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Bibliometric Analysis: Sustainable Finance through Environmental, Social, and Governance (ESG) Principles

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Abstract. This study aims to explore the application of Environmental, Social, and Governance (ESG) principles in the context of sustainable finance and its impact on the long-term sustainability of companies. Due to increasing global awareness of issues such as climate change and the social environment of companies, ESG principles are important for investors and companies when making decisions. The Bibliometric research used the VOSviewer approach. The analysis framework was based on an extensive data set from the Scopus from 2011 to mid-2024. 427 articles were published after taking several stages of the research protocol. The results of this study state an overview of the importance of implementing sustainable finance by both companies and governments. Based on the results of this study, it can be said that the implementation of sustainable finance and ESG in developing countries has been very low. The results of this study are expected to provide deeper insights into the implementation of sustainable finance and encourage further collaboration to achieve global sustainability goals. By integrating ESG principles, it is hoped that companies can not only achieve good financial performance but also contribute to overall social and environmental welfare.

Keywords: Sustainable finance, ESG, Blibliometric

1 Introduction

The world has currently taken climate change, increasing greenhouse gas emissions, depleting natural resources, and increasing population. These have caused a transition to a sustainable economy, which has a significant impact on the economic shift (Amisha Gupta & Shumalini Goswami, 2024)[3] as experienced by all countries. Developing and developed countries have experienced significant changes in how companies and investors are responsible for social and environmental aspects. Investors think that social and environmental responsibilities based on sustainability are implementing sustainable finance. Sustainable finance is a concept in the field of finance that integrates environmental, social, and governance (ESG) factors into financial, investment, and business decision-making. Its goal is to ensure that economic activities and investments not only generate financial returns but also contribute to environmental sustainability and social well-being. Sustainable finance refers to ESG initiatives from companies, governments, and macro-financial authorities to finance renewable and environmentally friendly energy projects (Cheng et al., 2021; Le et al., 2021). It directly refers to ESG principles (Nirino et al., 2021). It serves as a financial innovation for solving finance provided by an organization, committed to social and environmental responsibility (especially carbon reduction). In Europe, there is already an investment bank that is intended to help provide loans to organizations to carry out carbon emission reductions. The integration of ESG principles into corporate strategy and investments has driven progress toward the SDGs through socially responsible investments (Arefeen and Shimada, 2020; Camilleri, 2017; Goel et al., 2022; Risi et al., 2021; Vishali and Shafi, 2024). Figure 2 reports the CO_2 development and greenhouse gas emissions worldwide.

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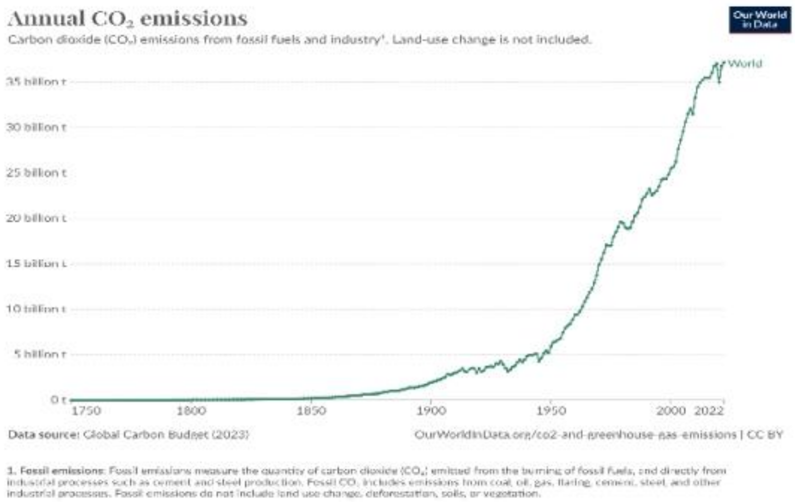


Source: Our World in Data

Fig. 1. CO_2 Development and Greenhouse Gas Emissions Worldwide

Climate change and environmental degradation have a significant impact on the activities of an organization. Sustainability issues have been growing, such as global warming (Lin and Niu, 2018) and decreasing natural resources (Mishra et al, 2021). All countries have begun to create sustainable strategies implemented by almost all levels of society. Environmental sustainability issues create an urgency to find how to take economic activities that not only focus on profitability but also consider environmental impacts. This is also supported by stakeholders to provide transparent information on the company's social and environmental responsibilities. It encourages companies to adopt more sustainable business practices, especially those oriented towards the environment. Nowadays, many countries and international institutions have begun to implement policies and regulations that encourage the adoption of sustainable financial practices. Sustainable finance develops as a sustainable financial innovation that is oriented towards ESG sustainability. Examples of this innovation can be green bonds, social bonds, sustainability bonds, sustainability-linked loans, and green loans. Thus, it is important to support the transition to a greener and more inclusive economy and ensure that financial investments have a long-term positive impact on society and the environment.

(Naeem A.M et al., 2023) found three types of green finance and socially responsible investment sustainability, green funding, and climate finance. (Clemens Fuest & Volker Meier, 2023), the results of their research stated that sustainable finance has an impact on welfare costs, but it must have a more targeted climate policy and the implementation of sustainable finance can be utilized by the government as an instrument to influence environmental policy decisions that can be directed to future governments. (Liu et al, 2023) showed that Bank provides funding loans to companies that implement sustainability can have a positive impact on the development of companies in the future and the government is expected to encourage commercial banks to provide loans. (Marco Migliorelli, 2021) argued that sustainable finance can encourage the emergence of certain financial risks and policy risks. Of course, this heterogeneity may weaken policies and industry efforts to streamline and optimize sustainable finance. Based on the background and previous research, this research paper attempts to explain how the trend of implementing sustainable finance that prioritizes ESG principles in various parts of the world runs effectively. It focuses on the application of sustainable finance in dealing with the impacts of climate change. It presents an analysis of a bibliometric review using VOSviewer.

2 Literature Review

Changes in investors' preferences are the main factor in sustainable finance (Azadda, W. N et al, 2023). It began with the millennial generations who wanted to invest their money to benefit others (Forbes Media LLC, 2023). Currently, they viewed companies that can consistently implement social and environmental responsibility as a factor in choosing to invest in a company (JPMorgan Chase and Company, 2023). Investors also include ESG factors as important long-term investment considerations for future investment portfolios. Sustainable finance is a decision-making process that considers ESG factors. The governance component in ESG focuses on how companies are managed and supervised and has an important role in eliminating environmental and social factors as a mechanism for financial decision-making (Azadda, W. N et al, 2023). Governance components include board structure, financial transparency, business ethics, and compliance with the law. Social components include where companies that can prioritize employee well-being, promote diversity, inclusion, and human rights, and have positive relationships with local communities to get a better image and stronger customer loyalty. The consistency of a company with good social practices can also increase employee productivity and satisfaction, which can improve company performance. Environmental factors include adaptation and mitigation of climate change, such as reducing carbon emissions and pollution, and preserving biodiversity (European Union, 2022).

(Xiuzhen et al, 2020), the results of the study stated that sustainable finance is a means to protect and improve the environment. It integrated financial decisions with ESG issues (C. li & Umair, 2023). Thus, the implementation of sustainable finance can encourage economic growth that is more aware and considerate of the environment and society. It is a long-term investment related to the company's operational activities and projects and it can encourage green economic growth. When environmental issues and problems are included as considerations in the financial decision-making process, a country can overcome climate change and restore the reduction of natural resource use leading to an environmentally friendly and socially responsible economy.

3 Method

This study used an analytical approach in the form of bibliometrics to review the research literature. To help analyze, it employed a tool in the form of VOSviewer software to reduce bias during the selection, analysis, and assessment of articles (Iddy & Alon, 2019; Secundo et al., 2019) ISI Web of Science (WoS). Bibliometric analysis is an increasingly popular approach to uncovering research patterns (Ahmi & Mohamad, 2019). Bibliometric analysis relies on citation records and cited references to identify relationships and patterns in research on a particular topic. The steps of bibliometric analysis in this study were divided into four parts: identifying search terms, generating initial search results, collecting initial data statistics, and analyzing data (Garza & Reyes, 2015). Furthermore, it presented a PRISMA diagram.

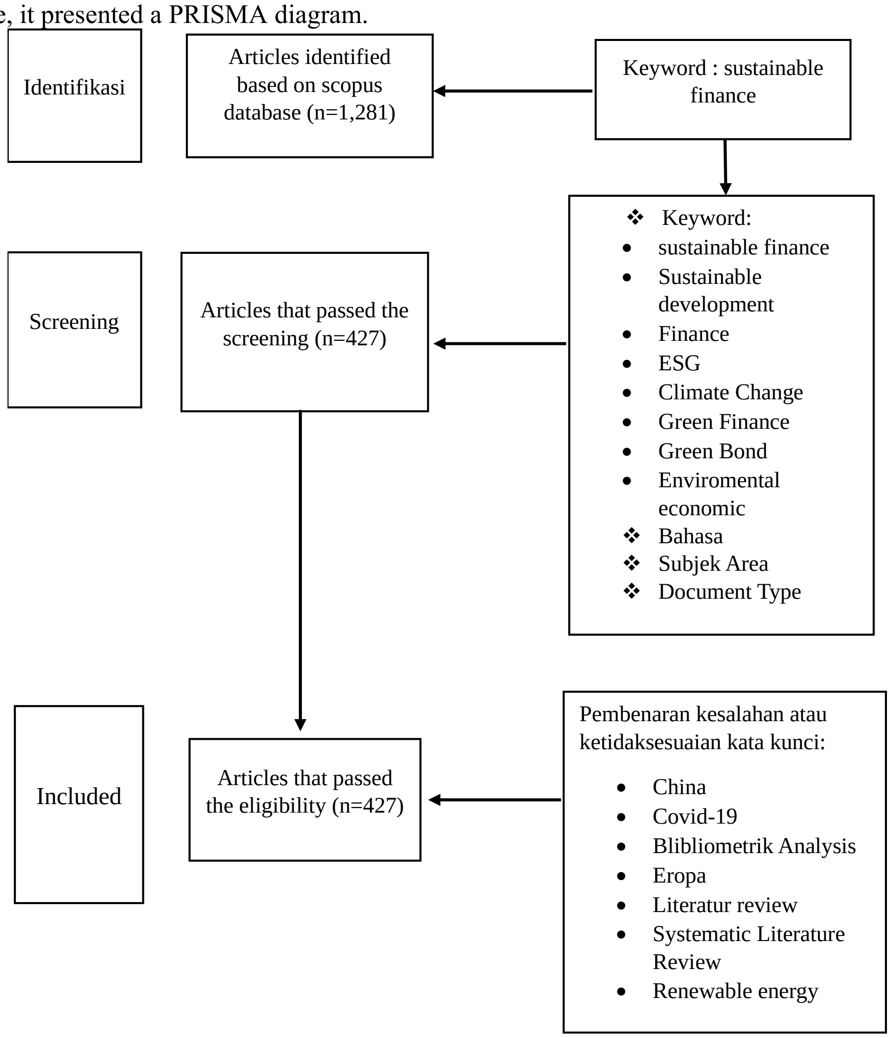
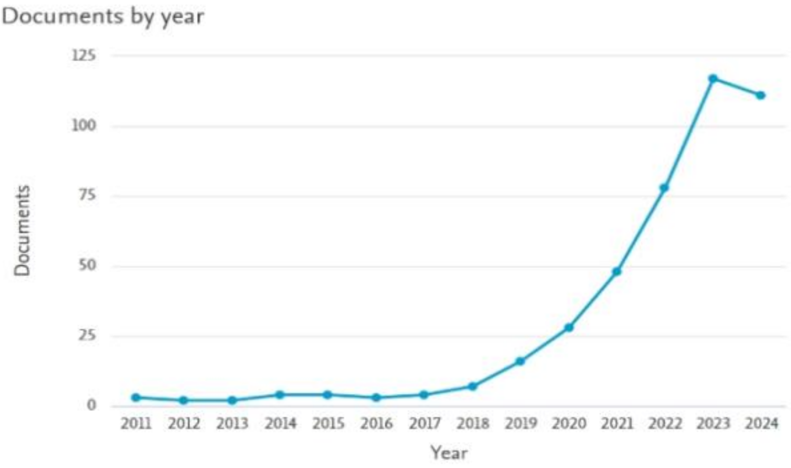


Fig. 2. Prisma Diagram

4 Results and Discussion

4.1 Publication Trend

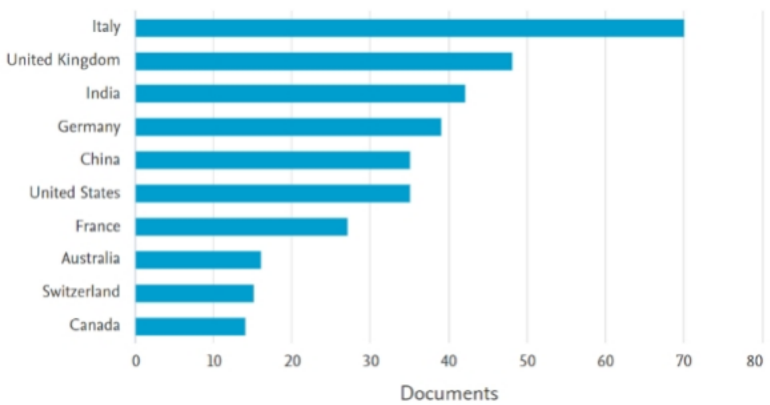


Source: Results of Scopus Analysis

Fig. 3. Publication Trend

Figure 1 shows the year of publication on sustainable finance, types of green financing, and ESG. The figure shows the publication trend needed from 2011 to 2024. This publication trend reached its highest peak in 2023 with 117 studies, which was a significant increase compared to 2022 with 78 studies. It is possible that at the end of 2024 there will be an increase. As the trend presented in the figure, the topics of sustainable finance and ESG have been increasingly popular with academic researchers, so that it can be used for additional knowledge insight to stakeholders on the importance of implementing sustainable finance, ESG in the midst of uncertain climate change. Researchers conducted screening in that year range because they wanted to see significant developments from year to year that discussed financial sustainability and awareness of the importance of social and environmental responsibility. Figure 1 shows that the publication trend in the academic field has been increasing from year to year. This indicates that the more advanced the era, every community, organization, and company must take part in maintaining sustainability and the environment. The development and innovation of sustainable finance, financing, and the implementation of ESG are very necessary to achieve sustainability goals.

4.2 Best Countries for Scientific Researches

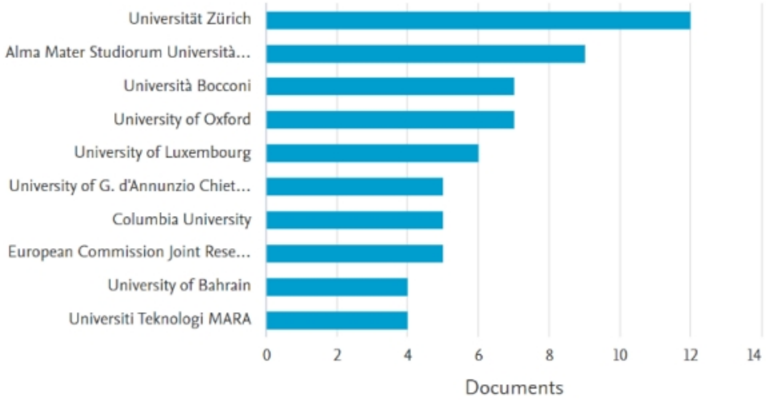


Source: Results of Scopus Analysis

Fig. 4. Best Countries for Scientific Researches

Fig. 4 reports that most of developed countries have conducted these researches, and it is even possible that companies in these countries have implemented sustainable finance and ESG well. Of the 10 countries, some of their industries have grown rapidly throughout the world. Italy published 70 published articles; the United Kingdom published 48 articles; India published 42 articles.

4.3 Institutions



Source: Results of Scopus Analysis

Fig. 5 Institutions

Figure 3 shows the last ten years of institutions that publish papers on sustainable finance and ESG. The four institutions that could contribute many publications on sustainable finance and ESG registered in the Scopus database are the University of Zurich (12 publications), Alma Mater Studiorum University (9 publications), Bocconi University (7 publications), and Oxford (7 publications). These four institutions are the best universities in Europe. It indicates that most institutions in Europe are aware of the importance of researches and their contribution to the development of financial sustainability, responsibility and concern for the environment, especially for the diversity of flora and fauna and greenhouse gas emissions (GHG).

4.4 Research Grand Project

Tabel 1. Best Institutions for Research Grand Project

Organisations	Amount of Publications
European Commission	15
National Natural Science Foundation of China	10
Horizon 2020 framework Programme	6
Fundacao para a Ciencia e a Tecnologia	4
Horizon 2020	4
Ministerio da Educacao e Ciencia	4
Universitas Zurich	4
Deutsche Forschungsgemeinshaft	3
Fonds National de la Recherche Luxembourg	3

Source: Results of Scopus Analysis

Based on the table above, the largest funding sponsor is the European Commission, which could publish 15 articles. It is the executive body of the European Union whose main role is to propose new laws and policies, monitor its implementation, and manage the European Union budget. Based on the website that researchers have explored, the European Commission organization has a commitment or policy to protect the environment and seeks to minimize risks to climate, human health, and biodiversity. Additionally, the European Commission opens funding opportunities for innovation-oriented research activities, this is evidenced by the results of institutions with funding that can publish the most articles over the past 10 years.

4.5 Bibliometric Analysis

4.5.1 Keywords

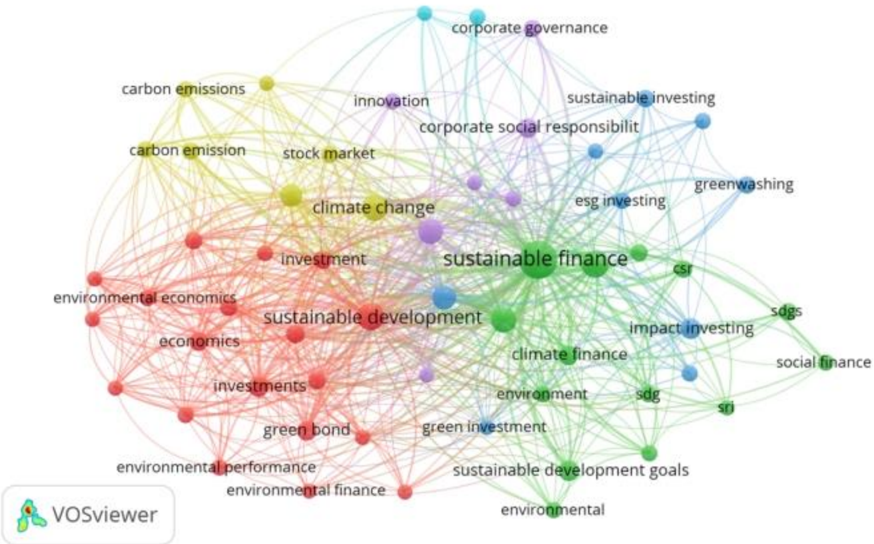
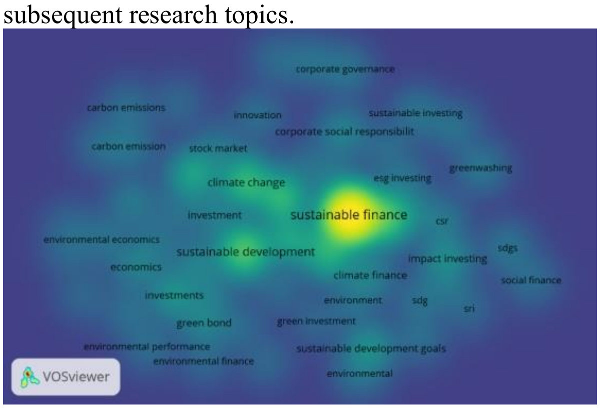


Fig. 6 *Keywords*

To develop an understanding of the growth of sustainable finance and ESG research, we conducted a high-frequency keyword network visualization analysis with minimum occurrence criteria shown in Figure 5. Keywords reflect research topics in a particular field (Chen et al., 2021; Su & Lee, 2010). We examined the occurrence and relationship between keywords and subject theme trends to determine the direction of research on sustainable finance and ESG. The keywords that frequently appear are sustainable finance (349 times), sustainable development (79 times), sustainability (55 times), green finance (48 times), and ESG (74 times). Keywords that rarely appear with low frequency indicate the novelty of the topic and the urgency of future research (Khan, M. A, 2022) in the field of sustainable finance. Figure 5 shows the density visualization or density marked on the network visualization. The networks connect research variables related to sustainable finance. The prominent keyword visualization colors are green, yellow-green, and red. Visual colors such as purple and light blue indicate that the variable is still rarely associated or research developments with sustainable finance.

Based on the visual results of Overlay Visualization ESG investing, there are a few research developments associated with sustainable finance and ESG investing is a study that was widely conducted in 2023. The color at each point in the keyword represents the density of items on a particular variable. A darker color indicates that there is more development in the research. Thus, less common keywords are displayed in a less dense color, indicating that the study topic is still narrow and requires further analysis (Widyantoro & Arief, 2022). Density Visualization shows that the lighter the color, the more research on sustainable finance has been conducted. For less dense colors such as SDGs (Sustainable Development Goals), green investment, and socially responsible investing (SRI), environmental performance, and greenwashing can be used for discussions on subsequent research topics.



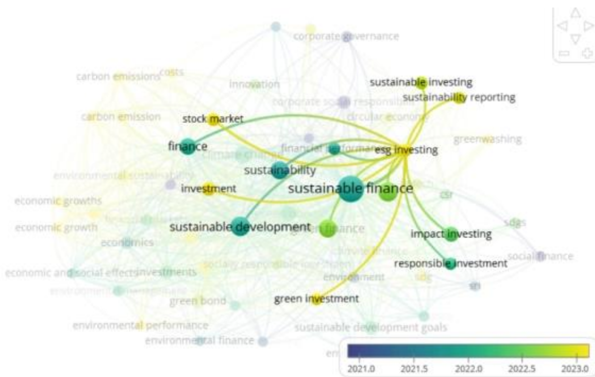


Fig. 7. Density Visualization Keywords

4.5.2 Co- Authors

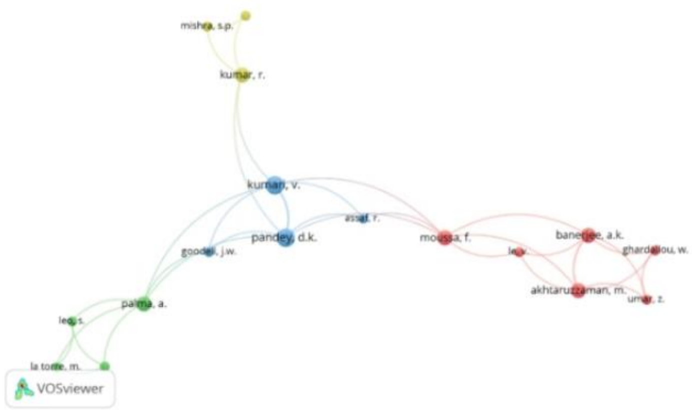


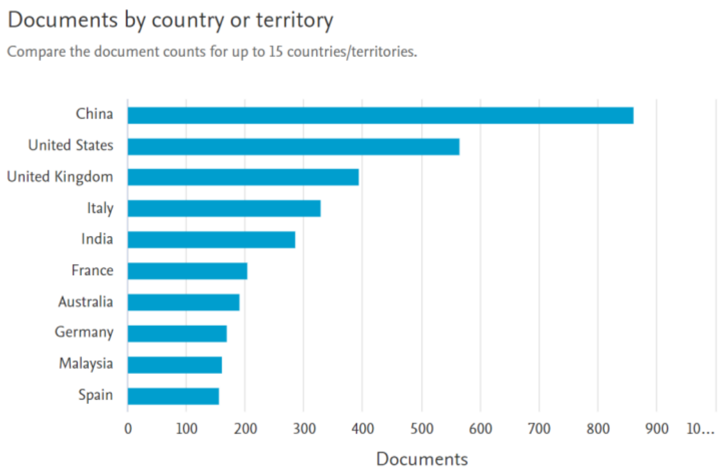
Fig. 8. Co- Authors

Based on the visualization results of VOSviewer (Figure 7), there are 4 different author network clusters represented graphically. The cluster network shows how authors are grouped according to specific fields of study or interests regarding sustainable finance and ESG Investing research. Furthermore, Figure 10 shows the density of the network between authors, and the number of author publications. The level of network integration is indicated by network density, which is a measure of how many nodes in the network are connected through edges. The top three authors are Paterline S (3 documents, and a total link strengt of 10), Pandey (3 documents, and a total link strength of 8), Chiappini, H (4 documents, total link strength of 8)

4.5.3 ESG

Best Countries for Scientific Researches

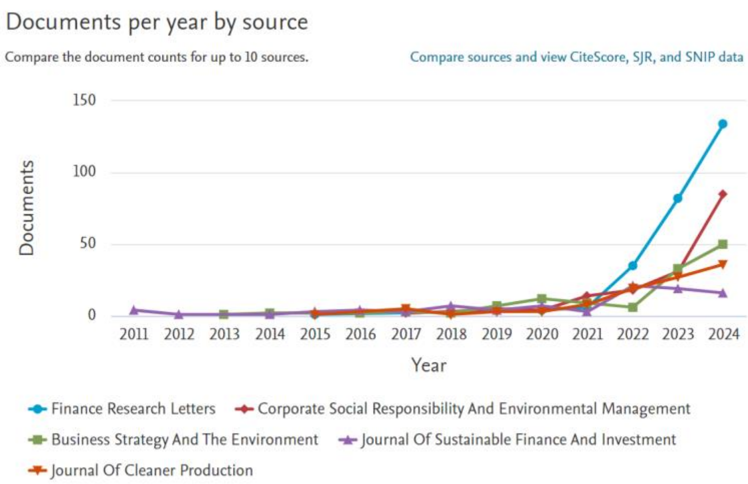
Based on figure 8, most of the developed countries that have conducted this research may even have companies in these countries that have implemented ESG well. Of the 10 countries, among them the industry has developed rapidly throughout the world, especially China, whose market product development has spread throughout the world. Based on this graph, China's contribution published the most 860 publication articles. United State as many as 564 articles. United Kigdom as many as 393 publication articles.



Source: Results of Scopus Analysis

Fig. 9. Best Countries for Scientific Researches

Tren Document per year by source



Source: Results of Scopus Analysis

Fig,10 Documents per year by source

Based on figure 9, there are 6 top journal publications with ESG theme. Finence Research Letters 262 articles, Corporate Social Responsibility and Enviromental management 162 articles, Business Strategy and The Enviroment 127 articles, Journal Of Cleaner Production 103 articles, Journal Of Sustainable Finance And Investment 93 articles. Based on the graph above, the Finence Research Letters Journal has a stable annual increase in the publication of articles with ESG topics.

Keyword ESG

Based on Figure 10, it can be concluded that research on esg is mostly associated with financial performance, esg performance, and investment. Based on Figure 10, it shows that many studies relate to industries in China. However, there are still many studies that have not linked the application of ESG with internal control within an organisation. In its application, ESG requires strong internal control so that it will tend to be more successful in implementing sustainability policies. Internal control also serves to help companies maintain accountability and prevent manipulation of ESG data reported to the public.

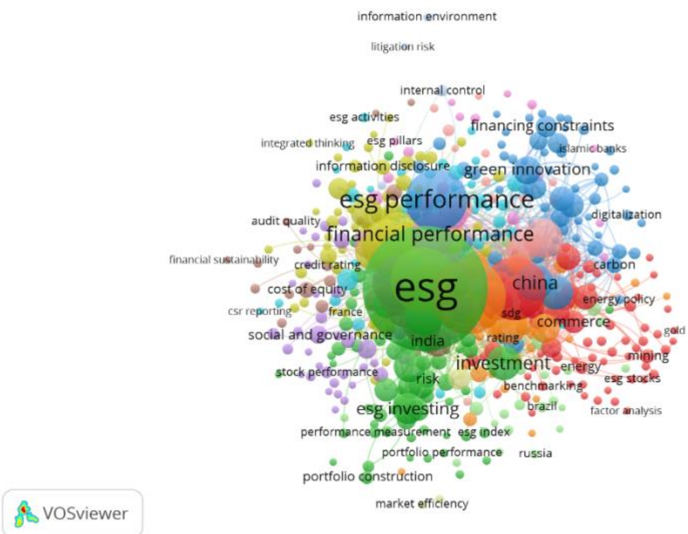


Fig. 11. Keyword ESG

CO -Author

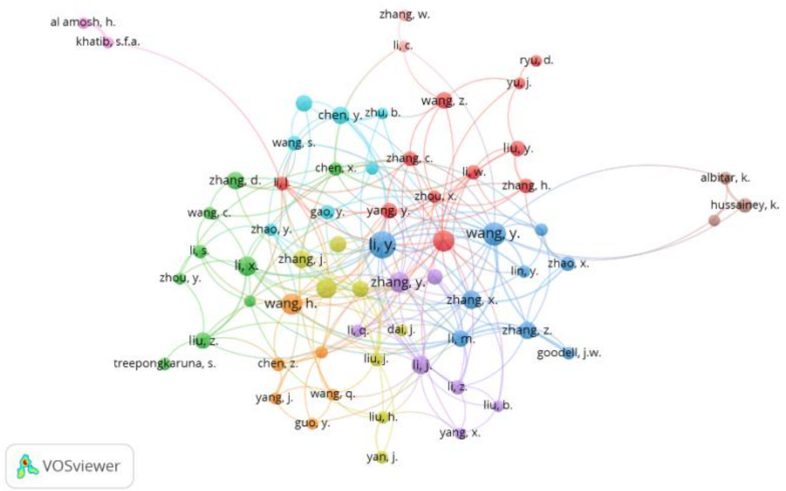


Fig. 12. CO-Autor

5 Conclusion

This study examines the application of Environmental, Social, and Governance (ESG) principles in the context of sustainable finance and its impact on the long-term sustainability of companies. Based on the results of the bibliometric analysis and the results of the Scopus analysis, it can be concluded that the discussion of sustainable finance is very diverse in types of financing and complex. The implementation of sustainable finance has been widely carried out by developed countries, but in developing countries, it is still very low. Sustainable finance is financing that focuses on organizations that apply ESG principles and are environmentally friendly. All industrial companies throughout are expected to be able to implement a sustainable system. Environmental sustainability and the implementation of sustainable finance are very important for all living things and the sustainability of the company. It is hoped that further research can provide innovation and solve complex issues in the implementation of sustainable finance.

The data sources of the study are limited to the Scopus website. The focus of study only uses articles in English and the subject area only focuses on the fields of management, finance, and accounting. Suggestions for further research will focus on the types of environmental financing in the form of sustainable linked-load, green bonds, and the development of greenwashing and use more diverse database. Therefore, it is expected that the research results will be more relevant and make it easier to find out the development of the research.

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