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Bibliometric Analysis: The Role of ESG in Green Finance

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ABSTRACT

This study aims to conduct a comprehensive bibliometric analysis of the development of the Environmental, Social, and Governance (ESG) and green finance literature. Research data was obtained from 519 scientific articles indexed in the Scopus database in the period 2020–2025. The analysis was carried out using a bibliometric approach through Bibliometrix and Biblioshiny software to map the performance of publications, topic evolution, conceptual structure, and research collaboration patterns globally. The results show that ESG and green finance related publications are experiencing exponential growth, which indicates that this field is a rapidly growing emerging research front. The thematic evolution analysis indicates a shift in research focus from normative issues and regulatory frameworks to more implementive and performance-based studies, especially related to ESG performance and green finance instruments. Thematic mapping places green finance, sustainable development, and ESG performance as the underlying themes that underpin the literature, while general concepts such as ESG and sustainable finance show a tendency towards specialization or conceptual saturation. Analysis of global collaborations shows a strong geographical concentration of research, with China emerging as the dominant actor in international research networks. This research contributes by uncovering the phenomenon of publication inflation and *the citation age effect*, identifying potential geographical bias in the ESG and green finance literature, and proposing a policy-market integration perspective as a conceptual framework to bridge the fragmentation between regulation-based approaches and financial markets. These findings provide important implications for the development of research agendas, evidence-based policy formulation, and sustainable investment strategies.

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1. Introduction

Green finance is a key component in global efforts to address climate change and promote sustainable development (Fu et al., 2024; Swaty, 2023; Xiao et al., 2023). This topic is receiving increasing attention, both among academics and practitioners (Judijanto et al., 2025; Rizvi et al., 2025). Green finance aims to direct capital flows to environmentally responsible investments and activities and support long-term sustainability goals by integrating environmental factors into financial decision-making (Lai, 2023; Sáng, 2024). This transformation is part of a broader shift in the financial system that seeks to align economic performance with social and environmental interests (Zaid et al., 2025).

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In this context, Environmental, Social, and Governance (ESG) standards have emerged as a fundamental framework for assessing a company's sustainability and investment risks. ESG integration strengthens the green finance function by linking environmental conservation, social accountability, and transparent and responsible governance with investment decisions and financial performance (Mudalige, 2023; OECD, 2022; van Niekerk, 2024). Within the framework of the green economy, ESG plays a more specific role by supporting green finance through increased transparency, accountability, and comparability of sustainability performance (Dung et al., 2024). Therefore, ESG serves as a bridge that connects financial decision-making with the goal of green economic transformation.

The rapid growth of academic literature on green finance and ESG shows the increasing importance of sustainable finance in the realm of research and policy. The number of publications has increased significantly since 2015, influenced by global policy initiatives such as the Paris Agreement and the United Nations Sustainable Development Goals (SDGs) (Judijanto et al., 2025; G. Wang et al., 2025). However, despite the rapid development, existing research is still not systematically organized. Most studies still analyze green finance, ESG, or governance separately, thus limiting a holistic understanding of the interconnectedness of conceptual frameworks, thematic evolutions, and collaboration trends (Hu & Gan, 2025; Koç, 2025; Pitaloka et al., 2024). In addition, conceptual differences and fluctuations in research focus are still ongoing (Boumaiza, 2025).

These inconsistencies show a clear research gap, especially related to the absence of a systematic and integrated literature mapping on green finance and ESG (Ante, 2024; Debrah et al., 2022). Although several reviews have addressed specific aspects of sustainable finance, few studies have been able to present a comprehensive picture that simultaneously includes the evolution of themes, knowledge structures, and patterns of collaboration (Koç, 2025; Mudalige, 2023) This fragmentation inhibits knowledge accumulation and limits the ability of researchers and policymakers to identify dominant themes and emerging research directions.

Bibliometric analysis offers a comprehensive methodological framework for examining publication trends, identifying key thematic clusters, as well as describing the relationships between authors, institutions, and research streams in a broad body of scientific literature (Koç, 2025; Magalhães-Timotio et al., 2024). In contrast to narrative reviews, the bibliometric approach allows for a systematic mapping of the intellectual landscape, while also uncovering knowledge gaps and new directions of emerging research (Magalhães-Timotio et al., 2024).

This study aims to conduct a comprehensive bibliometric analysis of the literature on ESG and green finance. Four main research questions were formulated. First (RQ1), this study analyzed the performance of publications in ESG and green finance studies. The second (RQ2), examines how ESG and green finance research topics have evolved over time. Third (RQ3), identify the main keywords and conceptual structures formed from the relationships between these keywords. Fourth (RQ4), examining the pattern of collaboration between authors and countries in forming a global scientific research network. The study presents an integrated bibliometric analysis of ESG, green finance, and governance, which makes a unique contribution to the sustainable finance literature and supports the formulation of future research agendas, evidence-based

policies, and investment strategies that are aligned with sustainability goals (Krastev & Krasteva-Hristova, 2024; H. Sharma & Jain, 2025).

1. Literature Review

2.1 The Evolution and Paradigm of *Green Finance*

Fundamentally, *Green Finance* has transformed from just a *niche* concept to a major pillar in the global financial architecture. Contemporary literature defines *Green Finance* not only as a funding instrument, but as a strategic intervention to internalize environmental externalities into market mechanisms. According to Zairis & Liargovas (2024), green finance serves as a catalyst that directs capital flows from the high-carbon sector to more sustainable and low-emission economic activities.

Recent developments highlight the role of technology in accelerating this adoption. Zaid et al., (2025) in their study found that digital transformation and *Financial Technology* (FinTech) are key *drivers* that democratize access to green financial instruments, allowing for wider investor participation and more transparent monitoring of environmental impacts. However, the literature also notes that the effectiveness of *Green Finance* is highly dependent on a strong regulatory framework. Without a clear taxonomy, these instruments are vulnerable to losing their credibility in the eyes of institutional investors.

2.2 *Environmental, Social, and Governance* (ESG)

The concept of ESG has shifted from just a *compliance tool* or corporate philanthropy to a vital indicator of long-term corporate health and resilience (Pasupuleti, 2025). In the perspective of *stakeholder theory*, the application of ESG principles reflects the company's ability to balance the interests of shareholders with social welfare and environmental sustainability.

Recent empirical studies show a positive correlation between strong ESG performance and a company's financial performance. D. Zhang (2023) emphasized that ESG integration helps companies mitigate systemic risks, especially those related to climate regulation and energy market volatility. Furthermore, investors now view ESG scores as a proxy for management quality; Companies with high ESG scores are considered to have better governance and a clearer long-term vision, thereby lowering information asymmetry between management and investors.

2.3 The Nexus Between *Green Finance* and ESG

The relationship between *Green Finance* and ESG is symbiotic and mutually reinforcing. *Green Finance* provides funding mechanisms (such as *Green Bonds* or *Green Sukuk*), while ESG provides a metric framework to measure the feasibility and impact of such funding. Green bonds and sukuk are essential in channeling investments into low-carbon projects, promoting energy efficiency and biodiversity conservation (Sami et al., 2024).

Critically, the literature highlights that a strong ESG profile can lower the *cost of capital* for companies. Companies with good ESG ratings tend to gain access to green financing with lower interest rates or *more competitive* yields (Tsai et al., 2023). This creates a *virtuous cycle*: access to cheap capital allows for greater investment in green

technologies, which in turn improves the company's ESG score. Lai (2023) and Sang (2024) reinforce this argument by pointing out that global capital markets are increasingly integrating ESG preferences into asset valuations, making *Green Finance* a vital bridge to the green economy transition.

3. Research Method

The bibliometric approach is used to map and analyze the development of global research related to green finance and environmental, social, and governance (ESG). The bibliometric approach is a quantitative method that analyzes the metadata of scientific publications to identify research trends, key actors, thematic structures, and patterns of scientific collaboration. (Demir et al., 2025).

This approach also allows for the visualization of keyword networks and theme clusters, thus providing a more structured understanding of how ESG and green finance issues develop and are interconnected in the academic literature (Judijanto & Apriyanto, 2025). This method allows for the grouping of scientific gaps, allowing researchers to pinpoint specific topics that require further exploration (de Oliveira et al., 2019). Therefore, this approach is not only relevant to explain the current state of the literature, but also effective in identifying research opportunities and novel contributions in ESG and green finance studies.

Table 1. PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses)

IDENTIFICATION	**Main topics**	ESG dan Green Finance
	Data source	Database Scopus
	Search keywords	("green finance" OR "sustainable finance" OR "climate finance") AND ("ESG" OR "environmental social governance").
	Total	1,174 documents found
SCREENING	**Type Document**	Only "Articles" documents
	Year	2020-2025 elections
	Subject Area	Economics, Finance, Business, Management, Accounting
	Total	581 documents found
ELIGIBILITY	**Trial**	Checking relevant titles and abstracts
	Exclusion	62 Excluded
INCLUDED	**Total Document Cleared**	519
	Finally	This document is used for bibliometrix analysis

Source: processed by researchers

The research data was obtained from the Scopus database. It was chosen because of its reputation and high quality of metadata. The search was conducted in the title, abstract, and keyword columns using a combination ("green finance" OR "sustainable finance" OR "climate finance") AND ("ESG" OR "environmental social governance"). The inclusion criteria include English-language journal articles, published in the 2020–2025 period, and in the fields of economics, finance, business, management, and accounting. The exclusion criteria include non-article documents, retracted articles, and irrelevant publications based on *title* and *abstract* examination.

The analysis period is set at 2020–2025, taking into account the increasing number of publications and academic attention to ESG and green finance issues in that period (Mahat et al., 2025). The document selection process follows the PRISMA flow, which includes the identification, screening, eligibility, and inclusion stages. From the 1,174 documents that were initially searched, the screening process resulted in 519 articles that were used as the final dataset.

The selected datasets were then processed using Bibliometrix R-package and Biblioshiny. The data processing stage includes duplication cleanup and metadata standardization. The analysis carried out includes publication performance analysis, keyword analysis and co-occurrence networks, thematic mapping, and author and country collaboration network analysis. The entire analysis was designed to answer research questions (RQ1–RQ4) and identify research gaps in the ESG and green finance literature.

4. Result & Discussion

4.1. Research Performance Publication

Table 2 summarizes the structure of the research dataset for the period 2020–2025 consisting of 519 article documents, reflecting the explosive phase in the academic literature. The research dynamics indicator looks very strong with an annual growth *rate* of 100% and a very young average age of the document of 0.948 years, confirming that this topic is.

Table 2. Main Information

DESCRIPTION	RESULTS	DESCRIPTION	RESULTS
Main Information		**Document Contents**	
Timespan	2020:2025	Keywords Plus (ID)	907
Sources (Journals, Books, etc)	219	Author's Keywords (DE)	1423
Documents	519	AUTHORS	
Annual Growth Rate %	100	Authors	1270
Document Average Age	0,948	Authors of single-authored docs	76
Average citations per doc	19,82	**Authors Collaboration**	
References	3728	Single-authored docs	80
Document Types		Co-Authors per Doc	2,9
Article	519	International co-authorships %	30,06

Source: processed by researchers

Based on bibliometric data (Table 2), research on this topic covers the period from 2020 to 2025 with a total of 519 articles sourced from 219 journals or books. The *Annual Production* graph (Figure 1) shows a significant exponential growth trend, shooting sharply from the initiation phase in 2020 to peaking at 256 documents in 2025. This surge in academic productivity can be justified as a direct response to the global urgency of the energy transition. G. Wang et al., (2025) assert that regulatory pressures towards *Net-Zero Emission targets* have forced the integration of ESG standards into the mainstream of the financial literature as an urgent need, no longer an option. In addition, the post-pandemic recovery momentum also acts as a main catalyst (Marni, 2022).

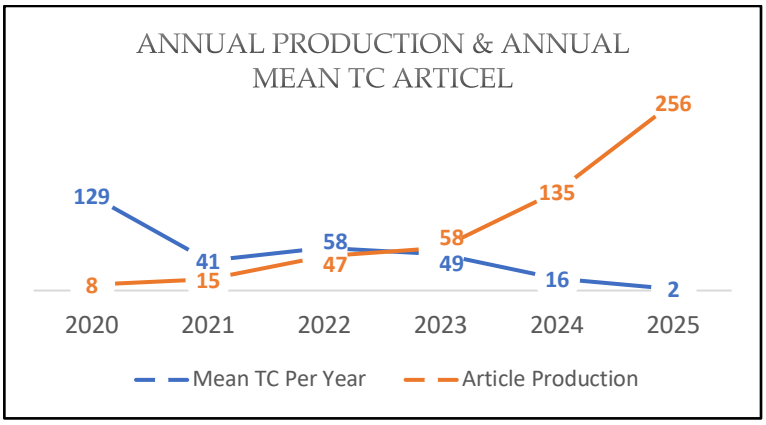

Figure 1. Annual Production

Table 5 shows an inverse relationship between the quantity of publications and the impact of citations during the period 2020–2025. The surge in research productivity is reflected in a significant increase in the number of articles, from 8 documents in 2020 to 256 documents in 2025, but the average citations per article was the highest in the early years (129.50) and decreased drastically in subsequent years to only 2.84 in 2025. This pattern confirms the *citation age effect*, where older articles have a greater chance of being read and cited D. Wang et al., (2013). Meanwhile, the latest publications have not had enough time to be widely disseminated. In line with that, Tahamtan et al., (2016) emphasized that the age of publication is the main determinant in the accumulation of citations.

Table 3. Most Relevant Sources

Sources	Articles
Sustainability (Switzerland)	38
Finance Research Letters	30
International Review Of Financial Analysis	21
Journal Of Environmental Management	17
Business Strategy And The Environment	16
Corporate Social Responsibility And Environmental Management	16
Research In International Business And Finance	15
Journal Of Sustainable Finance And Investment	14
Journal Of Risk And Financial Management	11
Environment, Development And Sustainability	10

Source: processed by researchers

Table 3 shows a concentrated but multidisciplinary landscape of knowledge dissemination. The Journal of Sustainability (Switzerland) dominates as the main source, followed by Finance Research Letters and the International Review of Financial Analysis, which reflect the strong wedge between sustainability perspectives and mainstream financial analysis. This pattern indicates that ESG and green finance research has gone beyond the boundaries of traditional science, with the integration of sustainability issues into business strategies and financial risk management.

4.2. Trend Topic Analysis

The evolution of the topic (Table 4) shows a paradigm shift from normative foundations to more mature empirical specializations**.** The initial focus on the *regulatory framework* (2022) is growing rapidly as the topic of *sustainable finance* and *ESG* has surged in tandem with the emergence of *the keyword covid-19*, confirming the role of the global crisis as a catalyst for the transformation of the literature. These findings are in line with (Broadstock et al., 2021) which suggests that the systemic shocks of the pandemic prompted investors to validate ESG-based assets as substantial hedging instruments, rather than simply complementing portfolios.

Table 4. TrendTopic

Term	**Freq**	**Q1-Q2-Q3**	**Term**	**Freq**	**Q1-Q2-Q3**
europe	8	2022-2022-2024	sustainable finance	177	2023-2024-2025
csr	7	2022-2022-2024	esg	164	2023-2024-2025
regulatory framework	6	2022-2022-2024	sustainable development	75	2023-2024-2025
covid-19	21	2023-2023-2024	green finance	94	2023-2025-2025
environmental	13	2021-2023-2025	sustainability	84	2024-2025-2025
spillover effect	8	2023-2023-2024	esg performance	41	2024-2025-2025

Source: processed by researchers

Pada tahun 2025, diskursus semakin mengerucut ke *green finance* dan *ESG performance*, mengindikasikan tuntutan literatur terhadap verifikasi kuantitatif guna mereduksi risiko klaim normatif. Dominasi orientasi performa ini merefleksikan fase kedewasaan riset, di mana keberlanjutan tidak lagi dinilai dari adopsi kebijakan semata, melainkan dari pembuktian dampak finansial yang terukur, sebagaimana ditegaskan oleh Lee et al., (2022).

Gambar 2 memetakan struktur konseptual literatur melalui Thematic Map berbasis densitas dan sentralitas. Kuadran *Motor Themes* didominasi klaster *China* dan *finance*, menegaskan peran sentral kontribusi riset China dan isu keuangan fundamental sebagai penggerak utama literatur yang telah matang. Sebaliknya, klaster inti seperti *green finance*, *sustainable development*, dan *ESG performance* menempati *Basic Themes*, mengindikasikan fungsinya sebagai fondasi konseptual yang krusial dalam diskursus akademik.

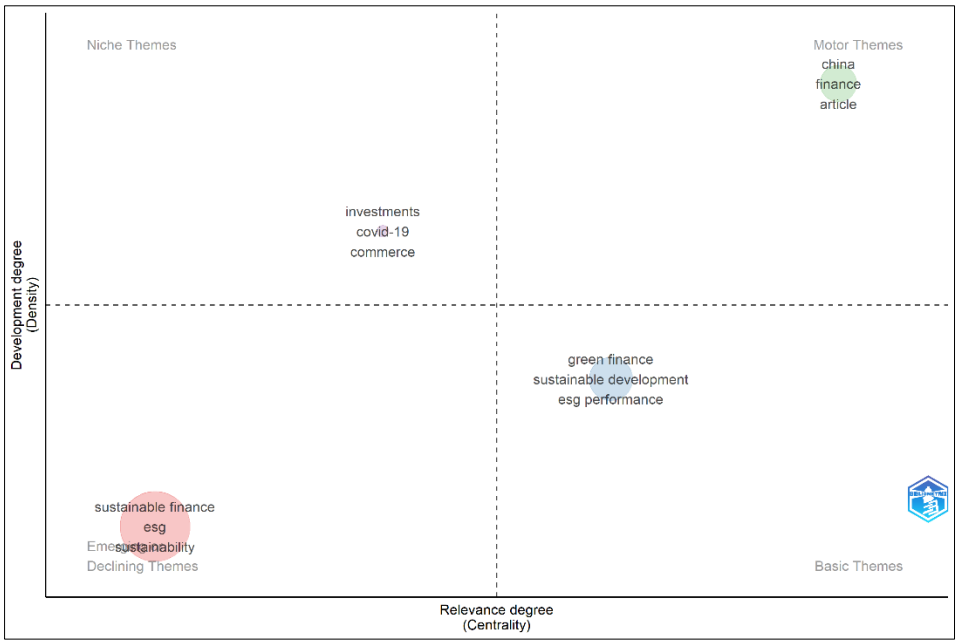

Figure 2. Thematic Maps

Specific issues such as *covid-19* and *investments* emerged as *Niche Themes* with high internal development but limited relevance to the mainstream, while umbrella terms such as *ESG* and *sustainable finance* were in the *Emerging/Declining* quadrant, which reflects the shift in research focus from general concepts to more specific and measurable sustainability indicators, this is in line with the development of the topic (Table 4).

4.3. Key Words Analysis

The results of the keyword frequency analysis (Table 6) place *sustainable finance*, *ESG*, and *green finance* as the dominant terminologies that affirm the institutionalization of sustainability in the global financial architecture. The dominance of *sustainable finance* as an umbrella concept reflects a paradigm shift from short-term profit orientation to long-term economic stability post-Paris Agreement (Zairis & Liargovas, 2024). This synergizes with the high frequency of *ESG* as a non-financial material indicator in risk assessment and corporate investment decisions (Drempetic, 2020).

Table 5. Most Frequent Words

No	Terms	Frequency	No	Terms	Frequency
1	sustainable finance	177	6	china	48
2	esg	164	7	finance	44
3	green finance	94	8	investment	42
4	sustainability	84	9	esg performance	41
5	sustainable development	75	10	green economy	35

Source: processed by researchers

Meanwhile, *green finance* represents an implementive dimension that bridges the theoretical framework of sustainability with real financial policy instruments

and practices, such as green bonds and sustainable portfolios (R. Sharma et al., 2025). This indicates the transformation of environmental issues from normative discourse to operational components of the modern financial system. In addition, the emergence of *the keywords sustainability*, *sustainable development*, *investment*, and *performance* shows the integration of environmental goals with economic growth (Kumar et al., 2023). Meanwhile, the dominance of *the Chinese* context confirms the strong influence of certain geographies in the formation of ESG and *green finance literature*.

To understand the thematic relationship between keywords in more depth, the results of the analysis were then visualized in the form of a co-occurrence cluster map (Fugure 3). Cluster 1 (Red) focuses on the dimensions of financial markets and performance, which are characterized by keywords such as assets, banks, investors, green bonds, returns, risk, and financial performance, as well as external issues such as climate change and covid. This cluster shows that most research places ESG and sustainable finance in the context of investment decisions, risk management, and market responses to environmental crises and challenges.

Cluster 2 (Green) represents macro and policy approaches, with the dominance of keywords such as green finance, policy, green innovation, enterprise, sustainable development, and China. This cluster emphasizes the role of the state, public policy, and industrial sector in driving the implementation of ESG and green finance, while demonstrating a strong empirical focus on the context of specific countries, especially China.

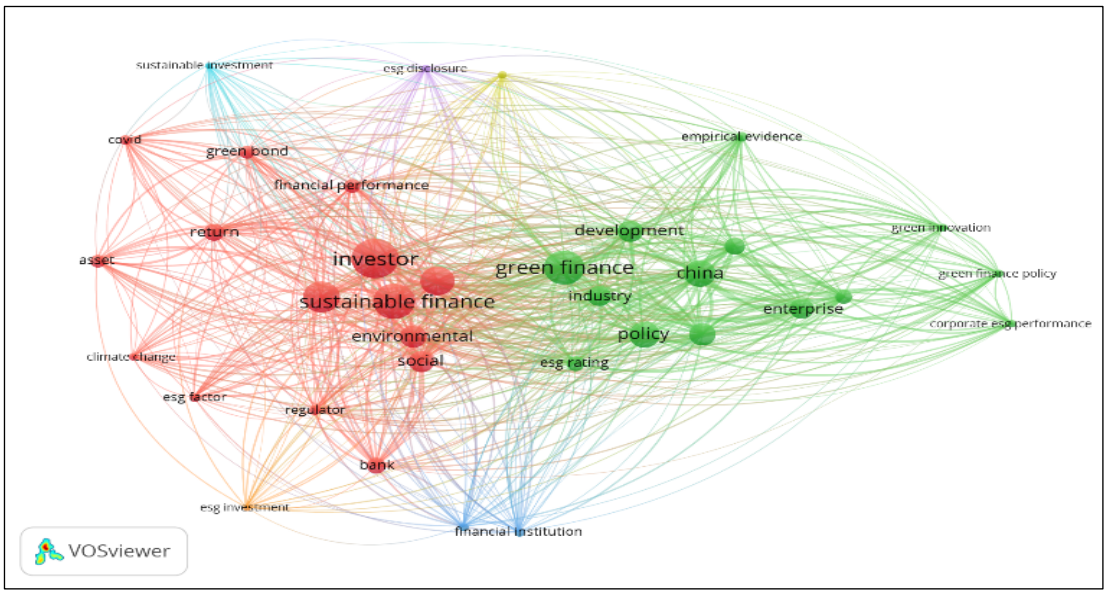

Figure 2. Co_occurrence Network

Overall, the keyword analysis shows that the ESG and green finance literature is developing in two main streams, namely a financial market-based approach and a policy-based approach and sustainable development. Cluster mapping indicates that these two currents develop in parallel, with a micro focus

on investors, performance, and risk, as well as a macro focus on policy, development, and the context of the country.

The separation between market approaches and policy approaches in the ESG and green finance literature is influenced by the availability and characteristics of data. The increasing accessibility of corporate ESG data has catalyzed a surge in quantitative research examining the relationship between ESG factors and financial performance (Pramitasari, 2024). A financial market-based perspective analyzes how market forces affect the adoption of ESG practices among companies (Mahat et al., 2025). This indicates that market-based clusters serve not only as a capital allocation mechanism, but also as a transmission channel of ESG principles into sustainability-oriented investment decisions (Verma et al., 2023).

Instead the policy-based approach emphasizes the importance of government regulations and incentives in promoting green finance, such as carbon trading markets and financial reforms aimed at sustainability (Xin & Hu, 2024). Effective policy guidance is essential to encourage corporate green innovation and ensure that financial markets are aligned with sustainability goals (Liu et al., 2025). Regulation also addresses challenges such as inadequate regulation and high transaction costs (Liu et al., 2025).

4.4. Global Dynamich of Research

The global collaboration map (Table 8) shows that ESG and green finance research networks are still concentrated in a certain number of countries. The most intense international collaboration is seen involving China as a major actor, especially with the United Kingdom, the United States, Australia, Hong Kong, and Malaysia. This pattern of collaboration indicates that cross-border research relationships tend to form concentrated networks, with China acting as a key hub for collaboration.

Table 6. Collaboration WorldMap

From	To	Freq	From	To	Freq
CHINA	UNITED KINGDOM	12	ITALY	FRANCE	5
CHINA	HONG KONG	6	CHINA	SAUDI ARABIA	4
CHINA	MALAYSIA	6	FRANCE	GREECE	4
CHINA	USA	6	FRANCE	TUNISIA	4
CHINA	AUSTRALIA	5	ITALY	GERMANY	4

Source: processed by researchers

China's dominance in the international collaboration network is inseparable from a combination of national policy directions, domestic research capacity, and China's strategic position in the global green finance agenda. Sustainable practices are promoted by China through limited-scale or *minilateral* cooperation arrangements, which allow the country to navigate international negotiations more effectively (Kobayashi & Sanchez, 2017). Green finance policies in China are comprehensively designed with an emphasis on synergies between macroeconomic development and the transition to a low-carbon economy, including attention to climate risks and carbon neutrality targets (J. Li et al., 2022).

Furthermore, China's vision of shaping a green world order integrates technological advances with geopolitical ambitions, which positions it as a central actor in global climate cooperation (Bosi-Moreira, 2025).

Table 7. Country Production

No	Country	Freq	No	Country	Freq
1	CHINA	378	6	USA	36
2	ITALY	73	7	FRANCE	29
3	UK	73	8	MALAYSIA	28
4	INDIA	71	9	SOUTH KOREA	26
5	GERMANY	50	10	GREECE	25

Source: processed by researchers

The distribution of publications by country shows that China is the largest contributor to ESG and green finance research. The next position is occupied by European countries such as Italy, the United Kingdom, Germany, and France, as well as several other Asian countries. This pattern shows that scientific production in the field of ESG and green finance is still dominated by countries with strong research capacity and academic infrastructure.

Tabel 8. Most Relevant Affiliations

Affiliation	Articles
Capital University Of Economics And Business	14
University Of Western Macedonia	10
Wuhan University	10
Zhongnan University Of Economics And Law	9
Central University Of Finance And Economics	8
Xi'an Jiaotong University	8
Guangdong University Of Foreign Studies	7
Università Bocconi	7
Beihang University	6
Bucharest University Of Economic Studies	6

Source: processed by researchers

China's high contribution to the production of ESG and green finance publications reflects the development of mature intellectual infrastructure and policies in this field. China has emerged as one of the major contributors in the green finance and ESG literature, along with the development of a strong and institutionalized research base (Mahat et al., 2025). The government also implements various supporting policy instruments, such as green finance standards, disclosure obligations, and regional pilot programs that encourage policy-based empirical research (W. Zhang & Zhao, 2024; Y. Li, 2025). In addition, the use of instruments such as green bonds, green financing, and green insurance to mobilize sustainable project capital has also expanded the availability of data and research topics, resulting in a high and sustainable volume of publications (Luo, 2024).

The justification for China's dominance in research production is also evidenced by the concentration of academic institutions active in the field of ESG and green finance. Some of the most prolific affiliates come from China, such as Capital University of Economics and Business, Wuhan University, Zhongnan University of Economics and Law, Central University of Finance and Economics, and Xi'an Jiaotong University. The concentration of these institutions reflects the strong academic and policy support for sustainability research in China, which ultimately contributes to the high publication output and strengthens China's position in the global ESG and green finance research landscape.

4.5. Research Gap Identification

The 10 highest-cited publications (Table 9) show that the most established literature today has provided a solid foundation on the benefits of ESG on market value, productivity, and green innovation through financial performance mechanisms and increased managerial awareness (Deng et al., 2023; Tan & Zhu, 2022; J. Wang et al., 2023; Zhou et al., 2022). This confirms that *green finance policies* play a crucial role in reducing emission intensity and improving the quality of sustainability practices at the corporate level (Sciarelli et al., 2021; Xu et al., 2023; D. Zhang, 2023).

Table 9. Most Global Cited Documents

NO	Paper	Total Citation	TC per Year
1	DREMPETIC S, 2020, J BUS ETHICS	958	159,67
2	ZHOU G, 2022, BUS STRATEGY ENVIRON	550	137,50
3	TAN Y, 2022, TECHNOL SOC	494	123,50
4	WANG J, 2023, INT REV FINANC ANAL	491	163,67
5	DENG X, 2023, FINAN RES LETT	192	64,00
6	XU A, 2023, J BUS RES	183	61,00
7	ZHANG D, 2023, ENERGY ECON	176	58,67
8	MACCHIAVELLO E, 2022, EUR CO FINANC LAW REV	167	41,75
9	STARKS LT, 2023, J FINANC	160	53,33
10	SCIARELLI M, 2021, TQM J	150	30,00

Source: processed by researchers

If we look at the Annual Production Growth (Table 1) which shows an exponential rapid increase, there is an anomaly in the form of *citation age effect* in the latest documents (Sub-chapter 3.2). This phenomenon confirms that *the field of green finance* is experiencing a phase of "publication inflation", where the flood of new articles makes the impact of each individual work more thinly distributed and often repetitive (Elia et al., 2024). This gap is even more pronounced when associated with Topic Trends (Figure X) which is now dominated by implementative issues.

Theoretical saturation in the mainstream literature requires researchers to explore new, more dynamic variables. In addition, there is an opportunity to be able to bridge the fragmentation between *market-based* and policy-based

approaches. Given that the results of *the co-occurrence* mapping (Figure 2) show that these two mainstreams develop in parallel but separately, future research agendas need to explore how macroregulatory interventions moderate the relationship between ESG and microfinance performance. As empirical findings that macropolicy interventions serve as catalysts for green innovation (Tan & Zhu, 2022). This has a direct transmission impact on improving ESG behavior at the company level (Xu et al., 2023).

In addition, research can be directed at topics that address geographic concentration bias. Based on the mapping of *Country Production* (Table 7) and *Most Relevant Affiliations* (Table 8), the current literature is heavily dominated by China (378 articles) and its academic institutions. This risks creating biased theoretical generalizations in the context of China's *state-led economy*. This hegemony is further confirmed through an analysis of the 10 articles with the highest citations (Table X), in which the majority of empirical studies are most influential (Deng et al., 2023; Tan & Zhu, 2022; Wang et al., 2023; Xu et al., 2023) exclusively used a sample of Chinese companies and focused on China-specific instruments such as *Green Finance Pilot Zones* or *SynTao Green Finance* ratings.

These conditions may not be entirely relevant for other developing countries that have more fragmented market structures or different institutional capacities. Therefore, future research will need to re-examine the validity of China's green policy model in a comparative context with objects other than China and its partners, as seen in Table 8. Research opportunities on systematic integration of advanced issues such as *greenwashing* and *fintech* in emerging countries are also still very open to be disclosed more comprehensively (Macchiavello & Siri, 2022; Starks, 2023; D. Zhang, 2023).

Although bibliometric studies on *Green Finance* and ESG have grown rapidly in the last two years, the majority of these studies tend to be thematic-descriptive or partial in looking at the scientific structure. For example, (Kaur & Negi, 2025) provides a comprehensive mapping of *inclusive green finance* with an emphasis on the digital economy, but their analysis focuses more on identifying positive topic trends without delving into the *citation anomalies* or publication saturation that occur in the mainstream literature.

On the other hand, specific studies such as (Sang, 2024) map the evolution of *green finance* in general and highlight the growth in publication volume as an indicator of research progress, but have not criticized in depth the potential for *geographic bias* due to the dominance of one particular country. Meanwhile, (Sang, 2024) tends to be fixated on testing the literature on the linear relationship between ESG practices and firm's *financial performance* alone.

This research fills this gap by offering three main novelties that have not been discussed by the studies above. First, this study reveals the phenomenon of 'publication inflation' through citation *age effect analysis*. Second, in contrast to the descriptive approach, this study criticizes the literary hegemony of China as a challenge to generalize theories for developing countries (*Global South*). Third, this study proposes a policy-market *integration framework* to bridge structural fragmentation that is neglected by single-focus studies.

5. Conclusion

The results of this study show that the literature on ESG and green finance experienced very rapid growth during the period 2020–2025, marking the consolidation of this field as one of the mainstream in global financial and sustainability studies. The significant increase in the number of publications reflects increasing academic and policy attention to sustainability issues, especially post-pandemic and as the energy transition agenda strengthens. Nevertheless, this quantitative growth is not fully followed by a balanced increase in scientific impact. Citation analysis shows the citation *age effect*, which is a tendency to decrease the average citation in the latest publication due to an explosion in publication volume, which indicates the phenomenon of *publication inflation* in the ESG and green finance literature.

The thematic evolution shows a shift from normative and conceptual approaches to more empirical, measurable, and performance-oriented studies, especially related to ESG performance and green financial instruments. In addition, network analysis reveals that there are two main streams of research, namely market-based approaches and policy-based approaches, which are developing in parallel but are not yet fully integrated.

In addition, spatial analysis and global collaboration show a strong concentration of knowledge production in certain countries, especially China as well as some developed countries in Europe. This dominance reflects institutional strength, policy support, and high research capacity, but at the same time creates geographical inequalities in knowledge production. As a result, developed narratives and theoretical frameworks tend to reflect the economic and regulatory contexts of developed countries, while the dynamics of developing countries are relatively underrepresented.

Theoretically, the findings of this study suggest that the ESG and green finance literature has progressed towards a phase of conceptual maturity, but is still fragmented between market-based approaches and policy-based approaches. This fragmentation indicates the need for a more integrative conceptual framework to explain how the interactions between public policy, financial institutions, and market behavior shape overall sustainability performance. From a practical perspective, the results of the study confirm that the effectiveness of ESG implementation does not only depend on formal regulations, but also on market mechanisms, governance quality, and institutional capacity of each country. Thus, the formulation of public policies and sustainable investment strategies needs to consider the linkages between regulations, market incentives, and national structural contexts so that their implementation is more adaptive and has a real impact.

6. Research Weaknesses & Further Research Directions

Although this study makes an important contribution in comprehensively mapping the development of the ESG and green finance literature, there are several limitations that need to be examined. First, the study relied entirely on the Scopus database and included only English-language publications, thus potentially ignoring academic contributions from relevant regional or non-English-language journals.

These limitations can lead to geographical representation bias and narrow the scope of global perspectives, particularly from developing countries.

Second, the bibliometric approach used is descriptive and structural, so it has not been able to capture the causal dynamics and depth of the substance of the relationship between ESG, green finance, and economic performance. This analysis has not delved in depth into how policy mechanisms, institutions, and the behavior of economic actors interact in real practice. In addition, the dominance of research from certain countries—especially China and developed countries in Europe—shows a geographical imbalance that has the potential to limit the generalization of findings globally.

Based on these limitations, further research is recommended to expand the scope of the data by integrating various international databases and incorporating qualitative approaches or mixed-methods to capture contextual dynamics that are not reached by bibliometric analysis alone. In addition, future research needs to place more emphasis on exploring the context of developing countries, especially related to policy effectiveness, institutional capacity, and the role of financial innovations such as green fintech and sustainable finance mechanisms. A cross-disciplinary approach that links economic, public policy, and environmental sustainability aspects is expected to enrich theoretical understanding while making a practical contribution to more inclusive and adaptive policy formulation.

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