

Environmental, Social and Governance (ESG) Integration in Financial Risk Management: Global Evidence From A Bibliometric and Systematic Literature Review

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ABSTRACT

This study aims to analyze the integration of Environmental, Social, and Governance (ESG) factors into financial risk management through a systematic literature review and bibliometric analysis on a global scale. ESG has transitioned to a central focus in modern financial strategies due to its role in increasing a company's resilience to long-term risks and driving business sustainability. The study synthesizes findings from 492 Scopus-indexed documents during the period 2015–2024, using VOSviewer and Biblioshiny (R) for bibliometric mapping, trend identification, and thematic clustering. The results of the analysis show an exponential growth in scientific production (Annual Growth Rate 68.76%), indicating the acceleration of the maturity of this topic, supported by a strong collaborative network and wide geographical spread. The thematic analysis confirms that the main focus of the literature is centered on the relationship between ESG and financial performance and risk, as well as the crucial role of corporate governance in mitigating risk. Qualitatively, the literature identifies three main clusters: (1) the relationship between ESG and financial risk (systematic and idiosyncratic), (2) the incorporation of ESG data in sustainable investment decisions and policy frameworks, and (3) the influence of global governance and regulatory structures on risk mitigation. Overall, the study concludes that ESG integration significantly reduces financial risk and increases corporate resilience, while highlighting the need for more sophisticated quantitative methodologies to address data standardization and disclosure challenges.

Keywords: *ESG; Sustainability; Financial Risk Management; Bibliometric; Sustainability Risk.*

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INTRODUCTION

In recent years, discourse surrounding Environmental, Social and Governance (ESG) criteria has expanded rapidly, assuming a central role in global debates on sustainability, corporate performance, and financial system resilience. Since its formal introduction in the 2004 Who Cares Wins report by the United Nations Global Compact, the ESG concept has evolved from a niche non-financial indicator into a strategic framework that fundamentally shapes how companies respond to environmental change, social challenges, and complex governance demands (Darsono et al., 2025). Today, ESG serves as a common lexicon for regulators, investors, industry practitioners, and academics seeking to understand how organizations can create long-term value within an uncertain economic landscape.

As sustainability issues evolve in the global economic landscape, ESG integration is increasingly considered an essential component of financial risk management (Friede, Busch, & Bassen, 2015; Fatemi, Glaum, & Kaiser, 2018). Various empirical studies indicate that companies with better ESG performance generally exhibit lower levels of market volatility, less exposure to idiosyncratic risks, and a lower probability of financial failure (Broadstock et al., 2021; Albuquerque, Koskinen, & Zhang, 2020). These findings affirm the role of ESG as a protection mechanism able to strengthen the stability of the company and increase its resilience to external shocks (Li, Minor, Wang, & Yu, 2019). However, the dynamics of ESG also give rise to a new spectrum of risks that cannot be ignored. Climate change presents

physical risks related to asset damage, operational disruption, and increased adaptation costs (Hong, Li, & Xu, 2019). The transition to a low-carbon economy poses transition risks, including regulatory changes, shifts in investor preferences, and the potential for depreciation of carbon-based assets (Battiston, Mandel, Monasterolo, Schütze, & Visentin, 2017).

On the social side, the relationship of companies with labor and local communities creates social risks related to job security, conflicts of interest, and social injustice. Meanwhile, the governance dimension introduces governance risks, such as fraud, report manipulation, and internal control system failures. These conditions show that ESG does not solely function as a risk mitigation instrument, but also as a new source of risk that demands a more comprehensive, multidimensional, and evidence-based analysis. Therefore, a deep understanding of how ESG factors affect a company's risk structure is becoming increasingly important in efforts to build a more resilient and sustainable financial system (Pathan & Mohanty, 2025; Nurhayati, 2025; Abu Bakar et al., 2025).

Although the literature on ESG has grown tremendously in the past decade, academic knowledge in this area still faces many inconsistencies and fragmentation. Studies examining the relationship between ESG and financial risk have shown mixed results: some have found negative associations, some positive associations, and others no significant associations. These differences not only reflect variation in research context but also show that ESG has not been uniformly analyzed in terms of both concepts and measurements. To date, there has been no agreement on how ESG risks should be defined or classified. The boundaries between environmental, social, and governance risks often overlap, making it difficult for researchers to develop a stable and usable analytical framework across studies (Chen, 2025; Landi et al., 2022).

On the other hand, methodological limitations also deepen the diversity of empirical findings. Most studies still rely on linear regression and conventional panel models that are less able to capture the dynamic and multidimensional nature of ESG risks (Ferriani & Natoli, 2021; Broadstock et al., 2021). Although some studies have begun to use more sophisticated approaches such as network modeling, copula-GARCH, or dynamic GMM, the number is still very limited and does not provide a comprehensive picture (Wang & Young, 2020; Reboredo & Ugolini, 2018). The challenge is further magnified by the inconsistency of ESG data between Demartis and other rating agencies, which often leads to measurement biases and weak comparability across firms (Berg, Kölbel, & Rigobon, 2022).

& Stake, 2024 sustainability rating providers, as well as the increased risk of greenwashing, which often makes ESG measurements inconsistent from one study to another. In addition, the very heavy focus of the literature on large companies in developed countries means the understanding of ESG in developing economies and Small and Medium Enterprises (SMEs) remains poorly represented.

This condition shows that although ESG has developed into a fairly dominant issue, scientific understanding of how ESG plays a role in financial risk management is still far from mature. Researcher fragmentation, differences in methodologies, and the lack of a standard for ESG risk classification cause the literature to develop without an integrated direction. Thus, efforts are needed to bring together this scattered research portrait into one complete and comprehensive analytical framework (Nian & Said, 2024).

Based on this explanation, this study combines bibliometric analysis and systematic literature review (SLR) to present a comprehensive mapping of the development of ESG research in the context of financial risk management. Bibliometric analysis is used to trace global publication trends, identify influential countries, journals, authors, affiliates, and collaboration networks, and map key keywords and thematic clusters in the literature. Meanwhile, SLR was conducted to further analyze empirical findings related to the relationship between ESG and risk, as well as assess the various methodologies used in previous research. This combined approach allows for a more holistic understanding of how the literature is developing, where its weaknesses lie, and where research is headed forward.

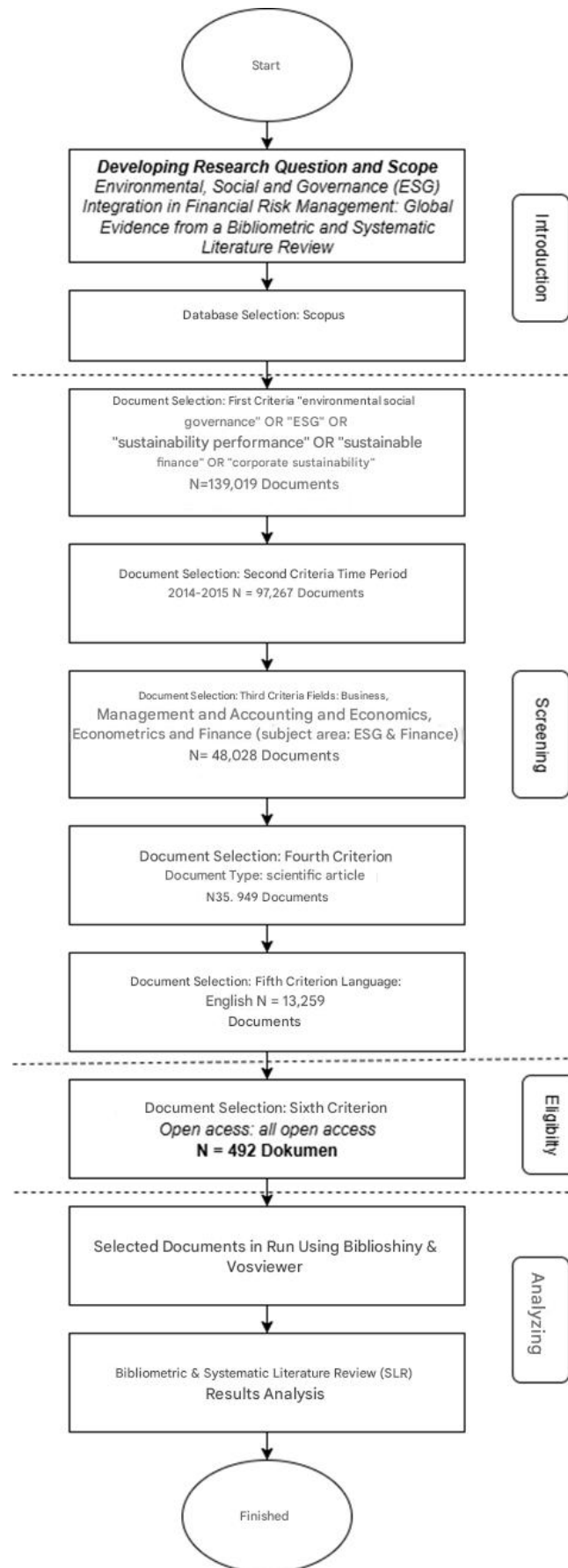
This research provides three main contributions. First, it prepares a comprehensive mapping of research developments related to ESG and financial risk management at the global level. Second, it identifies research gaps, including limitations of studies in developing countries and the lack of consistency of methodological approaches in previous studies. Third, it formulates an initial taxonomy of ESG-based risks that can be used as a reference for researchers, regulators, and industry players in developing more adaptive risk management research, policies, and practices in the future.

METHOD

This study used a bibliometric analysis approach combined with a systematic literature review (SLR) to provide a comprehensive overview of the development, direction, and quality of research related to the integration of *Environmental, Social and Governance (ESG)* in financial risk management. The combination of these two methods allowed researchers to identify large patterns in scientific publications while critically examining the empirical findings produced over the past few years (Pavani, 2024).

Bibliometric analysis was chosen for its ability to objectively and measurably uncover the knowledge structure of a field. This approach included citation and co-citation analysis, enabling researchers to trace how scientific ideas interconnected, developed, and formed intellectual networks. Through bibliometrics, the study mapped the role of the most influential countries, institutions, journals, and authors, as well as identified the keywords and research themes that dominated ESG discourse in the financial context. This analysis was conducted using the Scopus database, selected for its broad global scope and credibility as an index of international scientific publications, while data processing was carried out using Biblioshiny (R) and VOSviewer to produce comprehensive bibliographic visualizations (De Giuli et al., 2024).

As a further deepening of the quantitative analysis, this study also applied the Systematic Literature Review (SLR) to examine the substance, methodology, and direction of empirical findings in previous studies. The SLR process followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol, which is a global standard for minimizing selection bias and increasing transparency in literature reviews. Through PRISMA, the review process was carried out in stages—starting from identification, screening, and feasibility assessment, to the determination of studies included in the final analysis. This approach ensured that only literature meeting the criteria of relevance, quality, and methodological consistency was further analyzed.



Picture 1 PRISM Protocol
Source: Author, 2025

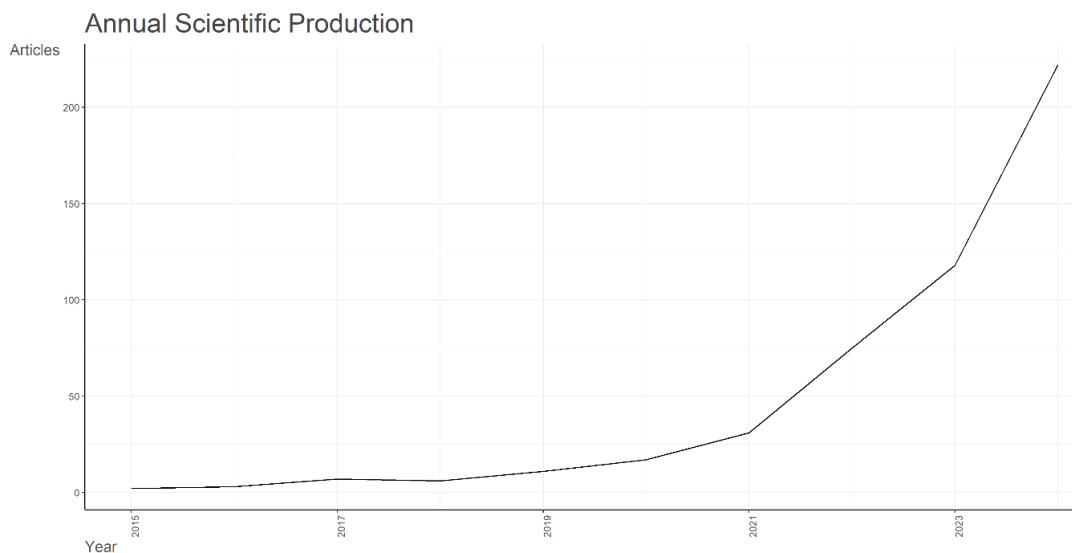
In figure 1, the literature identification process is presented systematically through keywords tied to "environmental social governance", "ESG", "sustainability performance", "sustainable finance" and "corporate sustainability" with specific keywords "ESG" and "Finance". Initial searches yielded 139,019 documents, reflecting the breadth of sustainability-related research. Furthermore, to obtain literature that is more relevant to the focus of the research, the documents were then filtered based on the 2014–2024 time frame, leaving 97,267 documents. The screening continued by limiting the research subjects to the fields of Business, Management and Accounting and Economics, Econometrics and Finance, reducing the number of documents to 48,028. The next stage includes the selection of article types, English language, final publication status, and Scopus indexed journal sources so that a final dataset that truly reflects the core literature related to ESG and financial risk as many as 492 documents is obtained.

RESULTS AND DISCUSSION

Research Trends



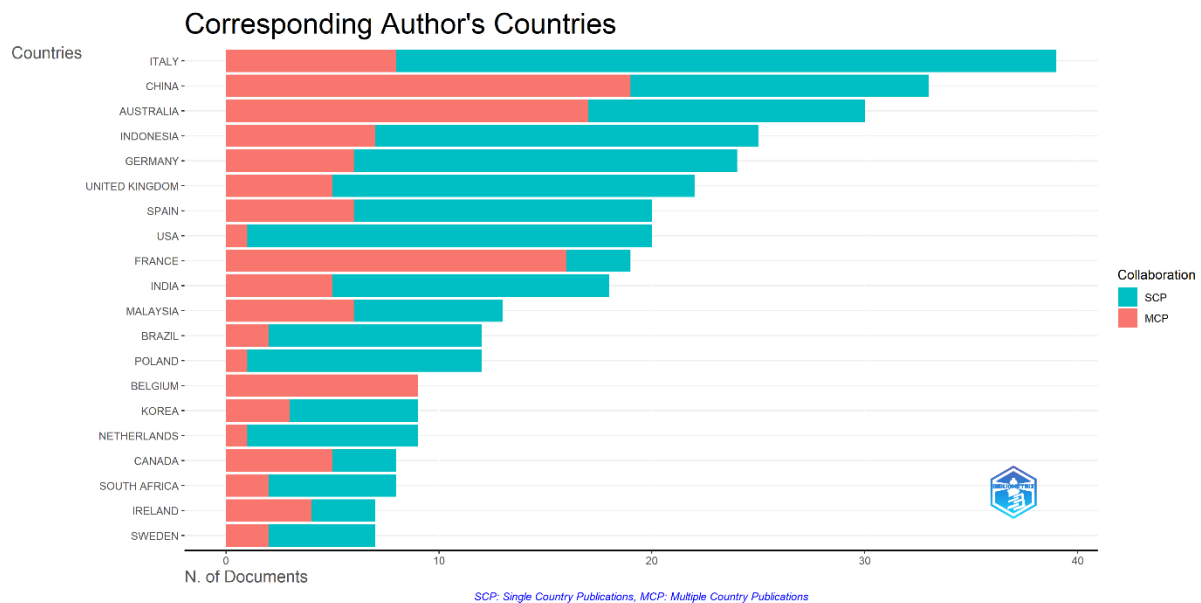
Picture 2. Main Information



Picture 3. Trend of Number of Publications 2014-2024

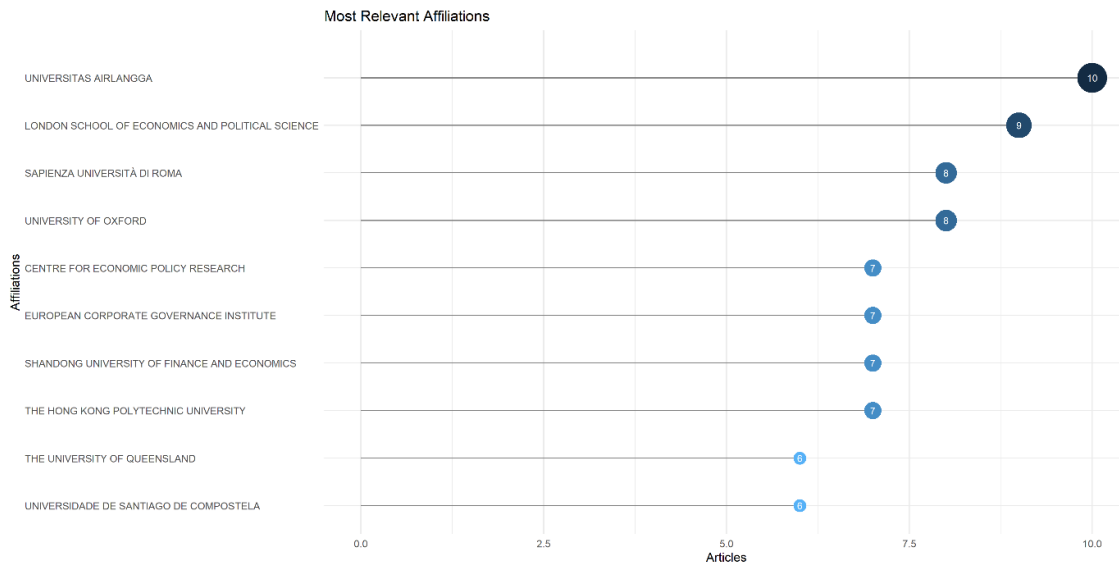
The figure (showing bibliometric metrics 2015–2024) and the Annual Scientific Production Graph show an explosive trend in publications related to the integration of Environmental, Social, and Governance (ESG) in Financial Risk Management during the period 2014 to 2024. Research on this topic shows a very high Annual Growth Rate, reaching 68.76% for a total of 492 documents. The trend of scientific production began to increase significantly in 2019, and reached its peak in 2023 and 2024, signaling a paradigm shift in the world of global finance. This drastic increase is closely aligned with the accelerating awareness of the materiality of ESG risks to financial performance and stability, as well as a strong regulatory push from international bodies to adopt sustainability frameworks. ESG integration has prompted financial institutions to adopt a more comprehensive, data-driven approach to measuring, mitigating, and managing non-financial risks. The high average citation per document of 32.91 and the international collaboration rate of 35.77% further confirms that this field of study is one of the most influential, mature and fast-growing topics in contemporary financial research.

Most Productive Countries



Picture 4. Most Productive Countries

Analysis of Corresponding Author's Countries reveals a geographical landscape of research dominated by European, Asian, and Oceanian countries. Italy emerged as the most prolific research contributor, followed closely by China, Australia, and Indonesia (which took fourth place). The structure of this publication shows that the issue of ESG integration in risk management has become a major focus, not only in mature financial markets, but also in emerging Asian economies. In addition, the significant proportion of publications with multi-country collaborations (MCPs) in most of the top producing countries confirms the global nature of this topic and the need to establish a cross-border framework of study to understand and manage sustainability risks



Picture 5. Sources Journal

In line with the country's contributions, the Most Relevant Affiliations analysis shows leading institutions that are leading scientific production in this field. Surprisingly, Universitas Airlangga (Indonesia) emerged as the most productive institution, outperforming other global institutions. It is followed by highly reputable institutions such as the London School of Economics and Political Science, Sapienza Università di Rome, and the University of Oxford. The presence of institutions from Asia (Airlangga University, Shandong University of Finance and Economics, The Hong Kong Polytechnic University, and The University of Queensland) along with European institutions in the top list underscores the widespread research efforts. The dominance of these research centers shows that cutting-edge research on the integration of ESG in risk management is driven by a global academic network that is multi-regional and focuses on expertise from different continents.

Table 1 may show the most publications and influence on the topic of Penelitation. Orrtama, publication of Pedersen, L.H.; Fitzgibbons, S.; Pomorski, L. entitled "Responsible investing: The ESG-efficient frontier" in 2021 quoted by sea lot of 943 times. Totwo are Tan, Y.; Zhu, Z. entitled "The effect of ESG rating events on corporate green innovation in China: The mediating role of financial constraints and managers' environmental awareness" in 2022 which was cited as many as 477. The three journals were written by Clementino, E.; Perkins, R titled "How Do Companies Respond to Environmental, Social and Governance (ESG) ratings? Evidence from Italy" in 2021 which was cited 319 times.

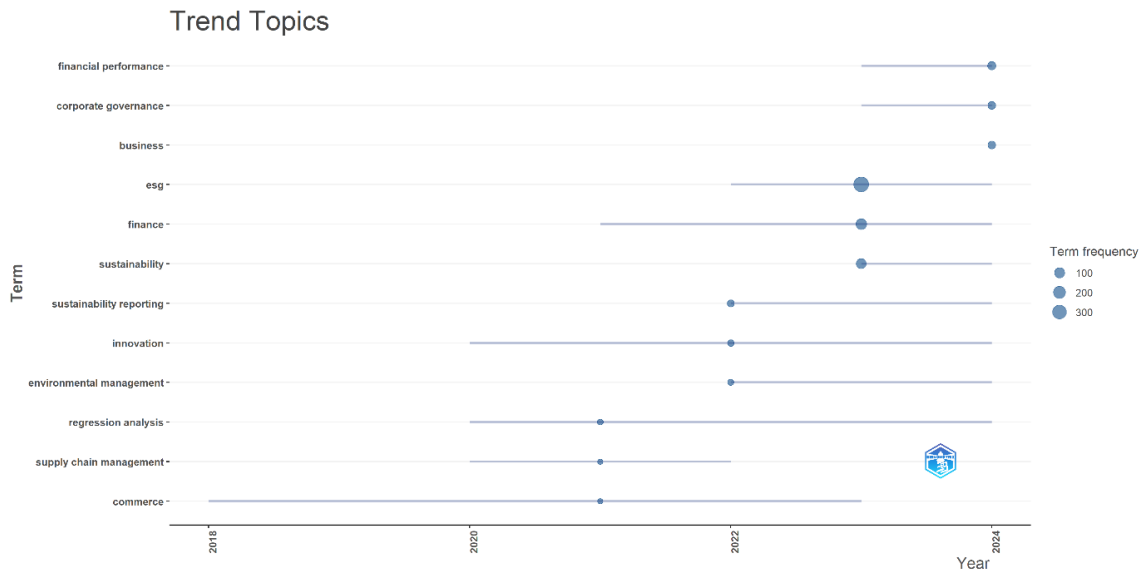
Table 1. Articles Studied

Authors	Title	Year	Source title	Cited by
Pedersen, L.H.; Fitzgibbons, S.; Pomorski, L.	Responsible investing: The ESG-efficient frontier	2021	Journal of Financial Economics	943
Tan, Y.; Zhu, Z.	The effect of ESG rating events on corporate green innovation in China: The mediating role of financial constraints and managers' environmental awareness	2022	Technology in Society	477

Clementino, E.; Perkins, R.	How Do Companies Respond to Environmental, Social and Governance (ESG) ratings? Evidence from Italy	2021	Journal of Business Ethics	319
Adams, C.A.; Abhayawansa, S.	Connecting the COVID-19 pandemic, environmental, social and governance (ESG) investing and calls for 'harmonisation' of sustainability reporting	2022	Critical Perspectives on Accounting	282
Demers, E.; Hendrikse, J.; Joos, P.; Lev, B.	ESG did not immunize stocks during the COVID-19 crisis, but investments in intangible assets did	2021	Journal of Business Finance and Accounting	275
Reber, B.; Gold, A.; Gold, S.	ESG Disclosure and Idiosyncratic Risk in Initial Public Offerings	2022	Journal of Business Ethics	268
Edmans, A.	The end of ESG	2023	Financial Management	258
Ardia, D.; Bluteau, K.; Boudt, K.; Inghelbrecht, K.	Climate Change Concerns and the Performance of Green vs. Brown Stocks	2023	Management Science	246
Aboud, A.; Diab, A.	The impact of social, environmental and corporate governance disclosures on firm value: Evidence from Egypt	2018	Journal of Accounting in Emerging Economies	226
Eccles, R.G.; Lee, L.-E.; Strohle, J.C.	The Social Origins of ESG: An Analysis of Innovest and KLD	2020	Organization and Environment	205
Zumente, I.; Bistrova, J.	Esg importance for long-term shareholder value creation: Literature vs. practice	2021	Journal of Open Innovation: Technology, Market, and Complexity	199
Bhandari, K.R.; Ranta, M.; Sallow, J.;	The resource-based view, stakeholder capitalism, ESG, and sustainable competitive advantage: The firm's embeddedness into ecology, society, and governance	2022	Business Strategy and the Environment	191
Kanda, W.; Geissdoerfer, M.; Hjelm, O.	From circular business models to circular business ecosystems	2021	Business Strategy and the Environment	187
Camilleri, M.A.	Environmental, social and governance disclosures in Europe	2015	Sustainability Accounting, Management and Policy Journal	184
Raghunandan, A.; Rajgopal, S.	Do ESG funds make stakeholder-friendly investments?	2022	Review of Accounting Studies	183
Uyar, A.; Kiliç, M.; Köseoğlu, M.A.; Kuzey, C.; Karaman, A.S.	The link among board characteristics, corporate social responsibility performance, and financial performance: Evidence from the hospitality and tourism industry	2020	Tourism Management Perspectives	182
Alkaraan, F.; Elmarzouky, M.; Hussainey, K.; Venkatesh, V.G.	Sustainable strategic investment decision-making practices in UK companies: The influence of governance mechanisms on synergy between industry 4.0 and circular economy	2023	Technological Forecasting and Social Change	169
Sandberg, H.; Al Sayed Noor, A.; Tiberius, V.	Environmental, social, and governance ratings and financial performance: Evidence from the European food industry	2023	Business Strategy and the Environment	165
Deschryver, P.; de Mariz, F.	What Future for the Green Bond Market? How Can Policymakers, Companies, and Investors Unlock the Potential of the Green Bond Market?	2020	Journal of Risk and Financial Management	152

Liu, M.; Luo, X.; Lu, W.-Z.	Public perceptions of environmental, social, and governance (ESG) based on social media data: Evidence from China	2023	Journal of Cleaner Production	148
Mansouri, S.; Momtaz, P.P.	Financing sustainable entrepreneurship: ESG measurement, valuation, and performance	2022	Journal of Business Venturing	146
Shanaev, S.; Ghimire, B.	When ESG meets AAA: The effect of ESG rating changes on stock returns	2022	Finance Research Letters	146
Valenta, R.K.; Kemp, D.; Owen, J.R.; Corder, G.D.; L��bre, ��.	Re-thinking complex orebodies: Consequences for the future world supply of copper	2019	Journal of Cleaner Production	143
Tao, H.; Zhuang, S.; Xue, R.; Cao, W.; Tian, J.; Shan, Y.	Environmental Finance: An Interdisciplinary Review	2022	Technological Forecasting and Social Change	135
Dorfleitner, G.; Kreuzer, C.; Sparrer, C.	ESG controversies and controversial ESG: about silent saints and small sinners	2020	Journal of Asset Management	129

Trend Topics



Picture 6. Trend Topics

Trend topics show the dynamics of thematic developments in the ESG literature and financial risk management during the study period. Since 2018, the initial themes that dominate the literature are commerce, supply chain management, and environmental management, reflecting an initial focus on the operational and environmental impacts of business activities. Entering the 2020–2021 period, there has been a shift towards a methodological and analytical approach, marked by the increasing use of the keywords “regression analysis” and “innovation,” thus showing that ESG studies are beginning to utilize a stricter empirical methodology in evaluating the influence of ESG on various performance indicators and company risks.

In the most recent period (2022–2024), the topic of ESG has experienced conceptual deepening and expansion to strategic finance themes. This can be seen from the dominance of keywords such as financial performance, corporate governance, finance, and sustainability

reporting, with a much higher frequency than in previous years. The emergence of the keyword ESG as a large node in the trend curve confirms that ESG is no longer a supporting variable, but a key framework in research related to financial risk and performance. In addition, the intensification of research on sustainability reporting shows the increasing importance of transparency and quality disclosure as key elements in mitigating financial risks and strengthening governance. Overall, this thematic pattern suggests that ESG research has moved from operational issues to strategic analysis that places ESG as a key determinant in risk management and corporate value creation.

TreeMap



Picture 7. TreeMap

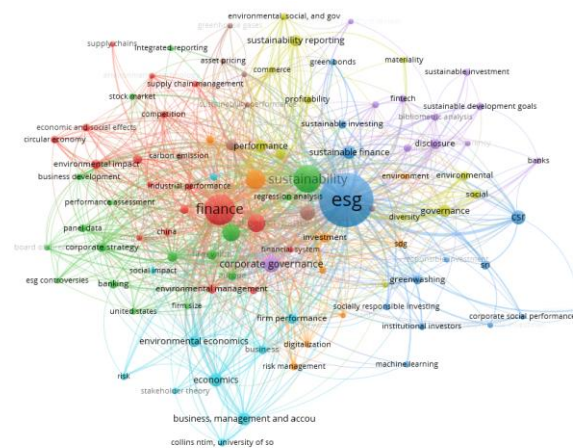
The Keyword TreeMap visualization provides a comprehensive overview of the thematic structure in the literature related to ESG integration in financial risk management. The mapping results show that the term ESG occupies the most dominant position (381 occurrences; 28%), confirming its role as a conceptual foundation as well as a key variable that drives academic discourse in this field. This dominance clearly indicates that the majority of research uses ESG as a core analytical framework in explaining the dynamics of risk and corporate financial performance.

In a more structured way, the distribution of keywords can be categorized into three main thematic clusters. First, the functional application cluster, with *the keyword finance* (9%) as the largest component, shows the focus of the literature on the implications of ESG on financial decisions, risk management, investment, and market stability. Second, the theoretical foundation cluster, which includes the keywords *sustainability* and *sustainable development* (11% total), underlines that ESG studies are not only oriented towards financial results, but also rely on the sustainable development paradigm and corporate sustainability values. Third, the outcome indicator cluster, which represents how ESG is associated with the company's performance results. In this cluster, keywords such as *financial performance* (3%), *firm value* (1%), and *performance* (1%) indicate that the relationship between ESG and corporate performance indicators is a consistent and significant empirical focus in literature.

In addition, there is a strong emphasis on the internal governance aspect of the company. Keywords such as *corporate governance*, *CSR*, and *governance* (5% combination) illustrate that governance is positioned as a moderation mechanism that affects the effectiveness of ESG implementation. These findings are consistent with the literature that places governance as a critical dimension that ensures that ESG practices are truly integrated into the company's decision-making process. TreeMap's visualization also captures thematic dynamics related to external risks. The emergence of keywords such as *COVID-19* (2%) reflects the sensitivity of the literature to global shocks affecting market and operational risks. The theme of *climate change* (1%) indicates that climate risk is increasingly recognized as an integral part of corporate risk management, in line with increased regulation and global attention to the transition to a low-carbon economy. The keyword *disclosure* (1%) emphasizes the importance of information transparency as a prerequisite for ESG accountability and as a more effective financial risk mitigation mechanism.

Overall, the thematic patterns in TreeMap show that research on ESG and financial risk has evolved into a multidisciplinary landscape, involving the close interplay between the concepts of sustainability, governance, external risk, and corporate financial outcomes. This structure suggests an evolution of literature towards an increasingly comprehensive and integrative approach, reflecting the academic and practical need to understand ESG risks in a broader and systematic perspective.

Co-occurrence Network



Picture 8. Keyword Network Structure Based on Co-occurrence

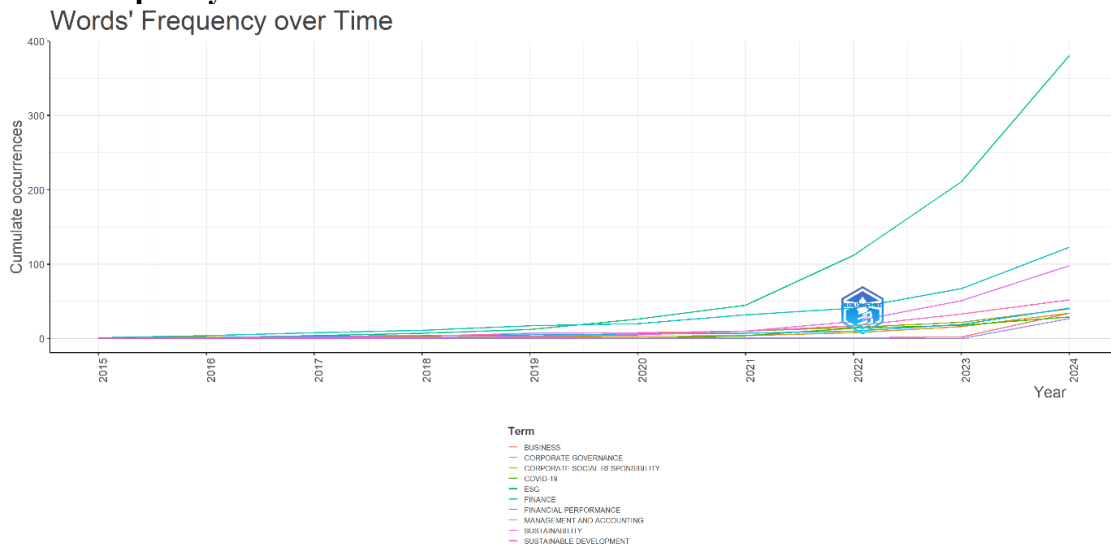
The mapping of *co-occurrence networks* shows that the term ESG serves as a *central node* in conceptual networks, reflecting its role as a key point of gravity in the sustainability and financial risk literature. From these nodes emerge three large thematic clusters that intersect each other. The first cluster focuses on the financial and risk dimensions, as shown by the interconnectedness of keywords such as *finance*, *risk management*, *stock market*, *carbon emission*, *industrial performance*, and *supply chain management*. The dense pattern of relationships within these clusters indicates that research consistently places ESG as an important determinant in the management of financial risks, including market risk, operational risk, and carbon transition risk.

emerges as the most prominent and largest-sized element, confirming that this concept is the center of attention and the main framework underlying the entire academic discourse on the field. The dominance of ESG shows that most studies use environmental, social, and governance factors as a starting point to evaluate a company's risk, performance, and sustainability strategy.

Other major keywords such as "finance," "sustainability," "financial performance," "corporate governance," and "sustainable development" indicate that the research focus shifts to the relationship between ESG and financial outcomes and governance mechanisms. The presence of the keywords *finance* and *financial performance* confirms the consistency of the literature in evaluating the financial consequences of ESG practices, including their effect on market risk, profitability, and company value. Meanwhile, terms such as *sustainability* and *sustainable development* indicate a strong theoretical foundation for a broader sustainability paradigm. In addition, the emergence of keywords such as "corporate social responsibility (CSR)," "sustainable finance," and "environmental" highlights the role of the transition towards more ethical, responsible, and environmentally friendly business practices. The smaller but still visible size of keywords—such as *governance*, *covid-19*, *climate change*, and *management and accounting*—implies that these themes are often additional variables or empirical contexts that enrich the relationship between ESG and financial risk.

Overall, the structure of Word Cloud confirms that ESG research is evolving as a multidisciplinary field that combines sustainability, governance, and financial performance issues. The dominance of core keywords and the diversity of supporting terms suggest that the literature not only evaluates ESG as a normative concept, but also as a strategic determinant that affects the stability and value of a company in the long run.

Words' Frequency over Time



Picture 10. Words' Frequency over Time

The keyword cumulative frequency graph shows a divergent growth trajectory among the key terms, reflecting the evolution and thematic maturity of this field of study. The thematic dominance of the term ESG is evident, which shows the steepest *exponential* growth and

reached the highest cumulative frequency (exceeding 350 occurrences) at the end of the study period. The inflection points in the growth of ESG frequency, along with other related terms such as Finance, Sustainability, and Sustainable Development, occurred cohesively around 2019-2020. This phenomenon indicates that the field is moving from a preliminary phase to an intensive exploration phase after 2020. While Finance and Sustainability are showing substantial growth, their trajectories serve as contextual and theoretical frameworks that underpin ESG concepts. Interestingly, specific keywords reflecting external risks, such as COVID-19, began to emerge and increase markedly in 2020/2021, demonstrating the sensitivity of the literature to market shocks and the need for adaptation of risk management models. Overall, this data confirms that the literature has expressly shifted to ESG-centric discussions, while financial *performance* and governance *function* as key mediators whose frequency is growing steadily but not as fast as the central ESG variables.

CONCLUSION

This study provides a comprehensive mapping of the scientific landscape of ESG integration in financial risk management from 2014 to 2024, revealing a rapid growth phase with an annual growth rate of 68.76% and a high average citation rate, highlighting ESG's rising importance in assessing systemic and idiosyncratic risks. The global collaborative nature of the research, with significant contributions from countries like Italy, China, and Indonesia, underscores the universal relevance of ESG integration. Thematic analysis shows a shift toward exploring the causal links between ESG, financial performance, and corporate governance as a risk mitigation moderator. The systematic literature review confirms ESG's role as a corporate resilience strategy during crises such as COVID-19. Future research should focus on developing advanced quantitative methods, including artificial intelligence, to standardize and enhance the accuracy of ESG disclosure, improving risk assessment precision and better embedding sustainability into financial risk management.

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