

Green Taxonomy Research: A Bibliometric Mapping of Sustainable Finance Development

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ABSTRACT

The increasing urgency to address climate change and achieve sustainable development goals has accelerated the transformation of global financial systems toward more environmentally responsible practices. Green taxonomy has emerged as an important policy and financial instrument designed to classify sustainable economic activities, improve transparency, prevent greenwashing, and facilitate the allocation of capital toward environmentally beneficial projects. This study aims to examine the intellectual structure, research trends, and development patterns of green taxonomy research within the broader field of sustainable finance through a bibliometric analysis approach. Data were collected from the Scopus database using relevant keywords associated with green taxonomy, sustainable finance, and green finance. The retrieved publications were analyzed using bibliometric techniques, including publication trend analysis, citation analysis, keyword co-occurrence mapping, density visualization, thematic evolution analysis, and collaboration network analysis using VOSviewer. The findings indicate that green taxonomy research has experienced significant growth, particularly following the emergence of sustainability regulations and climate-oriented financial frameworks. The analysis identifies sustainable finance, sustainable development, green finance, green bonds, climate finance, and EU taxonomy as the dominant research themes shaping the field. Furthermore, recent studies have increasingly focused on greenwashing prevention, sustainability reporting, transition finance, and the integration of taxonomy frameworks into financial decision-making processes. The collaboration analysis reveals that European countries, particularly Germany and other EU members, play a central role in advancing research, while emerging economies are gradually expanding their contributions. This study contributes to the sustainable finance literature by providing a comprehensive overview of the evolution of green taxonomy research and identifying future research directions related to regulatory implementation, climate risk management, and sustainable investment transformation.

Keywords: *Green Taxonomy, Sustainable Finance, Green Finance, ESG, Climate Finance, Bibliometric Analysis*

1. INTRODUCTION

In light of the growing concern about climate change and environmental degradation, global economic priorities have changed, and sustainability is now at the heart of the matter. Sustainable finance can be defined as a financial framework that allows for investments into environmental, social, and governance (ESG) criteria by using funds in such a way as to ensure carbon reduction, resource efficiency, and ecosystem resilience [1], [2]. Green taxonomies can be considered an important part of sustainable finance, which serves as systematic classifications for economically viable actions that can be qualified as environmentally sustainable.

The emergence of green taxonomies has been spurred by the adoption of certain global policies, such as the Sustainable Finance Taxonomy Regulation in the European Union that serves to operationalize the implementation of a common taxonomy framework to categorize environmentally sustainable economic activities in the union member states. In addition, other global organizations like the International Platform on Sustainable Finance (IPSF) and Network for Greening the Financial System (NGFS) have called for an interoperable taxonomy framework for improving global cooperation in sustainable finance [3]–[5].

The scholarly attention to green taxonomies has been increasing alongside the policy and market trends. In particular, the existing studies have looked at the theoretical underpinnings of

sustainability taxonomies, their methodologies for setting criteria for environmental performance standards, and their effects on resource allocation and company reporting [6], [7]. Nonetheless, while the body of research has been expanding rapidly, there has emerged a lack of coherence regarding the concept and use of taxonomies. For instance, definitions of "green," "sustainable," and "transition" activities vary.

In terms of its application in research, bibliometrics have increasingly become a popular methodology for examining how an emerging field develops in terms of its structure and intellectual dynamics [8]. Bibliometrics mapping provides an objective way of understanding current research areas, prevailing paradigms, and knowledge gaps by measuring publication trends, co-authorship relations, topic clustering, and citation behavior [8]. In the case of topics that fall into more than one field, such as green taxonomy, bibliometric methods may be useful in analyzing their knowledge generation processes.

The combination of urgency from policies and academic interest in sustainable finance means that studies on green taxonomy have become an important topic of discussion. Taxonomies are meant to offer some practical insights for the finance sector, but their construction and implementation are influenced by theoretical and normative ideas from academic conversations, institutions, and sustainability paradigms [9]. Therefore, an empirical overview of this literature may help to outline the directions of research and the works that have had some influence on the field.

Although there have been many advances in studying the area of green taxonomy and sustainable finance, the academic literature on this topic is quite fragmented and does not include any systematic overview revealing knowledge structure, important authors, trends in themes, and citation links between publications. Currently existing reviews are mainly qualitative, which means that there is no systematic approach in evaluating the state of the research area in terms of expansion of the field, prevailing topics, and forming intellectual networks. As a result, researchers cannot determine the level of maturity of the discussion regarding the subject, the emergence of new research domains, and possible directions of convergence and divergence in sustainable finance research. The main purpose of this study is to carry out bibliometric mapping of green taxonomy research in the domain of sustainable finance development.

2. METHODS

This study adopted a bibliometric approach for investigating the emergence of research on green taxonomy in the domain of sustainable finance. This technique is used to conduct quantitative analysis and measurements in order to understand the trends in terms of publications, significant authors, organizations, journals, and topic clusters [8]. The research was conducted following a well-organized research process, starting with the selection of relevant papers from the Scopus citation database, regarded as one of the largest and multidisciplinary databases for scientific research works. Keywords and search strings were defined in relation to "green taxonomy," "sustainable finance," and "environmental investment." Publications included in this study were selected from English peer-reviewed journals and years ranging from 2010 to 2026.

The extraction of the bibliographic data from Scopus included downloading the author names, affiliations, titles, abstracts, keywords, references, and year of publications. In order to perform consistent and clean bibliometrics, the bibliographic data obtained needed to be processed by standardizing the author names, institutional names, and the keywords. Such processing is critical to avoid duplication and misleading representations in network analyses within the field of bibliometrics. The processed data offered a detailed understanding of the intellectual landscape in green taxonomy.

The software VOSviewer was used in order to perform data visualization and network analysis as this software provides the capacity to produce bibliometric maps which are interpretable. The use of VOSviewer is possible as the software produces bibliometric maps which enable the analysis of co-authorship, co-citations and keyword co-occurrence networks and the formation of clusters which show thematic grouping and knowledge domains within the literature. It enables the visualization and clustering using distance-based approach and helps in highlighting authors, institutions and recurring themes in research, thus helping identify new trends and research gaps [10]. The choice of Scopus as the data source and VOSviewer as a mapping tool assures a solid methodological framework for the study.

3. RESULT AND DISCUSSION

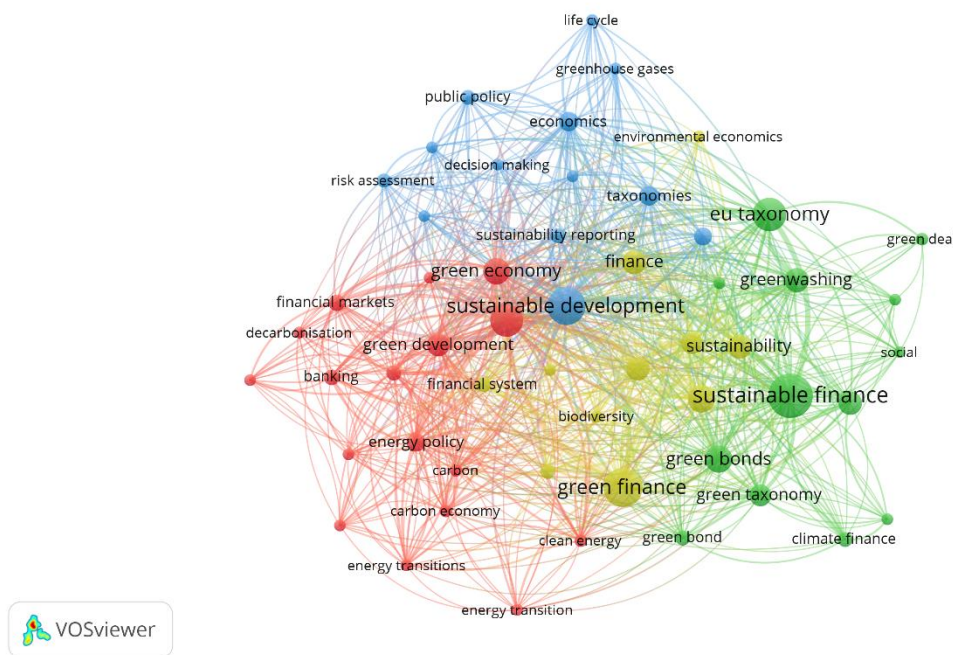


Figure 1. Network Visualization

Source: Data Analysis Result, 2026

Figure 1 depicts the co-occurrence network of green taxonomy and sustainable finance research. This diagram helps to show the concept of the structure and relationships of different research topics within this area. The size of each node shows how often a particular keyword was mentioned in the literature, whereas the links depict the strength of the relationships between each other. It can be said that the topic of green taxonomy research is significantly related to the wider scope of sustainable finance, sustainable development, green finance, climate policy, and environmental governance topics. The clustering of big nodes around such notions as “sustainable finance,” “sustainable development,” “green economy,” and “green finance” proves the key concepts of this area.

The “green” cluster is the main research direction pertaining to sustainable finance, green taxonomy, and green investment instruments. Keywords including sustainable finance, green finance, green bonds, green taxonomy, EU taxonomy, greenwashing, and climate finance are shown to be tightly associated with each other, which means that the recent scientific works concentrate on the role of classifications and financial instruments in the process of sustainable transition. The strong connection between EU taxonomy and greenwashing indicates the academic worries about the credibility, transparency, and responsibility of sustainable finance.

From the map, it is evident that sustainable finance is still the core theme, which acts as an important connection point for different streams of research. The high association of this theme with keywords like green finance, green bonds, climate finance, green taxonomy, and sustainability shows the importance of financial instruments in ensuring environmental sustainability and climate-related investments.

The results of the overlay show a movement from generic sustainability themes to more concrete and implementation-oriented topics. Research fields denoted in blue and purple colors correspond to more generic concepts, like sustainable finance, sustainability, and climate finance. On the other hand, new research directions, marked in yellow and green colors, are concerned with themes like green economy, green development, energy transition, decarbonization, carbon economy, and public policy. This trend shows that contemporary researchers have moved from discussing generic sustainability to developing concrete approaches related to policy, low-carbon and economic transitions. The appearance of words like taxonomies, EU taxonomy, and greenwashing indicates a focus on classification systems and transparency in sustainable investing.

Temporal mapping analysis reveals that green taxonomy studies are moving towards a more mature and policy-based stage where sustainability goals become more incorporated in financial governance and economic development processes. It seems that recent studies have been mainly concerned about how green taxonomy can be used in order to channel investments, curb misrepresentation in environmental claims, and foster transition to a greener economy. Potential areas for future studies would probably include effectiveness of various taxonomies, implementation issues in other countries, climate risks management, and involvement of financial organizations in decarbonization efforts.

3.2 Citation Analysis

Table 1. The Most Impactful Literatures

Citations	Authors and year	Title
238	[11]	Green finance and sustainable development goals: The case of China
112	[9]	The EU sustainable finance taxonomy and its contribution to climate neutrality
105	[12]	The Role of Disclosure in Green Finance
101	[13]	Sustainable board governance and environmental performance: European evidence
76	[14]	Shades of green: Life cycle assessment of renewable energy projects financed through green bonds
75	[15]	Regulating Sustainable Finance in the Dark
69	[16]	Towards a post-pandemic policy framework to manage climate-related financial risks and resilience
67	[17]	Can the EU taxonomy for sustainable activities help upscale investments into urban nature-based solutions?
50	[18]	Sustainable finance versus environmental policy: Does greenwashing justify a taxonomy for sustainable investments?
50	[19]	Measuring investments progress in ecological transition: The Green Investment Financial Tool (GIFT) approach

Source: Scopus, 2026

Table 1 contains the most influential literature on green taxonomy and sustainable finance research in terms of citation frequency, showing the main theoretical bases underlying the field of research. Most cited article by [11], titled "Green Finance and Sustainable Development Goals: The Case of China," having 238 citations, shows the significance of green finance as an instrument for implementing the goals of sustainable development through the transformation of the financial sector. The following most influential articles address the issue of sustainable finance with regard to

its institutional and regulatory aspects, specifically concerning the role of the EU Sustainable Finance Taxonomy in reaching climate neutrality [9] and the importance of disclosure for the increased transparency and credibility of green financial markets [12]. Other important articles discuss corporate governance issues, environmental performance, green bonds, climate-related financial risks, and regulatory issues in connection with sustainable investment practices. The inclusion of the most recent literature, specifically [18] on greenwashing and taxonomy development, demonstrates the increasing concern about the reliability of classification in the context of sustainable finance research.

3.3 Density Visualization

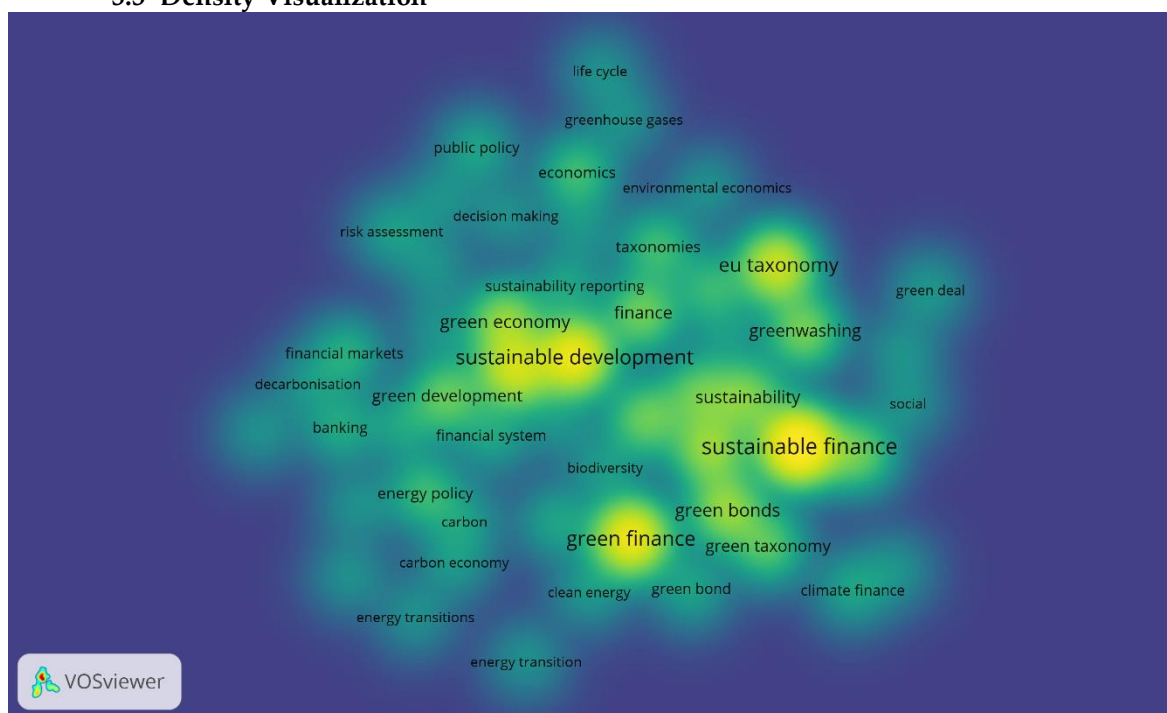


Figure 3. Density Visualization

Source: Data Analysis Result, 2026

The Figure 3 below depicts the density and focus of research topics in the field of green taxonomy and sustainable finance. Yellow areas highlight the keywords with the highest density and frequency of occurrence of the research topic, whereas green and blue areas refer to less talked about topics. The most concentrated areas are in the topics of “sustainable finance,” “sustainable development,” and “green finance,” suggesting that these topics comprise the most important research areas of the literature. Similarity between these topics reflects that the contemporary research focuses on how financial systems can enable sustainability through green investments, sustainable financing and so forth. This figure also draws attention to some new and interrelated fields of study, which include EU taxonomy, greenwashing, green bonds, climate finance, sustainability reporting, and green taxonomy. This suggests that academia is becoming increasingly concerned about developing transparency and classification criteria as well as the reliability of sustainable investments. On the other hand, topics like decarbonisation, energy transition, carbon economy, and clean energy belong to less dense clusters but retain their strategic significance due to an increasing connection between sustainable finance and climate change.

3.4 Co-Authorship Analysis

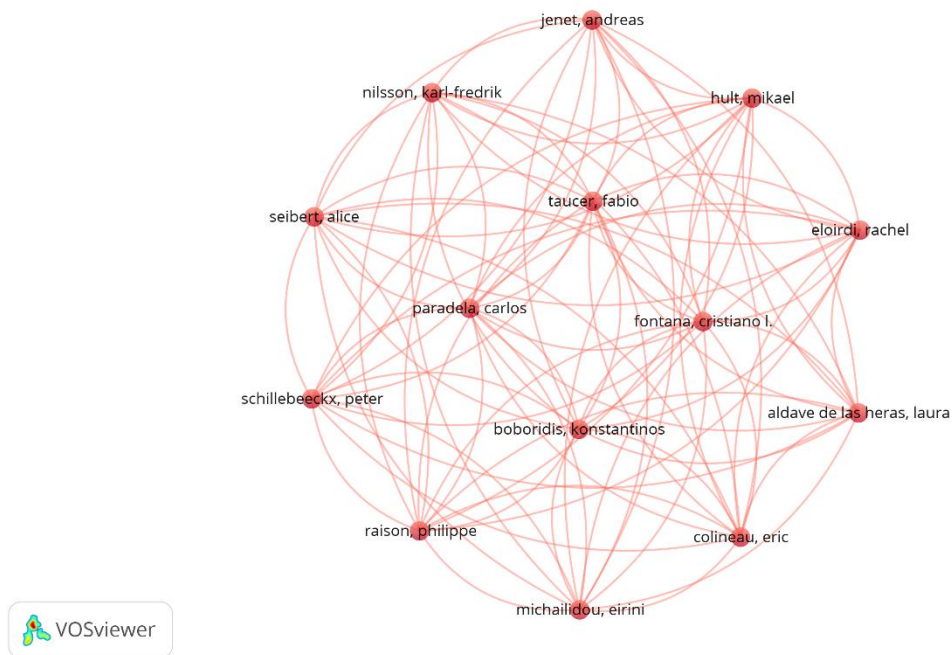


Figure 4. Author Visualization

Source: Data Analysis Result, 2026

Figure 4 presents the connections and cooperation patterns between scientists who work in the field of green taxonomy and sustainable finance. This graph has a very dense structure because almost all scientists are interconnected through different collaboration relations, which means that there exists a significant level of academic cooperation in this scientific sphere. There are several scientists such as Jenet Andreas, Hult Mikael, Boubidis Konstantinos, and Fontana Cristiano who can be considered to be central nodes due to many connections which exist in relation to them. This means that these people can be seen as key actors in the process of knowledge exchange and scientific development. Dense author connections mean that the scientific field of green taxonomy research is interdisciplinary because there are scholars in the spheres of sustainability, finance, environmental economics, and policy studies.



Figure 5. Institution Visualization

Source: Data Analysis Result, 2026

The network of cooperation between various organizations engaged in the development of green taxonomy and sustainable finance can be seen from Figure 5. As can be seen from the figure, the cooperation network between organizations has a certain number of connections, but it is limited. In particular, the University of Crete, Greece, represents the center where the different research organizations are connected. This organization is highly connected with other academic institutions, such as the University of Thessaly, Greece, and Neapolis University Pafos, Cyprus. This fact shows the existence of a regional academic cooperation, especially for European research networks. In addition, the connection between the institutions proves that research in this area is based on inter-university cooperation. Moreover, the density of the network is rather low in comparison with other sciences. It is also worth noting that there are departments of physics, mechanical engineering education, and management science in the University of Crete, Greece.

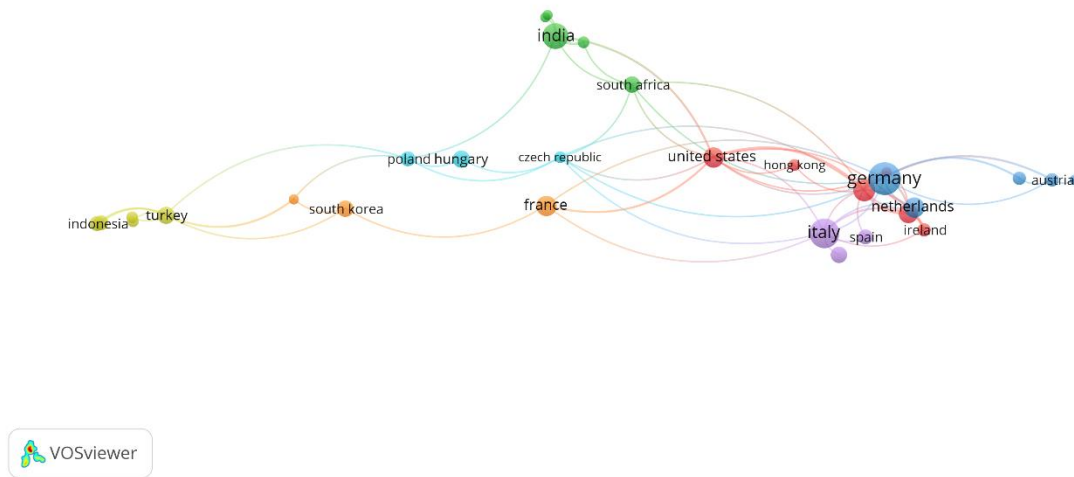


Figure 6. Country Visualization

Source: Data Analysis Result, 2026

Figure 6 depicts global research cooperation networks in the area of green taxonomy and sustainable finance. The network depicts research activities that have been spread out geographically across various locations. Germany, the US, and the Netherlands are depicted as some of the most highly connected and influential countries because of their high connectivity and collaboration levels with other countries. Germany is depicted in the center of the network because of its strong cooperation levels with European countries like Austria, Spain, Ireland, and Italy. It is worth noting that Europe has been leading in sustainable finance research because of the introduction of the EU Sustainable Finance Taxonomy. Moreover, visualization demonstrates the involvement of newly involved research contributors, such as India, South Africa, Indonesia, Turkey, South Korea, and China-related networks, which shows the rising global interest to the concept of sustainable finance beyond the developed countries. Countries in Europe form a rather compact collaboration cluster, while Asia and developing countries are represented by new research partners that are linked by international collaboration. The involvement of Indonesia and Turkey shows the increased interest to green finance implementation in the developing world.

CONCLUSION

The current research is dedicated to the creation of the bibliometric mapping of green taxonomy development and intellectual structure in the field of sustainable finance. According to the results of the bibliometric mapping, the green taxonomy has become a multidisciplinary research area, which unites several research fields such as sustainable finance, green investment, climate policy, environmental governance, and economic transformations. The analysis of the publications and citations shows the increasing interest to this topic since the creation of international sustainability frameworks such as the EU Sustainable Finance Taxonomy. The results of the keyword analysis have shown that such keywords as sustainable finance, sustainable development, green finance, green bonds, climate finance, and green taxonomy reflect the main research themes, while keywords like prevention of greenwashing, transition finance, carbon neutrality, and taxonomy implementation show future directions of the research. Bibliometric mapping also demonstrates the importance of international cooperation, when European countries, especially Germany and other

EU countries, play the leading roles because of the regulation in this field, and developing countries make their contributions.

REFERENCES

- [1] G. Nyikos and Z. Kondor, "National Development Banks in Europe – A Contribution to Sustainable Finance," *Cent. Eur. Public Adm. Rev.*, vol. 20, no. 1, pp. 135–165, 2022, doi: 10.17573/cepar.2022.1.06.
- [2] M. D. H. Nelemans, "ESG Targets for the Financial Sector and the Choice of Legal Instruments," *Palgrave Studies in Impact Finance*, vol. Part F9256. Palgrave Macmillan, Radboud University, Nijmegen, Netherlands, pp. 217–241, 2023. doi: 10.1007/978-3-031-36457-0_11.
- [3] E. P. Ermakova, "Esg-banking in russia and the european union: Concept and problems of legal regulation," *Gos. i Pravo*, vol. 2021, no. 7, pp. 161–174, 2021, doi: 10.31857/S102694520016188-7.
- [4] M. Neumann, "A Stalling Green Bond Take-Off," *International Political Economy Series*. Palgrave Macmillan, Political Science, University of Kassel, Kassel, Germany, pp. 113–247, 2023. doi: 10.1007/978-3-031-30502-3_5.
- [5] T. N. Thị Thu, "Improving the Legal Framework for Green Finance... in Vietnam. A Comparison with Selected ASEAN Countries," *Prawo i Wiez*, vol. 57, no. 4, pp. 847–868, 2025, doi: 10.36128/PRIW.VI57.1372.
- [6] N. Razali, A. H. A. Aziz, and R. Hassan, "Governments' initiatives towards Islamic green finance," *Islamic Green Finance: A Research Companion*. Taylor and Francis, International Centre for Education in Islamic Finance, Malaysia, pp. 135–143, 2024. doi: 10.4324/9781032672946-19.
- [7] H. Cantell, "Developments in the Labelled Bond Concept: More than just Green," *AiIB Yearbook of International Law*, vol. 4. Brill Nijhoff, Nordic Investment Bank, pp. 224–245, 2023. doi: 10.1163/9789004460010_011.
- [8] N. Donthu, S. Kumar, D. Mukherjee, N. Pandey, and W. M. Lim, "How to conduct a bibliometric analysis: An overview and guidelines," *J. Bus. Res.*, vol. 133, pp. 285–296, 2021.
- [9] F. Schütze and J. Stede, "The EU sustainable finance taxonomy and its contribution to climate neutrality," *J. Sustain. Financ. Invest.*, vol. 14, no. 1, pp. 128–160, 2024, doi: 10.1080/20430795.2021.2006129.
- [10] N. Van Eck and L. Waltman, "Software survey: VOSviewer, a computer program for bibliometric mapping," *Scientometrics*, vol. 84, no. 2, pp. 523–538, 2010.
- [11] J. W. Lee, "Green finance and sustainable development goals: The case of China," *J. Asian Financ. Econ. Bus.*, vol. 7, no. 7, pp. 577–586, 2020, doi: 10.13106/jafeb.2020.vol7.no7.577.
- [12] S. Steuer and T. H. Tröger, "The Role of Disclosure in Green Finance," *J. Financ. Regul.*, vol. 8, no. 1, pp. 1–50, 2022, doi: 10.1093/jfr/fjac001.
- [13] P. Velte, "Sustainable board governance and environmental performance: European evidence," *Bus. Strateg. Environ.*, vol. 33, no. 4, pp. 3397–3421, 2024, doi: 10.1002/bse.3654.
- [14] T. Gibon, I.-Ş. Popescu, C. Hitaj, C. Petucco, and E. Benetto, "Shades of green: Life cycle assessment of renewable energy projects financed through green bonds," *Environ. Res. Lett.*, vol. 15, no. 10, 2020, doi: 10.1088/1748-9326/abaa0c.
- [15] D. A. Zetsche and L. Anker-Sørensen, "Regulating Sustainable Finance in the Dark," *Eur. Bus. Organ. Law Rev.*, vol. 23, no. 1, pp. 47–85, 2022, doi: 10.1007/s40804-021-00237-9.
- [16] P. D'Orazio, "Towards a post-pandemic policy framework to manage climate-related financial risks and resilience," *Clim. Policy*, vol. 21, no. 10, pp. 1368–1382, 2021, doi: 10.1080/14693062.2021.1975623.
- [17] C.-A. Papari, H. Toxopeus, F. Polzin, H. Bulkeley, and E. V. Menguzzo, "Can the EU taxonomy for sustainable activities help upscale investments into urban nature-based solutions?," *Environ. Sci. Policy*, vol. 151, 2024, doi: 10.1016/j.envsci.2023.103598.
- [18] R. Inderst and M. M. Opp, "Sustainable finance versus environmental policy: Does greenwashing justify a taxonomy for sustainable investments?," *J. financ. econ.*, vol. 163, 2025, doi: 10.1016/j.jfineco.2024.103954.
- [19] L. Becchetti, M. Cordella, and P. Morone, "Measuring investments progress in ecological transition: The Green Investment Financial Tool (GIFT) approach," *J. Clean. Prod.*, vol. 357, 2022, doi: 10.1016/j.jclepro.2022.131915.