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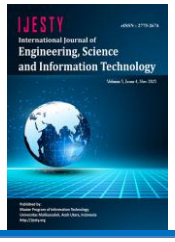

Role of fintech in financial inclusion: A quantitative review

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Abstract

This study presents a comprehensive bibliometric analysis of the scholarly literature on fintech and financial inclusion. Using a structured search strategy, 611 articles published in Scopus-indexed journals were analysed to uncover key trends, contributors, and research themes within this rapidly evolving field. The analysis identifies "sustainable development" and "China" as well-developed and central motor themes, while "fintech," "financial inclusion," and "electronic money" remain central yet still developing areas of inquiry. Notably, Ozili P.K. emerged as the most influential author, with a high citation impact and H-index, followed by Banna H and Mhlanga D. The Journal of Risk and Financial Management, Sustainability (Switzerland), and Finance Research Letters were the leading publication outlets. Geographically, India led in terms of publication volume, reflecting its dynamic fintech ecosystem, whereas the UK and US showed strong international research collaborations. Despite a solid foundation, the literature reveals underdeveloped focus areas, particularly regarding the traditional financial system and the integration of emerging technologies. These points point to meaningful gaps for future exploration, including the application of blockchain, artificial intelligence, and digital identity frameworks to promote inclusive finance. Additionally, socio-cultural factors influencing fintech adoption remain insufficiently explored, especially in underserved communities. Cross-country comparative research and long-term studies are also needed to deepen our understanding of fintech's role in achieving inclusive and sustainable economic growth.

Keywords: *Artificial Intelligence, Banks, Finance, Fintech, Technology.*

1. Introduction

Financial Technology, also known as Fintech, has entered the global financial sector in the past ten years as a disruptive agent. Fintech was an innovative concept that came into the banking industry to bridge the gap created by traditional financial institutions. Different investigations have been conducted on the issue of fintech in the banking sector. Most unbanked or unlinked to the banks live in the Saharan region of Africa, East Asia, as well as the Indian sub-continent. Thus, many fintech companies have emerged in the last few years in this region.

Any country needs to be financially included to grow and be linked to the new global markets. Nevertheless, developing economies have yet to achieve inclusive access to the financial system compared to their developed counterparts. The aspect of financial inclusion, or access to good, affordable financial functions offered by incumbent firms [1], is to be interpreted as a broad concept, comprising a wide range of financial services [2][3], including deposits and credits. The financial inclusion gap is worse in credit-based financial inclusion (CFIN) than in the deposit-based financial inclusion (DFIN) [4], which is the first phase in the financial inclusion process. Therefore, Fintech leads the way in terms of increased financial inclusion in developing economies.

Although several empirical studies have identified the importance of fintech in the enhancement of financial inclusion, it has rapidly expanded and in an uncoordinated way, thus challenging pundits and practitioners to understand the intellectual landscape of the same. A bibliometric study will represent an effective mechanism to quantitatively and graphically trace this research field's development. It assists in determining the prevailing players, thematic patterns, and emerging patterns, providing an in-depth picture of how fintech has been employed in financial inclusion in various scenarios. This review is well needed and pertinent in the light of the exponential increase in publications within the past decade and the strategic placement of financial inclusion in the wider developmental agenda.

In addition to that, as mobile banking, digital wallets, and non-bank lending platforms boomed, the discussion of fintech influence on financial inclusion has grown substantially beyond geographical and methodological borders. Literature like [1][5] has focused on the role of fintech innovations in changing the provision of financial services, particularly in financially underserved areas. Nonetheless, the literature can be described as widely disseminated and spanning several fields related to finance, development economics, and information systems. Such scattering usually results in conceptual obscurity and duplicity of stimulus. A bibliometric survey would be able to compile the current knowledge, reveal some unknown trends, and provide a strategic vision of future studies. With the help of pinpointing valuable contributors and intellectual vectors, the current research not only closes a significant gap in scholarship that is built on reviews but also can serve as a systematic basis for policymakers and practitioners who intend to scale inclusive fintech approaches.
In emerging countries, spreading the fintech services offered by Fintech websites helps make safe and fast payments within the hitherto unbanked population [6][7].
The uptake of the use of fintech applications in the academic space boasts of many studies that document this. Nevertheless, a lack of review studies, particularly of a holistic review study representing the entire literature of fintech and financial inclusion, exists. With a thorough review, it becomes easier to determine the key contributors and intellectual accomplishments in a field of research. To contribute towards a lower level of research, this paper intends to undertake a review of the research that has been carried out regarding the influence of fintech on financial inclusion. To this end, the following research questions (RQ) can be posed to be worked on:
RQ1: How do the fintech-financial inclusion papers tend to be published annually?
RQ2: Which are the main authors (journal prestige and country) and outcomes (articles) on the literature in fintech-financial inclusion?
RQ3: Which authors, journals, countries and contributions to the literature on fintech-financial inclusion are the most influential?
RQ4: What are the hot topics in the fintech-financial inclusion research?
RQ5: How does the fintech-financial inclusion literature have an intellectual structure?
The research follows with the following paper: In section 2, the method and data selection are presented. Section 3 brings some of its findings to the forefront, and the final section 4 is the study's conclusion with limitations and future research directions.

2. Method

There are numerous methods of doing a review of the literature. Such as narrative review, thematic review, conceptual review, systematic literature review, etc. This study adopted the quantitative version of the systematic review, which is also called a bibliometric review. Several studies have used this technique [8] 9][10]. This technique has several benefits, such as capturing a large amount of data in the review; it not only retrieves the themes but also creates a network among themes and gives the performance of various players in the field. R software [11] and VosViewer [12] are used for the analysis.
The data for the study are retrieved from the Scopus database. There are several databases that have a list of articles. Web of Science and Scopus are the two major databases that are used for quantitative review [13][14][15][16][17]. The Scopus database has an upper edge over the Web of Science database as the former has wide coverage of quality articles, whereas the latter has limited coverage. Therefore, this study ensures a large sample of data by extracting the data from the Scopus database.
The articles were selected by searching for the main keywords "Fintech" AND "Financial Inclusion". These two keywords were searched in the title, abstract, and keyword fields. On the initial search, the number of documents was 967. Such a large number of documents have noise and may give vague results. Therefore, we decided to exclude some of the articles on a systematic basis. We switched on the document type filter, and only “empirical articles” and “review articles” were selected; this filter left us with 625 documents. After that, the language filter was switched on, and only those articles were selected that were written in the English language; this left us with 612 documents. At last, we selected documents that were published in the journals. The final sample of data consists of 611 documents.

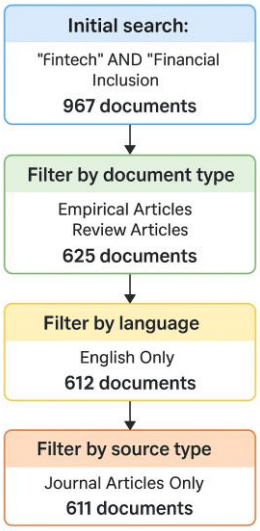

Fig 1. Sample document selection process.

Figure 2 presents the descriptive statistics of the sample data. It is observed that academia started taking an interest in 2016, as this is the year in which the first paper was published in this domain. Interestingly, after five years, there are around 349 sources (journals) that publish in this area. The annual growth rate in the publication is 74.5%. There are 96 documents in the sample that are authored by a single author compared to the rest of the documents. Each document has 24 citations on average.

2.1. Descriptive Statistics

Fig 2. Main information of the data used in the study.

3. Results and Discussion

3.1. Annual Production

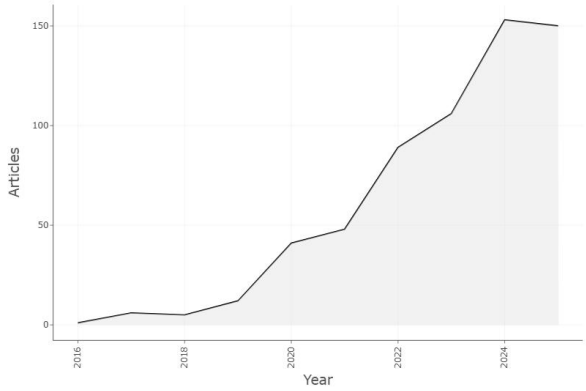

Fig 3. Annual production of research papers.

Figure 3 presents the annual scientific production in the area of fintech and financial inclusion. Although the research started in 2016, the momentum started in the early months of 2020. This may be because of COVID-19. Since the pandemic, society has turned towards cashless payments and E-commerce. This instigated the academia to work on the fintech apps usage. It is interesting to note that the upward trend is still present in this literature, as there were around 48 papers in 2020, and then there were around 95 papers in 2022. In 2023, the publications crossed the 100 remarks, and in 2024, they crossed the 150 remarks.

3.1. Author Analysis

3.1.1. Leading Authors

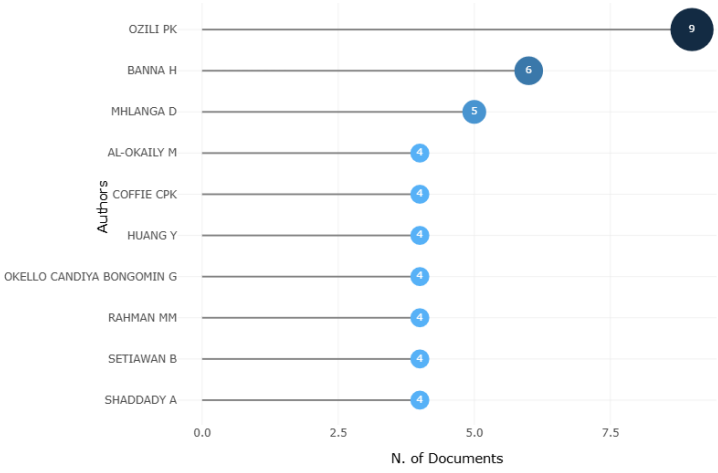

Fig 4. Top 10 most productive authors

Figure 4 presents the top ten authors as per the number of publications. The author that have published the most number of articles in the fintech-financial inclusion field is Ozili PK. 9 articles have been published under this author's name. After Ozili, there comes Banna H. with 6 publications. 5 papers were published by Mhlanga D. They are the top three authors who have produced the most. After them, the rest of the authors have produced 4 documents each.

3.1.2. Impactful Authors

Table 1. Top 10 impactful authors

Author's name	h_index	g_index	m_index	TC	NP	PY_start
OZILI PK	7	9	0.875	1472	9	2018
BANNA H	5	6	1	376	6	2021
MHLANGA D	5	5	0.833	404	5	2020
OKELLO CANDIYA BONGOMIN G	4	4	0.667	126	4	2020
RAHMAN MM	4	4	1.333	63	4	2023
SETIAWAN B	4	4	1	158	4	2022
AL-OKAILY M	3	4	0.6	214	4	2021
BERNARDS N	3	3	0.429	247	3	2019
CHEN S	3	3	0.6	82	3	2021
COFFIE CPK	3	4	0.6	117	4	2021

Table 1 presents the top ten authors as per their impact. The leading authors in the production of articles don't need to have the most influence on the relevant literature. Therefore, it is evident to unravel the leading authors based on their impact. The impact or influence of the authors is primarily measured by the number of citations that an author receives. However, there are other impact matrices that have been invented in academia and have wide acceptance. Such impact matrices are the H-index, G-index, and M-index. The author that have the highest H-index is Ozili PK. Interestingly, it is the same author who has the most number of articles in the fintech-financial inclusion [18]. The H-index, M-index and G-index of Ozili PK are 7, 9 and 0.875. The total number of citations that Ozili PK got is 1472. In the second rank, Banna H. is the most influential author. The H-index, M-index and G-index of Banna H are 5, 6 and 1. The total number of citations that Banna H got is 376. If compared, Ozili PK has more than twice the citations that Banna H got. In the third rank, Mhlanga D is the most influential author. The H-index, M-index and G-index of Mhlanga D are 5, 5 and 0.833. The total number of citations that Mhlanga D got is 404. After these three authors, the following authors are the most influential: Okello Candiya Bongomin G, Rahman MM, Setiawan B, Al-Okaily M, Bernards N, Chen S, Coffie CPK.

3.2. Journal Analysis

3.2.1 Leading Journals

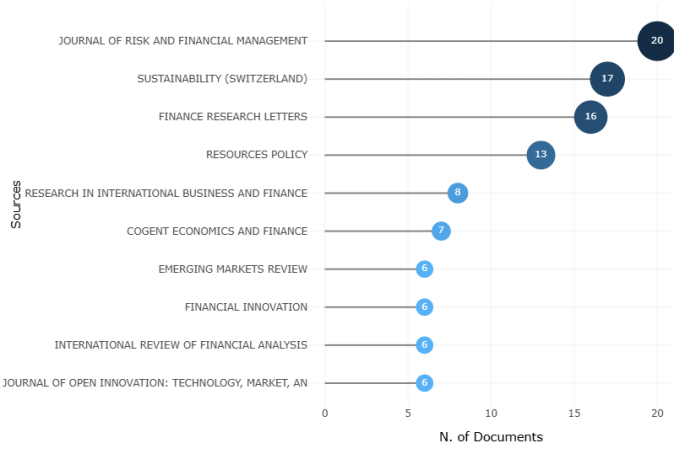

Fig 5. Top 10 most productive journals

Figure 5 presents the top ten sources (journals) as per the number of publications. The journal that has published the most articles in the fintech-financial inclusion field is "Journal of Risk and Financial Management". 20 articles are published in this journal. After this, there comes "Sustainability (Switzerland)" with 17 publications. 16 papers were published in "Finance Research Letters". In the fourth rank, "Resource Policy" has published 13 papers. Thereafter, 8 papers were published by "Research in International Business and Finance". Then, 7 papers were published by "Cogent Economics and Finance" After that, the rest of the journals have produced 6 documents each. It is interesting to note that the top two journals that are leading in production come under MDPI publishing, and the majority of the production-leading journals come under the Elsevier publishing house.

3.2.2. Impactful Journals

Table 2. Top 10 impactful journals

Journal title	h_index	g_index	m_index	TC	NP	PY_start
"SUSTAINABILITY (SWITZERLAND)"	14	17	2.333	792	17	2020
"JOURNAL OF RISK AND FINANCIAL MANAGEMENT"	10	18	1.429	344	20	2019
"RESOURCES POLICY"	7	10	2.333	121	13	2023
"RESEARCH IN INTERNATIONAL BUSINESS AND FINANCE"	6	8	2	149	8	2023
"FINANCE RESEARCH LETTERS"	5	16	1.25	467	16	2022
"INTERNATIONAL REVIEW OF FINANCIAL ANALYSIS"	5	6	1.25	165	6	2022
"JOURNAL OF CULTURAL ECONOMY"	5	5	1.25	94	5	2022
"JOURNAL OF OPEN INNOVATION: TECHNOLOGY, MARKET, AND COMPLEXITY"	5	6	1	157	6	2021
"REVIEW OF INTERNATIONAL POLITICAL ECONOMY"	5	5	0.714	260	5	2019
"ASIAN ECONOMIC POLICY REVIEW"	4	4	1	217	4	2022

According to their impact, the first ten journals are ranked in Table 2. The first journals in the origin of articles need not necessarily be influential in the concerned literature. That is why it is easy to peel off the most influential journals by taking into consideration their influence. Just like the influence or impact of the author, the influence or impact of the journals is mostly determined by the number of citations that a journal gets. Nevertheless, other existing matrices of impacts have been created in academic circles and are fairly accepted. There are such impact matrices as H-index, G-Index, and M-Index. The journal with the highest index is "Sustainability (Switzerland)"; however, this is in the second position in the production table, but the impact is quite high compared to the remaining journals that have articles on fintech-financial inclusion. In the case of "Sustainability (Switzerland)", its H, M and G indices are 14, 17 and 2.333, respectively. "Sustainability (Switzerland)" has a total number of citations of 792. In the second position, the most influential journal is "Journal of Risk and Financial Management". H-index, M-index and G-index of the journal of risk and financial management are 10, 18 and 1.429. The overall number of citations received by the journal is 344, and it is noticeable that the number of citations received by the journal is considerably high. Assuming comparison, nearly 2 times more are there which are cited under "Sustainability (Switzerland)" as against "Journal of Risk and Financial Management". At the third position, the most influential journal is "Resource Policy". H-index, M-index and G-index of the journal "Resource Policy" are 7, 10 and 2.333. The overall quantity of references which the article entitled "Resource Policy" received is 2023. Next is the journal called "Research in International Business and Finance", although it has only the three journals mentioned previously in terms of the number of citations, which is equal to 149. The H-index, M-index and G-index of the "Research in International Business and Finance" are 6, 8 and 2. Next, come such influential journals as "Finance Research Letters", "International Review Of Financial Analysis", "Journal Of Cultural Economy", "Journal Of Open Innovation: Technology, Market, And Complexity", "Review Of International Political Economy", "Asian Economic Policy Review".

3.3. Country Analysis

3.3.1. Leading Country

Table 3. Top 10 Leading Countries

Country	Document	Citations	Total Link Strength
India	88	828	34
United States	79	2790	70
United Kingdom	74	4585	75
China	69	2512	53
Indonesia	56	649	41
Malaysia	38	930	55
South Africa	29	631	14
Saudi Arabia	28	309	49
Australia	25	1305	30
Pakistan	25	478	30

Table 3 presents the top ten countries as per the number of publications. The total link strength denotes the number of collaborations. The country that has published the most articles in the fintech-financial inclusion field is India. The reason behind this phenomenon is that India has a huge scope for fintech and financial inclusion. 88 articles have been published in India. After this, there comes "United States" with 79 publications. 74 papers were published in the United Kingdom. In the fourth rank, "China" has published 69 papers. Thereafter, 56 papers were published by "Indonesia". Then, 38 papers were published by "Malaysia". After them, the rest of the countries have produced various numbers of documents. It is interesting to note that the top two countries that are leading in collaboration are the United Kingdom and the United States. This indicates that both these countries can be approached to unravel the future potential of fintech and financial inclusion.

3.3.2. Impactful Country

Table 4. Top 10 Leading Countries

Country	Document	Citations	Total Link Strength
United Kingdom	74	4585	75
United States	79	2790	70
China	69	2512	53
Australia	25	1305	30
Malaysia	38	930	55
India	88	828	34
Germany	11	668	15
Indonesia	56	649	41
South Africa	29	631	14
Nigeria	19	564	18

Table 4 presents the top ten countries as per their impact. The leading countries in the production of articles don't need to have the most influence on the relevant literature. Therefore, it is evident to unravel the leading journals based on their impact. Unlike authors' and journals' impact, the impact or influence of a country is measured by the number of citations that a country receives. The country that has the highest number of citations is the United Kingdom (4585 citations). Interestingly, this is on the third rank in the production table, but its impact is very high compared to the rest of the countries. The second most citations are received by the United States (2790 citations). The third most citations are received by China (2512 citations). Western nations are most influential in the fintech-financial inclusion literature. From Asian nations, only China is somewhere near the US and the UK in terms of the number of citations. Thereafter, the following countries are the most influential: Australia, Malaysia, India, Germany, Indonesia, South Africa and Nigeria. Pakistan got a place among the leading countries in terms of production; however, it lost out when checking for impact. Germany and Nigeria came forward in the impact table.

3.4. Top Cited Research Papers

Table 5. Top 10 Global Cited Articles

Paper	DOI	Total Citations	TC per Year	Normalized TC
"Impact of digital finance on financial inclusion and stability"	10.1016/j.bir.2017.12.003	1026	128.25	4.52
"The digital revolution in financial inclusion: international development in the fintech era"	10.1080/13563467.2017.1259298	489	54.33	2.81
"Blockchain disruption and decentralised finance: The rise of decentralised business models"	10.1016/j.jbvi.2019.e00151	464	77.33	6.36
"Sustainability, FinTech and Financial Inclusion"	10.1007/s40804-020-00183-y	394	65.67	5.40
"Fintech, financial inclusion and income inequality: a quantile regression approach"	10.1080/1351847X.2020.1772335	389	97.25	8.71
"Industry 4.0 in Finance: The Impact of Artificial Intelligence (AI) on Digital Financial Inclusion"	10.3390/ijfs8030045	322	53.67	4.42
"The rise of digital finance: Financial inclusion or debt trap?"	10.1016/j.frl.2021.102604	293	73.25	6.56
"Unearthing antecedents to financial inclusion through FinTech innovations"	10.1016/j.technovation.2020.102155	257	42.83	3.53
"Financial inclusion research around the world: A review"	10.1080/07360932.2020.1715238	251	50.20	5.69
"Nurturing a FinTech ecosystem: The case of a youth microloan startup in China"	10.1016/j.ijinfomgt.2016.11.006	250	27.78	1.44

Table 5 presents the top ten cited articles in the field of fintech-financial inclusion. Unlike authors' and journals' impact, the impact or influence of the country is measured by the number of citations that an article receives. The article that has the highest number of citations is the 10.1016/j.bir.2017.12.003 (1026 citations). The second most citations are received by the 10.1080/13563467.2017.1259298 (489 citations). The third most citations are received by CHEN Y, 2020, J BUS VENTUR INSIGHTS (464 citations).

3.5. Network Analysis

3.5.1. Keyword Analysis

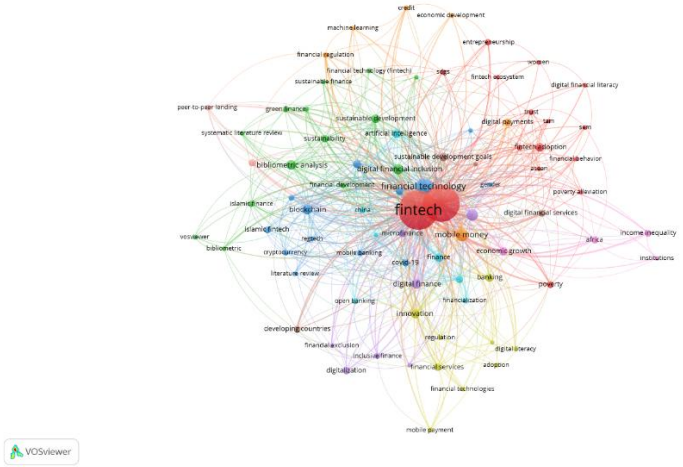

Fig 6. Most frequent keywords

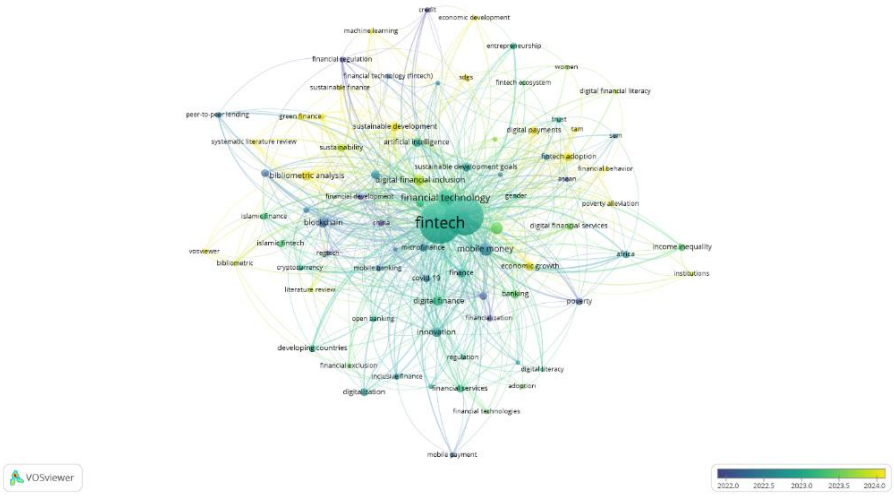

Fig 7. Overlay map of keywords with time

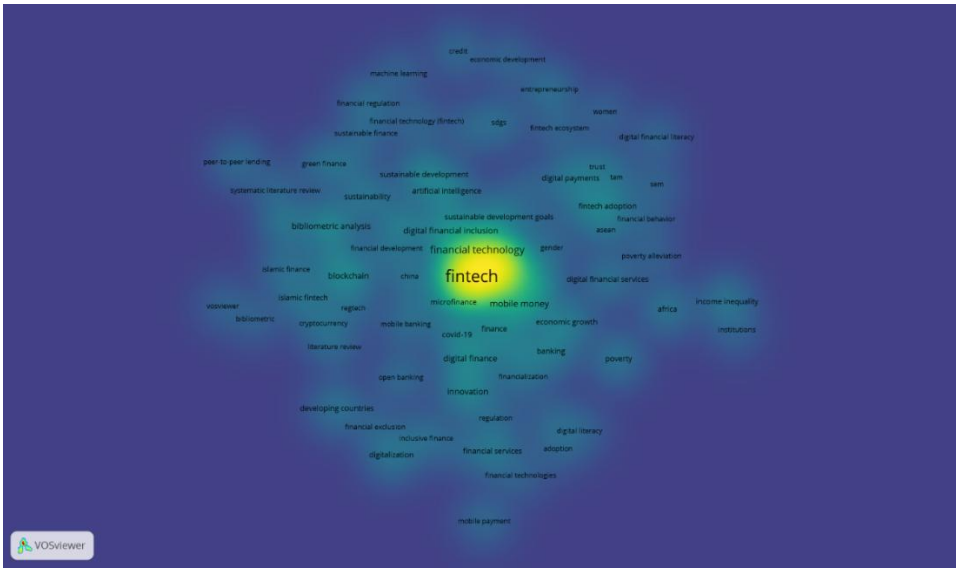

Fig 8. Density map of keywords

The most occurring keywords network depicted in Figure 6 illustrates the interconnectedness of various concepts within the field of Fintech-Financial Inclusion. We can observe that "fintech" occupies a central position, with strong connections to other key themes such as "sustainable development", "mobile money", "China", and "financial development". This suggests that fintech is deeply connected with the various aspects of the economy. The distance between the nodes indicates the closeness of the topics. Figure 7 can be used to watch the emerging keywords that have been used in the past few years along with fintech. Such keywords are “green finance”

[19][20][21], “fintech adoption”, “poverty”, “economic growth” [22][23][24][25], “machine learning” [26][27] and “sustainable development”. Such keywords indicate the direction of the literature. Green finance and sustainable development literature are closely connected, and researchers are now examining green finance literature in connection with the fintech-financial inclusion literature. The term “machine learning” indicates that researchers are using advanced techniques and methods that are inspired by machine learning and artificial intelligence. Using such novel techniques would fill the methodological gaps and fetch more reliable results. Figure 8 presents a density visualisation analysis that illustrates the density of key terms based on their frequency of occurrence in the data analysed. The term “fintech” emerges as the most dominant, marked in bright yellow, indicating that this topic takes centre stage in the dataset. In addition, other terms such as “digital financial inclusion,” [28][29][30][31]“microfinance,” [32][33][34] and “COVID-19” [18][35][36][37][38] also show significant density in green, signifying their high relevance. On the other hand, terms such as “income inequality” and “credit” have a lower density, visible in blue, indicating their minor contribution to the central theme. This visualisation is handy for identifying key topics and understanding their relationship with broader themes in the dataset. Additionally, Figure 9 (trend topic) illustrates the most popular topics within this field of study. Overall, this analysis reveals that fintech-financial inclusion has become a central topic in finance research, with a growing emphasis on its role in addressing the financial growth of an economy.

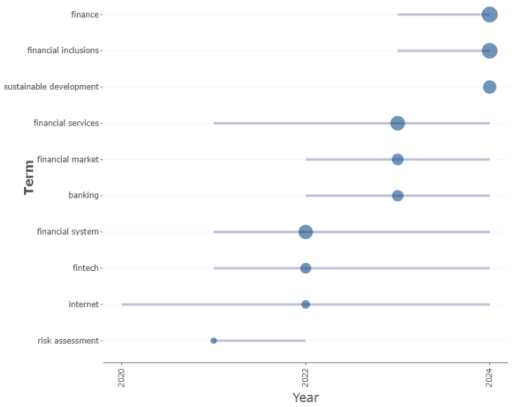

Fig 9. Trending topics

3.5.2 Thematic Analysis

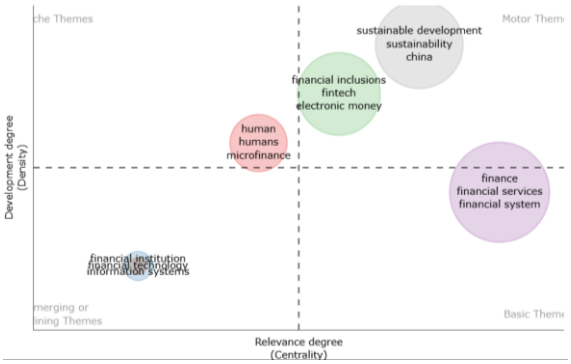

Fig 10. Thematic Map

In Figure 10, the thematic map illustrates the intellectual structure and the thematic development within the field of research of the problem of the development of Fintech and Financial Inclusion. The map resorts into four quadrants with regard to two dimensions, which are the centrality (degree of relevance) on the x-axis and density (degree of development) on the y-axis. The four quadrants provide the themes into Motor Themes, Basic Themes, Emerging or Declining Themes and Niche Themes. In the upper-right quadrant, we find "sustainable development," "sustainability," and "China" [39][40][41] categorised as Motor Themes. These issues are central to the field, and they are well-developed. It shows that they are mature and influential regarding different thematic. This implies that the issue of sustainability and regional (especially China) analysis is now part and parcel of the literature on fintech and financial inclusion. The lower-right quadrant shows "finance," "financial services," and "financial system". These are Basic Themes. Such themes are quite baseline and widely related yet not so well elaborated in this particular literature, considering that they measure up as abstract concepts or supporting columns of the fintech-financial inclusion scene. In the upper-left quadrant, "humans," "human," [42][43] and "microfinance" are marked as Niche Themes. These are less central and less developed and are perhaps specialised subdomains with depth but very restricted connections with other themes. Two of them point at a human-focused or micro-level approach to inclusion enabled by fintech. The lower-left quadrant, containing "financial institution," "financial technology," and "information systems," [44] includes Emerging or Declining Themes. The centrality and density of their topics show that they are not very well explored or could be becoming irrelevant. But alternative evidence of this being a research gap or emerging research interests that need to be addressed once again in academia could be seen in the very fact that their underlying theme is fintech. In general, the map shows the transition between conventional finance and the technology-based inclusion process, which is emphasised by the appearance of new global priorities of sustainability and the backs of thematic interrelations in the literature.

4. Conclusion

The bibliometric analysis of the fintech–financial inclusion literature reveals key thematic, authorial, journal, and geographic insights. Thematic mapping shows that "sustainable development" and "China" have emerged as well-developed motor themes, while "fintech," "financial inclusion," and "electronic money" are central yet still evolving. Ozili PK stands out as the most impactful author with the highest H-index and citation count, followed by Banna H and Mhlanga D. Among journals, the Journal of Risk and Financial Management leads in publications, followed by Sustainability (Switzerland) and Finance Research Letters. India tops in publication output, highlighting its growing fintech landscape, while the UK and US dominate collaborative research. Notably, traditional financial system themes are foundational but underdeveloped, and technological themes appear underexplored, indicating potential future research directions. Future studies may focus on integrating emerging technologies like blockchain, AI, and digital identity into financial inclusion frameworks. There is also a need for deeper investigations into the socio-cultural dimensions of fintech adoption, particularly in underserved regions. Furthermore, cross-country comparative studies and longitudinal analyses can provide more nuanced insights into the long-term impact of fintech innovations on inclusive growth.

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