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Review

Mapping the Evolution of Sustainable Financial Inclusion: A Bibliometric Analysis of Global Trends (2007–2025)

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Abstract

Sustainable financial inclusion is an essential factor for economic development, social justice, and environmental sustainability. The primary objective of this bibliometric analysis is to investigate trends in sustainable financial inclusion publications using 1467 Scopus and WoS-indexed documents published between 2007 and 2025. The review visualized major trends, intellectual structures, and thematic clusters using VOSviewer and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol. This analysis identified eight thematic clusters, including digital finance, Environmental, Social, and Governance (ESG) integration, green finance, and financial literacy, which demonstrate the multidimensional nature of the field. Since 2017, research on sustainable financial inclusion has grown, led by China, India, and the USA, revealing geographic imbalances and underrepresentation of the Sub-Saharan Africa and Central Asia regions. Major barriers identified were financial illiteracy and uncoordinated regulations among institutions. This review suggests critical insights for scholars, policymakers, and practitioners should align inclusive finance with the Sustainable Development Goals (SDGs) and advocate for a shift from mere financial access to systemic, sustainability-driven models. It calls for collaboration between decision-makers and financial institutions to foster inclusive, fair, sustainable, and environmentally responsible financial ecosystems.

Keywords: financial inclusion; sustainability; digital finance; green finance; ESG; bibliometric analysis

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1. Introduction

Financial inclusion refers to ensuring that people and business companies gain access to and actively use a variety of affordable financial services and payments delivered by a responsible and sustainable provider (World Bank, 2025). It is a key driver of sustainable economic development, making significant contributions to poverty reduction and equity (Omar & Inaba, 2020). It enhances the delivery of essential financial services and is widely regarded as a leading contributor to economic growth (World Bank, 2018).

Given their importance in economic growth, the role of small businesses in inclusive financial systems has become more important. Empirically, financial inclusion promotes the growth and development of small businesses (Okello Candiya Bongomin et al., 2017).

Other experts think that access to financial service is not enough where an integrated approach from the financial institutions, the government, and civil society is needed to translate it into performance improvements (Matama, 2016).

To bridge financing gaps, especially in underdeveloped areas, alternative financing models like microfinance and impact investing have emerged (Rahmadi & Rozamuri, 2024). Sustainable financial inclusion is therefore crucial for the growth, profitability, and survival of small businesses. It ensures access to financial services for all while supporting economic, social, and environmental challenges. It is an issue of expanding access to financial services on equal terms while achieving long-term economic, social, and environmental sustainability. It entails responsible lending, ethical investing, and financial literacy to promote economic growth without exacerbating environmental depletion and social disparity. The literature quotes that sustainable financial inclusion is at the core of domestic savings mobilization and financial stability consolidation, especially within developing economies where financial access remains limited (Mbuthia & Ndiritu, 2020). It involves harnessing financial technology (FinTech), impact investing, and green finance towards realizing inclusive access to capital while promoting environmental sustainability.

Financial institutions, policymakers, and international organizations are increasingly recognizing that sustainable finance can drive social progress by supporting small businesses, fostering job creation, and promoting financial literacy among marginalized groups. Researchers highlight the value of innovative financial instruments, such as blended finance and social impact bonds, in closing financial gaps and building economic resilience (Abankina, 2016). These policies ensure that financial institutions adopt Environmental, Social, and Governance (ESG) principles, aligning with the Sustainable Development Goals. Financial regulations impact local economic sustainability by influencing income structures and investment potential in rural and developing areas (Kozera, 2017).

Recent evidence underscores the transformative role of digital financial services. These services enhance access for remote small businesses, improve working capital management, and boost operational efficiency (Fatoki & Awinja, 2021). Mobile payment platforms, for example, enable small firms to serve distant customers, increasing their revenue potential. Digitalization also strengthens resilience and financial literacy, key pillars of sustainability (Ulianti & Purbadharmaja, 2023; Garba et al., 2022).

Green finance and other ESG-based instruments also promote environmental stewardship by offering products like renewable energy loans and green bonds. These encourage eco-friendly investments and attract environmentally conscious stakeholders (Bocken et al., 2014; Kato et al., 2024). In regions like Kenya, sustainable financial inclusion tools, ranging from micro-savings to digital banking, have demonstrably improved SME resilience (Njagi & Mutwiri, 2024). Furthermore, Robles et al. (2024) argue that sustainable financial inclusion must be supported by a threesome of conditions, i.e., financial literacy, inclusive, and stable policy frameworks. Studies stress that the long-term viability and competitiveness of small firms depend on integrating sustainability practices such as green finance and ESG-aligned strategies (Riswandi et al., 2024).

Therefore, conceptually, sustainable financial inclusion can be best understood as a triple-bottom-line framework, balancing people, planet, and profit (or economy) (Hassan et al., 2024). It extends traditional financial inclusion by embedding ESG principles such as ethical investment, transparency, and environmental accountability (Ozili, 2022; Kato et al., 2024).

This review can be framed within the context of three interlinked theoretical concepts. The first one is the institutional theory, which explains how regulatory environments, governance institutions, and financial institutions shape the development and application of inclusive financial systems. Inclusive financial policies supported by institutional

reforms, such as ESG legislation and digital networks, are considered crucial for creating balanced and sustainable financial environments (Eldomiaty et al., 2020). Second, the capability approach (Sen, 1999) views financial inclusion as a strategy for expanding individuals' fundamental freedoms and economic agency, particularly of marginalized communities. Through credit, savings, and insurance facilities, sustainable financial inclusion allows small business owners, women, and rural residents to achieve increased economic resilience and adaptive capacity (Garba et al., 2022; Njagi & Mutwiri, 2024). Third, ESG-linked finance provides frameworks that quantify financial performance in relation to environmental and social outcomes. Furthermore, the existing literature has also validated the integration of ESG in financial services, through the emergence of green bonds, impact investments, and sustainability-linked loans. It enhances long-term stakeholder value by reducing carbon emissions and achieving better environmental outcomes (Huang et al., 2022; Mehmood, 2022).

Although financial inclusion and sustainable finance attract significant scholarly attention, existing reviews mainly focus on either access to financial services or the environmental and social impacts of finance. No reviews have explored their intersection under the comprehensive concept of sustainable financial inclusion. Even those related reviews often cover limited time periods, rely on a single database, or fail to explicitly analyze thematic development, geographic differences, and the integration of Environmental, Social, and Governance (ESG) criteria within inclusion systems. Therefore, this review aims to fill these gaps by providing a thorough bibliometric analysis of sustainable financial inclusion research from 2007 to mid-2025, utilizing data from Scopus and Web of Science through PRISMA-guided screening and VOSviewer network mapping. In general, this paper intends to map the intellectual structure of sustainable financial inclusion by addressing the following research questions:

RQ1: What are the publication trends in sustainable financial inclusion research using bibliometric analysis?
RQ2: What are the most prolific scholars, articles, journals, and countries contributing to sustainable financial inclusion?
RQ3: What are the key drivers, barriers to achieving sustainable financial inclusion, and research directions for future research?

This bibliometric analysis highlights the reality that sustainable financial inclusion not only enhances access to finance but also promotes a more comprehensive achievement of the Sustainable Development Goals (SDGs) (Mahmood et al., 2024).

2. Materials and Methods

Bibliometric analysis is a review of the academic literature that quantifies publication trends, citation indices, and collaboration patterns within a particular discipline (Zupic & Čater, 2015). It is suitable for summarizing the trend of research studies, identifying gaps, and offering recommendations for further studies. It tries to discover the intellectual structure of a field through co-authorship analysis, co-citation mapping, and co-word clustering techniques. The selection of relevant studies for this review followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol, which was developed prior to data collection. PRISMA provides an evidence-based framework designed to enhance the transparency, rigor, and reproducibility of systematic reviews and meta-analyses (Gough et al., 2012). It emphasizes methodological clarity and comprehensive reporting, and ensures that the review process follows high standards of academic integrity.

2.1. Identifying Sources for the Review

Data from Scopus and the Web of Science (WoS) were utilized in this bibliometric analysis. These two databases feature well-constructed indexing protocols, high citation reliability, and global academic recognition, which collectively ensure a wider coverage of social science literature and greater journal diversity than any other database (Paul et al., 2021; Singh et al., 2021). Metrics such as the h-index, CiteScore, and journal rankings are openly accessible and less prone to distortion than other platforms, thereby supporting transparency and reproducibility (Falagas et al., 2008). However, the exclusive reliance on Scopus and WoS may sometimes introduce certain methodological bias. Because both databases predominantly index English-language publications, this can result in the under-representation of regionally significant research from Latin America, Sub-Saharan Africa, and certain parts of Asia, which may be published in local languages or regional journals not indexed by these databases.

Additionally, we utilized VOSviewer version 1.6.20 to conduct our study. It is one of the powerful bibliometric tools for analyzing, exploring, visualizing, and interpreting academic literature. It is accompanied by network visualization, citation analysis, clustering, and keyword co-occurrence, which can surface hidden patterns and trends within bibliographic data (Máté et al., 2024). It can even render a detailed graphical representation of bibliometric maps (Van Eck & Waltman, 2010). Network visualization illustrates the relations between different bibliographic elements, publications, authors, and keywords. Citation analysis supports impact evaluation, and clustering is particularly helpful for detecting trends and identifying communities. Keyword co-occurrence easily surfaces major themes. Co-author analysis displays a collaboration structure that provides a heuristic for identifying important authors and teams (Máté et al., 2024).

Likewise, bibliometric analysis employs a range of citation analysis approaches to identify connections between research streams. The study is based on the idea that scientific knowledge or information is transformed by interconnected pathways known as a citation network. This idea is plausible, since researchers from the same group often refer to one another to place their work in a broader perspective or a previous study (Hummon & Dereian, 1989). Network analysis has often taken place when large research clusters were found to accurately represent the breadth of a discipline (Fahimnia et al., 2015). Author co-citation analysis (ACA) is a bibliometric technique used to explore intellectual structures by examining the frequency with which pairs of authors are co-cited. This method can be applied fruitfully to identify not only research clusters but also influential scholars and emerging research trends. ACA is most typically employed for mapping disciplinary boundaries and intellectual networks within scientific communities (Ayman et al., 2024). Journal co-citation analysis (JCA) identifies the frequency with which two journals are cited together within the same research paper, reflecting intellectual structures and disciplinary relationships. It is applied to measure interrelations among scientific fields and track the development of knowledge domains. Figure 1 illustrates the structural process involved in selecting relevant papers from Scopus and Web of Science to conduct a bibliometric analysis using VOSviewer, which maps citations, co-citations, and keyword networks.

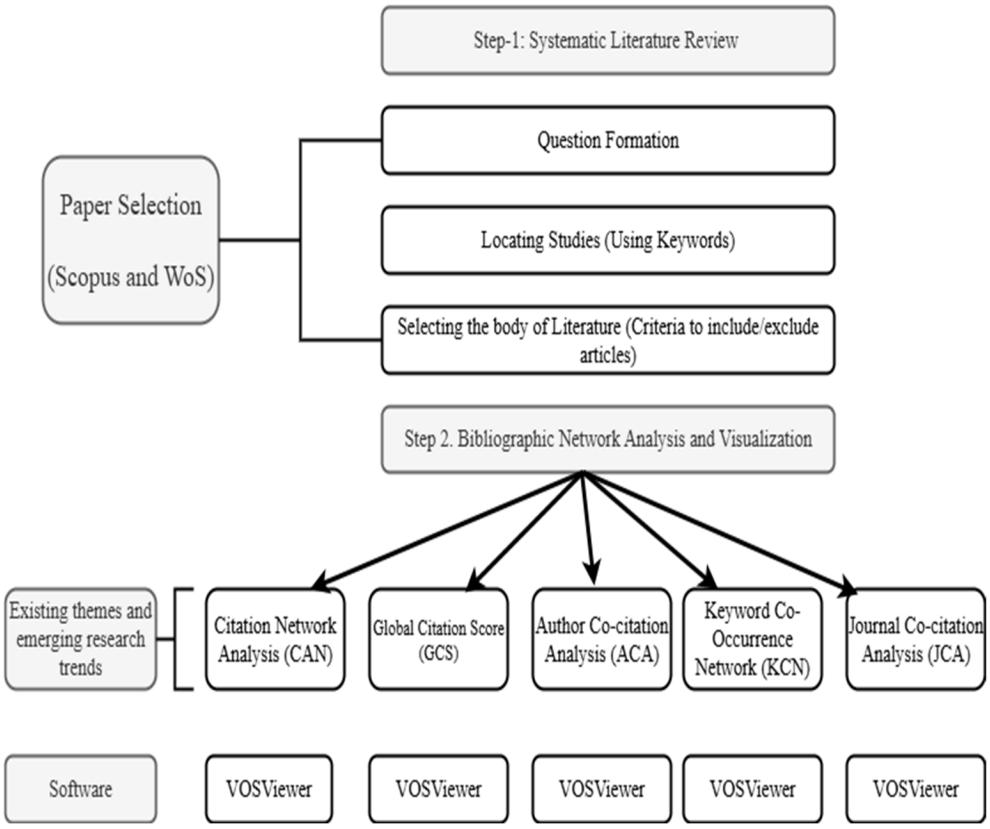

Figure 1. Methodological flow of the analysis.

2.2. Search Delimiting Criteria

Literature searches were conducted using the "TITLE-ABS-KEY" operator in the Scopus database and the comprehensive search function of Web of Science (WoS). Both support searching across titles, abstracts, and author-specified keywords. The first search was conducted on 8 February 2025. After some revisions, the final search for this bibliometric analysis was performed on 16 June 2025. We used the search syntax "Sustain*" AND "Financial" AND "Inclusion" and retrieved a total of 4113 records (2932 in Scopus and 1181 in WoS), covering the period from 2007 to 2025. The year 2025 endpoint encompasses only articles published up to 16 June 2025, including in-press articles already indexed in Scopus and Web of Science at the time of data collection. We employed a series of filter techniques, utilizing thematic relevance and publication characteristics, as part of the refinement process. Subject areas were limited to the fields of Economics, Econometrics and Finance, Business, Management and Accounting, Environmental Science, Computer Science, Energy, Engineering, and Social Sciences. Only documents published in English were considered. Eligible publication source types include articles, conference papers, reviews, and conference reviews. Publications prior to 2007 were excluded because they fell outside the scope of the subject. After excluding duplicated records in both databases, the dataset consists of 1467 records, which were considered to adequately fulfill the purposes of this study. The detailed steps and criteria used for inclusion or exclusion are depicted in Figure 2 in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) methodology. The subsequent search query was formulated as follows:

TITLE-ABS-KEY (sustain* AND financial AND inclusion) AND PUBYEAR > 2006 AND PUBYEAR < 2026 AND (LIMIT-TO (SRCTYPE, "j") OR LIMIT-TO (SRCTYPE , "p")) AND (LIMIT-TO (PUBSTAGE, "final")) AND (LIMIT-TO (SUBJAREA, "SOCI") OR LIMIT-TO (SUBJAREA, "ECON") OR LIMIT-TO (SUBJAREA, "BUSI") OR LIMIT-TO (SUBJAREA, "ENVI") OR LIMIT-TO (SUBJAREA, "COMP") OR LIMIT-TO (SUBJAREA, "ENER") OR LIMIT-TO (SUBJAREA, "ENGI") OR LIMIT-TO (SUBJAREA, "DECI") OR LIMIT-TO (SUBJAREA, "MULT") OR LIMIT-TO (SUBJAREA, "AGRI") OR LIMIT-TO (SUBJAREA, "ARTS") OR LIMIT-TO (SUBJAREA, "EART")) AND (LIMIT-TO (DOCTYPE, "ar") OR LIMIT-TO (DOCTYPE, "ch") OR LIMIT-TO (DOCTYPE, "cp") OR LIMIT-TO (DOCTYPE, "re") OR LIMIT-TO (DOCTYPE, "bk") OR LIMIT-TO (DOCTYPE, "cr")) AND (LIMIT-TO (LANGUAGE, "English")) (1)

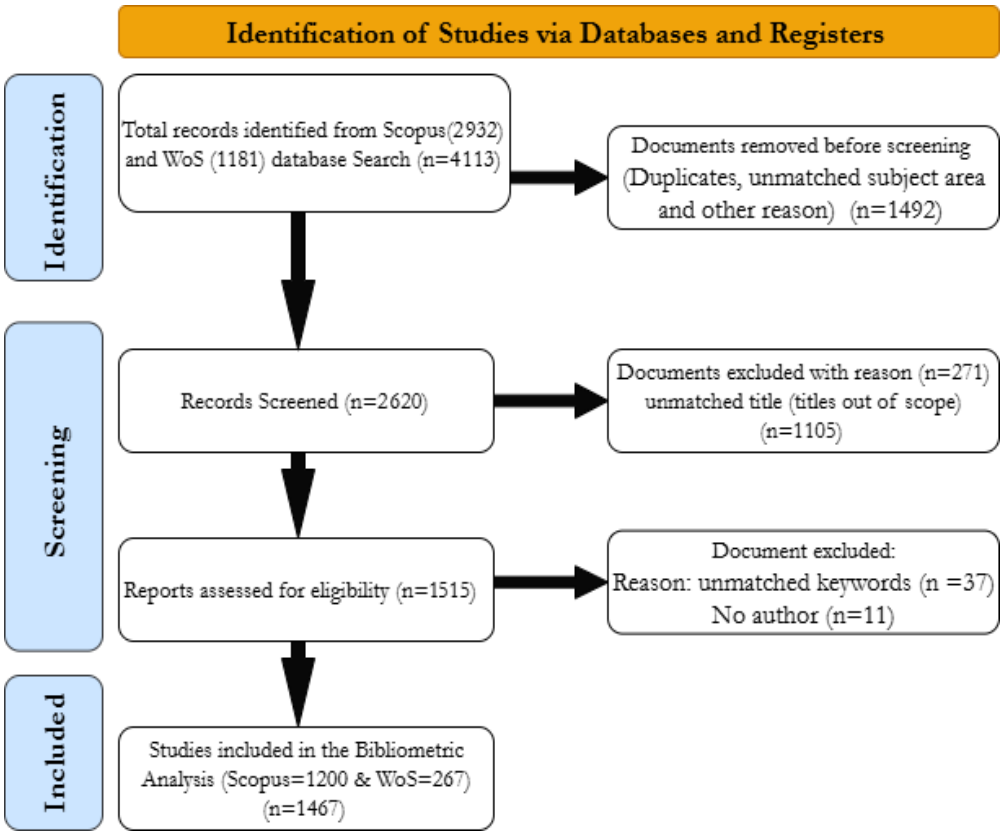

Figure 2. PRISMA flow diagram of identification and screening. A structured PRISMA flow diagram showing the identification of 4113 records, removal of duplicates and irrelevant items, and final inclusion of 1467 documents for bibliometric analysis after screening.

Table 1 presents a summary of the search strategy for sustainable financial inclusion across Scopus and Web of Science, initially retrieving 4113 records. After screening and removing duplicates, 1467 records were retained for analysis.

Table 1. The search query description pertains to sustainable financial inclusion.

Description	Conditions (Scopus)	Conditions (WoS)	Total Documents
Final search query after refining	TITLE-ABS-KEY (sustain* AND financial AND inclusion) AND PUBYEAR > 2006 AND PUBYEAR < 2026 AND (LIMIT-TO (SUBJAREA, "SOCI") OR LIMIT-TO (SUBJAREA, "ECON") OR LIMIT-TO (SUBJAREA, "BUSI") OR LIMIT-TO (SUBJAREA, "ENVI") OR LIMIT-TO (SUBJAREA, "COMP") OR LIMIT-TO (SUBJAREA, "ENER") OR LIMIT-TO (SUBJAREA, "ENGI") OR LIMIT-TO (SUBJAREA, "DECI") OR LIMIT-TO (SUBJAREA, "MULT") OR LIMIT-TO (SUBJAREA, "AGRI") OR LIMIT-TO (SUBJAREA, "ARTS") OR LIMIT-TO (SUBJAREA, "EART")) AND (LIMIT-TO (DOCTYPE, "ar") OR LIMIT-TO (DOCTYPE, "ch") OR LIMIT-TO (DOCTYPE, "cp") OR LIMIT-TO (DOCTYPE, "re") OR LIMIT-TO (DOCTYPE, "bk") OR LIMIT-TO (DOCTYPE, "cr")) AND (LIMIT-TO (PUBSTAGE, "final")) AND (LIMIT-TO (SRCTYPE, "j") OR LIMIT-TO (SRCTYPE, "p")) AND (LIMIT-TO (LANGUAGE, "English")) number of documents = 1927	sustain* AND financial AND inclusion Number of documents = 2186	4113
Screened	Records removed from two databases were after they were merged (as a result of duplicates, no author name, unmatched keywords and subjects, or title) number of documents = 2646		1467
Query search date	First search on 8 February 2025, and final search on 16 June 2025		
Years	2007–16 June 2025		
Publication stage	Final publication		
Language	The exploration was restricted to the English language		

3. Results

This section presents results from an in-depth bibliometric analysis, providing insight into the structure and development of academic interest in sustainable financial inclusion, with the aim of achieving research goals. The bibliographic data of 1467 documents, including authors, titles, abstracts, keywords, and other citation information, were exported and saved for later data processing. Citation network analysis, the global citation score, journal citation analysis, along with author co-citation and keyword co-occurrence analysis, comprised the comprehensive bibliometric study. Data was processed in VOSviewer for network visualizations and in Microsoft Excel for supporting analyses.

3.1. Descriptive Trends in Sustainable Financial Inclusion

Research output in the sustainable financial inclusion domain has been growing since 2017 from multiple perspectives. Accordingly, in relation to the geographic region of these publications, China and India were the leading countries, generating the most studies (644 and 302, respectively), followed by Pakistan (185). Together, these countries account for more than 77% of all publications identified in this analysis. Malaysia and Indonesia produced 157 and 138 papers, respectively. From the West, the USA has 144, Spain 103, and the UK 94, which means they are among the leading regions in the field of sustainable financial inclusion research outputs. African countries are represented by only two, Nigeria (134) and South Africa (106). The distribution of research across continents and nations suggests that the topic under discussion has global importance, while also revealing noticeable geographic concentration.

The dominance of certain leading countries in publications can be attributed to their alignment of domestic policy priorities and the availability of strong data. For example, in

China, the rapid expansion of digital payment systems such as Alipay and WeChat Pay, combined with the government's inclusive finance development plan, has significantly advanced both the practice and measurement of digital financial inclusion, particularly in rural communities (Zreik et al., 2024). China and India further strengthen their research capacity by publishing large-scale and open-access datasets on financial inclusion metrics. This pattern aligns with institutional theory, which suggests that regulatory quality, policy coherence, and infrastructure serve as decisive enablers of inclusive finance. These enabling factors have allowed China, India, and the United States to combine advanced digital finance ecosystems with coordinated inclusion strategies, resulting in both high research volume and global visibility. In contrast, underrepresented regions such as Sub-Saharan Africa and Central Asia lack comparable institutional frameworks, thereby constraining both practical implementation and scholarly output.

The international research collaboration network map, as shown in Figure 3, positions China, India, and the United States as major central nodes. This indicates their positions in global research output and partnerships. Chinese connections were strong with Pakistan, Malaysia, and other Asian nations. Similarly strong connections existed with India, the United Kingdom, Nigeria, and South Africa. European countries, such as Spain and Germany, have established extensive links, primarily with partners in Asia and Africa. There is an increasing trend among Middle Eastern countries, led by Saudi Arabia, Qatar, and the United Arab Emirates (UAE), which denotes increased global participation in research collaborations. African countries, led by South Africa and Nigeria, are also joining the global research network.

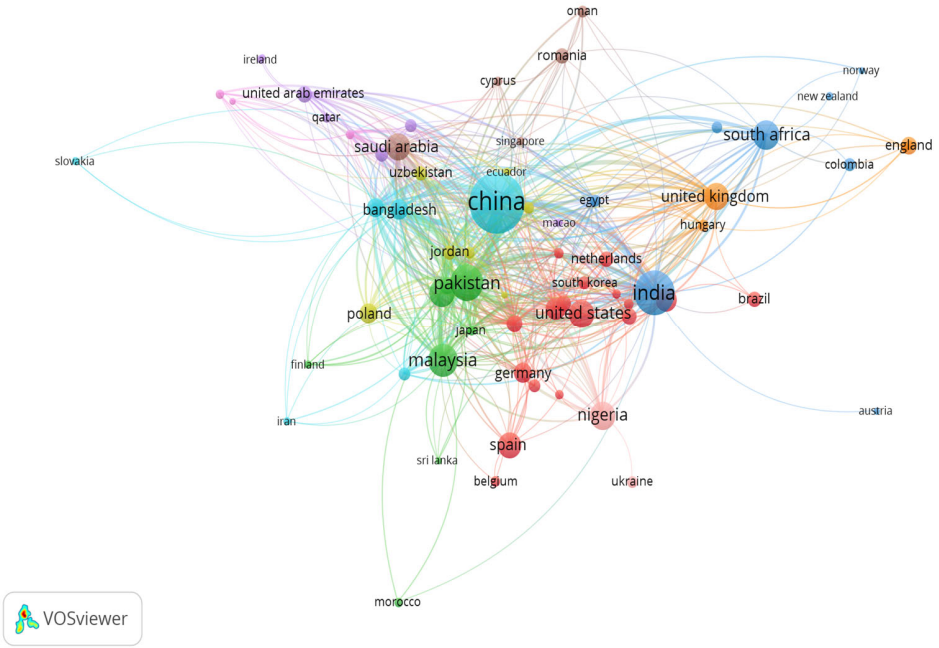

Figure 3. Collaboration between countries in sustainable financial inclusion research. Network map generated via VOSviewer using data from 1467 publications. Node size reflects the country's publication volume. Centrality measures indicate China, India, and the USA as primary collaboration hubs.

On the other hand, the number of research papers in the sustainable financial inclusion domain from 2007 to mid-2025 is illustrated in Figure 4. Publications were few, with small increments in 2012 (9 articles) and 2014 (12) between 2007 and 2016. There is a sharp increase in the number of papers in 2017, with 40 papers published, followed by a slow increase up to 93 papers in 2020. The largest publications began in 2021, with 118 papers, followed by 186 in 2022, 264 in 2023, and a record 383 papers in 2024. This increase in

growth speed indicates that more and more research attention is being drawn to this area. Nevertheless, the slight decrease in 2025 is due to the partial data taken up to 16 June 2025, being less than a full year's total. Generally, the trend of research is upward, particularly since 2017, indicating a notable shift in scientific interest in sustainable financial inclusion.

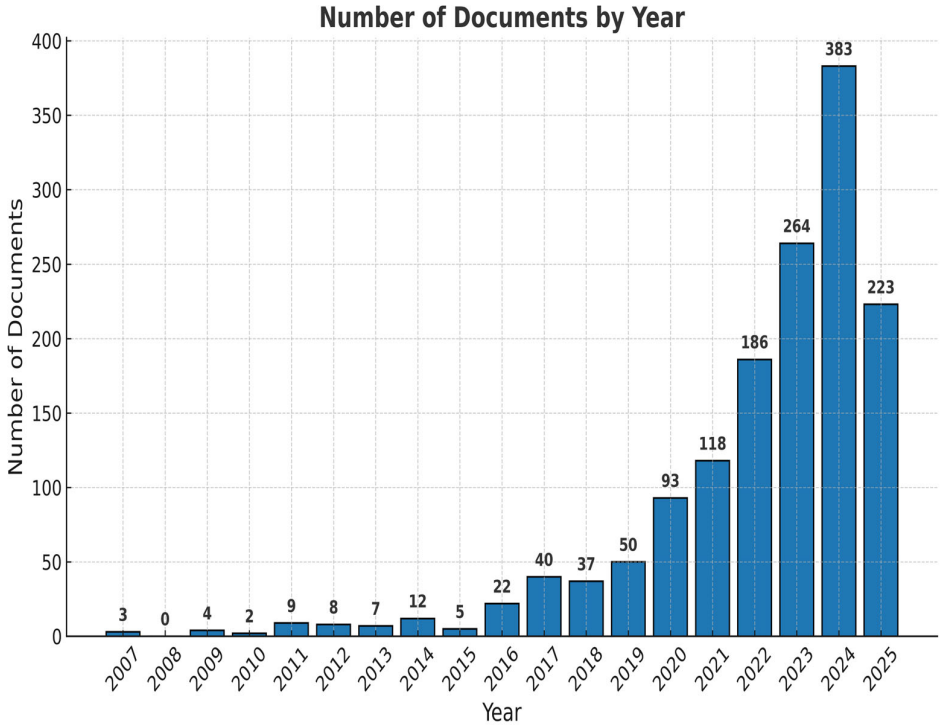

Figure 4. Longitudinal evolution of financial inclusion literature. Documents by year 2007 to mid-2025. Annual publication counts derived from merged Scopus and WoS datasets, filtered per inclusion criteria. The variable "year" is on the x-axis and "number of documents" on the y-axis. Sharp growth of publications post-2017 is visible. In addition to annual publication counts, Figure 5 shows the thematic evolution of the sustainable financial inclusion domain between 2007 and mid-2025. In the early years studies primarily addressed financial inclusion in its traditional sense, focusing on access and poverty reduction. From 2013 onward, digital finance and financial literacy have become increasingly prevalent, reflecting the integration of technology and capacity building into efforts to promote inclusion. Since 2017, green finance and ESG have emerged as rapidly growing themes, indicating a stronger alignment between financial inclusion research and the global sustainability agenda.

The authors' keyword cloud analysis, presented in Figure 6, reveals that the most dominant theme is "financial inclusion," which reflects the core focus of the discipline, broadening access to financial services, especially in underserved societies. Closely related words demonstrate a strong dependence on technology to enhance literacy and promote greater inclusivity. An adjacent group of keywords related to sustainability, including terms like "sustainable development," "green finance," "ESG," and "renewable energy," highlights an emerging research area where environmental goals are linked to financial systems. Social issue-related keywords (poverty, gender, and education) highlight the ongoing importance of social equity and development outcomes. Regional keywords help specify specific geographic areas that are of academic interest, such as Sub-Saharan Africa, China, and India. Therefore, this demonstrates that it is a multidisciplinary field primarily driven by impactful research that emphasizes inclusion, equity, and sustainability.

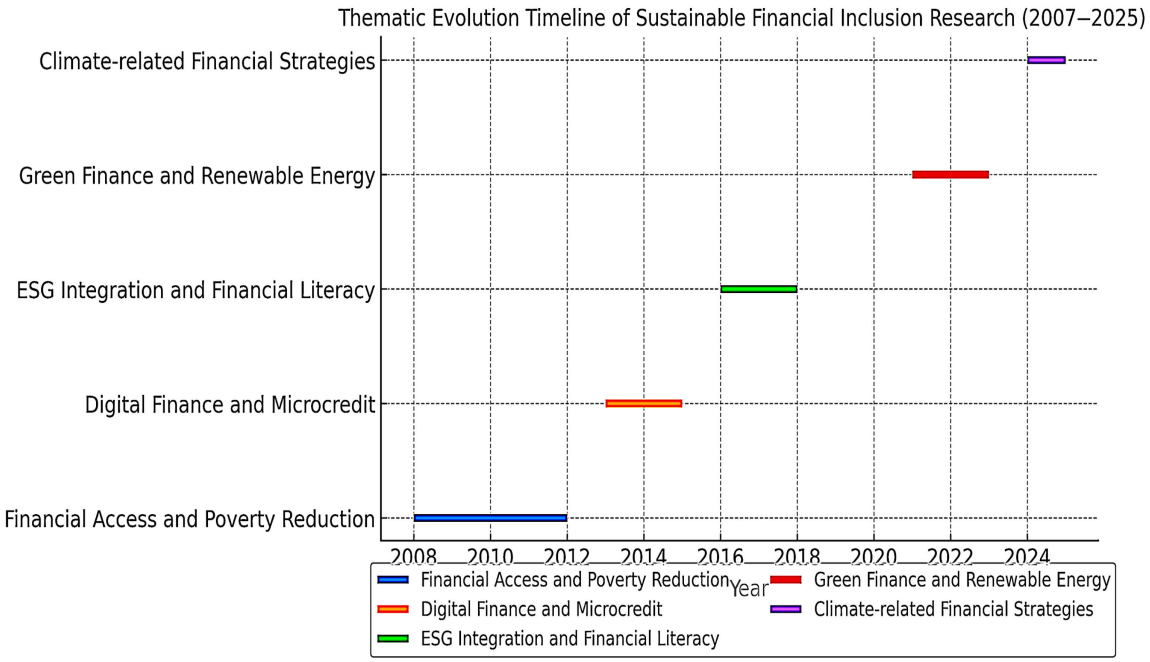

Figure 5. Thematic evolution of sustainable financial inclusion research from 2007 to mid-2025 based on Scopus and Web of Science datasets. The graph tracks the annual frequency of publications across financial inclusion, digital finance, green finance, ESG, and financial literacy, showing their emergence and relative growth over time.

The top 10 most influential researchers and journals in the sustainable financial inclusion literature, which have had a substantial impact on the number of documents produced and the number of citations, are presented in Table 2. Authors are ranked based on the number of documents they have produced and the number of citations they have received, providing insight into their impact and contribution to the domain of sustainable financial inclusion research. Ozturk ranks first in citations (611) despite having only five publications, indicating a high impact per paper. Asongu A., with nine documents and 284 citations, emerges as the next most prolific author. Therefore, this suggests that high-impact research does not always require many publications, and some authors with fewer papers still achieve significant influence. Similarly, the top 10 cited journals that align with the most cited authors are also presented in this table. *Technological Forecasting and Social Change* is the top average cited journal, with a 93.89 average citation score followed by *Renewable Energy* with an average citation score of 67.14, which makes it the second top average cited journal followed by *Journal of Cleaner Production*, *Sustainable Development*, and *Journal of Financial Economic Policy* by receiving the highest average citation scores of 59.36, 54, and 42, respectively. Some journals become the most influential journals in terms of the number of documents published in this field, such as *Sustainability (Switzerland)* with 91 articles, *Resources Policy* with 40, *Environmental Science and Pollution Research* with 27, and *Heliyon* with 26 articles.

Table 2. Performance of top prolific writers and journals in the sustainable financial inclusion domain.

Top Authors	Documents	Total Citations	Top Journals	Total Citations	Publications	Av. Citations
Asongu A.	9	284	*Technological Forecasting and Social Change*	845	9	93.8889
Rastogi S.	9	21	*Renewable energy*	470	7	67.1429
Qamruzzaman	8	72	*Journal of Cleaner Production*	831	14	59.3571

Table 2. *Cont.*

Top Authors	Documents	Total Citations	Top Journals	Total Citations	Publications	Av. Citations
Ali K.	7	285	*Sustainable Development*	918	17	54
Khan Z.	5	336	*Journal of Financial Economic Policy*	294	7	42
Ozturk I.	5	611	*Environmental Science and Pollution Research*	779	27	28.8519
Ullah S.	5	107	*Sustainability (Switzerland)*	2457	91	27
Hussain S.	4	107	*Heliyon*	682	26	26.2308
Forcadell F.	4	59	*Frontiers in Environmental Science*	411	17	24.1765
Gautam R.	4	12	*Resources Policy*	655	40	16.375

Figure 6. Keyword cloud map generated based on co-occurrence analysis of author keywords from 1467 Scopus and WoS-indexed publications on sustainable financial inclusion (2007–mid-2025).

3.2. Bibliographic Network Analysis and Visualization

3.2.1. Co-Citation Analysis

Co-citation analysis is the most widely used bibliometric method, as it connects two publications that co-occur in the list of references in another publication (Donthu et al., 2020; Phan et al., 2024). The frequency with which two publications are mentioned together is referred to as co-citation (Small, 1973), indicating a relatedness of their content (Zupic & Čater, 2015). The analysis helps to shape the intellectual structure of a research field, uncovering important publications, significant themes, and developing thematic clusters based on highly co-cited articles (Donthu et al., 2020).

Author co-citation analysis identifies the most important authors through their citation records and connects them (Zupic & Čater, 2015). It suggests that authors who receive numerous co-citations from other authors share similar academic ideas (Hallinger & Kovačević, 2019). Authors who are highly co-cited are often influential researchers in their

respective fields; their works are widely recognized, and they have numerous citations from other researchers. The co-citation analysis of the ten most relevant authors in the field of sustainable financial inclusion research is presented in Table 3. The high number of co-citations indicates that Demirguc-Kunt, A., Klapper, L., Shahbaz, M., and Wang, Y. are core authors with a high reference frequency and significant influence in the selected study topic. A high total link strength tends to indicate that the works of these authors are widely cited across multiple fields, which also suggests their significant influence on academic and policy research. Their research on innovative methodological approaches, technology, financial inclusion, and financial restrictions collected numerous co-citations.

Table 3. Author co-citation analysis results.

Author	Frequency of Co-Citations	Total Link Strength
Demirguc-Kunt A.	888	44,649
Klapper L.	566	28,298
Shahbaz M.	472	54,626
Wang Y.	441	38,260
Pesaran m.h.	421	45,121
Taghizadeh-Hesary F.	395	40,412
Beck T.	381	20,403
Zhang Y.	361	30,571
Ozturk I	359	41,421
Ullah S.	347	35,749

Notes: Threshold = 20 for 1328 authors, and four clusters.

VOSviewer software generates a network map that "visualizes commonalities" by examining the frequency of author co-citations among the authors cited in the sustainable financial inclusion database (Van Eck & Waltman, 2017). According to the frequency of co-citations, the larger bubbles in Figure 7 represent the most important researchers, i.e., highly co-cited authors, such as Demirguc-Kunt, Wang, and Shahbaz.

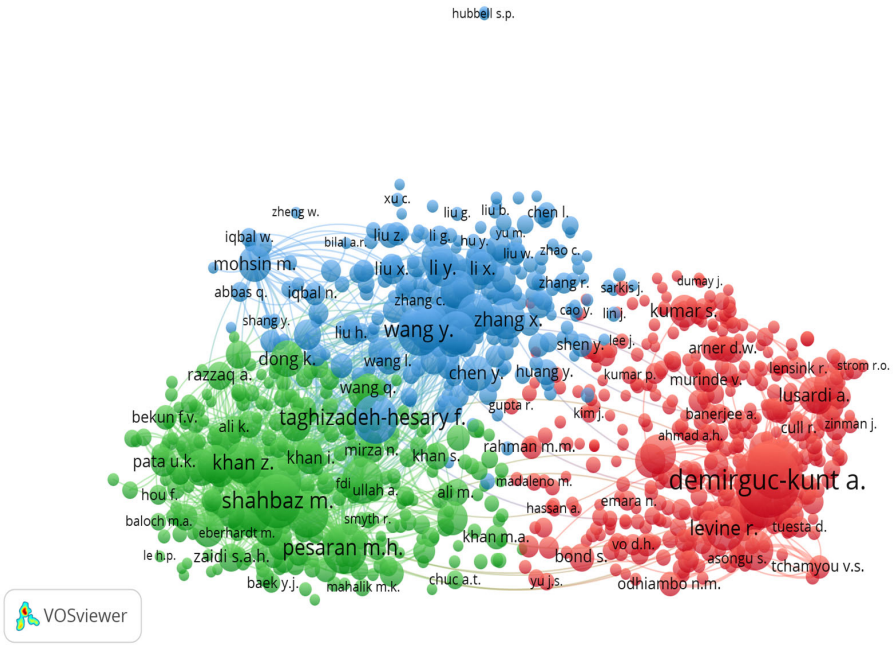

Figure 7. Author co-citation network map of the sustainable financial inclusion literature. A bibliometric network illustrating clusters of authors based on their co-citation frequency. Larger circles represent highly co-cited authors, such as Demirguc-Kunt, Klapper, and Wang.

3.2.2. Journal Co-Citation Analysis (JCA)

In this paper, the relationship between journals, as determined by the frequency with which they are cited together in articles of the selected field, has been analyzed using journal co-citation analysis (JCA). It reveals the main journals and thematic clusters, as well as the interdisciplinarity of a research field. Investigating citation counts that works receive in other works, researchers can gain insight into the influence of a journal in some area of research. Hence, it would be possible to know which journals are more important and impactful in a particular area of knowledge. It also allows researchers to understand the relations between similar concepts within a particular domain.

Table 4 shows the top ten journal co-citation analysis, which reflects the intellectual structure and influence in academic research. It presents data on important journals that are co-cited with the journals. Accordingly, the dataset shows that the *Sustainability* journal is a highly influential source for intellectual work, with a co-citation frequency of 1282 and a total link strength of 38,480. Likewise, the *Journal of Cleaner Production* is the next top source for publication in the research area of financial inclusion, with a co-citation count of 777.

Table 4. Journal co-citation analysis results.

Journal	Citations	Total Link Strength
Sustainability	1282	38,480
Journal Of Cleaner Production	777	33,170
Environmental Science and Pollution Research	492	23,393
World Development	419	11,690
Energy Policy	410	18,154
Resource Policy	343	11,045
Energy	308	14,321
Energy Econ.	279	11,626
Renew. Energy	263	11,612
Heliyon	255	8790

In addition, co-citation analysis will be employed to confirm the interdisciplinarity of sustainable financial inclusion and sustainability research. It indicates strong ties between environmental, economic, and policy-based areas. The high citation and link strength of *Sustainability, Energy Policy*, and *Journal of Cleaner Production* indicate that they are important knowledge hubs in relation to the literature on sustainable financial inclusion and sustainable development. This highlights the importance of comprehensive, cross-sectoral, and interdisciplinary approaches to addressing global sustainability challenges.

3.2.3. Citation Network Analysis (CNA)

One approach to understanding the composition and development of scientific research areas is citation network analysis. Zhao and Strotmann (2015) stated that CNA techniques support merits in knowledge illustration and depiction, particularly in recognizing knowledge streams and networks between subjects. This entails creating networks through citations among scholarly articles, which can provide several pieces of data on the research setting. The ability to trace information flows and citation networks provided a better understanding of how earlier work influenced later work. Smaller networks, or clusters, are segmented, and each member within the cluster has a minimum of ten references to other members. Including articles that provide a minimum number of citations enhances cluster stability and provides a solid intellectual foundation. This methodological norm facilitates the capture of widely recognized works that are essential to the field. Within

the complete author network, CNA enables the identification of papers with the highest number of citations (weights) (Hummon & Dereian, 1989).

Figure 8 shows the citation network map. The scope of the topic clusters can be specified using the CNA technique. This method yields a network with 509 links and 164 nodes. Since the amount of data collected is significantly greater in large clusters than in small clusters, CNA is believed to yield the best results in clusters with a large number of nodes (Bianchi et al., 2019). VOSviewer has created eight most important clusters based on this assumption, along with the pertinent results, presented in Table 5.

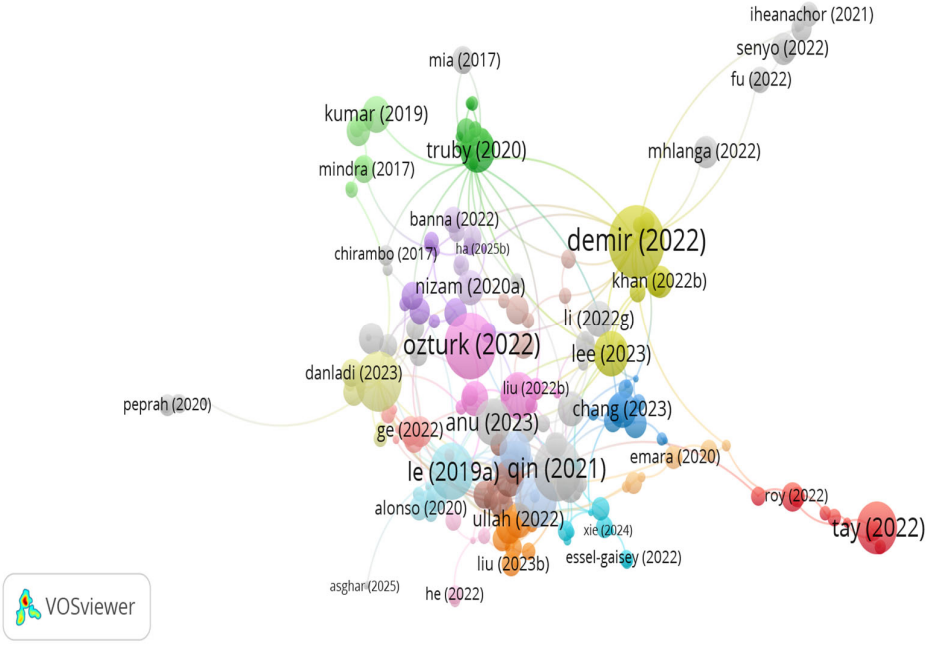

Figure 8. Citation Network Map. A citation map with 164 nodes and 509 links, showing how documents are connected by citation patterns. Eight major clusters highlight topics like FinTech, green finance, income inequality, energy transition, and financial literacy.

Five articles with the highest number of references are evaluated, along with the key research subjects of the clusters. Unlike reviewing articles, not every work assigned to a cluster needs to have a direct connection to its main topic. According to the CNA, the majority of research on combining sustainability and financial inclusion has focused on a few key areas that are interconnected, mutually advantageous, and complementary. Research subjects covered include financial inclusion, environmental degradation, green finance, digital financial inclusion, the energy environment, sustainable economic growth, FinTech, income inequality, empowering sustainable technologies, and environmental sustainability in the context of financial inclusion. CNA enabled the identification of eight clusters, which are presented in the following section.

Cluster 1 focused on FinTech, financial inclusion, income inequality, and the challenges of digital financial inclusion for sustainable development. One important way digital finance reduces income inequality is through sustainable financial inclusion. When individuals gain access to digital financial tools, their ability to save, borrow, and invest increases, ultimately improving their livelihood opportunities (Demir et al., 2022). The creation of FinTech services for financial inclusion necessitates combining the skills of independent but complementary rivals from three distinct traditional industries: banking, telecommunications, and information technology (for FinTech companies) (Sethi et al., 2025). Infrastructure for information and communication technology (ICT) offers innovations that expand ICT applications in numerous ways, advancing humankind (Lee et al.,

2023). Farmers' vulnerability to poverty may be impacted by digital financial inclusion through the economic channel of income diversification (Yang et al., 2023). So, from this cluster one can understand that digital financial inclusion enabled by financial technology and an ICT infrastructure is critical to level income inequality and achieving sustainable development, particularly for disadvantaged communities such as farmers.

Table 5. Topics for research based on the most significant clusters in the citation network.

Clusters	Nodes	Links	Topics	Top 5 Papers
1	9	28	FinTech, financial inclusion, income inequality, poverty alleviation, policies, practices, and challenges of digital financial inclusion for sustainable development.	(Demir et al., 2022); (Lee et al., 2023); (F. Khan et al., 2022); (Anakpo et al., 2023); (Suhrab et al., 2024)
2	8	29	The roles of energy efficiency improvement and financial inclusion in stimulating environmental sustainability, and the role of financial inclusion in the energy transition	(S. Khan et al., 2022); (Ullah et al., 2022); (Amin et al., 2022); (Barut et al., 2023); (K. Ali et al., 2023)
3	8	15	Financial inclusion matters for economic growth, financial inclusiveness, and bank stability.	(Ozturk & Ullah, 2022); (Nizam et al., 2020); (Banna & Alam, 2021); (Niaz, 2022); (Chinoda & Kapingura, 2023)
4	8	17	Financial inclusion promotes green finance and its role in natural resources and energy intensity.	(Chang et al., 2023); (Tufail et al., 2022); (Huang et al., 2022); (Hodžić et al., 2023); (Cheng et al., 2023)
5	7	27	Financial inclusion limits CO_2 emissions: globalization and renewable electricity output, energy structure, infrastructure, and environmental quality	(Qin et al., 2021); (Ahmed & Shaker, 2024); (D. Liu et al., 2022), (S. Hussain et al., 2023); (S. Q. Ali et al., 2023)
6	6	31	Financial inclusion and its impact on financial efficiency, sustainability, and sustainable development.	(Le et al., 2019); (Odugbesan et al., 2022); (Alonso et al., 2020); (Luo et al., 2022)
7	6	16	The role of financial inclusion on human development and ecological footprint	(K. Ali et al., 2022); (J. Liu et al., 2023); (M. Hussain et al., 2022); (Rehman et al., 2022); (Qin et al., 2021)
8	6	26	Sustainable Development Goals through financial inclusion and financial literacy	(Sharma, 2016); (Danladi et al., 2023); (Pandey et al., 2022); (Lontchi et al., 2022)

Cluster 2 shows how sustainable financial inclusion can promote environmental sustainability and its role in the energy transition. Energy efficiency and financial inclusion can interact to reduce CO_2 emissions. The moderating and mediating effects of energy efficiency on the relationship between financial inclusion and CO_2 emissions are well-known. Greening the financial sector is also crucial to address the negative environmental impacts of financial inclusion in both consumption and production channels. Regarding the consumption-side channel, the provision of financial services, such as loans and payment facilities, should be made easy and at a low cost, provided that consumers receiving these financial services consume energy-efficient commodities (Z. Khan et al., 2023). The ecological footprint is accelerated by financial inclusion (K. Ali et al., 2022). One way to mitigate or respond to environmental degradation is through financial inclusion. Financial inclusion significantly improves ecological footprints in various ways (Fareed et al., 2022). This finding aligns with Amin et al. (2022), who found that financial inclusion has both positive and negative effects on emissions, depending on the complementary sustainability strategies employed. As a result, the potential for financial inclusion and modernization

should be integrated into comprehensive climate mitigation strategies at the regional, national, and international levels to mitigate the negative dynamics of carbon emissions associated with modern development.

Cluster 3 emphasizes the importance of financial inclusion in enhancing bank stability and stimulating economic growth. It has shown the relationship between financial inclusion and economic growth, and it was suggested that the positive role of financial inclusion has been increased after reaching an optimal level of inclusion, where the effect of financial inclusion is stronger in countries with lower economic growth than in countries with higher economic growth (Nizam et al., 2020). Consequently, sustainable economic growth will be ensured by an inclusive digital banking sector, which is anticipated to support financial sustainability amid economic downturns of the COVID-19 pandemic (Banna & Alam, 2021). Financial inclusion is a vital driver of economic empowerment among underprivileged communities. The advantages of financial inclusion are more pronounced for female borrowers (Niaz, 2022). Bank stability and digital financial inclusion are significantly positively correlated (Chinoda & Kapingura, 2023). This cluster frames inclusion as a fundamental enabler of sustainable and resilient economic development.

Cluster 4 demonstrates that financial inclusion promotes green finance and its role in natural resources and energy intensity. New financial sector technologies have overtaken traditional banking access in terms of physical access points (Chang et al., 2023). It greatly boosts the green total factor productivity and presents promising opportunities for low-carbon development (Cheng et al., 2023). While energy efficiency and export size lower CO_2 emissions, financial inclusion, gross domestic product (GDP), and import size increase CO_2 emissions (Tufail et al., 2022; Gotoh, 2025). Energy–environment performance (EEP) is likely to be influenced by digital financial inclusion (DFI), which has recently been identified as a crucial factor in promoting sustainable development in developing and transitional economies (Huang et al., 2022). Energy and climate policies need to incorporate financial inclusion more, particularly in their early phases of development (Hodžić et al., 2023). Measures to increase financial access have a statistically significant positive effect on lowering extreme poverty (Amin et al., 2022). Despite the cost of financial inclusion, financial deepening policy should indeed be adopted and initiated by developing tangible strategies to strengthen the contribution of financial inclusion for energy efficiency. It can be achieved through credit for clean production, labor education, and environmental sustainability, as well as credit restrictions for high-polluting firms (Dai et al., 2022). Studies by Neaime and Gaysset (2018), Vincent and Evans (2019), Barik and Pradhan (2021), Gershenson et al. (2021), Daud and Ahmad (2023), and Zheng et al. (2023) have all demonstrated the contribution of digital financial inclusion to financial stability. Therefore, the result is supported by the finding of Gallego-Losada et al. (2023), which stated that digital financial inclusion significantly supports green transitions. Overall, this cluster positions financial inclusion as a strategic tool in the global pursuit of green finance.

Cluster 5 discussed financial inclusion, globalization, renewable electricity generation, infrastructure, and environmental quality, and how these policies lead to improvement of environmental quality. Research by Qin et al. (2021) shows that the provision of formal financial services to individuals and firms leads to a greater investment in cleaner and efficient technologies. Therefore, the relationship between economic growth and environmental degradation should be viewed from the perspective of pursuing common development that balances the economy, society, and environment. It is through the practice of policies and strategies that promote sustainable economic growth to benefit all without affecting environmental well-being, quality, and the interests of future generations (S. Hussain et al., 2023). Financial inclusion promotes achieving carbon neutrality (Brahmi et al., 2023). Inclusive finance plays a significant role in driving sustainable employment

(Geng & He, 2021). There are notable relationships between the financial inclusion–GDP connection and the financial inclusion–CO_2 relationship (D. Liu et al., 2022). In this sense, results indicate that financial inclusion not only supports economic development but also establishes itself as an important environmental policy instrument, especially when implemented in carbon-aware financial planning and policy formulation.

Cluster 6 addresses financial inclusion and its impact on financial efficiency, sustainability, and sustainable development. Le et al. (2019) show that inclusive financial systems reduce transaction costs, increase financial access, and enhance the productivity of capital. These efficiencies contribute to greater economic stability and long-term development. It is one way to mitigate the degree of financial exclusion that currently exists and work toward sustainable development in Africa (Mavilia & Pisani, 2020; Carè et al., 2025). In general, this cluster portrays financial inclusion as both a social and operational efficiency driver with critical implications for institutional and developmental sustainability.

Cluster 7 deals with financial inclusion and human development. Financial inclusion contributes to increasing human well-being, providing access to education, healthcare, and entrepreneurship, but it can also increase environmental stress if it leads to unsustainable consumption (K. Ali et al., 2022; J. Liu et al., 2023). Financial development has a positive influence on the utilization of renewable energy by reducing financial risk, creating new opportunities, lowering borrowing costs, and increasing capital accessibility (Chang et al., 2022). However, financial inclusion can make worse environmental damage if current financial services and products are not aligned with the sustainable development agenda (J. Liu et al., 2023). The cluster contributes to an emerging recognition that sustainable financial inclusion must be socially and environmentally informed to be effective.

Cluster 8 addresses Sustainable Development Goals through financial inclusion and financial literacy. This cluster explores how financial inclusion can help to achieve SDGs. Strengthening conceptual bases, Sharma (2016) has set the tone by associating financial inclusion with SDGs like poverty alleviation, gender equality, and economic development. Research by Danladi et al. (2023) and Mishra and Sahoo (2025) has shown that financial literacy and effective inclusion programs, particularly for underserved populations, are empirically positively related. Access to finance without financial literacy can lead to incorrect decisions when making a loan and becoming indebted. Lontchi et al. (2022) take a more global approach, looking at some case studies from different countries with their particular path into development and proving the role of culturally responsive financial policies as a better way to foster inclusive and sustainable growth. Therefore, from this cluster, it is possible to say that achieving Sustainable Development Goals (SDGs) depends not just on expanding financial access but also on fostering financial literacy and culturally responsive policies to ensure truly inclusive and sustainable development.

3.2.4. Global Citation Score Analysis (GCS)

Global Citation Score (GCS) analysis is another very important technique used to determine the level of impact and influence research publications have attained within the academic community. It measures the total number of citations a paper has received and, to a large extent, reflects its reach and importance. It is a bibliometric indicator that represents the total number of times a publication has been cited over an entire citation database without limiting the analysis to any particular research network. It serves as a broad measure of scholarly impact, reflecting a publication's influence across disciplines (Gould, 2023). Xu et al. (2021) stated that international collaborations significantly enhance research visibility and citation impact. Unlike raw GCS, which measures the total number of citations, the normalized GCS accounts for variations in citation practices among disciplines by adjusting citation counts relative to the average citation rate in the field (Haunschild et al.,

2022). According to Table 6, only five of the ten publications with the highest normalized global citation scores are related to the most significant clusters revealed by the citation network analysis.

Table 6. Top 10 most cited articles ranked by normalized GCS.

Rank	Title	Author	Journal	GCS	Normalized GCS
1.	Fintech, Financial Inclusion, and Income Inequality: A Quantile Regression Approach	Demir et al. (2022)	*The European Journal of Finance*	390	10.72
2.	Does Digital Financial Inclusion Matter for Economic Growth and Environmental Sustainability in OBRI Economies?	Ozturk and Ullah (2022)	*Resources, Conservation, and Recycling*	328	9.01
3.	Does Financial Inclusion Limit Carbon Dioxide Emissions? Analyzing the Role of Globalization and Renewable Electricity Output	Qin et al. (2021)	*Sustainable Development*	278	8.58
4.	Nexus Between Financial Inclusion and Economic Growth: Evidence from the Emerging Indian Economy	Sharma (2016)	*Journal of Financial Economic Policy*	257	6.43
5.	Financial Inclusion and Its Impact on Financial Efficiency and Sustainability: Empirical Evidence from Asia	Le et al. (2019)	*Borsa Istanbul Review*	230	5.91
6.	Digital Financial Inclusion and Poverty Alleviation: Evidence from the Sustainable Development of China	Lee et al. (2023)	*Economic Analysis and Policy*	153	8.68
7.	The Roles of Energy Efficiency Improvement, Renewable Electricity Production, and Financial Inclusion in Stimulating Environmental Sustainability	S. Khan et al. (2022)	*Renewable Energy*	124	5.41
8.	Making the World a Better Place with FinTech Research	Lagna and Ravishankar (2022)	*Information Systems Journal*	108	5.22
9.	Examining the Role of Financial Inclusion Towards CO_2 emissions: Presenting the Role of Renewable Energy and Globalization in the Context of EKC	Mehmood (2022)	*Environmental Science and Pollution Research*	97	4.69
10.	Environmental Concerns of Financial Inclusion and Economic Policy Uncertainty in the Era of Globalization: Evidence from Low and High Globalized Organisation for Economic Co-Operation and Development (OECD) Economies	Ullah et al. (2022)	*Environmental Science and Pollution Research*	92	2.52

Demir et al. (2022) hold a global citation score of 390, as well as a normalized global citation score of 10.72, following their publication in 2022. It focused on whether having access to FinTech platforms can make affordable banking, credit, and investment services, and assumed that FinTech participation would be associated with significantly decreased

income inequality, particularly among lower-income groups, through increasing individuals' financial access. The paper is among the top ten cited papers, as presented in Table 6, and reflects a strong impact on the field, likely due to its relevance to FinTech and the role of the latter in promoting social and economic progress.

The second research study achieved the highest GCS (328), and the normalized GCS (9.01) was found to be a significant factor in digital financial inclusion, contributing to economic growth and environmental sustainability (Ozturk & Ullah, 2022). Therefore, the article's impact may be from its relevance to global sustainability goals.

Additionally, financial inclusion limiting carbon dioxide emissions (Qin et al., 2021); the nexus between financial inclusion and economic growth (Sharma, 2016); financial inclusion and its impact on financial efficiency and sustainability (Le et al., 2019); the contributions of financial inclusion, renewable energy generation, and increased energy efficiency to promoting environmental sustainability (Amin et al., 2022); the role of financial inclusion towards CO_2 emissions (Mehmood, 2022); and environmental concerns of financial inclusion and economic policy uncertainty in the era of globalization (Sohail et al., 2024) were among the ten published research papers that obtained the highest GCS and NGCS, according to Table 6.

It has been shown that relevant related work is common claim for PCC (paper co-citation) networks. However, there are papers with higher normalized GCS values and GCS scores (Demir et al., 2022), as well as papers with lower normalized GCS values and GCS scores (Ullah et al., 2022). Accordingly, these top ten articles based on normalized GCS scores are instrumental in understanding the changing narrative on financial inclusion and its overall impact on economic development, green growth, poverty reduction, and environmental sustainability.

3.2.5. Co-Occurrence Network of Keywords

The co-occurrence network method has been frequently employed as a bibliometric approach to visualize the conceptual structure and dynamic trends of a research domain. This technique examines the structure of keyword co-occurrences in academic publications, thereby revealing intellectual links and thematic groups (Adolph, 2016). The method is based on the assumption that words that co-appear in a document are thematically related and are therefore used to depict the intellectual structure of the research field. With clusters of similar words, one can discover popular topics, emerging trend topics, and the relationships between ideas within a domain (Newman, 2001). The foundation of a co-occurrence network is the transformation of documents to a network by modeling nodes as keywords and edges (or links) as co-occurrence of pairs of keywords in the same documents. This approach assumes that a thematic relation exists between high-frequency keywords as the basis for mapping the intellectual structure of a field. This method involves several standard processing steps, including data collection from relevant sources, keyword standardization, construction of a co-occurrence matrix, network visualization, and cluster analysis to identify related thematic groups (Van Eck & Waltman, 2010). To be considered for inclusion in the network, a keyword needs to be used in a minimum of five papers (Börner et al., 2003).

VOSviewer was used to visualize the conceptual structure and thematic landscape of literature in the sustainable financial inclusion research field (see Figure 9). Eight clusters of 396 keywords shared a consistent sub-theme in the literature. The financial inclusion node was reported as the central and influential node in the entire thematic field. Peripheral clusters included technological innovation (FinTech, blockchain, mobile banking), socioeconomic issues (gender, empowerment, access to rural areas), environmental issues (carbon emissions, green finance), and macroeconomic systems (economic growth, financial

systems, governance). Nodes were connected in 14,187 edges and 31,043 weights. This already provides some insight into how highly interactive this particular field is with other cross-cutting issues related to digital finance, sustainability, and inclusive development. Keywords such as climate change, green energy, or cryptocurrency ensured dynamism in the scientific field. This demonstrates that financial inclusion research can be highly dynamic, yet increasingly aligns with major global interests in matters related to sustainable development, environmental sustainability, and technological advancement.

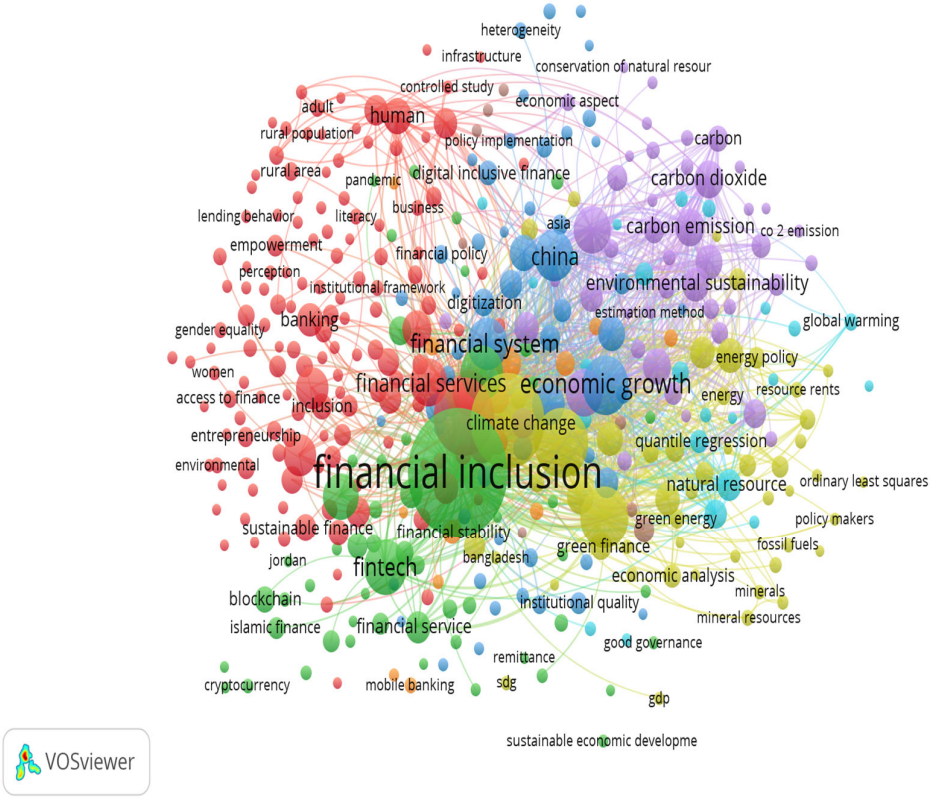

Figure 9. Co-occurrence of Keywords Network Map. A network map with 396 keyword nodes and 14,187 connections, showing frequently co-occurring keywords in sustainable financial inclusion.

4. Discussions

The overall objective of this study is to map the intellectual landscape and research evolution of sustainable financial inclusion by analyzing global scholarly output using bibliometric methods. Data was synthesized from 1467 Scopus and WoS-indexed publication documents. The VOSviewer tool and PRISMA guidelines were utilized to create a knowledge structure that provides suggestions and informs future research, policymakers, and practitioners on sustainable financial inclusion.

Over time, the definition of financial inclusion has expanded. It now encompasses not only access to banking but also perspectives such as green finance and investment models grounded in the ESG framework (Miller et al., 2023). From a sustainability perspective, it suggests that environmental, social, and corporate governance aspects are incorporated into the financial inclusion strategies. Although numerous efforts have been made towards economic inclusion, it is increasingly important today to combine finance with sustainability goals, so that financial inclusion leads to long-term socioeconomic resilience and environmental sustainability. Hence, the principal findings of some existing literature suggest that financial inclusion reduces carbon emissions by investing in green activities and green energy (Qin et al., 2021). Microfinance organizations and online lending platforms promote green entrepreneurship by enabling companies to transition towards green businesses (Z.

Khan et al., 2023). Blockchain-based financial services, in particular, deliver transparency and accountability for green finance investments (Lagna & Ravishankar, 2022).

Additionally, both digital finance and FinTech have significantly enhanced access to financial services, particularly in developing economies where traditional banking networks remain relatively underdeveloped (Demirgüç-Kunt et al., 2020). FinTech has democratized financial services, making credit, insurance, and savings products accessible to the masses through mobile banking or digital channels (Nugraha et al., 2022). A similar discussion is also provided by Chang et al. (2023) regarding how efficiency and access to financial services are improved through digital financial inclusion in rural and less accessible areas. Although there are benefits, it is necessary to address the significant challenges of financial inclusion in the digital space, including cybersecurity risks, digital literacy gaps, and regulatory uncertainties, among others (Vincent & Evans, 2019; Barik & Pradhan, 2021; Neaime & Gaysset, 2018). Mobile payment systems, blockchain, and artificial intelligence can improve financial inclusion while maintaining legal compliance and financial security (Huang et al., 2022; Tufail et al., 2022). Furthermore, a study conducted by Ratnawati et al. (2024) highlights the importance of financial literacy in enhancing access to finance, particularly for low-income households and small businesses. But, there are still obstacles to overcome, as difficult problems persist, including high costs, regulatory burdens, inadequate infrastructure, and social inequality (Matama, 2016).

Sustainability of the environment is a further key dimension of sustainable financial inclusion. Recent research has shown that enhanced financial inclusion is a key factor in accelerating green finance and the adoption of renewable energy. S. Khan et al. (2022) found that enhancing access to financial services leads firms and individuals to invest in energy-efficient options, thereby reducing carbon footprints and promoting environmental conservation programs. Additionally, research on sustainable finance and impact investment indicates that online lending markets and microfinance institutions play a key role in financing green entrepreneurship (Bocken et al., 2014).

Still, concerns exist regarding the environmental impact of increased financial access, as research findings by Mehmood (2022) and Ullah et al. (2022) suggest that uncontrolled financial expansion has the potential to create unsustainable consumption habits and higher carbon emissions unless properly regulated. Some literature suggests that green investments help lower carbon emissions. At the same time, other studies indicate that they lead to more ecological degradation through consumption-driven green practices, thereby creating a paradox in green finance.

Consequently, this bibliometric investigation resonates with ongoing debates in the development of finance and sustainability theory. By drawing on theoretical frameworks of institutional theory and the capability approach, sustainable financial inclusion can be conceptualized not only as an access mechanism but also as a transformative lever rooted in governance systems and empowerment pathways. As discussed so far, bibliometric evidence showing thematic convergence around green finance, digital inclusion, and ESG-aligned products reflects a broader theoretical shift, from access-oriented models to sustainability-driven paradigms in financial services. In addition, the literature has a geographical bias towards higher-income areas. It highlights the enduring North–South knowledge gap inherent in development finance and reinforces the need for ESG frameworks that are grounded in the realities of socioecological contexts in economically underserved nations and regions.

Digital tools expand access to financial systems, financial literacy enables informed and responsible use of these services, and green finance aligns financial flows with environmental objectives. Together, these elements form a systemic model that not only broadens access but also embeds sustainability into financial ecosystems.

Overall, this analysis reveals that sustainable financial inclusion is a many-sided and crucial objective that integrates finance, technology, environmental sustainability, and social justice. Using citation and keyword network analyses, this paper identifies eight key themes, including digital financial inclusion, income inequality, human development, FinTech, green finance, ESG alignment, and financial literacy. These themes cover the environmental, technological, and developmental aspects of sustainable financial inclusion within the broader research landscape. Together, they trace the intellectual and practical progress in the field. Early studies primarily focused on the relationship between financial access and poverty reduction (Clusters 3 and 8), viewing inclusion as a tool for development with limited emphasis on environmental factors. Since 2017, the literature has shifted toward technologically driven inclusion (Cluster 1) and its role in supporting economic resilience and reducing inequality, reflecting the wider FinTech revolution. The integration of green finance, ESG alignment, and environmental sustainability (Clusters 2, 4, and 5) marks another shift, framing inclusion not just as an economic tool but also as a means to address climate and ecological goals. Clusters 6 and 7 expanded to encompass human development outcomes and institutional efficiency, highlighting a systemic perspective where finance supports social and environmental well-being. Hence, this review shows that the field is moving from access-focused designs toward more sustainability-driven, multifaceted models. At the same time, certain integration problems persist; for instance, research linking human development metrics to environmental performance remains limited, and studies integrating multiple clusters into a unified model are rare. Achieving greater thematic integration remains an important research goal yet to be fully accomplished, as it is essential to bridge these thematic clusters to advance inclusive, resilient, and environmentally responsible financial development, especially in underserved regions.

On the other hand, this review reveals a rapid increase in publications related to sustainable financial inclusion, particularly after 2017, which can be attributed to the fact that financial inclusion serves as a key vehicle for many countries to achieve the Sustainable Development Goals (SDGs). FinTech and mobile banking have significantly expanded access to finance, particularly in developing countries; however, problems such as digital illiteracy, cybersecurity threats, and regulatory arbitrage still pose the greatest challenges to their effectiveness. The green loans, renewable energy financing, and ESG-aligned products have received increasing attention; yet, the environmental aspect of money, as it relates to matters of sustainable financial inclusion, has received little attention within the academic literature and policy discussions. Such studies are not only scant in number but geographically concentrated in a few regions (e.g., China, India, USA), and most low-income countries, like countries in Sub-Saharan Africa and Central Asia, where the vulnerability is the greatest, need the boldest sustainability solutions in finance and remain significantly underrepresented. Therefore, researchers should prioritize studies that explore the effectiveness of inclusive financial models in low-income and infrastructurally weak environments, which in turn enhances future sustainable financial inclusion research in these regions. Governments should also realign financial regulation with the Sustainable Development Goals (SDGs), invest in financial and digital literacy programs, and ensure access to microfinance and green credit systems for the entire population.

5. Contributions and Implications of the Investigation

This review has contributed to the growing literature on sustainable financial inclusion by mapping its thematic, geographic, and intellectual dimensions. Specifically, it advances the field in three key ways. First, it is the first bibliometric analysis to conceptualize sustainable financial inclusion as the convergence of access to finance, technological innovation, and environmental and social governance principles to form a core thematic

framework. Second, by combining two major databases and extending the analysis to mid-2025, it provides the most comprehensive temporal and geographic mapping to date, uncovering previously underexplored disparities in research output and collaboration patterns. Third, its synthesis links bibliometric insights directly to recommended actionable policy pathways, bridging academic analysis with practical implementation in regions most vulnerable to financial exclusion and environmental risk. Additionally, the review can serve as a valuable resource for scholars and practitioners interested in developing sustainable and inclusive financial mechanisms to achieve global goals, including the SDGs.

Similarly, the impact of this bibliometric review can also be observed from both analytical and transformative perspectives. Analytically, this study has revealed a significant regional disparity, with countries such as China, India, and the USA leading in output. However, vulnerable regions, such as those in Sub-Saharan Africa and Central Asia, have not been highlighted as much; meanwhile, they face long-term threats related to financial exclusion as well as environmental degradation. On the thematic side, sustainable financial inclusion covers indicators of carbon emission reduction, energy efficiency, and ESG (Environmental, Social, and Governance) governance. It also highlights the significant contribution of digital financial services in expanding financial inclusion, promoting social inclusion, and fostering economic growth.

Finally, the review calls for a paradigm shift in sustainable financial inclusion, which should not be seen solely as providing access to a bank or a loan, but as a strategic tool for inclusive development and social equity worldwide.

6. Conclusions

Sustainable financial inclusion stands at the nexus of equitable access to financial services, environmental stewardship, and long-term economic resilience. Digital financial services, green finance, and ESG-compliant investment strategies have the potential to synergize for sustainable economic growth. Whereas access, affordability, and sustainability are to be ensured by concrete policies for financial products and services, research on current trends and emerging issues also extends to the next generation and is made affordable as well.

This bibliometric investigation provides a systematic, evidence-based overview of the increasingly dynamic field of sustainable financial inclusion, a growing convergence of finance, sustainability, digital innovation, and social equity. It helps to define the intellectual and thematic domain of a research field by identifying key authors, journals, and countries/publishers, along with their performance. It found that digital finance represents a crucial tool in enhancing sustainable financial inclusion among the unbanked. However, it is hindered by recurring barriers, including digital incompetence and regulatory fragmentation. At the same time, the review has found that market penetration of green and ESG finance has considerably increased over the last years, although its incorporation in inclusive finance frameworks is so far limited and concentrated in high-income countries. This geographical imbalance highlights the imperative for more extensive academic research on inclusionary nature law from the Global South, where financial exclusion is most severe. Despite enormous progress in FinTech and digital financial solutions, which have enabled greater financial inclusion, deficiencies remain, particularly in low-income communities, where environmental and social sustainability are not well interwoven into efforts to expand access to finance.

Accordingly, based on the findings presented, this review recommends three policy frameworks to make sustainable financial inclusion a feasible reality. First, regulatory alignment with ESG and SDGs emphasizes the integration of sustainability metrics and environmental safeguards into financial regulations, aiming to avoid ecological damage

while expanding access. Specifically, policymakers should harmonize regulations that incorporate social and environmental sustainability into the framework of sustainable financial inclusion, such as providing strong incentives for green microfinance. Second, integrate digital skills training, financial literacy efforts, and sustainability awareness, especially for rural and marginalized communities. Third, promoting inclusive green finance mechanisms involves creating microcredit, green bonds, and climate-related loan products accessible to low-income households and small businesses, including carbon-linked loans and digital ESG platforms for underserved communities. Furthermore, continued work on SDG monitoring should address regional and thematic gaps, such as in Sub-Saharan Africa and Central Asia, while leveraging interdisciplinarity, crisis-resilient financial ecosystems, and new disruptive technologies, including blockchain and AI, to foster inclusive, eco-conscious finance.

7. Limitations

Although the study is methodologically sound, it still has some limitations. First, the analysis only utilized two large databases (Scopus and Web of Science) and English-language publications, which can introduce some bias, as many academic pieces of literature published in languages other than English, as well as regional and local studies composed in the Global South, are excluded. Second, while this bibliometric analysis employed PRISMA and VOSviewer for rigorous screening and visualization, it primarily considered quantitative developments and patterns, such as publication numbers, co-citation networks, keyword clustering, and word frequencies, without incorporating qualitative insights. Thirdly, the time frame from 2007 to 16 June 2025 includes in-press articles already indexed at the time of search but does not capture the full publication year of 2025, potentially omitting studies released later in the year. To overcome these technical limitations in future studies, it is recommended to extend the database search (e.g., using Google Scholar and other sources) and to consult other knowledge repositories to find alternative perspectives (e.g., local repositories of knowledge). It must also incorporate other bibliometric indicators, such as qualitative research, case studies, and inter-regional comparisons, to provide a comprehensive outlook on sustainable financial inclusion. Furthermore, longitudinal research is crucial for a comprehensive understanding of the development of the pathway to financial inclusion and for creating a more refined theory of sustainable financial inclusion.

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Abbreviations

DFI	Digital Financial Inclusion
DFS	Digital Financial Services
ESG	Environmental, Social, and Governance
FI	Financial Inclusion
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
SDGs	Sustainable Development Goals
FinTech	Financial Technology

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