulatory Technology (Regtech):</i>	<ol style="list-style-type: none"> 1. How effective are Regtech solutions in assisting financial institutions across different regulatory environments? 2. What challenges arise in implementing Regtech solutions internationally, and how can these be addressed? 3. What similarities and differences exist in regulatory compliance practices supported by Regtech in various regions, and what can be learned from these comparisons?
VII	<i>Biometric Authentication in Finance:</i>	<ol style="list-style-type: none"> 1. How reliable and secure are different biometric authentication methods across various financial contexts? 2. What factors influence user acceptance and concerns about biometric authentication in multicultural settings? 3. What lessons can be drawn from comparing the use of biometric authentication by financial institutions in different regions?
VIII	<i>Fintech and Sustainable Development:</i>	<ol style="list-style-type: none"> 1. Which recent fintech innovations have had the greatest impact on sustainable

(continued on next page)

Table 1 (continued)

S.No	Theme	Research Questions
		development, and how can this impact be quantified?
		2. How is fintech contributing to specific sustainable development goals (SDGs), and what more can be done to enhance this role?
		3. How are traditional financial institutions adopting fintech to support sustainable economic development, and what have been the effects?
IX	<i>Fintech and Financial Inclusion:</i>	1. What strategies are fintech-enabled financial inclusion initiatives employing in developed versus developing countries? 2. To what extent is fintech reaching rural and disadvantaged populations, and what factors either facilitate or hinder this outreach? 3. What impact has fintech had on reducing financial exclusion, and how can this impact be further strengthened?
X	<i>Metaverse Banking:</i>	1. How relevant is relationship banking in metaverse-operated banks, and how does it differ from traditional banking relationships? 2. How can user behavior and preferences in the adoption and continued use of metaverse banking be analyzed? 3. What factors drive the adoption of metaverse banking within the traditional banking industry, and how can these be leveraged for future growth?

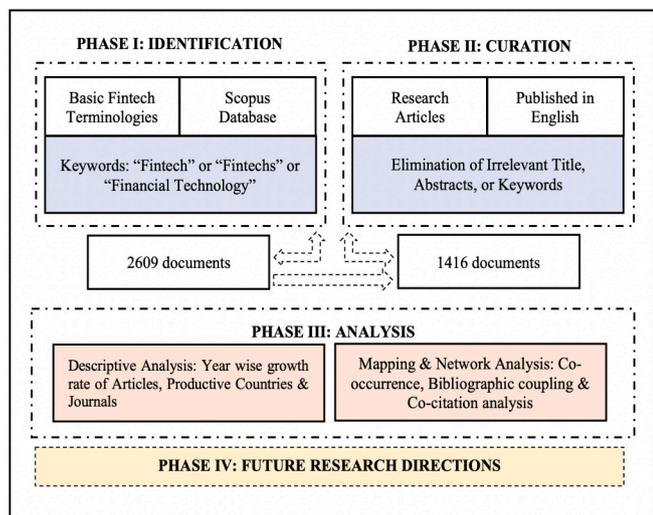


Fig. 1. Research framework adopted. (Source: Authors)

comprehensive understanding, a pilot search was conducted on different platforms using the keywords “Fintech,” “financial technology,” “digital finance,” “financial innovation,” “fintech ecosystem,” “fintech evolution,” and “digital payments.” The results confirmed that our chosen terms retrieved a substantial number of Fintech-related studies. However, the studies gathered excessive noise and even included articles beyond the scope of the current research. These results were then cross-verified with prominent Fintech-related systematic reviews and highly influential journals to validate the inclusion of keywords relevant to the scope of the current study. Thus, the two keywords “Fintech” and “Financial technology” were extracted. The keywords were then tested on Scopus using Boolean logic to maximize the retrieval of only relevant literature. Additional feedback was also sought from a panel of experts and researchers in the field of finance, to validate the Boolean logic and extracted keywords for the Scopus database. Thus, the search string

“TITLE-ABS-KEY (‘fintech’ OR ‘financial technology’ OR ‘financial technologies’)” was finalized. Through iterative adjustments and validation, the final search string yielded a total of 2609 documents on the Scopus database. This robust process of validation not only confirmed the comprehensiveness of the search string but also ensured that it aligned with the research objectives, facilitating a thorough exploration of the relevant Fintech literature. This comprehensive search strategy laid the groundwork for a systematic review, ensuring that critical insights and contributions from the field were included in the analysis.

2.1.2. Data curation

The PRISMA 2020 protocol as depicted in Fig. 2 is used to curate data. With a systematic approach and a comprehensive checklist, the PRISMA 2020 helps increase the quality and standard of bibliometric analysis (Page et al., 2021), bolstered by the following inclusion and exclusion criteria.

i. Inclusion Criteria.

The study includes only research articles published in English up until the year 2022. The rigorous peer-review process of research articles helps maintain high quality and standards. A brief review of the titles, abstracts, and keywords was conducted to identify documents relevant to the study.

ii. Exclusion Criteria.

The exclusion criteria resulted in the elimination of 1193 records. These included 1141 records belonging to the “Others” category, 52 records not published in English, and 1 record that was irrelevant to the main topic of the study. Only articles published in English were considered due to their accessibility, consistency, and the broader audience they reach.

The exclusion of non-English articles was made to improve accessibility, consistency, and the overall quality of data analysis in the study. English is widely recognized as a global lingua franca, especially in academic and research communities, allowing the findings to reach a broader audience, including researchers, practitioners, and policy-makers who may not be proficient in other languages. This approach ensures that the research is disseminated effectively and encourages further investigation into the topic.

In addition to enhancing accessibility, focusing on English-language publications promotes consistency in data analysis. Analyzing articles in a single language reduces the risks of misinterpretation and bias that can arise from language differences. This uniformity allows for more coherent coding, data extraction, and thematic analysis, ultimately leading to more reliable and valid conclusions. Moreover, using English facilitates collaboration among researchers from diverse backgrounds, fostering clearer communication and a shared understanding of the study’s objectives. While this exclusion criterion is justified, it is important to acknowledge that it may omit valuable insights from non-English contributions. Recognizing this limitation highlights the need for future research to adopt a more inclusive approach to language, which could enrich the academic discourse surrounding the topic.

2.1.3. Bibliometric analysis

This study employs Bibliometric Analysis ascribed by its wide application and ability to confer deeper insights into the realms of business and economics (Castillo-Vergara et al., 2018; Goyal et al., 2021; Kraus et al., 2020). It can not only handle large volumes of data but also can yield impactful research results (Donthu, Kumar, Pattnaik, & Pandey, 2021). Authors in the past have implemented the use of VOSviewer to map and network influential journals, countries, and authors which ultimately help identify influential research areas and ongoing trends within the literature. This study adopted the use of VOSviewer to conduct a more detailed bibliometric analysis based on critical aspects of the fintech research area. It was useful in mapping and networking the interrelations between keywords, authors, and research themes derived from 1416 research articles. The use of VOSviewer helped to reveal the patterns and development of the fintech research, as well as to define the

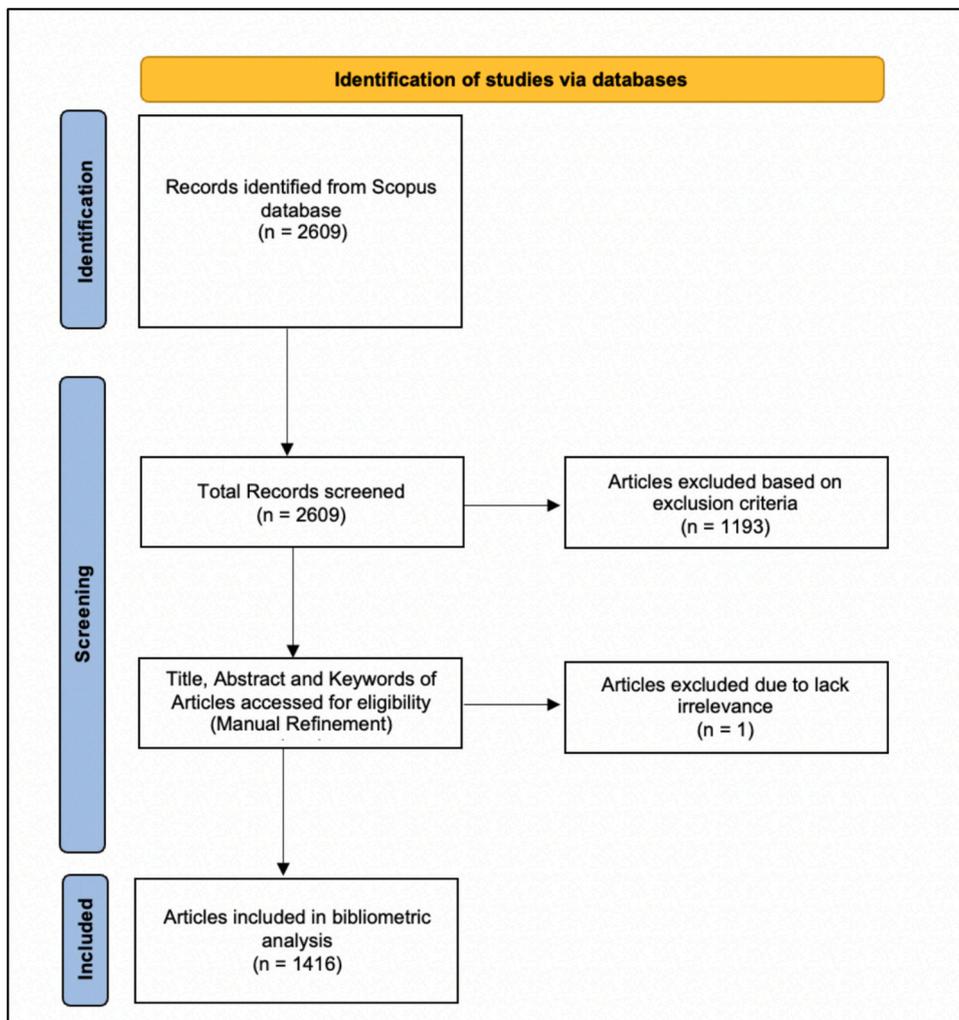


Fig. 2. PRISMA Flowchart. (Source: Authors; modified from work of Page et al., 2021)

key trends, active contributors, and promising directions of the field.

3. Analysis

This section is organized as follows: First, a detailed picture of the fundamental characteristics of fintech articles is delineated depicting the year-wise growth of articles, the top productive countries, and journals. Further, a brief analysis of highly cited papers is conducted to determine their main results and extract the key themes of these articles. Then follows, the bibliometric analysis which sheds light on the Co-Occurrence Analysis of Author Keywords, Co-Citation Analysis of Cited References, Journals, and Authors, Bibliographic Coupling of Authors, and Co-Authorship Analysis of Countries.

3.1. Descriptive characteristics of Fintech publications

Fig. 3 depicts the annual growth of published articles concerning Fintech. The growth of fintech publications has been phenomenal, especially after the year 2015, this field has emerged at an immense rate. Out of the total of 1416 articles from the earliest year as per the Scopus database, 30.37 % (430) articles were published in the year 2021. The flow of publications remained stagnant during the first decade, however, after 2015, this area of research was widely acknowledged by researchers around the world.

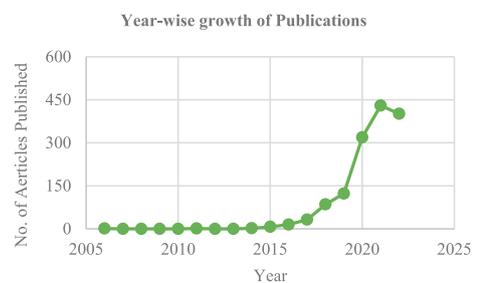


Fig. 3. Year-wise growth of Fintech Publications. Source: Authors' collaboration based on Scopus data.

3.2. Most productive countries

As per the total no. of articles (TA) published, total no. of citations (TC), and average citations per article (AC) the top 10 productive countries are represented in Table 2. The number of citations of documents is a significant measure of its impact or influence (Smith, 1981). China stands out as the most productive country with a total of 280 articles, each of them having an average citation of 11.33. Out of the total published articles (1416), 19.77 % are contributed by China, followed by the USA (12.64 %), United Kingdom (11.65), South Korea (5.51 %), and Australia (4.87 %). However, the impact of articles

Table 2
: Most Productive Countries.

S.no	Country	TA	TC	AC
1	China	280	3172	11.33
2	United States	179	3058	17.08
3	United Kingdom	165	3261	19.76
4	South Korea	78	1303	16.71
5	Australia	69	1019	14.77
6	Germany	60	1475	25.58
7	Indonesia	97	388	4
8	Italy	68	881	12.96
9	India	85	456	5.36
10	Malaysia	69	384	5.57

Source: Authors' collaboration based on Scopus data.

published by the United Kingdom is more than the top two countries with 3261 total citations accounting for an average of 19.97. Also, Germany has the maximum average citations per article i.e. 25.58.

The analysis of the most productive countries in Fintech research reveals important insights into the landscape of global scholarly contributions. As shown in Table 2, while China leads with a total of 280 articles published, its average citations per article (AC) stand at 11.33. This suggests that while China is prolific in terms of quantity, the impact of its articles, as measured by citations, is lower compared to other countries. This discrepancy may indicate a focus on quantity over quality in certain areas, potentially leading to a dilution of research relevance or visibility in the international arena.

In contrast, the United Kingdom exhibits a higher average citation per article of 19.76 with 165 articles, resulting in a total of 3261 citations. This suggests that UK-based research in Fintech may be addressing high-impact areas that resonate more significantly within global discussions. The prominence of UK research could also reflect a more mature ecosystem that emphasizes quality and relevance, allowing its contributions to be recognized and cited more frequently by peers in the field. This could be attributed to the UK's strong financial services sector and its historical role as a global financial hub, enabling researchers to engage with practical challenges that attract international attention. Even though China has the highest number of fintech publications, the average citation count of these publications is lower compared to the UK. A prominent reason for this gap is the difference in research focus between the two countries. Chinese studies are more technology-driven and regulatory-adapted; therefore, they attract fewer international citations. In contrast, studies from the UK receive greater global attention due to their focus on theoretical contributions and policy regulations, which are relevant to a broader audience. Language is another factor that may partly contribute to this gap. Chinese studies are mostly published in the local language, whereas UK studies, published in English, are widely accessible and understandable around the globe. Another factor that accounts for this gap is strong is UK's strong academic-industry collaboration, and it's presence in global financial hubs. On the other hand, the Chinese academic literature remains limited in international exposure because it mainly appears in regional publications.

The United States, with 179 articles and an average citation of 17.08, also demonstrates substantial research output and impact. While its average citation per article is lower than that of the UK, it still indicates a significant level of influence. The USA's diverse research landscape and funding opportunities might contribute to its ability to produce a variety of impactful studies in Fintech.

Interestingly, Germany has the highest average citations per article at 25.58 despite publishing only 60 articles. This suggests that German research may be highly specialized and concentrated in influential topics within Fintech, potentially leading to greater recognition and citation in the literature. The lower publication count combined with high citation metrics may indicate a focused approach to impactful research that resonates well with the academic community.

Countries like South Korea (AC of 16.71) and Australia (AC of 14.77)

also show strong research productivity, indicating that these nations are contributing valuable insights and innovations in Fintech. Their ability to produce impactful research suggests a growing recognition of their work on international platforms, reflecting the increasing globalization of Fintech research.

The differences in average citations across these countries illustrate not only varying levels of research maturity but also differing priorities in research focus. While some nations may prioritize sheer volume, others focus on producing fewer but more impactful studies that contribute significantly to the field. These dynamic highlights the diverse landscape of Fintech research, with each country's contributions reflecting its unique context, expertise, and areas of emphasis. Overall, the higher average citations in the UK and Germany suggest a trend toward quality and relevance, indicating their research is more likely to influence ongoing discussions and practices within the global Fintech community.

3.3. Most productive journals

Table 3 represents the most productive and impactful journals concerning Fintech publications based on the total number of articles published and the total number of citations. The "Sustainability (Switzerland)" has the highest number of published articles i.e. 37, having 300 total citations accounting for an average of 8.11 citations per article. Follows, the IEEE Access with 35 total articles, 483 total citations, and 13.8 average citations, and Technological Forecasting and Social Change with 23 articles, 577 total citations, and 25.09 average citations. The journal "Electronic Commerce Research and Technology Research" has the maximum average citations per document accounting for 29.53.

3.4. Analysis of highly cited papers

On the grounds of Keywords extracted from the top 10 articles as detailed in Table 4, Fig. 4 represents the key themes of these articles based on the frequency of author keywords. Apart from the key term 'Fintech', Blockchain emerged as the most frequent word. Other keywords that occurred the same number of times are financial technology, digital finance, financial institution, financial inclusion, cryptocurrency, and bitcoin.

Thus, it can be interpreted that Blockchain is the hottest topic of interest among researchers concerning fintech. Apart from this, researchers can also address the gaps in the literature on financial inclusion, digital finance, and cryptocurrency.

3.5. Bibliometric analysis of Fintech research

3.5.1. Co-occurrence analysis of author keywords

Keywords analysis helps in portraying the key topics or main subject matter of an article (Seguí-Amortegui et al., 2019) wherein occurrences (Oc) represent the number of documents in which the respective

Table 3
: Most Productive Journals/Sources.

Journal	TA	TC	AC
Sustainability (Switzerland)	37	300	8.11
IEEE Access	35	483	13.8
Technological forecasting and social change	23	577	25.09
Finance research letters	22	168	7.64
Financial innovation	20	255	12.75
Electronic commerce research and technology research	17	502	29.53
Journal of payments strategy and systems	13	13	1
Mathematics	12	66	5.5
Journal of economics and business	11	517	47
International journal of scientific and technology research	11	30	2.73

Source: Authors' collaboration based on Scopus data.

Table 4
Analysis of highly cited articles.

Authors	Source Title	Citations	Main Results
Lee and Shin (2018)	Business Horizons	363	A clear picture of the fintech ecosystem was delineated, with their related business models existing in the era of digitalization viz., Insurance, Wealth Management, Lending, Payments, etc. The study highlighted the application of the real options approach for fintech investment projects. The disruptive innovation driven by the evolution of fintech brought challenges for traditional financial institutions and start-ups to the foreground.
Gomber et al. (2017)	Journal of Business Economics	316	The study adopted a structured and systematized approach to analyze the previous literature on Digital Finance. The digital finance cube focusing on the business functions, technologies, and institutions was applied to segregate the literature accordingly and identify the gaps for future research.
Aste et al., 2017	Computer	313	The theoretical background of Blockchain with a keen focus on emerging blockchain technologies and their related limitations and risks were discussed in this study. Significant questions on user security and the effect of sentiments were raised for future studies.
Ozili (2018)	Borsa Istanbul Review	245	The study brings an important aspect of Fintech to the limelight stating the lack of literature on Digital finance issues. Despite, the positive influence of digital finance on financial inclusion this is one of its kind of studies to address the issues of digital finance concerning low-income groups.
Adhami et al. (2018)	Journal of Economics and Business	222	The concept of Initial Coin Offering (ICO) was detailed in this study to analyze the factors promoting the success of the same. The findings contribute valuable insights into the decision-making processes behind businesses embracing cryptocurrency, shedding light on the dynamics of ICOs in the economic and business landscape.
Buchak et al. (2018)	Journal of Financial Economics	220	Technological forces and regulatory restrictions are accounted as key determinants to promote the growth of shadow banks in this study. The increasing regulatory restrictions on traditional banks led to their contractions thereby, leading the shadow banks to address this gap.
Gabor and Brooks (2017)	New Political Economy	215	This study looks at how networks of government agencies, international development organizations,

Table 4 (continued)

Authors	Source Title	Citations	Main Results
Treleaven et al. (2017)	Computer	213	philanthropic investors, and fintech firms are organizing development interventions and how important digital-based financial inclusion is becoming in doing so. The study delves into how blockchain technology has significantly impacted the banking sector and altered the operations of financial service industries. The challenges faced by the latter are also put forward along with its enormous potential to further transform the system.
Haddad and Hornuf (2019)	Small Business Economics	164	The economic and technological factors that entice entrepreneurs to start businesses with the mission of reinventing fintech are highlighted in this study. It is brought to notice that political guidelines and initiatives can sway the onset of fintech start-ups.
Gai et al. (2018)	Journal of Network and Computer Applications	163	The study established a theoretical base of Fintech research and proposed a data-driven Fintech framework covering four aspects on those grounds. Data and security emerge as the pivotal aspects of Fintech, therefore, a detailed review of privacy and security issues, and solutions, to solve the same are addressed.

Source: Authors' collaboration based on Literature Review.

keyword appears (Van Eck & Waltman, 2016). On mapping a total of 3770 keywords from 1416 articles 185 keywords met the threshold value of a minimum of 5 occurrences Which are organized in 13 clusters with the help of Vos viewer software

Fig. 5 depicts the co-occurrence network of these keywords, wherein other than Fintech, Blockchain, financial technology, financial inclusion, artificial intelligence, and bitcoin emerge as the most frequently occurring keywords, the details of which are enlisted in Table 5. After Fintech, Blockchain emerged as the leading keyword that occurred 166 times (denoting occurrences), and 97 other keywords appeared with it (the links) at least 447 times (the total link strength) because of its wide consideration in academia and industry (Fernandez-Vazquez et al., 2019). Financial Inclusion transpires as another key area of research in association with fintech (with 87 occurrences, 77 links & 239 total link strength) since fintech innovations are said to accelerate the rate of financial development and inclusion (Senyo & Osabutey, 2020). A large number of studies have also diverted their attention to fintech adoption, since from the dark blue cluster trust, TAM, perceived risk, perceived benefit, and adoption are visibly mapped keywords. The pink cluster highlights security and privacy as significant keywords and the brown cluster comprises emerging technologies such as Big data, Machine Learning, Deep Learning, Artificial intelligence, etc.

The co-occurrence analysis of keywords in Fintech research reveals significant insights into current trends and focal areas within the field. Among the 3770 keywords extracted from 1416 articles, blockchain, financial inclusion, and artificial intelligence (AI) emerge as particularly prominent. Their prominence not only reflects ongoing technological advancements but also indicates evolving socio-economic priorities in financial services.

financial inclusion highlights the role of technology in bridging gaps in access and fostering economic participation.

Artificial intelligence also holds a prominent position within this network of keywords, indicative of its growing impact on Fintech solutions. The integration of AI in financial services enhances data analysis, risk assessment, and customer service through advanced algorithms and predictive analytics. As the demand for personalized financial solutions and improved operational efficiency increases, AI is becoming essential in driving innovation within the sector.

The distribution of keywords across various clusters further illustrates current research trends and potential gaps. For example, the dark blue cluster, which encompasses keywords such as trust, the Technology Acceptance Model (TAM), perceived risk, and perceived benefit, indicates a robust focus on user acceptance and adoption of Fintech solutions. This reflects a critical understanding of the factors influencing customer behavior in adopting new technologies.

Conversely, the pink cluster, emphasizing security and privacy, underscores the ongoing challenges associated with digital financial services. As Fintech solutions proliferate, concerns over data breaches and consumer privacy have become increasingly significant, highlighting the need for more research into secure technologies and regulatory frameworks to protect users.

The brown cluster, featuring emerging technologies like Big Data, Machine Learning, Deep Learning, and AI, showcases a trend toward leveraging advanced analytics to enhance decision-making processes in Fintech. The interplay between these technologies is becoming a focal point for researchers exploring how they can collectively improve financial services.

Despite the increasing awareness of sustainability in academics and industry, it is observable that the Sustainability of Fintechs has not been touched upon immensely, and this area is probably in its phase of emergence. Green finance is another area concerning fintech that has lured the attention of scholars around the world in recent times.

3.5.2. Co-citation analysis of cited references, journals & authors

A co-citation relationship is said to occur when two authors, references, or journals are cited together by a third item, wherein, co-citation denotes the occurrence of documents cited together (Small, H). The strength of the relationship between authors, references, or journals is denoted by the closeness of the nodes between them. This section portrays the co-citation analysis of cited references, journals, and authors.

Out of 1416 total articles, 69,245 cited references were extracted, among which 34 met the threshold value of a minimum of 10 citations.

Fig. 6 represents the same mapped in 5 clusters. The most representative articles from these clusters are Gabor and Brooks (2017) from the red cluster with 15 citations, 15 links, and 31 link strength. This cluster mainly had studies focusing on digital finance and traditional banking institutions. Also, a keen focus of these studies was financial inclusion and underserved populations. Chen (2016) from the green cluster had 13 citations, 12 links, and 21 link strengths. This cluster has user-oriented studies where research was directed toward the adoption of fintech using TAM. Haddad and Hornuf (2019) from the blue cluster had 25 citations, 22 links, and 54 link strengths. Lee and Shin (2018) from the yellow cluster had 34 citations, 21 links, and 64 link strengths. The studies catering to this cluster focused on the concept of fintech, its emergence, ecosystem, and business models. Lin et al. (2013) from the purple cluster had 22 citations, 13 links, s, and 21 link strengths, along with studies focusing their attention on Crowdfunding.

Fig. 7 represents the co-citation network of cited sources, wherein 116 sources meet the threshold value of a minimum of 50 citations. A total of four clusters are formed mapping the data. The MIS quarterly journal belonging to the blue cluster has the maximum number of citations accounting for 316, with 7753 total link strength. This cluster comprises the information system journals acknowledging multi-disciplinary realms of research having managerial and business implications. The Journal of Financial Economics emerges as the most influential journal from the red cluster with 264 citations and 5561 link strength. The majority of the journals in this cluster focus on banking and finance e.g. Financial Innovation Journal, Finance Research Letters, Journal of Financial Intermediation, Journal of Banking and Finance, etc. The IEEE Access emerged as the most representative journal of the green cluster with 295 citations, 109 links, and 1965 link strength, followed by the Sustainability journal from the yellow cluster.

The co-citation network of authors is depicted in Fig. 8, here 189 authors that meet the threshold value of a minimum of 50 citations are networked in five clusters. The red cluster is the major cluster, having a total of 72 authors, the most representative of which are Gai, k., (150 citations and 8103 link strength), Qiu, m., (133 citations and 7109 link strength), Li, y., (234 citations and 6316 link strength) and Zhang, y., (258 citations and 5978 link strength). The green cluster has 42 authors among which Demirguc, A., emerges as the most representative one with 227 citations and 4541 link strength along with Jagtiani, J., with 140

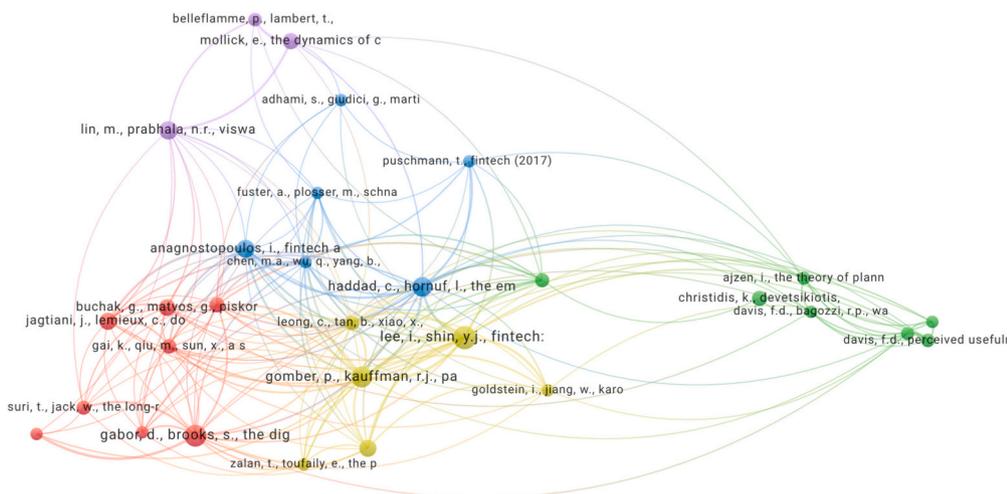


Fig. 6. Co-citation network of cited references
Source: Authors' collaboration based on Scopus data.

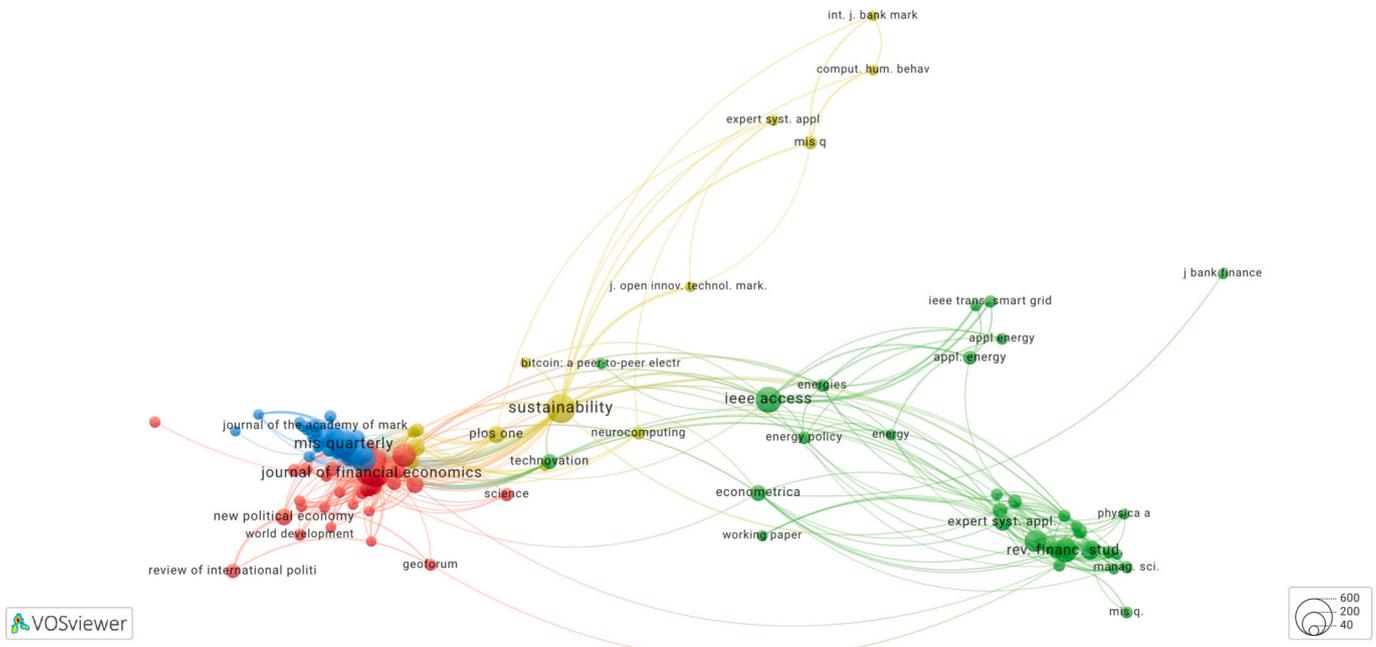


Fig. 7. Co-citation network of cited sources.
(Source: Authors' collaboration based on Scopus data)

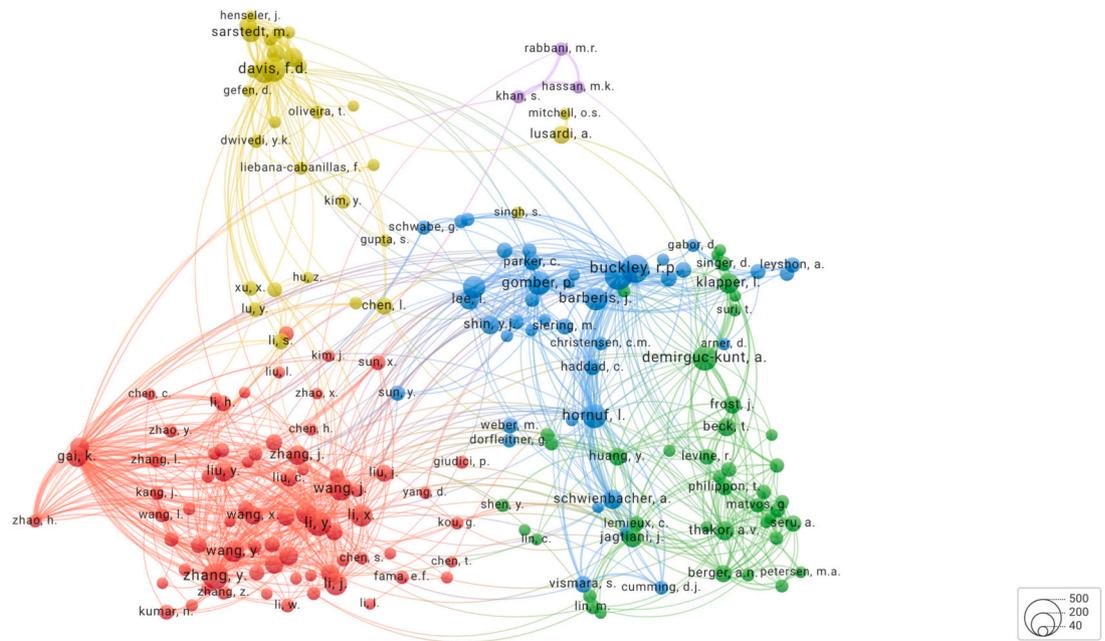


Fig. 8. Co-citation network of authors.
(Source: Authors' collaboration based on Scopus data)

citations and 3785 link strength. Among blue (41 authors), yellow (31 authors), and purple (3 authors) clusters Arner, D.W. (292 citations and 6568 link strength), Davis, F.D., (226 citations and 5049 link strength) and Khan, S., (66 citations and 1536 link strength) are the most representative ones.

3.5.3. Bibliographic coupling of authors

The Bibliographic coupling of authors is an indication of common areas of interest of researchers, depicted if two authors cite the same author or in other words, have a common reference (Gazni & Didegah, 2016). Out of a total of 3332 authors, 38 met the threshold value of a

minimum of 5 documents, which are networked in six clusters in Fig. 9. The most representative authors from each cluster are as follows: Khan S., (red, 5 documents & 510 link strength, Zhang, Y., (green, 14 documents & 946), Sun Y., (blue, 9 documents & 904 link strength), Wang Y., (yellow, 11 documents & 304 link strength), Liu J., (purple, 6 documents & 553 link strength), Okoli T.T., (light blue, 6 documents & 334 link strength). The top five authors with maximum publications are as follows: Zhang Y., (14), Wnag Y., (11), Liu Y., (10), Zhang X., (10) & Li Y., (9).

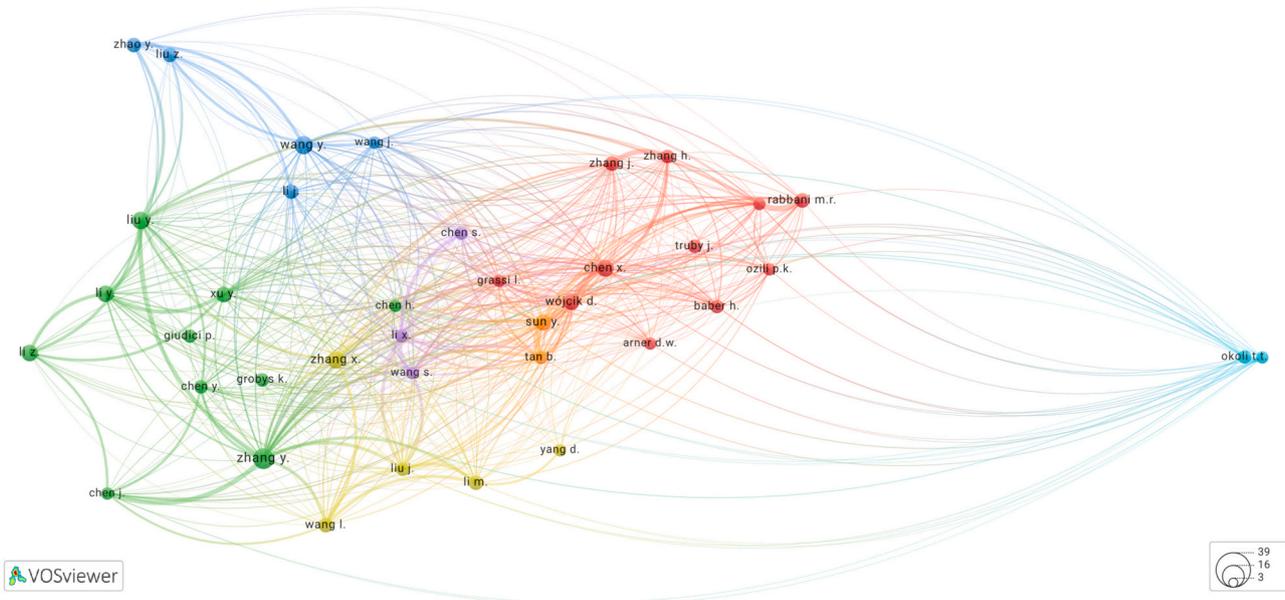


Fig. 9. Bibliographic Coupling of Authors.
(Source: Authors' collaboration based on Scopus data)

3.5.4. Co-authorship analysis of countries

The Country Co-authorship network is depicted in Fig. 10, portraying 59 countries that meet the threshold value of a minimum of 5 documents, organized in 7 clusters. Based on the link strength, the countries are ranked as follows: China (174), United Kingdom (155), United States (136), Australia (104) & Malaysia (71). The most representative countries from each cluster are as follows: China (purple, 3172 citations & 174 link strength), United States (green, 3058 citations & 136 link strength), Australia (light blue, 1019 citations & 104 link strength), Malaysia (dark blue, 384 citations & 71 link strength), Hongkong (green, 467 citations & 49 link strength), Singapore (yellow, 193 citations & 38 link strength) and South Korea (orange, 1303 citations & 32 link strength).

The co-authorship analysis reveals strong collaborative networks among high-productivity countries such as China, the USA, and the UK, indicating a trend toward increasingly globalized Fintech research. This collaboration is essential in a rapidly evolving field like Fintech, where

diverse expertise and shared resources can drive innovation and facilitate the exchange of ideas. The analysis highlights how researchers from different regions are coming together to address complex challenges and explore new opportunities in financial technologies.

In examining the Country Co-authorship network, depicted in Fig. 10, 59 countries meeting the threshold of a minimum of five documents are organized into seven clusters. The ranking based on link strength places China at the forefront (174), followed by the United Kingdom (155), the United States (136), Australia (104), and Malaysia (71). Notably, China emerges as the most representative country in the purple cluster, boasting 3172 citations and a link strength of 174. This signifies not only a high volume of research output but also robust collaboration with neighboring countries.

The analysis further reveals that there are regional clusters dominating specific areas of Fintech research. For instance, Australia (light blue cluster), Malaysia (dark blue cluster), Hong Kong (green cluster), Singapore (yellow cluster), and South Korea (orange cluster) each

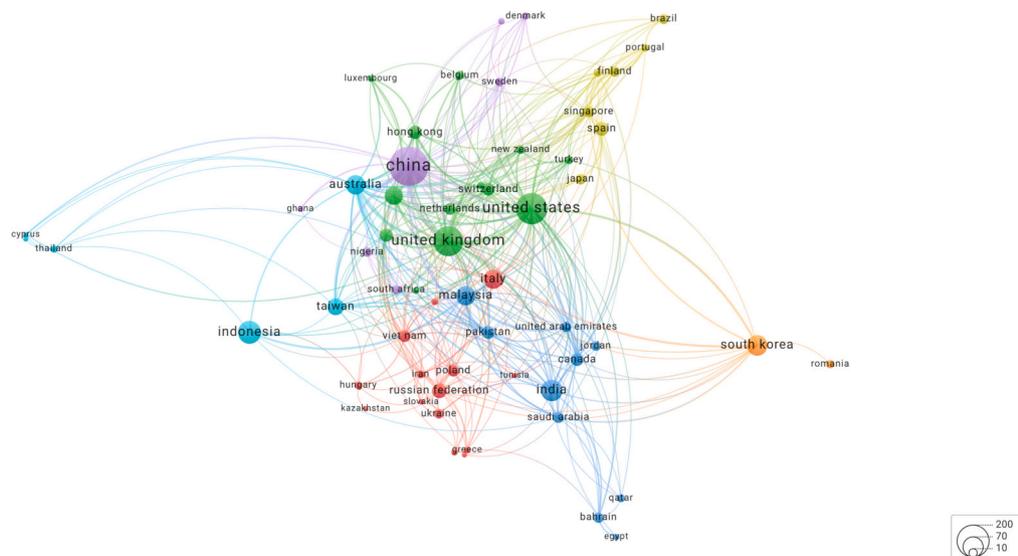


Fig. 10. Country Co-authorship Network.
(Source: Authors' collaboration based on Scopus data)

represent significant contributions in their respective clusters. The strong presence of countries like Australia and Singapore in the co-authorship network suggests that these regions are pivotal in advancing specific Fintech domains, such as regulatory technologies or mobile banking innovations. A network driven knowledge exchange is noticeably visible between US and UK researchers. This also contributes to higher international citations in both counties. While China is more regionally concentrated due to its powerful domestic presence and collaboration with neighboring Asian countries, a strong inter-country knowledge exchange prevails between US and UK. More research is required to investigate how the global collaboration of researchers is capable of opening the contributions to more inclusive and internationally recognized Fintech innovations. Identical to its Importance, Fintech Obscurity can be found in countries with strong Fintech regulatory environments, such as US and UK with interdisciplinary work among finance, technology, policy studies. Patterns shown here indicate how Global research networks have a role in the dissemination of knowledge as well as in innovation in Fintech.

These regional partnerships can profoundly influence research outputs by promoting localized knowledge sharing and collaboration, which can lead to innovative solutions tailored to specific market needs. For example, Australia's focus on regulatory compliance in Fintech may encourage collaborative efforts that yield research outputs geared toward enhancing regulatory frameworks, thereby fostering a more secure and efficient Fintech landscape. Similarly, the partnerships seen among Southeast Asian countries could drive research on financial inclusion, considering the unique challenges and opportunities in those markets.

4. Future research directions

The Fintech Revolution has transitioned from hype to a key component of the financial ecosystem, necessitating a thorough understanding of its impacts and challenges. This study identifies critical research areas to explore, as shown in Table 6. While topics like Blockchain, financial inclusion, and cryptocurrency are well-researched, emerging fields such as sustainability, green finance, Robo-advisors, financial literacy, and support for MSMEs remain underexplored. Addressing these gaps is essential for enhancing the existing literature and advancing knowledge in the rapidly evolving fintech landscape, ensuring that both users and service providers can navigate the complexities of this transformation effectively.

5. Findings and implications

The bibliometric analysis of Fintech research shows the trends and points out further directions for the development of the field. The number of Fintech publications has been on the rise since 2015. Of the 1416 articles reviewed in this study, 30.37 % were published in the year 2021 only. This increase reflects the increasing worldwide concern in the area of finance and technology. China has the highest number of articles with nearly 20 % of the total articles but the UK has the highest average citations per article (19.76) and the highest total citations (3261). This implies that UK-based research is most dominant, which may be attributed to the fact that UK-based research is more holistic and of high quality.

The most popular journals in this area are "Sustainability (Switzerland)" and "IEEE Access", where the latter has a higher average citation per article, which indicates the high significance of the journal. Some of the most cited articles such as those by Lee and Shin (2018) and Gomber et al. (2017) have provided the conceptual tools to understand Fintech ecosystems and digital finance, including the role of regulation and technology. Despite this, a critical research gap remains: thus, the majority of the research is rather limited to certain areas such as Blockchain and digital finance, and the broader issues, including sustainability and the effects of Fintech, are rather overlooked.

The bibliometric findings of Fintech research provide several key

Table 6
Future Research Domains Concerning Fintech.

Domain Of Research	Research Gaps
Sustainability & Financial Inclusion	It is concerned with the delivery of financial services, the promotion of transparency, and the facilitation of green investment. Fintech being a relatively new area of research provides the researcher with an opportunity to come up with new solutions to various economic, social, and even environmental issues. Although there is an increased awareness of the concept of fintech, there are few studies that have analyzed the part that fintech plays in the provision of financial services. This research direction seeks to understand visions of fintech financial inclusion in various economies and looks at extension to the rural and other unserved areas.
Artificial Intelligence (AI) and Machine Learning (ML)	AI and ML advance credit scoring and fraud detection and individualized customer care in the space of fintech. Substantial literature discusses their use (Malali & Gopalakrishnan, 2020; Kushwaha & Kar, 2021; Verma, 2022.), however, little is known about the ethical and regulatory issues mainly because the uses of AI in fintechs are relatively new.
Digital Payments	A considerable increase in the integrated use of technology in financial systems has had a major impact around the world. Scholars have paid much attention to the adoption and effects (Fraczek & Urbanek, 2021; Patil et al., 2017), an area that has not been well-researched is the weaknesses in the digital payment system that needs protection through the use of cybersecurity measures.
Peer-to-Peer Lending (P2P)	P2P lending platforms provide borrowers and lenders with a meeting point that makes people financially included. Much work has been done on adoption (Rosavina & Rahadi, 2018) and risk analysis (Adriana & Dhewantoa, 2018, Byanjankar et al., 2015), while there is an opportunity to look at the stability of P2P lending platforms during an economic crisis and consider the appropriate regulation to stabilize the market.
Insurtech	Insurtech technologies are changing the insurance industry. Previous work has looked into it but investigating standardization initiatives and issues in the Insurtech space can help improve the insurance industry worldwide (Ching et al., 2020; Yan et al., 2018)
Regtech	Regtech solutions help the financial institutions to address the regulatory requirements (Buckley et al., 2020; Butler & Brooks, 2018). This area can be considered as the one offering the most opportunities the further research beyond the regional context.
Biometric Authentication	The use of biometric authentication methods is effective security measures in a financial context (Hong et al., 2019; Wang, 2021). Research works can study the new trends in biometric technology, assess the threats, and conclude the security of financial services.
Robo-Advisors	AI has been one of the key enablers that are helping grow the fintech space. Some of the advancements for example Robo-advisors are still in their infancy and have not yet tapped into their research potential (Cheng et al., 2019; Fan & Swam, 2020; So, 2021).
Banking in the Metaverse	The appearance of Metaverse in banking can be a turning point in the industry's development. This research area examines the applicability of relationship banking in banks under Metaverse operations, the trend of adoption, and sustained use and determinants that drive Metaverse Banking. The area is still emerging and have scope in understanding the role Metaverse banking plays in overall banking development.

insights into the development and dynamics of this rapidly evolving field:

5.1. Rapid Growth Post-2015

The significant increase in the number of Fintech publications since 2015, particularly the sharp rise in 2021, highlights the growing global interest in financial technology. This surge likely correlates with the maturation of technologies like Blockchain, digital payments, and the increasing integration of AI and machine learning in financial services. It also suggests that Fintech is no longer a niche area but has become central to discussions about the future of finance.

5.2. China's leading role

China's contribution, with nearly 20 % of the total articles, reflects its position as a global leader in the adoption of Fintech solutions, particularly in areas like mobile payments, digital currencies (such as the digital yuan), and peer-to-peer lending. However, this volume dominance doesn't necessarily translate into higher impact, as the UK, despite publishing fewer articles, has higher citations per article.

5.3. UK's research dominance

The UK's high average citations per article (19.76) and the highest total citations (3261) indicate that UK-based research in Fintech is not only comprehensive but also influential. The high citation count suggests that UK scholars may be addressing critical issues within Fintech, producing work that resonates globally. This could be because UK researchers often take a more holistic approach, addressing regulatory frameworks, ethical concerns, and broader socio-economic impacts alongside technical advancements, making their work more relevant and widely applicable.

5.4. Journal impact

The prominence of journals like "Sustainability (Switzerland)" and "IEEE Access" highlights the interdisciplinary nature of Fintech research, encompassing not only technical advancements but also the societal and sustainability implications of financial technologies. The higher average citation rate of "IEEE Access" points to the importance of technical developments in Fintech, while the inclusion of "Sustainability (Switzerland)" suggests a growing awareness of the environmental and social consequences of Fintech innovation.

5.5. Conceptual groundwork

The most cited articles, such as those by Lee and Shin (2018) and Gomber et al. (2017), are foundational in shaping the understanding of Fintech ecosystems and digital finance. These works provide conceptual tools to analyze the integration of technology in finance, highlighting the importance of regulation, digital infrastructure, and the transformative impact of Fintech on traditional financial systems. Their high citation counts suggest that they are essential reading for scholars and practitioners alike.

5.6. Critical research gaps

Despite the broadening of the Fintech research landscape, there is a noted gap in exploring more diverse topics beyond Blockchain and digital finance. Areas like sustainability, the ethical implications of Fintech innovations, and the socio-economic effects of these technologies remain underexplored. This highlights a potential avenue for future research, as these broader issues will likely become more pressing as Fintech continues to disrupt traditional economic models and financial systems.

By collaborating with regulators, researchers can help develop standards that promote ethical practices and sustainability in fintech. Ultimately, by implementing these recommendations, researchers can effectively address existing gaps in the literature and contribute to a sustainable, innovative fintech landscape that enhances the fairness and resilience of the global financial system while guiding industry practices toward responsible growth.

This limited scope, therefore, requires more comprehensive research that not only looks at the sustainability of Fintech but also the social impact of the entire Fintech ecosystem. China and the UK are in a good place to set the pace in Fintech regulation for the rest of the world, given their policies on innovation, stability, and inclusion. It is crucial to foster collaboration between the fields and extend the research to the area of sustainability of Fintech. In this way, the Fintech research can shift from being merely a source of technological advancement that can help to create new products and services to be a source of real social and economic value that can help to make the global financial system more inclusive and sustainable.

This study adds to theoretical Fintech research globalization knowledge by demonstrating differences in knowledge generation and influencing power and thematic preference between geographic areas. The sharp increase in Fintech publications post-2015, particularly in 2021, highlights the field's transition from an emerging niche to a mainstream area of financial research. The data obtained does not support the general belief that elevated research outputs always translate into elevated academic prominence. The UK stands ahead of China regarding Fintech citation impact since research quality together with policy environments and institutional collaboration determine knowledge diffusion more than sheer publication volume does. A well-developed theoretical scheme for Fintech research influence should integrate quantitative production numbers and qualitative policy and academic adoption dynamics in worldwide contexts.

6. Policy recommendations

To fill the gaps in fintech literature and support its growth, researchers are encouraged to conduct inclusive studies that explore the sustainability aspects of fintech and their effects on global financial systems. Interdisciplinary approaches that integrate finance, technology, and social sciences will provide a holistic understanding of fintech's implications. Investigating regulatory environments in leading fintech nations like China and the UK can reveal how different countries manage fintech innovations; comparative studies can identify policies that foster innovation while maintaining financial stability and inclusion. Additionally, case studies focusing on specific fintech innovations, such as Blockchain and P2P lending, in various economic contexts can uncover regulatory best practices. Researchers should also undertake empirical studies assessing fintech's contribution to the Sustainable Development Goals (SDGs), focusing on green finance initiatives and the ecological footprint of digital financial services. Collaborating with policymakers to create regulations that support innovation while ensuring financial stability is vital; developing frameworks governing emerging technologies and promoting sustainable practices will advance the fintech sector. By implementing these recommendations, researchers can effectively address existing gaps in the literature and contribute to a sustainable, innovative fintech landscape that enhances the global financial system's fairness and resilience.

7. Conclusion and limitations

This study conducted a comprehensive bibliometric analysis of 1416 documents in the FinTech domain, revealing significant trends and themes in the literature. Key findings indicate that while established topics such as blockchain, financial inclusion, and cryptocurrency are well-researched, emerging fields like sustainability, robo-advisors, and financial literacy remain underexplored. The analysis identified

influential countries—China, the United States, and the United Kingdom—as leaders in FinTech research, providing valuable insights for scholars in other regions seeking to replicate successful studies. Based on these findings, policymakers should foster collaboration between academia and industry to address gaps in emerging research areas. Regulatory frameworks must adapt to support responsible innovation while ensuring consumer protection. A proactive approach is essential to monitor developments in FinTech and maintain a competitive landscape. The primary limitation of this research is the exclusive reliance on the Scopus database for data collection. While Scopus is a reputable source, this focus may introduce bias by excluding relevant literature from other databases such as Web of Science and Dimensions. Consequently, this could lead to an underestimation of the overall state of FinTech research. Future research should incorporate multiple databases to provide a more comprehensive view of FinTech literature. Additionally, qualitative methodologies should be integrated to explore the motivations behind research trends and capture real-world implications of innovations. Addressing these gaps will enhance understanding of the evolving FinTech landscape and support its continued development.

CRedit authorship contribution statement

Mahak Sethi: Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Narendra Singh Bohra:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Amar Johri:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Mohammad Asif:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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