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# From metrics to strategy: A two-decade bibliometric analysis of ESG integration in corporate finance

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## Abstract

This study aims to systematically explore the development of Environmental, Social, and Governance (ESG) integration in corporate finance over the past two decades, addressing gaps in thematic coherence, geographic representation, and strategic alignment. The study employs bibliometric analysis on 633 peer-reviewed ESG-related publications indexed in the Web of Science (2004–2024). It utilizes VOSviewer and Biblioshiny to conduct citation analysis, co-authorship network mapping, and keyword co-occurrence analysis. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework was applied to ensure transparency in data selection. The results reveal four distinct phases of ESG evolution: foundational ethics (2004–2013), strategic integration (2014–2018), expansion into performance and governance (2019–2021), and maturity with a focus on resilience and risk management (2022–2024). Key contributors, dominant journals, thematic clusters, and regional disparities were identified. Emerging opportunities include digital transformation, greenwashing detection, and inclusive ESG adoption in developing markets. ESG has transitioned from a peripheral ethical concern to a strategic framework for corporate financial decision-making. While developed countries lead in scholarly output, emerging markets offer untapped potential for innovation in ESG implementation. The study provides actionable insights for scholars, corporate practitioners, and policymakers to enhance ESG alignment with long-term value creation, transparency, and global sustainability goals. It also proposes future research pathways to address existing geographic and thematic imbalances in ESG literature.

**Keywords:** Bibliometric analysis, corporate governance, ESG integration, sustainable finance, thematic evolution.

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## 1. Introduction

Over the past two decades, Environmental, Social, and Governance (ESG) factors have transitioned from peripheral concerns to fundamental elements of corporate finance and investment strategies. This evolution reflects escalating global challenges, such as climate change, social inequality, and governance failures, alongside growing recognition of ESG's financial and reputational benefits. As ESG increasingly shapes financial decision-making, it has become a critical framework for managing risks, fostering resilience, and driving long-term value creation [1-4].

Despite the expanding body of ESG-related research, the field remains fragmented. Existing studies predominantly focus on isolated aspects of ESG, such as environmental metrics or governance mechanisms, without integrating these findings into a cohesive framework for understanding its role in corporate finance [5, 6]. Furthermore, regional disparities exacerbate this fragmentation, as developed markets benefit from robust regulatory frameworks and institutional support. In contrast, emerging markets face challenges such as limited ESG data and lower stakeholder awareness [7, 8]. Additionally, there is limited exploration of how ESG research themes have evolved over time, hindering the identification of emerging opportunities and interdisciplinary collaborations that could advance the field.

To address these challenges, this study aims to systematically evaluate ESG research trends, thematic clusters, and their temporal evolution through bibliometric analysis. The research is based on data retrieved from the Web of Science (WoS) database, encompassing 633 ESG-related publications spanning 2004 to 2024. Bibliometric analysis is conducted using R Studio and VOSviewer to perform citation analysis, co-authorship network mapping, and keyword co-occurrence analysis [9]. These tools facilitate a detailed and reproducible examination of the intellectual structure and thematic evolution of ESG research. The study identifies dominant contributors, highlights key themes, and uncovers underexplored opportunities, such as the integration of innovative technologies like artificial intelligence and blockchain. These findings provide a foundation for advancing ESG integration and offer actionable insights for both academia and industry.

The structure of this paper is as follows: Section 2 reviews the theoretical foundations and research gaps in ESG finance, identifying key areas for further exploration. Section 3 describes the bibliometric methodology and analytical techniques employed in this study. Section 4 presents the results, structured around four research questions, covering research trends, thematic clusters, thematic evolution, and emerging opportunities. Section 5 provides a combined conclusion and discussion, summarizing the key findings, discussing their implications for academia, industry, and policy, and proposing directions for future research while acknowledging the study's limitations.

## 2. Literature Review

### *2.1. The Evolution of ESG Integration in Corporate Finance*

Initially rooted in Corporate Social Responsibility (CSR), ESG practices have evolved to address pressing global challenges such as climate change, social inequality, and governance failures. This shift reflects the increasing recognition of ESG as a tool for risk management, long-term value creation, and alignment with global sustainability initiatives like the United Nations Sustainable Development Goals (SDGs) [10-12]. The importance of ESG lies in its dual role as a performance metric and a strategic driver. While early efforts primarily focused on reporting and compliance, contemporary ESG practices emphasize strategic implementation, enabling firms to enhance resilience, stakeholder trust, and innovation [13, 14]. This evolution highlights ESG's pivotal role in shaping corporate decision-making and financial performance. Despite significant progress, challenges such as regional disparities, greenwashing, and limited data availability persist [15, 16]. These barriers underscore the need for further research, particularly in understanding thematic trends, key contributors, and emerging opportunities in ESG finance.

### *2.2. Theoretical Foundations for ESG Integration*

The integration of ESG into corporate finance is supported by interconnected theoretical frameworks that provide valuable insights into its mechanisms and implications. A comprehensive understanding of ESG requires examining these frameworks collectively to address the complexities of sustainable finance effectively.

Stakeholder Theory highlights the need to balance diverse stakeholder interests, fostering trust and corporate legitimacy that drives long-term financial performance [17-19]. However, competing demands often create tensions, particularly in resource-constrained contexts where trade-offs between financial goals and sustainability arise. Dynamic Capabilities Theory emphasizes the importance of adaptive organizational capabilities to meet evolving stakeholder expectations and address environmental uncertainties [20]. Firms that leverage these capabilities can align ESG priorities with financial goals, enhancing competitiveness and mitigating risks [21, 22]. The Triple Bottom Line Framework integrates economic, social, and environmental dimensions, aligning corporate objectives with global sustainability initiatives like the SDGs [23, 24]. However, its effectiveness often depends on supportive institutional environments. Integrating this framework with Dynamic Capabilities Theory enables firms to innovate and collaborate, overcoming systemic constraints in emerging markets [25]. Institutional Theory examines how regulatory frameworks and cultural norms shape ESG adoption [26]. While stringent regulations drive ESG practices in developed markets, weaker institutional support in emerging markets creates disparities [27]. Cross-border investor activism and global reporting standards offer opportunities to standardize ESG practices [28].

By synthesizing these perspectives, this study underscores the interplay between internal capabilities and external pressures in advancing ESG integration. This approach provides a foundation for addressing research gaps and promoting ESG adoption across diverse contexts.

## 3. Methodology

The bibliometric methodology adopted in this study addresses critical gaps in ESG research by systematically mapping its evolution in corporate finance. Through the integration of advanced analytical tools and visualization techniques, the study identifies dominant contributors, prevailing themes, and thematic shifts, providing actionable insights to guide future research. Unlike traditional narrative reviews, bibliometric methods enable a quantitative, reproducible, and comprehensive analysis of vast academic datasets, offering a global perspective on ESG's development and fostering interdisciplinary linkages [29].

### *3.1. Bibliometric Analysis*

Bibliometric analysis was selected as the primary methodology for its ability to objectively evaluate large volumes of academic literature and capture longitudinal research trends. By leveraging bibliometric tools such as VOSviewer and Biblioshiny (an R-based application within the bibliometrix package), this study systematically examines the intellectual structure of ESG research [30, 31]. Citation analysis identifies influential authors, institutions, and journals, while co-authorship network mapping explores collaboration patterns. Keyword co-occurrence analysis uncovers prevailing themes, and temporal analysis tracks the evolution of ESG focus areas over time. This methodology enhances transparency and reproducibility, offering unique advantages over traditional meta-analyses or qualitative reviews [32, 33].

### *3.2. Research Questions (RQs)*

This study addresses the following research questions:

RQ 1: To what extent has ESG integration in corporate finance been explored, including dominant research trends and key contributors?

RQ 2: What are the prevailing themes in ESG-related research?

RQ 3: How have research themes and focus areas evolved over time?

RQ 4: What emerging research opportunities exist for advancing ESG integration?

These research questions guided the design and analysis process. To address RQ1, publication output, citation trends, and co-citation networks were analyzed to map the intellectual structure of ESG research. By identifying influential authors, institutions, and journals, this analysis provides insights into the global drivers of ESG scholarship. For RQ2, keyword co-occurrence analysis was conducted to identify prevailing themes and categorize them into thematic clusters based on centrality and density, and to identify the dominant topics within ESG research. RQ3 was addressed through temporal analysis, which examined the shifts in research focus across distinct periods. Finally, insights from thematic mapping were employed to explore RQ4, identifying emerging topics and underexplored opportunities in ESG research. Together, these methods provide a systematic framework to address the study's research questions and advance ESG integration in corporate finance, offering actionable insights for academia, policymakers, and industry practitioners.

### *3.3. Bibliographic Database Selection*

Data for this study were retrieved from the Web of Science (WoS) database, chosen for its comprehensive coverage of peer-reviewed academic journals and its inclusion of high-impact sources. Compared to other databases such as Scopus, WoS offers greater reliability and the inclusion of Keywords Plus, facilitating the identification of relevant themes and topics [34]. The dataset was curated using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework to ensure a systematic and transparent selection process [35].

The search query included ESG-related terms such as "Environmental, Social, and Governance," "sustainable finance," "socially responsible investing," "ethical investing," and "green investing." Articles were limited to English-language, peer-reviewed journal publications from January 2004 to March 1, 2024. Exclusions included books, conference proceedings, and early-access publications to maintain focus on high-impact contributions. After duplicate removal and relevance filtering, a final dataset of 633 articles was produced. Figure 1 illustrates the PRISMA-based workflow used to refine the dataset, ensuring consistency and reproducibility.

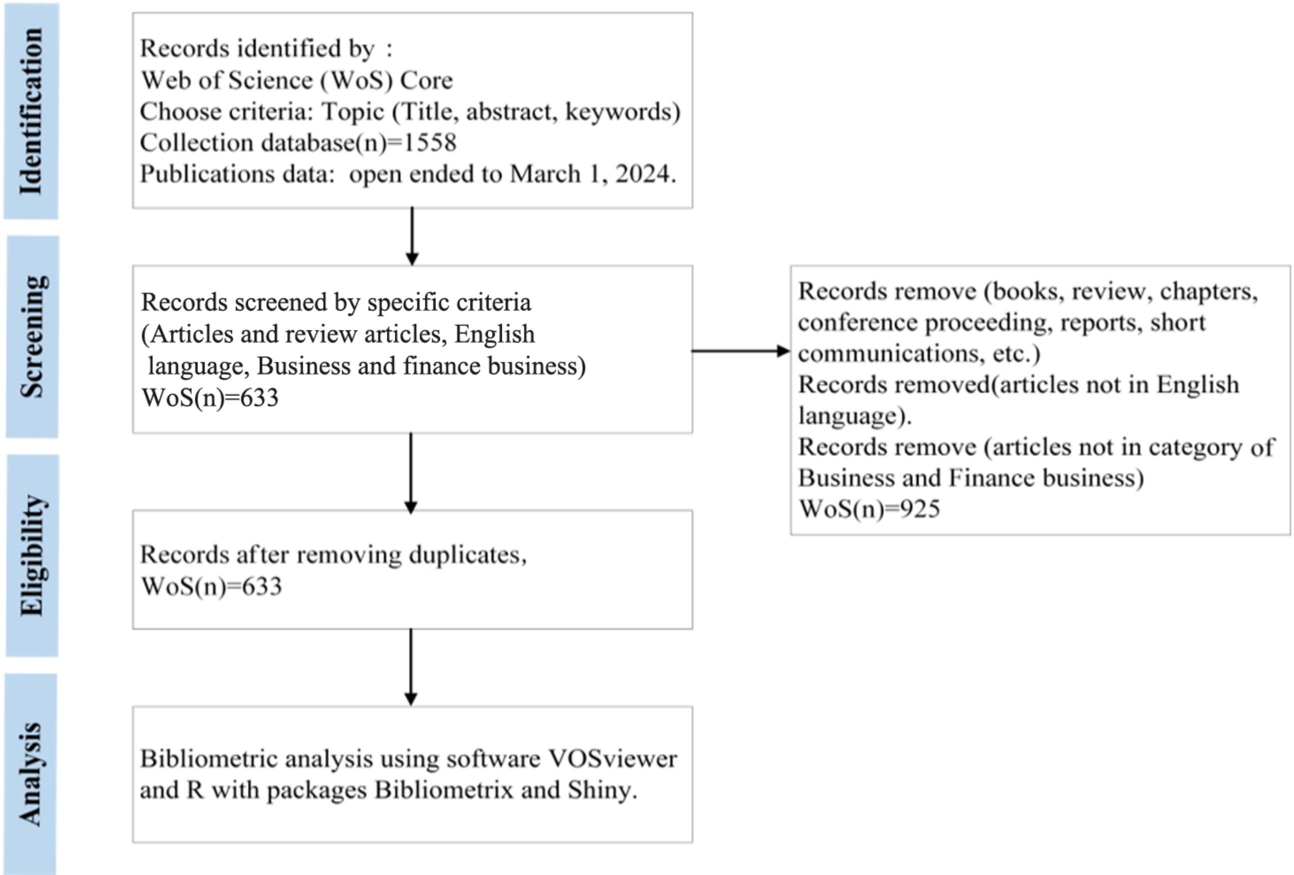


**Figure 1.**
Flow diagram using the PRISMA method.

## 4. Results

*4.1. Research Trends and Key Contributors in ESG Finance Research (RQ1)*

*4.1.1. Publications Output*

The bibliometric analysis included 633 documents published across 179 sources between 2004 and 2024 (Table 1). With an annual growth rate of 22.82%, ESG research in corporate finance demonstrates increasing scholarly attention. On average, each document received 22.92 citations, reflecting significant academic influence. The dataset featured contributions from 1,454 authors, with an average of 2.68 authors per document, underscoring a collaborative research environment. International co-authorship accounted for 32.54% of publications, highlighting the global scope and cross-border relevance of ESG research. The analysis identified 1,647 unique author keywords and 954 Keywords Plus terms, showcasing a diverse research landscape, reflecting the growing integration of ESG considerations into corporate financial strategies, and emphasizing the increasing strategic importance of ESG factors.

**Table 1.**
Summary of Results After Combining Datasets from WoS.

| Description | Results |
|---|---|
| Timespan (Year) | 2004:2024 |
| Sources (Journals, Books, etc) | 179 |
| Documents | 633 |
| Annual Growth Rate % | 22.82 |
| Average citations per doc | 22.92 |
| Document Average Age | 2.65 |
| References | 28,024 |
| Document Content | |
| Keywords Plus | 954 |
| Author's Keywords | 1647 |
| Authors | |
| Authors | 1454 |
| Authors of single-authored docs | 91 |
| Single-authored docs | 104 |
| Co-Authors per document | 2.68 |
| International co-authorships % | 32.54 |
| articles | 190 |

*4.2. Number of Publications and Citations Per Year*

The seminal ESG-finance study, Sustainable Corporate Finance by Soppe [36], marked the introduction of ESG principles into corporate finance discourse, as published in the Journal of Business Ethics [36]. Figure 2 illustrates the growth trajectory of ESG research between 2004 and 2024. The field witnessed gradual growth after limited activity until 2011, accelerating significantly post-2018. This surge aligns with heightened global attention to sustainability, influenced by initiatives like the UN Sustainable Development Goals and evolving regulatory frameworks. The publication peak in 2023, with 218 studies, contrasts with a drop to 61 in early 2024, suggesting potential saturation in some areas or a shift toward applied research. This trend underscores the importance of analyzing ESG's financial implications, risk mitigation, and strategic integration, affirming its central theme in financial decision-making and academic inquiry.

*4.3. Sankey Diagrams: Three-Field Plots on Authors-Keywords-Sources*

Figure 3 presents a Sankey diagram visualizing the interconnections among authors (AU), keywords (DE), and publication sources (SO) in ESG finance research. The left-hand nodes represent frequently contributing authors, the central nodes highlight key topics, and the right-hand nodes identify major publication outlets. The width of the flows reflects the strength of relationships, with larger flows indicating stronger connections or higher co-occurrence frequencies between elements. To enhance clarity, the diagram includes the following details:

*Node Size:* The size of the nodes represents the relative frequency of each element. For example, larger nodes for keywords such as "ESG" or "sustainable finance" indicate their higher occurrence in the dataset.

*Flow Width:* The width of the connecting flows illustrates the degree of association between elements. For instance, the strong flow between "ESG" and Business Strategy and the Environment indicates a high concentration of studies focused on ESG themes published in this journal.

*Color Coding:* Different colors are used to distinguish nodes across the three fields. Authors (left) are marked in red, keywords (center) in orange and green, and publication sources (right) in blue. The diagram highlights dominant themes such as "ESG," "sustainable finance," and "financial performance," aligning with this study's objective of mapping ESG research trends in corporate finance. Key overlaps, such as the connection between "corporate social responsibility" and "corporate governance," underscore the interdisciplinary nature of ESG research. Notable authors, including Chiappini and Zwergel [37], are shown to have contributed extensively to these themes, often published in leading journals like the *Journal of Sustainable Finance & Investment and the Journal of Business Ethics*. The Sankey plot also reveals evolving thematic priorities. The increasing prominence of terms like "sustainable finance" reflects ESG's transition from a compliance framework to a strategic imperative in finance and governance.

*4.4. Distribution by Critical Countries*

Table 2 provides a comprehensive overview of ESG research contributions by country, highlighting both publication output (TP: Total Publications) and citation impact (TC: Total Citations; AC: Average Citations per article). The results reveal interesting geographic patterns in ESG research. Italy leads in publication volume with 160 articles (24.13%), reflecting its academic focus on ESG topics. Conversely, the United States demonstrates unparalleled research influence, with 2,526 citations and an average of 42.8 citations per article, underscoring its leadership in shaping ESG discourse. Other significant contributors include the UK and Germany, which combine substantial output with impactful research. Australia maintains a balanced profile, with 71 publications and 1,069 citations. Notably, countries like Japan and Lebanon achieve exceptionally high average citations (82.8 and 63.5, respectively), highlighting the quality of their contributions despite fewer publications. In contrast, China's considerable output (124 articles) signals its growing commitment to ESG research, though its lower average citation count (16.7) highlights opportunities for broader global engagement and collaboration. These findings illustrate the geographic diversity of ESG research, driven by varying regulatory, cultural, and academic contexts. They also underscore the collaborative nature of sustainable finance research, with countries contributing unique strengths to the global discourse.

**Table 2.**
Countries with the most published and most influential in research of ESG in finance.

| **Most published countries** | | | **Most impactful countries** | | |
|---|---|---|---|---|---|
| **Country** | **TP** | **Fre (%)** | **Country** | **TC** | **AC** |
| ITALY | 160 | 24.13% | USA | 2526 | 42.8 |
| USA | 132 | 19.91% | UNITED KINGDOM | 1585 | 33 |
| CHINA | 124 | 18.70% | GERMANY | 1439 | 38.9 |
| UK | 118 | 17.80% | AUSTRALIA | 1069 | 30.5 |
| INDIA | 99 | 14.93% | ITALY | 1033 | 14.2 |
| FRANCE | 77 | 11.61% | FRANCE | 952 | 38.1 |
| AUSTRALIA | 71 | 10.71% | CHINA | 752 | 16.7 |
| GERMANY | 60 | 9.05% | INDIA | 439 | 8.8 |
| SPAIN | 60 | 9.05% | JAPAN | 414 | 82.8 |
| MALAYSIA | 48 | 7.24% | CANADA | 382 | 23.9 |

***Note:*** *TP=total publications, TC=total citations, AC=average citations.*

### *4.5. Country-Level Cooperation*

Global academic collaboration is critical in advancing ESG finance research. Figure 4 visualizes the international network of collaborative efforts, highlighting the interconnectedness of nations contributing to ESG studies. The map uses nodes to represent countries and connecting lines to indicate the strength and frequency of collaborations. Darker shades represent regions with higher research output, emphasizing their central roles in shaping global ESG discourse. The United States and the United Kingdom emerged as pivotal hubs, with extensive networks spanning multiple continents. The UK's partnerships with China and Italy illustrate its role in bridging European and Asian research communities, fostering cross-regional integration. Similarly, Australia and New Zealand exhibit strong regional cooperation, reflecting Oceania's consolidated approach to ESG research. Connections between the UK and nations like Malaysia and France highlight the diversity of collaborative efforts, encompassing countries with varying regulatory, economic, and cultural contexts. This map underscores the importance of cross-border partnerships in addressing regional disparities, standardizing ESG frameworks, and fostering shared methodologies.

### *4.6. Distribution by Authors' Productivity*

Table 3 highlights the productivity and influence of leading authors in ESG finance research, balancing publication volume and citation metrics. CHIAPPINI H leads with six publications from 2022, showcasing significant output quickly. Meanwhile, ZWERGEL B and DORFLEITNER G exhibit high impact, with h-indices of 3 and 4, respectively, reflecting consistent quality and academic influence since 2015. Emerging authors such as NASRALLAH N and AL AMOSH H display impressive annual citation rates, with m-indices of 2.0 and 1.333, demonstrating their growing prominence in the field. Early-career researchers like JALAL RNUD and BIRINDELLI G also contribute meaningfully, with strong citation rates despite limited output. This dynamic mix of seasoned and emerging scholars underlines the vibrant and evolving nature of ESG finance research. It highlights the balance between maintaining established expertise and fostering new contributions to drive the field forward.

**Table 3.**
Distributions of the author's productivity.

| **Element** | **NP** | **TC** | **h_index** | **g_index** | **m_index** | **FPY** |
|---|---|---|---|---|---|---|
| CHIAPPINI H | 6 | 21 | 2 | 4 | 0.667 | 2022 |
| ZWERGEL B | 4 | 478 | 3 | 4 | 0.3 | 2015 |
| DORFLEITNER | 4 | 375 | 4 | 4 | 0.4 | 2015 |
| NIRINO N | 4 | 186 | 3 | 4 | 0.75 | 2021 |
| HUSSAINEY K | 4 | 140 | 3 | 4 | 1 | 2022 |
| CHOUAIBI J | 4 | 125 | 2 | 4 | 0.5 | 2021 |
| UTZ S | 4 | 92 | 4 | 4 | 0.364 | 2014 |
| NASRALLAH | 4 | 73 | 4 | 4 | 2 | 2023 |
| AL AMOSH H | 4 | 58 | 4 | 4 | 1.333 | 2022 |
| KHATIB SFA | 4 | 58 | 4 | 4 | 1.333 | 2022 |

**Note:** *NP-Number of publications, TC-Total Citations, TC/N- Total Citations per publications, FPY-First publication Year.

*4.7. Co-Citations Analysis of Authors*

Figure 5 illustrates the co-citation network in ESG finance research, generated using VOSviewer. This visualization identifies 18 highly influential authors with over 100 citations, grouped into two distinct thematic clusters that represent the interdisciplinary nature of ESG research. The nodes in the network represent individual authors, with node size corresponding to the total number of citations each author has received. Larger nodes. The connections between nodes represent co-citation relationships, with thicker lines indicating stronger co-citation frequency—the distinct color-coding highlights thematic clustering.

The red cluster, led by Orlitzky, M. (177 citations), focuses on corporate social responsibility (CSR) and ethical investment. This cluster emphasizes the social and governance dimensions of ESG, reflecting the integration of stakeholder engagement and corporate governance into broader ESG frameworks. Key contributors include Freeman, who developed Stakeholder Theory, and Porter et al., whose work highlights the role of corporate strategy in addressing societal challenges. Authors in this cluster often explore how ethical considerations influence firm performance, stakeholder trust, and legitimacy, providing a foundation for CSR-focused ESG integration. In contrast, the green cluster, centered on Fama, E.F. (199 citations), highlights the application of classical financial theories to ESG integration. This cluster focuses on risk management, financial performance, and investment strategies. Notable authors such as Ferrell et al. [38] explore how sustainability considerations reshape traditional financial metrics, linking ESG practices to risk mitigation, cost of capital, and long-term value creation. For example, Eccles investigates the impact of ESG disclosure on investor behavior, while Flammer examines the financial implications of green bonds and corporate sustainability initiatives. This cluster underscores the practical integration of ESG into financial decision-making frameworks. This co-citation network reveals the intellectual structure of ESG finance research, bridging ethical and financial paradigms. By demonstrating the interplay between these perspectives, the network offers valuable insights into how ESG enriches traditional financial theories and informs interdisciplinary collaboration.

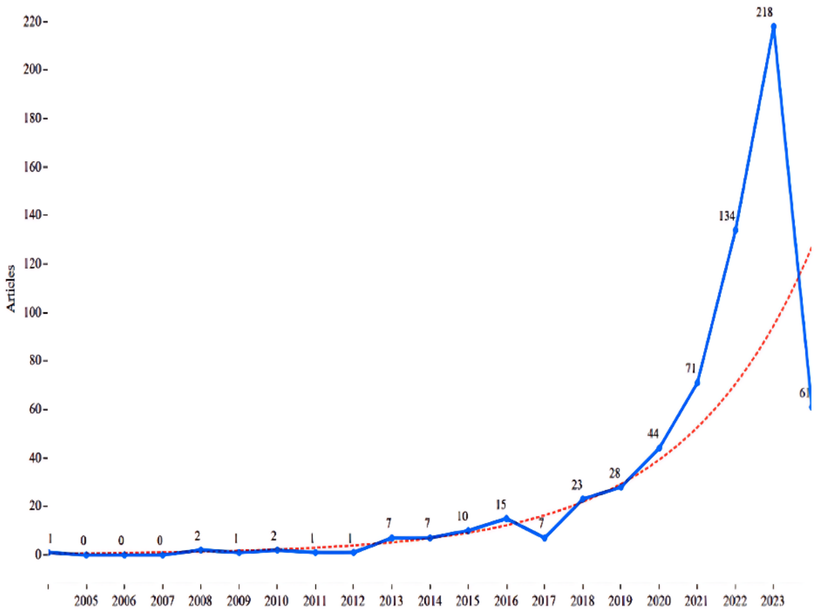


**Figure 2.**
Trend of publications in the research of ESG in finance.

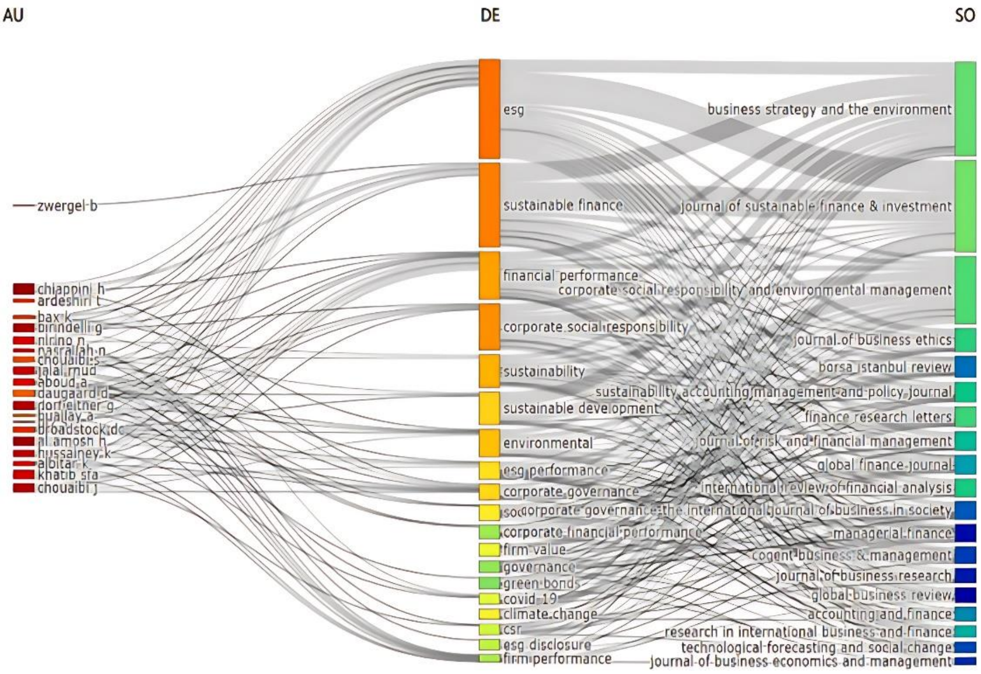


**Figure 3.**
Threefold diagrams or Sankey diagrams.

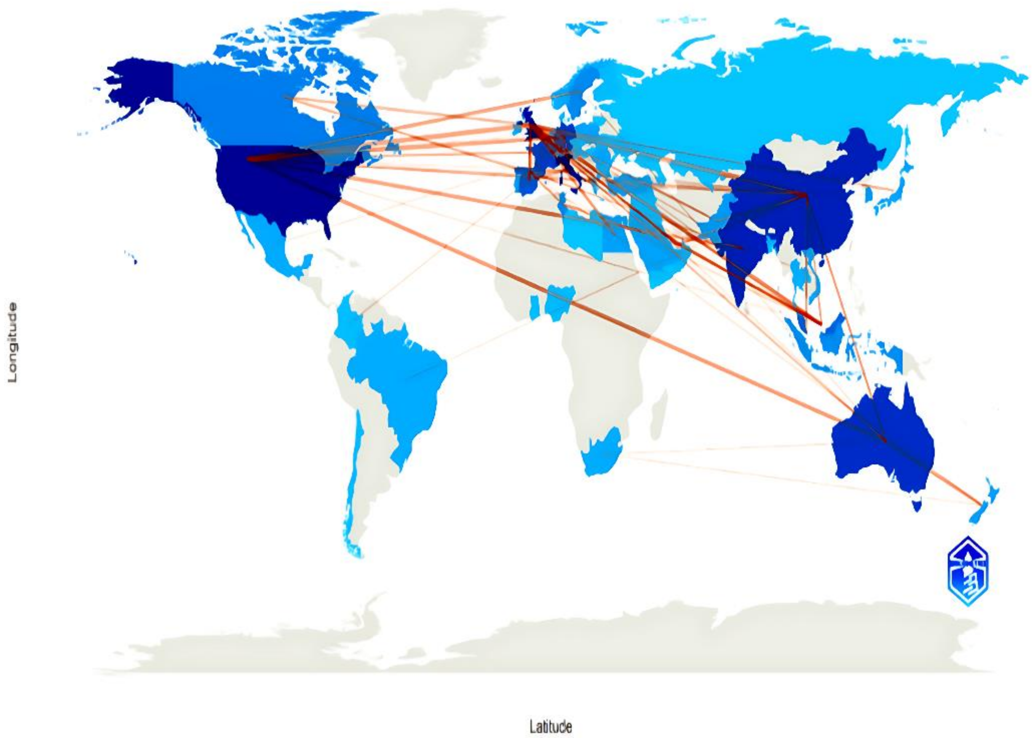


**Figure 4.**
Global geographical distribution of papers and collaboration patterns.

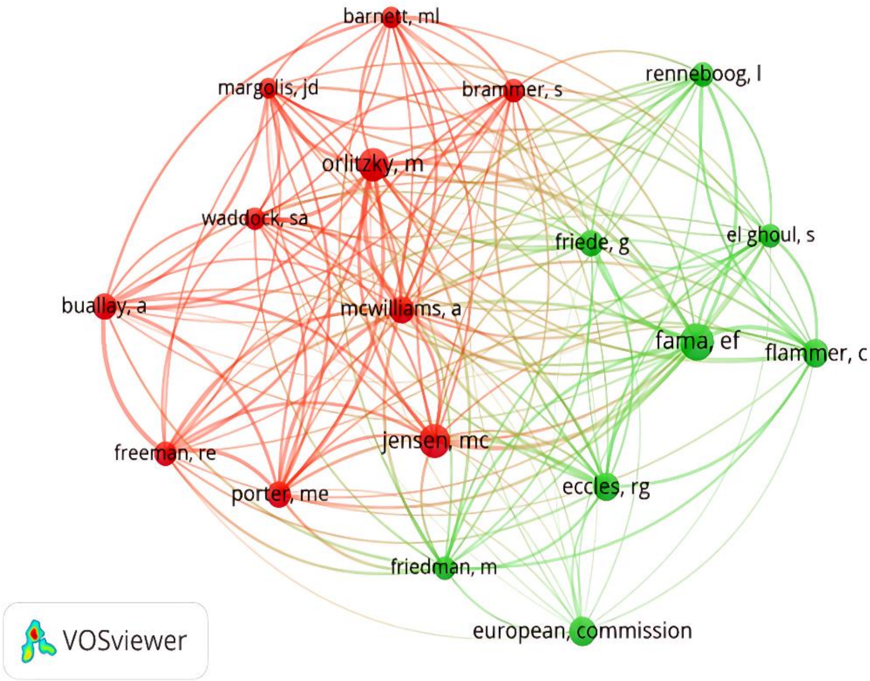


**Figure 5.**
Visualizations, authors, and co-citations.

### *4.8. Distribution by Impactful Journals*

Table 4 identifies the top 10 journals driving ESG finance research, which account for 43% of the 633 publications and 8,084 total citations. The Journal of Sustainable Finance & Investment leads with 49 publications since 2018, signaling its rapid growth and relevance in ESG scholarship. Business Strategy and the Environment boasts the highest citation count (1,704) and an h-index of 20, reflecting its substantial academic influence. The Journal of Business Ethics, a foundational publication since 2004, has amassed 1,592 citations, underscoring its long-standing role in shaping ESG discourse. Newer journals, such as Finance Research Letters (2020) and Technological Forecasting and Social Change (2021), exhibit high m-indices, reflecting strong annual citation rates and emerging influence despite shorter publication histories. These journals significantly shape ESG finance by fostering theoretical advancements and practical applications. Their collective impact emphasizes the critical role of academic publishing in promoting sustainable finance, offering a platform for interdisciplinary research and policy-relevant insights.

**Table 4.**
Top 10 Most Influential Journals.

| Article | TC | TP | h_index | g_index | TN (%) | FPY |
|---|---|---|---|---|---|---|
| Journal of sustainable finance & investment | 824 | 9 | 16 | 27 | 7.74 | 2018 |
| Business strategy and the environment | 1704 | 1 | 20 | 41 | 6.48 | 2014 |
| Corporate social responsibility and environment management | 599 | 1 | 12 | 24 | 6.48 | 2019 |
| Journal of Business Ethics | 1592 | 9 | 15 | 19 | 3.00 | 2004 |
| Finance research letters | 357 | 9 | 9 | 8 | 3.00 | 2020 |
| Sustainability accounting management, and policy journal | 415 | 4 | 7 | 4 | 2.21 | 2015 |
| International review of financial analysis | 157 | 4 | 5 | 12 | 2.21 | 2016 |
| Journal of risk and financial management | 206 | 2 | 7 | 12 | 1.90 | 2019 |
| Research in international business and finance | 182 | 2 | 5 | 12 | 1.90 | 2019 |
| Global Finance Journal | 549 | 0 | 6 | 10 | 1.58 | 2013 |

**Note:** *NP-Number of publications, TC-Total Citations, FPY-First publication Year, TN (%)- the percentage of the total number of publications.

### *4.9. Prevailing Themes in ESG Finance Research (RQ2)*

#### *4.9.1. Citations Analysis of Journals*

Figure 6, generated using VOSviewer, visualizes the most influential citation sources in ESG finance research, offering insights into the intellectual foundations of the field. Among 179 sources analyzed, 18 exceed the threshold of eight citations, categorizing them as central to shaping ESG discourse. The network comprises three primary clusters:

The red cluster, anchored by the Journal of Business Ethics with 19 articles and 1,592 citations, underscores the journal's pivotal role in bridging ethical principles and corporate finance. This cluster reflects how ESG themes, particularly corporate governance and social responsibility, have been rooted in ethical considerations. The green cluster, centered on Business Strategy and the Environment, includes 41 articles and 1,704 citations, highlighting its influence in aligning ESG principles with strategic decision-making. This cluster emphasizes the operationalization of sustainability goals within financial frameworks. The blue cluster, led by the Borsa Istanbul Review, comprises nine articles and 131 citations. Although smaller, this cluster demonstrates a strong regional focus, contributing localized insights into ESG integration, particularly in emerging markets. This visualization highlights the balance between globally impactful journals that set broad research agendas and regionally focused sources that address localized ESG challenges. The network reinforces the role of academic publications in advancing ESG research, offering a roadmap for future interdisciplinary collaborations and practical applications.

### *4.10. Analysis of Highly Cited Publications*

Table 5 presents the top 10 most-cited publications in ESG finance research, collectively accounting for 2,049 citations, representing 20% of total citations. These works provide a critical foundation for understanding ESG's impact on corporate finance, particularly in areas such as corporate valuation, risk management, and governance. Fatemi et al. [39] and Flammer [40] represent pivotal studies on ESG disclosure and corporate green bonds, respectively, illustrating the financial value of sustainability initiatives [39, 40]. Other works, such as Li et al. [41] and Xie et al. [42] explore ESG's influence on CEO power dynamics and corporate financial performance, offering empirical evidence that links ESG strategies to value creation [41, 42]. Collectively, these publications reveal a strong emphasis on ESG's role in aligning corporate governance with long-term stakeholder value. These highly cited studies underscore key themes in ESG finance research: the importance of transparency in ESG disclosure, the financial implications of green finance, and the complexities of ESG rating systems. By identifying these foundational contributions, the analysis highlights the empirical evidence shaping both academic inquiry and practical approaches to sustainable finance.

### *4.11. Network Analysis of Authors' Keywords*

Figure 7 provides a visual representation of the co-occurrence network of authors' keywords in ESG finance research from 2004 to 2024, highlighting the thematic diversity and interconnectedness of the field. In the visualization, the size of each node represents the frequency of the corresponding keyword in the dataset, with larger nodes (e.g., "ESG," "sustainable finance") indicating higher prominence.

The color of each node reflects the thematic cluster to which it belongs, while the thickness of the connecting lines represents the co-occurrence strength between keywords. For example, strong connections between "sustainable finance" and "climate change" underscore the tight coupling of financial tools with environmental goals.

**Table 5.**
Top 10 most cited publications.

| Title | Authors | Year | Journal | TC | TC/Year |
|---|---|---|---|---|---|
| ESG performance and firm value: The moderating role of disclosure | Fatemi, et al. [39] | 2018 | Global Finance Journal | 90 | 55.71 |
| Corporate green bonds | Flammer [40] | 2021 | Journal of Financial Economics | 89 | 97.25 |
| The impact of environmental, social, and governance disclosure on firm value: The role of CEO power | Li et al. [41] | 2018 | The British Accounting Review, | 38 | 48.29 |
| Do environmental, social, and governance activities improve corporate financial performance? | Xie et al. [42] | 2019 | Business Strategy and the Environment | 19 | 53.17 |
| The influence of firm size on the ESG score: Corporate sustainability ratings under review | Drempetic, et al. [43] | 2020 | Journal of Business Ethics | 18 | 63.6 |
| Environmental, social, and governance (ESG) scores and financial performance of multilatinas: Moderating effects of geographic international diversification and financial slack. | Duque-Grisales and Aguilera-Caracuel [44] | 2021 | Journal of Business Ethics | 92 | 73 |
| Do ESG controversies matter for firm value? Evidence from international data | Aouadi and Marsat [45] | 2018 | Journal of Business Ethics | 69 | 38.43 |
| Corporate social responsibility, firm value, and influential institutional ownership | Buchanan, et al. [46] | 2018 | Journal of Corporate Finance | 12 | 30.29 |
| Environmental responsibility and firm performance: The application of an environmental, social and governance model | Lee et al. [47] | 2016 | Business Strategy and the Environment | 89 | 21 |
| ESG practices and the cost of debt: Evidence from EU countries | Eliwa et al. [48] | 2021 | Critical Perspectives on Accounting | 88 | 47 |

This analysis identifies five key clusters, each representing a distinct dimension of ESG integration within financial research. The red cluster, centered on keywords such as "sustainable finance," "climate change," and "green bonds," emphasizes the role of financial mechanisms in achieving environmental sustainability. This cluster also includes "greenwashing," reflecting ongoing concerns about superficial ESG practices and the need for more genuine integration of ESG principles. These themes highlight the critical role of green finance in combating climate challenges while addressing potential pitfalls in ESG implementation. The green cluster features terms such as "COVID-19," "ESG disclosure," and "corporate governance," illustrating how ESG is operationalized within corporate strategies. This cluster underscores ESG’s transition from a compliance measure to a strategic governance framework, emphasizing the importance of transparency and adaptability, particularly during global disruptions such as the pandemic.

The blue cluster focuses on methodological and analytical approaches, with keywords like "bibliometric analysis," "CSR," and "sustainable development." This cluster reflects the study’s methodological foundation, showcasing the role of quantitative tools and bibliometric methods in evaluating ESG’s contribution to financial research. It also bridges ESG themes with broader sustainable development goals. The yellow cluster emphasizes ESG’s impact on financial performance, featuring terms like "corporate financial performance," "stakeholder theory," and "risk management." These terms highlight how ESG practices improve profitability and organizational resilience, aligning with the study’s focus on the financial implications of ESG integration. The purple cluster represents the foundational ESG components, including "environmental," "social," and "governance," which address evolving societal expectations and regulatory pressures. This cluster reflects the core ESG dimensions and their interconnected roles in shaping sustainable corporate practices. Visually mapping these interconnected themes reveals ESG’s evolution from a compliance-focused tool to a core strategic framework within corporate finance.

### *4.12. Thematic Evolution in ESG Research (RQ3)*

#### *4.12.1. Thematic Map of Authors' Keywords*

Figure 8 provides a thematic map categorizing ESG finance research topics into four quadrants based on relevance (centrality) and development (density). This structured framework evaluates the evolution and maturity of ESG-related themes and identifies influential and specialized research areas in corporate finance.

The Motor Themes quadrant (upper right) includes topics that are both highly relevant and well-developed, such as "integrated reporting," "legitimacy theory," and "business ethics." These themes have become central drivers of ESG integration, reflecting the institutionalization of ESG principles through practices like advanced reporting, alignment with ethical standards, and compliance with regulatory frameworks. The Basic Themes quadrant (lower right) contains foundational and widely studied topics, including "CSR," "sustainable development," "firm value," and "financial performance." These themes serve as the established pillars of ESG finance research, emphasizing the tangible impact of ESG practices on corporate performance.

The Niche Themes quadrant (upper left) features specialized yet less central topics, such as "executive compensation," "institutional ownership," and regional focuses like "India." These themes are well-developed but context-specific, contributing unique insights into governance mechanisms or regional sustainability challenges. Although they are peripheral to the mainstream ESG discourse, they offer opportunities for further exploration, particularly in underrepresented geographic or industry contexts. The Emerging or Declining Themes quadrant (lower left) includes topics like "portfolio choice," "digital transformation," and "ESG practices." These themes, while less developed, indicate areas of growing interest or waning relevance. Emerging themes, such as "digital transformation," which integrates advanced technologies with ESG principles, represent potential directions for future exploration, as discussed further in Section 4.4.

By visually categorizing these themes, the thematic map illustrates how ESG-related topics have progressed, highlighting their evolution from foundational constructs to mature, widely studied frameworks. Researchers can leverage these insights to consolidate existing knowledge and refine the strategic role of ESG in corporate finance.

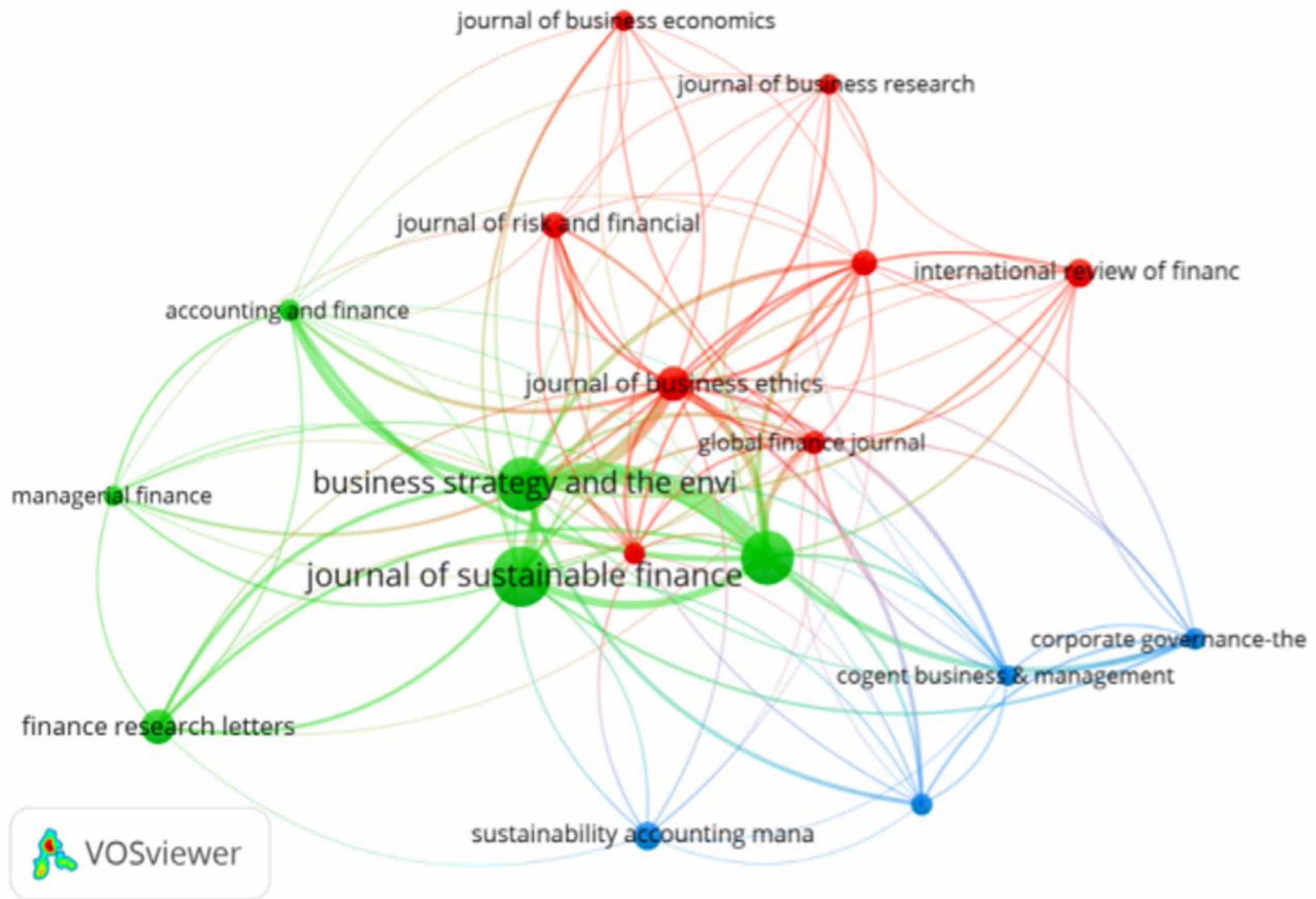


**Figure 6.**
Networking mapping of the most impactful citation sources.

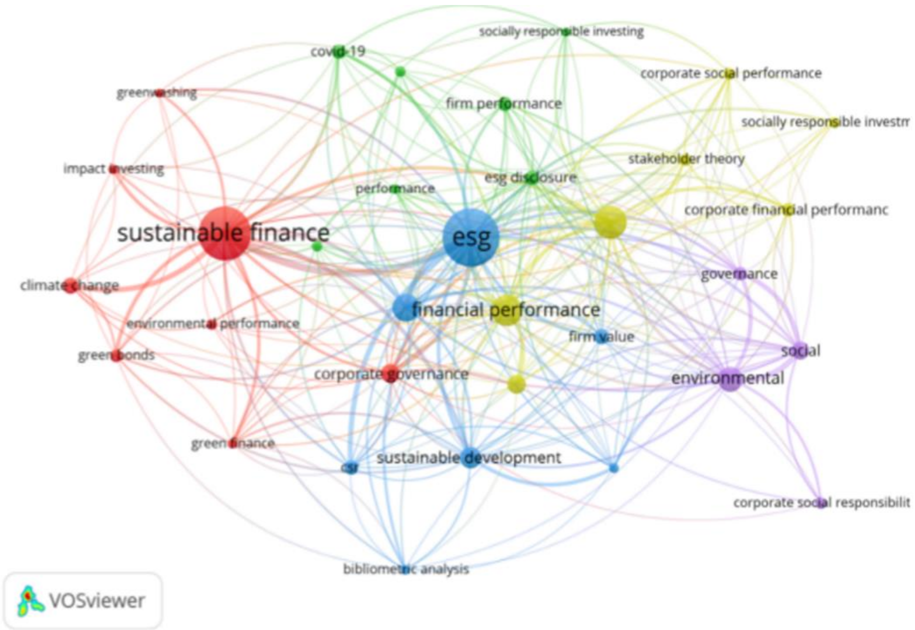


**Figure 7.**
Authors' keywords co-occurrence network visualization.

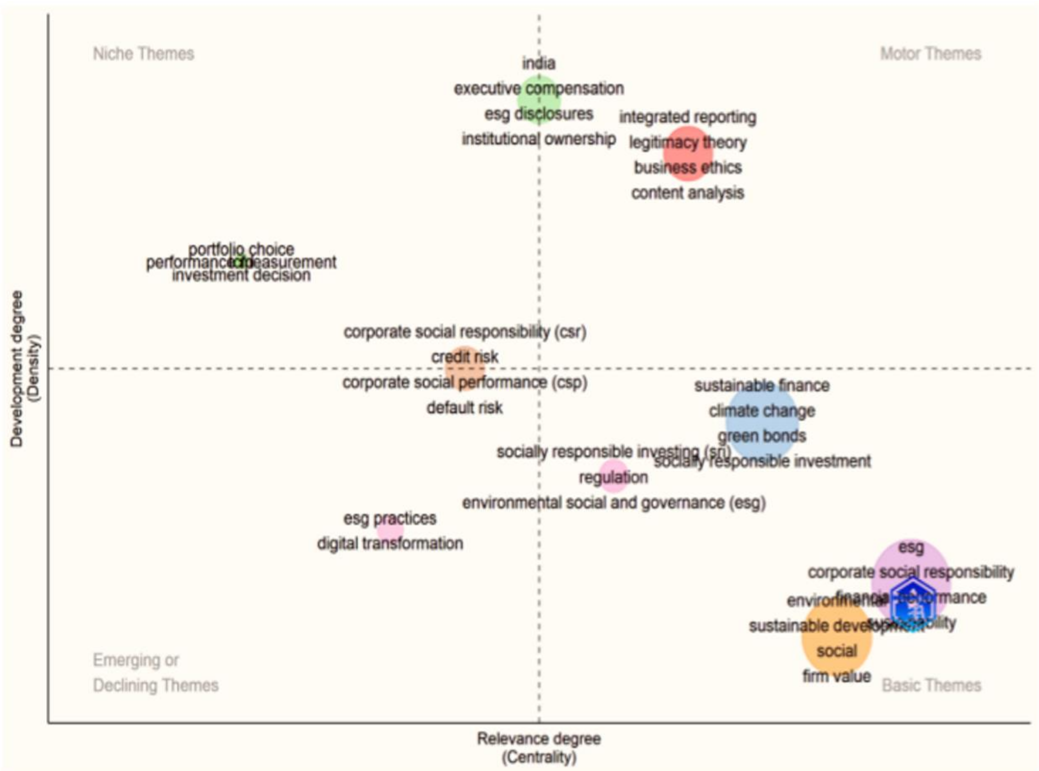


**Figure 8.**
Thematic map.

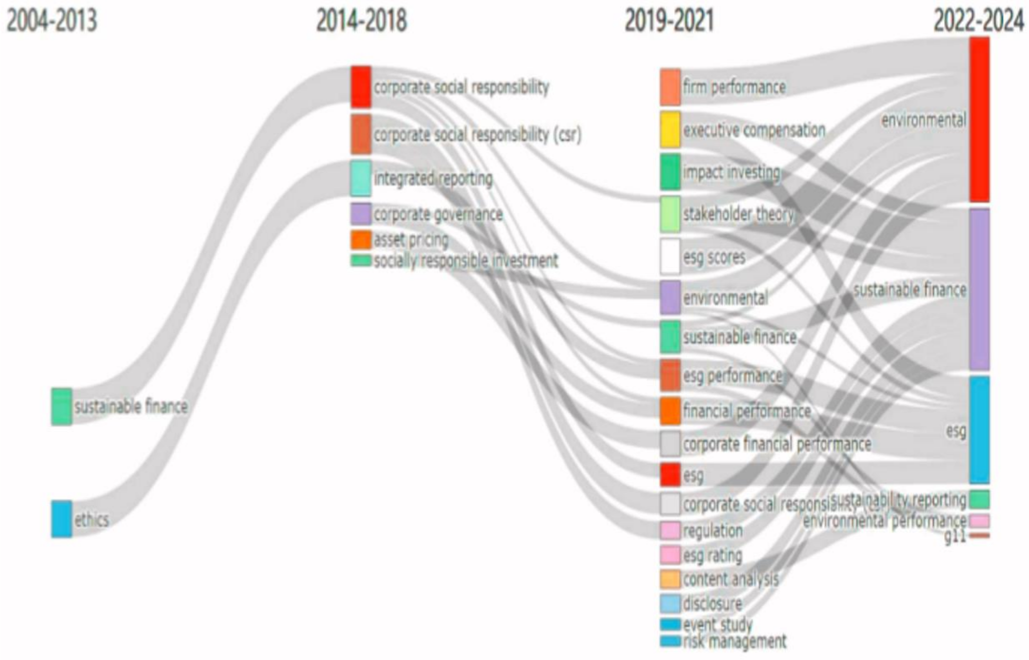


**Figure 9**.
Evaluation of keywords in different periods.

## *4.13. Thematic Evolution*

Figure 9 provides a comprehensive visualization of the thematic evolution in ESG finance research across four distinct periods: Foundation (2004–2013), Strategic Integration (2014–2018), Expansion (2019–2021), and Maturity (2022–2024). This temporal analysis reflects the dynamic progression of ESG as it transitions from an ethical construct to a central framework within corporate finance.

The Foundation Phase (2004–2013) is characterized by themes such as "sustainable finance" and "ethics," marking the early incorporation of ethical considerations into financial research. These themes underscore the initial attempts to bridge sustainability and finance, laying the theoretical groundwork for the future integration of ESG into corporate strategies. During this period, ESG research was largely exploratory, focused on conceptualizing the role of ethical and sustainable practices in finance. The Strategic Integration Phase (2014–2018) highlights a shift toward governance and accountability. Dominant themes, including "CSR," "corporate governance," and "integrated reporting," demonstrate how ESG began influencing organizational structures and decision-making. This phase reflects increased regulatory and stakeholder pressure to formalize ESG principles within corporate governance frameworks, establishing ESG as a critical element of corporate accountability. The Expansion Phase (2019–2021) signals ESG's growing relevance to financial outcomes, with key themes such as "firm performance," "impact investing," and "ESG performance." During this period, ESG research diversified, moving beyond governance to explore ESG's direct impact on financial performance and strategic investment decisions. These developments highlight ESG’s increasing role in driving financial innovation and risk mitigation strategies. Finally, the Maturity Phase (2022–2024) demonstrates the institutionalization of ESG as a core component of corporate resilience and strategic planning. Themes such as "environmental performance," "sustainability reporting," and "risk management" illustrate ESG’s transition into a sophisticated framework for managing risks and ensuring long-term value creation.

By identifying these key phases and transitions, the analysis highlights how ESG has evolved from a peripheral ethical concern to a fundamental framework informing corporate governance and financial strategy.

## *4.14. Evolution of ESG Research and Emerging Opportunities (RQ4)*

Network Analysis (Figure 7), the thematic map (FIGURE 8), and thematic evolution analysis (FIGURE 9) highlight emerging or underexplored topics that present significant opportunities for advancing ESG research. Key areas include digital transformation, greenwashing, and geographic disparities, each addressing critical gaps in ESG integration and offering pathways for future exploration.

Digital transformation represents a promising frontier for integrating advanced technologies such as artificial intelligence (AI) and blockchain with ESG objectives. AI enhances ESG reporting accuracy through automated data analysis, while blockchain ensures transparency and traceability in sustainability disclosures, these technologies could standardize ESG practices and improve decision-making processes across industries [49, 50]. However, their practical implementation remains limited, particularly in developing regions, calling for future research on their scalability and effectiveness in diverse contexts.

Greenwashing is an increasingly urgent concern, as misrepresenting ESG performance undermines trust and poses reputational risks for firms. Addressing this issue requires robust frameworks to detect and mitigate greenwashing practices. Further research could explore its impact on investor behavior and corporate valuation while developing methodologies to improve the authenticity of ESG disclosures [51, 52].

Geographic disparities in ESG research output and adoption remain a notable gap. While developed markets dominate the ESG discourse, emerging markets face challenges such as limited regulatory support, weaker data infrastructure, and cultural differences in sustainability priorities. Future studies should focus on tailoring ESG practices to local contexts and exploring region-specific barriers to adoption, fostering more inclusive and impactful global ESG integration [7, 53].

By addressing these emerging opportunities, future research can bridge existing gaps and advance ESG integration globally. These insights emphasize the importance of leveraging innovation and inclusivity to align financial systems with sustainability goals and meet the evolving demands of stakeholders.

## 5. Conclusions and Discussions

### *5.1. Conclusions*

This study provides a comprehensive bibliometric analysis of ESG research in corporate finance, addressing its thematic evolution, key contributors, and emerging opportunities. By analyzing 633 publications from 2004 to 2024, the study identifies four distinct phases in ESG research: (1) foundational ethics and sustainability (2004–2013), (2) strategic integration into corporate practices (2014–2018), (3) diversification into financial performance and governance implications (2019–2021), and (4) maturity characterized by risk management and sustainability reporting (2022–2024). These phases highlight ESG's evolution from a peripheral ethical consideration to a core component of corporate strategy and financial decision-making.

The bibliometric analysis reveals significant findings. First, ESG research is increasingly aligned with global sustainability initiatives, such as the United Nations Sustainable Development Goals (SDGs), emphasizing its role in addressing environmental, social, and governance challenges while creating financial value. Second, the identification of thematic clusters, including sustainable finance, corporate governance, and green investing, underscores ESG’s interdisciplinary potential. Third, the analysis of geographic trends reveals persistent regional disparities, with developed markets dominating ESG discourse while emerging economies face institutional and data-related constraints. Finally, the study identifies emerging opportunities, such as digital transformation and the need for robust frameworks to combat greenwashing, which offer critical avenues for advancing ESG integration globally. These findings provide actionable insights for both academia and industry. By mapping thematic clusters and identifying emerging trends, the study highlights the strategic role of ESG in enhancing resilience, fostering innovation, and addressing global sustainability challenges.

### *5.2. Discussion*

The findings extend previous research in several important ways. Prior studies, such as those by Kassi and Li [5] and Tut [6], emphasized the relationship between ESG practices and financial performance, primarily focusing on corporate governance and environmental outcomes. This study advances the discourse by illustrating how ESG themes have matured into interconnected clusters that bridge traditional financial theories with social and environmental considerations. For example, the thematic map reveals ESG's transition from compliance-focused activities to strategic drivers of competitiveness, highlighting its alignment with sustainable finance and corporate governance.

A key contribution of this study is the exploration of emerging opportunities in ESG research, particularly in relation to digital transformation and geographic disparities. Technologies such as artificial intelligence (AI) and blockchain hold significant potential to address long-standing challenges in ESG reporting and data standardization. While Asif et al. [50] explored blockchain’s applications in sustainable supply chains, this study situates these technologies within ESG integration, emphasizing their role in enhancing transparency and ensuring accountability. Additionally, the findings on greenwashing build upon [54] by underscoring the urgency of developing frameworks to detect and mitigate misleading ESG disclosures [54].

From a regional perspective, the study highlights disparities between developed and emerging markets, a theme echoed by Singhania et al. [7]. However, this research advances the discussion by proposing tailored strategies to address these gaps. For instance, emerging markets could leverage digital technologies to overcome resource and data limitations while aligning ESG practices with local economic and cultural contexts. Policymakers and global organizations should foster cross-regional collaborations to enhance capacity-building and harmonize ESG reporting standards.

The study also enriches theoretical frameworks. It extends Dynamic Capabilities Theory by demonstrating how firms can leverage adaptive capabilities to integrate ESG into strategic decision-making, particularly through the adoption of advanced digital tools. Moreover, it advances Institutional Theory by illustrating how global ESG standards interact with localized practices, revealing the complex interplay between external pressures and internal organizational responses. These insights contribute to a deeper understanding of ESG's role in driving organizational resilience and long-term value creation.

For corporate managers, the findings provide a roadmap for embedding ESG principles into strategic planning, leveraging technologies like AI and blockchain to improve reporting accuracy and operational efficiency. Policymakers can use these insights to incentivize ESG-aligned innovations, particularly in underrepresented regions, while investors can adopt advanced analytics to identify high-impact opportunities and mitigate long-term risks.

### *5.3. Limitations*

While this study offers valuable insights into ESG integration in corporate finance, certain limitations should be acknowledged. The reliance on the Web of Science database may exclude relevant studies from other academic sources, potentially narrowing the scope of analysis. Moreover, bibliometric methods primarily emphasize quantitative metrics and may not capture the qualitative dimensions of ESG research, such as contextual or cultural factors. The study’s temporal boundary, which ends in early 2024, may overlook the latest developments and emerging themes, particularly in rapidly evolving areas such as artificial intelligence and blockchain in ESG. Future research should expand data sources to include other databases and focus on qualitative methods to provide richer insights. Exploring interdisciplinary approaches and examining the interplay between ESG and digital finance would further enhance understanding and broaden the applicability of ESG principles. By addressing these limitations and building on the findings presented, this study reinforces the strategic importance of ESG in corporate finance, offering a roadmap for advancing sustainable financial practices globally. It sets the foundation for future research to further integrate ESG principles into financial decision-making, ensuring resilience and sustainability in a rapidly changing world.

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