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MEASURING THE PULSE OF SUSTAINABLE INVESTMENT: A SYSTEMATIC REVIEW & BIBLIOMETRIC PERSPECTIVE

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Abstract

In recent times, increasing regulatory pressure and changes in investor preferences have led to an increase in the importance of sustainable investment at both academic and practitioner levels, with the field still occupying the formative stage. Therefore, the objectives of this study are to explore the intellectual underpinnings of and suggest future research avenues in the discipline of sustainable investment, as well as to conduct a systematic review and bibliometric analysis. In total 1,222 articles were selected from the Scopus database for the period 2013-2023. The study follows the SPAR-4-SLR protocol, involving performance analysis and science mapping using VOSviewer and the R-package. Network analysis revealed eight major clusters primarily focusing on firms' financial performance, stock returns, contributions to climate change, economic growth, sustainable development goals, risk assessment, and corporate social responsibility. Additionally, the study developed a unified taxonomy model based on a causal framework that includes the foremost independent, mediating, moderating, and dependent variables, studied in the field of sustainable investment.

Keywords: Sustainable Investment, Systematic Review, Bibliometric Analysis, ESG, Sustainable Development, Taxonomy, R-package, VOSviewer, SPAR-4-SLR.

1. INTRODUCTION

In recent times, environmental sustainability remains a key challenge for humanity; the difficulties brought on by extensive nitrogen pollution do not seem to be very comfortable or advantageous for humanity; lack of sustainability measures may result in increasing costs of production, difficulties in financial access, insufficient human resource competency, destructive climatic changes, and heavy reliance on artificial and harmful pesticides (Ngatindriatun & Adzim, 2022). Ocean acidification, scarcity of fresh water, holes in the ozone layer, global warming, deforestation, and biodiversity loss, are just a few of the numerous problems posed by climate change that the world is already facing (Sekhar & Raina, 2021; Cherkaoui & Aliat, 2023). The idea of Sustainable Development gained worldwide acceptance at the United Nations Conference on Human Environment (1972), where stakeholders agreed

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that economic and environmental development can be considered mutually beneficial (Paetzold et al., 2022; Aroonsrimorakot et al., 2022). Another historical development towards 'Sustainable Development' (SD) can be traced to the year 1987 when the World Commission on Environment and Development (Brundtland Commission) conceptualized SD as 'Our Common Future', the recommendations provided by the Brundtland Commission recalled SD to be advocated as the most important factor in the agenda for global development in United Nations Conference on Environment and Development (UNCED) (Rio Earth Summit) held in 1992 (Handl et al., 2012; WCED, 1987).

The notion of sustainability focuses on the strong integration of environmental, social, and economic benefits for present and future generations (Srisawasdi et al., 2023; Ellili, 2023). The 2030 Agenda for Sustainable Development was introduced by the United Nations (UN) General Assembly in September 2015 and serves as a shared framework for the effective implementation of sustainability principles. An individual's pro-environmental behavior can be substantially influenced by their connection to nature, biospheric values, empathy towards the environment, subjective norms, moral norms, and intentions to conserve natural resources, which in turn generates responsible practices to ensure sustainable approaches (Pinthong et al., 2024). Sathatip (2024) extended the Norm Activation Model (NAM) by identifying that anticipated feelings and the ascription of morality and duty have been shown to be important and crucial determinants of consumer intentions, especially when it comes to efforts to cut back on waste management.

The management of local resources by the community is driven by social and cultural factors, contrary to governmental influence, aligning with the objectives of sustainable development in this context, small medium sized enterprises can play an important role by using local resources effectually and proficiently (Romprasert & Trivedi, 2021). To combat climate change successfully, it is vital to undertake a fundamental transformation of the financial sector (Epstein & Buhovac, 2014; Kölbel et al., 2020; Sood et al., 2022). Despite market unpredictability during COVID-19, investments with a sustainable theme have expanded significantly in global capital markets (UNCTAD, 2021). There was a notable increase in net inflows to sustainable funds in the United States, reaching an estimated $21.4 billion in 2019, $51.1 billion in 2020, and a record-breaking $69.2 billion by 2021 (Hale, 2020). Notably, prior research studies have analyzed different dimensions with a particular focusing on 'financing' perspectives such as sustainable finance, green finance, climatic finance, recycling behavior, green bonds, and environmental finance (Alsmadi et al., 2023; Coeslier et al., 2016; Ouyang et al., 2023; Sharma et al., 2022).

A systematic review provides a transparent method for accumulating, analyzing, and assessing research findings on a given subject by employing scientific procedures (Sathatip et al., 2024). Additionally, bibliometric analysis uses a variety of quantitative techniques to measure, monitor, and assess academic publications (Donthu et al., 2021; Paul et al., 2021; Rojas-Sánchez et al., 2022). However, a systematic literature appraisal in the domain of sustainable investment is scarce, since it is still an evolving field of research; it is a multifaceted concept encompassing various academic disciplines such as finance, economics, environmental studies, and social sciences, the diversity in perspectives poses a challenge in obtaining a comprehensive understanding of the subject matter (Indana & Pahlevi, 2023). A systematic literature review (SLR) can amalgamate these diverse research strands to present a holistic view of the current state of knowledge.

Moreover, the dynamic nature of sustainable investment is characterized by varying definitions and frameworks across different studies and regions, it is crucial to clarify these definitions, identify commonalities, and trace their development over time. Employing a SLR standardizes the definitions and highlights theoretical advancements, thereby enhancing the coherence of understanding of sustainable investment (Zairis et al., 2024). Empirical studies

on sustainable investment often yield conflicting results, particularly concerning financial outcomes, risk evaluation, and overall impact. These discrepancies create uncertainty among stakeholders, including investors, policymakers, and researchers; SLR systematically reviews the existing data, reconciling contradictory findings, and identifying unexplored areas which require further investigation.

The impacts of sustainable investment practices differ across markets, with notable distinctions between developed and emerging economies, literature frequently overlooks emerging markets, leading to a biased understanding of sustainable investment practices on a global scale (Aulia et al., 2024); conducting a SLR can uncover these geographical and market-specific variations, offering insights for potential research endeavors.

Consequently, this study provides a comprehensive literature review of sustainable investment, reflecting a spectrum of sustainable investments that is not confined to just one aspect. Bibliometric analysis, in particular, integrates the combination of big data analytics with artificial intelligence in two major ways. First, a bibliometric search was performed on a scientific database to extract a considerable volume of bibliometric data connected to notable works in the field of research using defined keywords. Second, artificial intelligence was employed to uncover major variables and their possible relationships in the form of clusters. Additionally, this study contributes significantly by developing a taxonomy in the form of a causal framework based on synthesis from 1,222 research articles comprising key independent, mediating, moderating, and dependent variables, which have been studied in the domain of sustainable investment. The research questions presented aim to fill the gaps identified in the current literature, in order to tackle these crucial issues and enhance comprehension of sustainable investment:

Q1. What is the research publication trend for sustainable investment during 2013-2023?

Q2. What are the most prominent journals and cited research articles on sustainable investment?

Q3. Which are the major institutions and countries contributing to the research on sustainable investment?

Q4. Who are the major contributing authors to the research on sustainable investment?

Q5. What are the major research themes which have been explored in the context of sustainable investment?

Q6. What are the possible directions for future research in the context of sustainable investment?

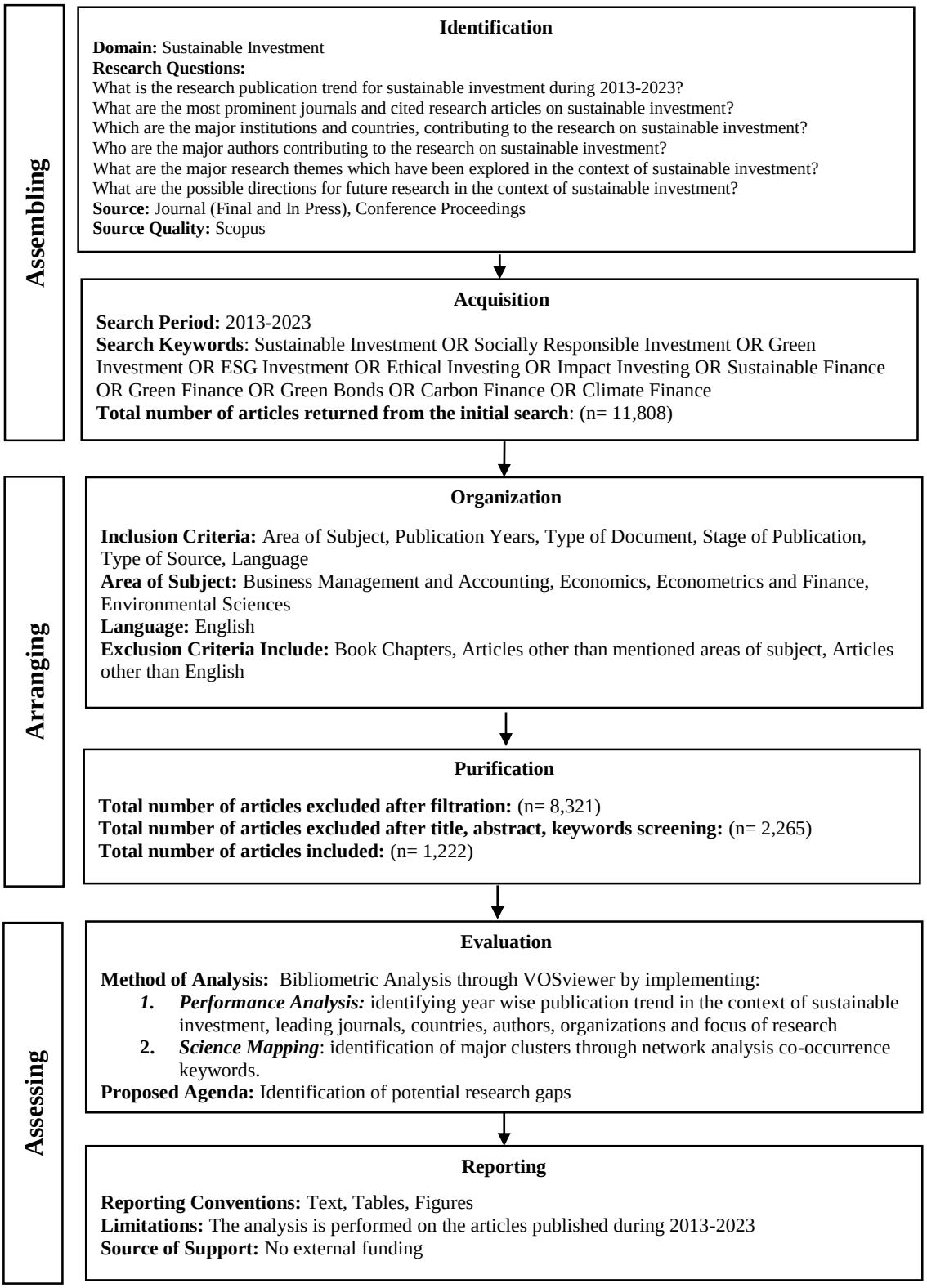
2. METHODOLOGY

This study executes the 'The Scientific Procedures and Rationales for Systematic Literature Reviews (SPAR-4-SLR)' procedure. Figure 1 depicts the protocol (SPAR-4-SLR) which comprises of three major steps: assembling, which involves identification and acquisition of articles; arranging, in which research articles are organized and filtered; and assessing, which involves evaluating and the reporting of the synthesis from selected articles, using an interrogative approach which aims to answer the 'why', 'what', 'where', 'when', 'how', and 'who' of the systematic literature review (Paul et al., 2021).

2.1 Assembling

This study used the Scopus database as a search engine to identify research articles in the field of interest. Scopus is frequently regarded as an organized, focused, and systematic database of academic literature, such as scientific journals, books, and conference proceedings.

Figure 1 Systematic Literature Review (SPAR-4-SLR) Protocol



The database includes 23,452 journals, 120,000 conference proceedings, and 206,000 books published by more than 5000 foreign publishers and has a fast update frequency (Borrett et al., 2018; Singh et al., 2021). In comparison with Web of Science (WoS), Scopus offers a greater selection of categories and topic areas, making it easier for scholars to find journals

based on topics that are most pertinent to the review domain (Paul et al., 2021). Scopus has established itself as a reliable and comprehensive bibliographic data source, offering wider and unique coverage in comparison to WoS. Its user-friendly interface and robust search tools enable easier navigation, and citation analysis to ensure the quality of research journals and tracking of research trends, providing more up-to-date information for evaluating research impacts, especially in emerging and interdisciplinary fields (Pranckutė, 2021; Indana & Pahlevi, 2023). The selection of keywords was based on a review of the literature, along with expert guidance. The following advanced search string in the Scopus database was used to assemble significant keywords: 'Sustainable Investment' OR 'Socially Responsible Investment' OR 'Green Investment' OR 'ESG Investment' OR 'Ethical Investing' OR 'Impact Investing' OR 'Sustainable Finance' OR 'Green Finance' OR 'Green Bonds' OR 'Carbon Finance' OR 'Climate Finance'

2.2 Arranging

To arrange the articles identified in the assembling stage, the category function of Scopus was used, in which the inclusion and exclusion criteria were implemented. The inclusion criteria were subject area, publication years, type of document, stage of publication, type of source, and language. The research papers were chosen for the period 2013–2023. Non-journal materials such as books, book chapters, and non-English publications were excluded. Consequently, a corpus of 3,487 research articles was produced. Moreover, on the basis of keywords, title and abstract screening, another 2,265 research articles were excluded, lastly a total number of 1,222 articles were selected for the assessment.

2.3 Assessing

A systematic review and bibliometric analysis were used to evaluate the final sample of 1,222 articles. Bibliometric assessment includes a performance analysis to determine year-wise publication trends in the context of sustainable investment, leading journals, countries, authors, and institutions. In bibliometric studies, performance analysis is used to examine the interrelationships between research constituents (Cucar et al., 2023; Donthu et al., 2021).

3. ANALYSIS OF LITERATURE

The increasing number of international agreements and strong emphasis on the importance of 'sustainable development' have also impacted the financial system, with business organizations expected to use the 3Ps approach, also known as the "Triple Bottom Line" (TBL). This approach, introduced by John Elkington, refers to the integration of people, planet, and profit, in business operations (Elkington, 1998). TBL disagrees with Friedman's contention that businesses should seek profit maximization, instead emphasizing that companies should not pursue profit at the expense of societal and environmental well-being (Sood et al., 2022).

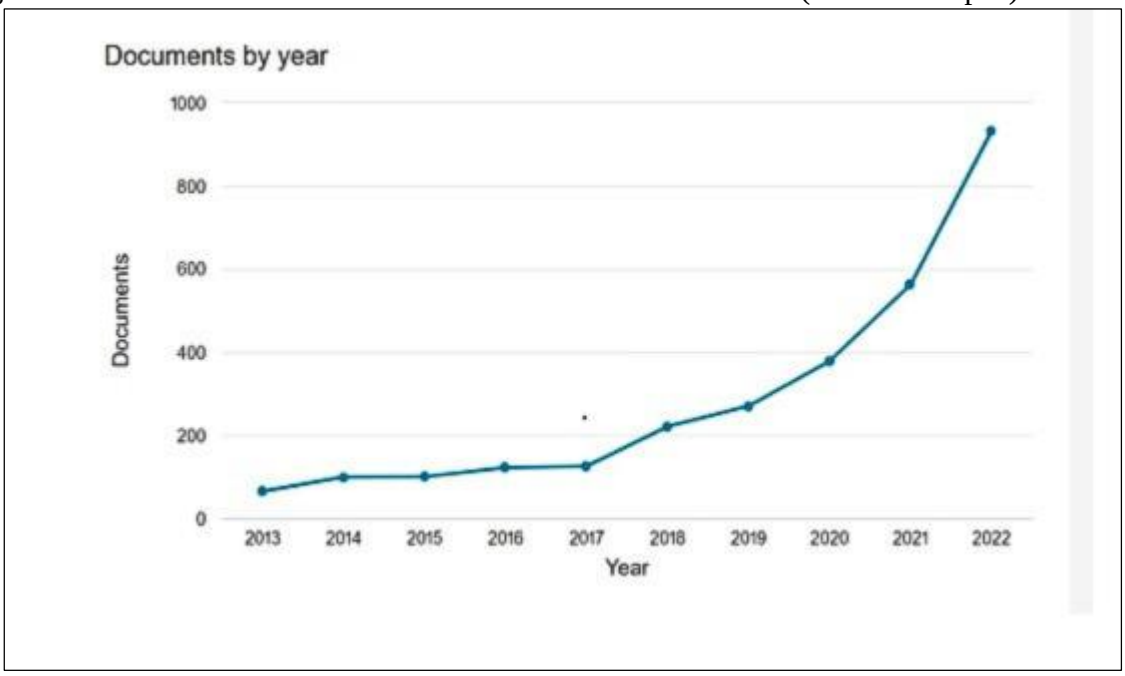
According to The **Forum for Sustainable and Responsible Investment** of the United States (US SIF), *'sustainable investment'* can be defined as a discipline that includes environmental, social, and governance, as core factors to maximize financial wealth and bring positive societal outcomes (USSIF, 2018). The concept of 'sustainable investment' includes three significant pillars: environmental, social, and governance (Hartzmark & Sussman, 2019; Kölbel et al., 2020; Kumar et al., 2022; Sood et al., 2022). *Environmental factors* include the efficient use of resources, minimizing greenhouse effects, implementation of environmental protection policies, and waste management (Díaz et al., 2022; Epstein & Buhovac, 2014).

Social factors include the consciousness and implementation of human rights, health and safety considerations, equal work opportunities, employee training and development, and employee representative unions (Epstein & Buhovac, 2014; Sood et al., 2022; Starks, 2021). *Governance factors* include the fiduciary and credible role of the board of directors, inclusion of managers to safeguard the interests of all stakeholders, and the implementation of transparent internal control systems (Beisenbina et al., 2022; Epstein & Buhovac, 2014; Kumar et al., 2022).

3.1.Research Publication Trend for Sustainable Investment

The research publication trend in the domain of sustainable investment for the period 2013-2022 is depicted in Figure 2. Sustainable investment has received considerable attention over the years. In particular, an exponential increase can be seen from 2015 onwards, when the United Nations presented the framework of the SDGs. However, the lowest number of articles in the field of sustainable investment was found to be (80) in 2013, while the increasing trend in terms of publication continued with notable proliferation; thus, the highest number of articles were found to be in 2022 (931 articles).

Figure 2: Research Publication Trend for Sustainable Investment (Source: Scopus)



3.2.Distinguished Countries for Sustainable Investment Research During 2013-2023

The results for the top contributing countries in the context of sustainable investment research for the period 2013-2023 are depicted in Table 1. The results reveal that the highest number of research articles belong to China (272 articles) followed by the United States (172 articles) and the United Kingdom (139 articles). However, the maximum number of citations remains with the United States (4,789 citations) followed by China (4,655 citations), and the United Kingdom (3,557 citations). Notably, the Netherlands yielded the highest number of average citations per document (43.80, with only 30 articles). North American, North Western European, Southern, and Eastern European countries, continue to remain the top contributors in the field of sustainable investment, with a total of 827 articles. Furthermore, Asian and Southeast Asian countries accounted for 574 research articles, of which 272 were from China. It is notable that China surpassed the US as the second most prominent sustainable funds

market, witnessing a 149% increase in sustainable assets since 2020 (Ma, 2022). Middle Eastern countries accounted for 52 articles. Lastly, Australia is the only Oceania country with total publication of 86 articles. The most notable nations in terms of publications on sustainable investment are presented in Figure 3.

Table 1 Distinguished Countries for Sustainable Investment Research During 2013-2023

S.NO	Country	Total Documents	Percentage of Documents (%)	Total Citations	Average Citations Per Document
1	China	272	17.16	4655	17.11
2	United States	172	10.85	4789	27.84
3	United Kingdom	139	8.77	3557	25.59
4	Italy	96	6.06	1745	18.18
5	Germany	93	5.87	3273	35.19
6	Australia	86	5.43	2176	25.30
7	France	83	5.24	2339	28.18
8	Spain	82	5.17	1577	19.23
9	Canada	65	4.10	974	14.98
10	India	63	3.97	738	11.71
11	Pakistan	63	3.97	1081	17.16
12	Malaysia	46	2.90	821	17.85
13	South Korea	36	2.27	435	12.08
14	Netherlands	30	1.89	1314	43.80
15	Saudi Arabia	30	1.89	337	11.23

Figure 3 Density Visualization of Top Contributing Countries for Sustainable Investment Research During 2013-2023 (Source: VosViewer)

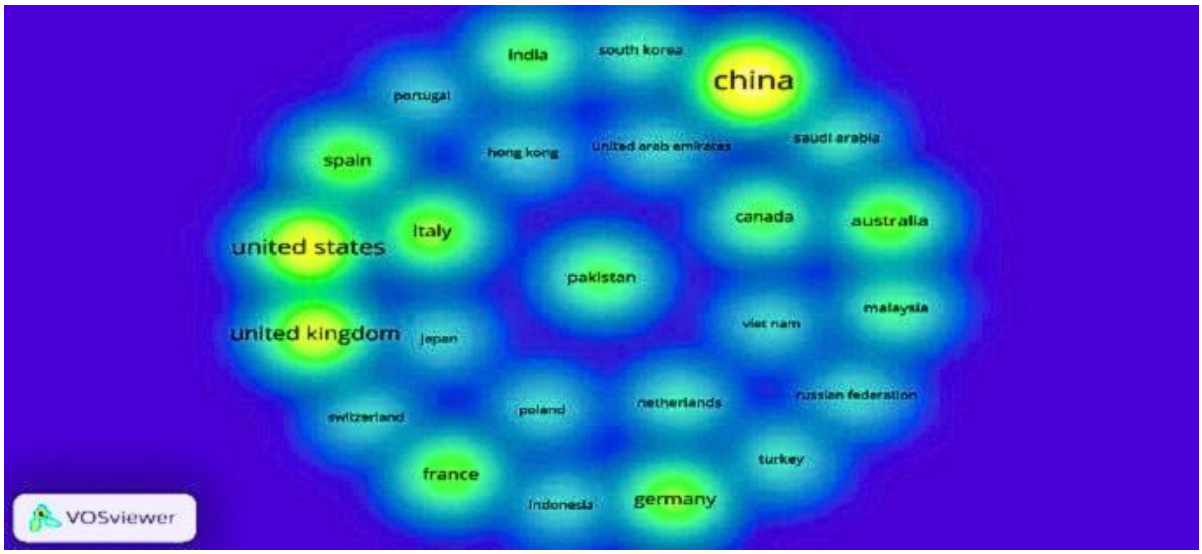


Table 2 presents the details of the top contributing countries in terms of co-authorship. China retains its top position in terms of co-authorship with 272 research publications, followed by US with 172 and UK with 139. The maximum number of citations in terms of co-authorship remains with the United States (4,789), followed by China (4,655), and the United Kingdom (3,557). It is also notable that Hong Kong has the lowest number of research publications in terms of co-authorship (21), whereas in terms of citations Poland has the lowest score (214).

Figure 4 depicts the bibliometric mapping for leading countries in terms of co-authorship on sustainable investment research.

Table 2 Top Countries in Terms of Co-authorship for Sustainable Investment Research During 2013-2023

S.NO	Country	Total Documents	Total Citations	Average Citations Per Documents
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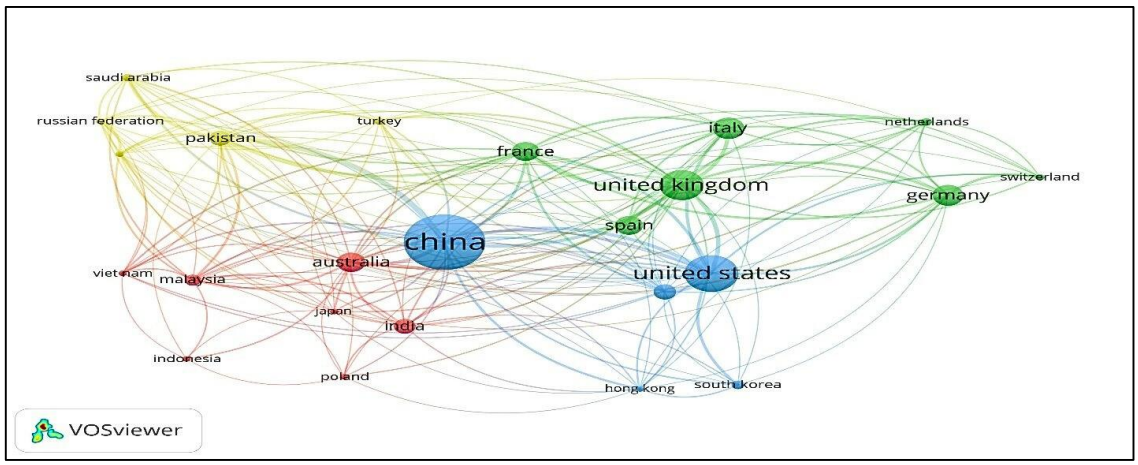
5	Germany	93	3273	35.19
6	Australia	86	2176	25.30
7	France	83	2339	28.18
8	Spain	82	1577	19.23
9	Canada	65	974	14.98
10	India	63	738	11.71
11	Pakistan	63	1081	17.16
12	Malaysia	46	821	17.85
13	South Korea	36	435	12.08
14	Netherlands	30	1314	43.80
15	Saudi Arabia	30	337	11.23
16	Turkey	28	397	14.18
17	Russian Federation	24	458	19.08
18	Switzerland	24	527	21.96
19	Indonesia	23	282	12.26
20	Poland	23	214	9.30
21	Viet Nam	23	403	17.52
22	Japan	22	563	25.59
23	United Arab Emirates	22	313	14.23
24	Hong Kong	21	444	21.14

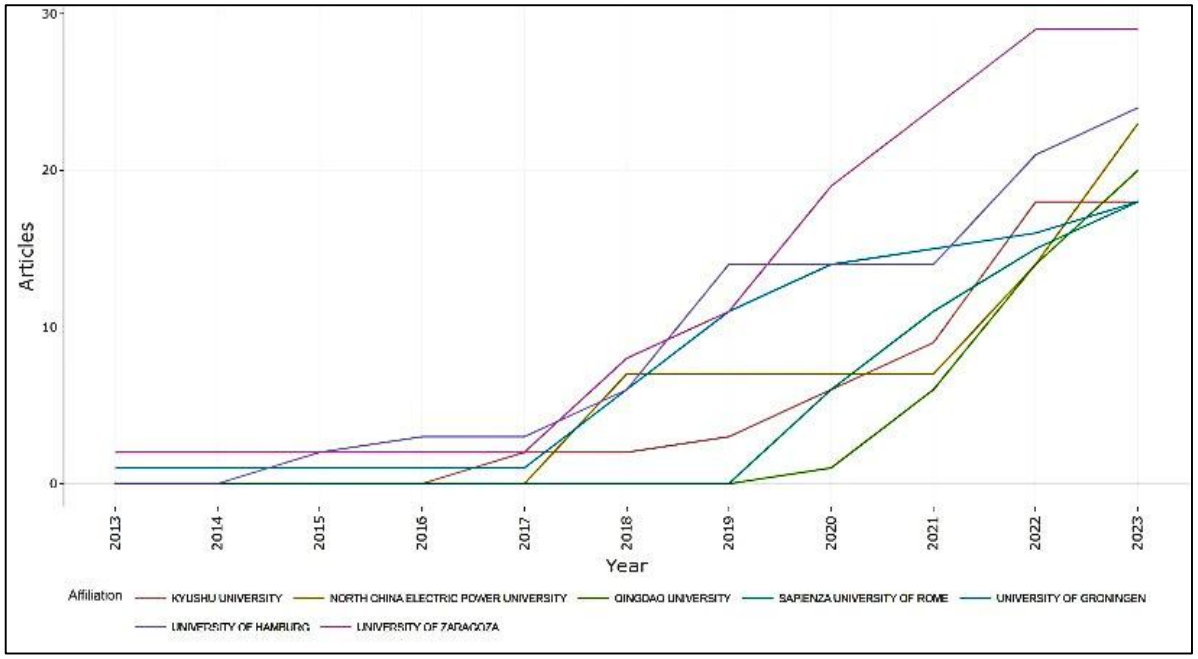
Figure 4: Top Countries in Terms of Co-authorship for Sustainable Investment Research During 2013-2023 (Source: VosViewer)



3.3 Prominent Institutions for Sustainable Investment Research During 2013-2023

The top contributing institutions in the context of sustainable investment research during 2013-2023 on the basis of publications is depicted in Figure 5, where the University of Zaragoza holds the top position with the highest number of publications in the domain of sustainable investment (29) documents, famously known for their research and teaching excellence as members of the EUREC, possess great expertise in renewable energy, energy efficiency, and sustainability elements. The second- highest number was held by the University of Hamburg (24). The University of Hamburg has made sustainability elements a major part of its mission statement and has taken various initiatives to promote SDGs by establishing the Center for a Sustainable University that allows networking and cooperation on SDG topics. Lastly, North China Electric Power University ranks third with (23) publications focusing on meeting sustainable development goals. The university has established the first Renewable Energy School to promote research in the field of renewable energy.

Figure 5. Prominent Institutions Research Publication Trend for Sustainable Investment During 2013-2023 (Source: R-package)



3.4 Top Contributing Research Journals for Sustainable Investment During 2013-2023

The top research journals that have significantly advanced the subject of sustainable investing between 2013 and 2023 are shown in Table 3. 10,748 citations were made to 508 research publications published in the top 12 contributing journals. The top three research journals among them are Sustainability (187), the Journal of Cleaner Production (59), and Business Strategy and the Environment (42); in contrast, Sustainability leads in terms of total citations (2,712), followed by the Journal of Cleaner Production (1,771), and the Journal of Sustainable Finance and Investment (1,558); on the other hand, the Journal of Business Ethics (i.e.) has the highest average number of citations per document. Figure 6 illustrates the leading research journals that have contributed substantially to the field of sustainable investment. Figure 7 depicts the cumulative occurrence trends of the top contributing journals in sustainable investment research.

Table 3 Top Contributing Journals for Sustainable Investment Research During 2013-2023

S.NO	Journals	Total Documents	Total Citations	Average Citations Per Document	Impact Factor
1	Sustainability (Switzerland)	187	2712	14.50	3.889
2	Journal Of Cleaner Production	59	1771	30.02	11.1
3	Business Strategy and The Environment	42	744	17.71	13.4
4	Journal Of Sustainable Finance and Investment	34	1558	45.82	4.3
5	Corporate Social Responsibility and Environmental Management	28	580	20.71	9.8
6	Economic Research-Ekonomska Istrazivanja	28	185	6.61	3.54
7	Journal Of Business Ethics	28	1514	54.07	6.1
8	Environmental Science and Pollution Research	27	378	14.00	5.8
9	Energy Economics	23	466	20.26	9.252
10	International Review of Financial Analysis	20	211	10.55	8.235
11	Research In International Business and Finance	16	280	17.50	6.143
12	Resources Policy	16	349	21.81	10.2

Figure 6 Top Contributing Journals for Sustainable Investment Research During 2013-2023 (Source: VosViewer)

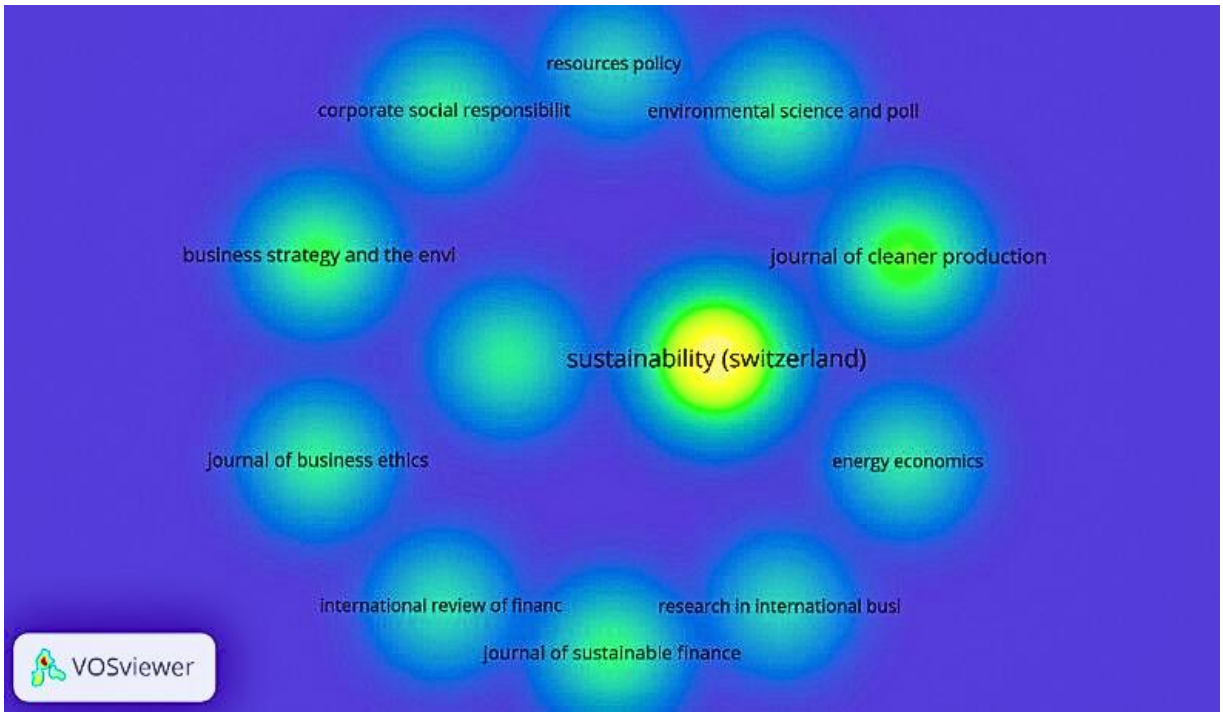
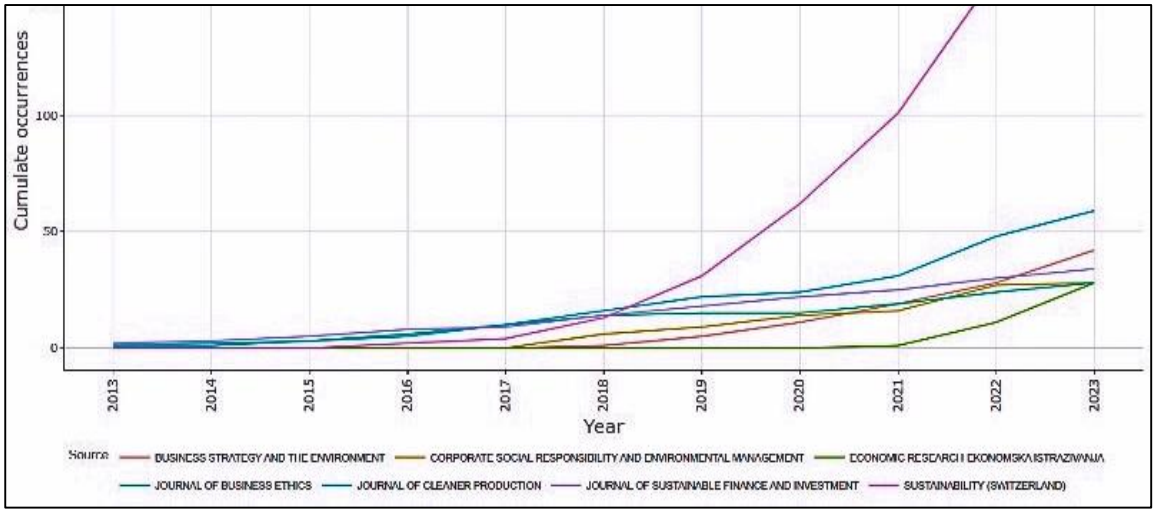


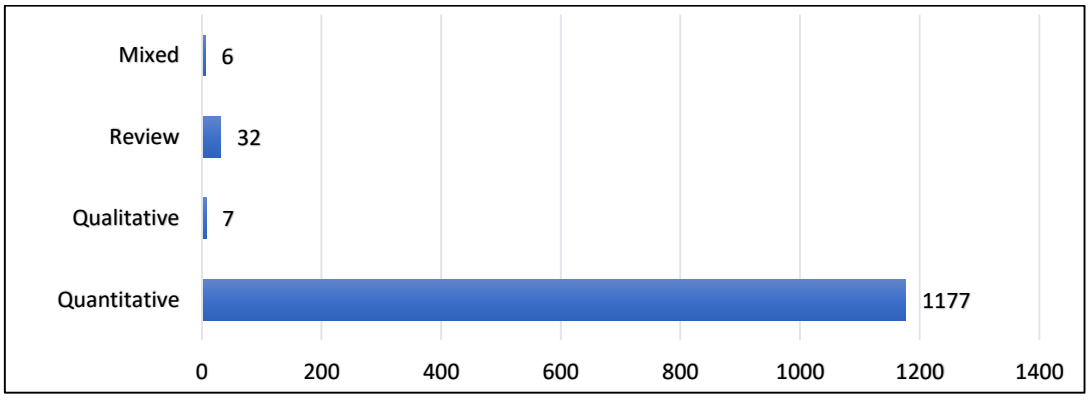
Figure 7 Cumulative Occurrence Trends of Top Contributing Journals for Sustainable Investment Research During 2013-2023 (Source: R-package)



3.5 Methodological Choices for Sustainable Investment Research During 2013-2023

The majority of studies in the context of sustainable investment followed a quantitative research design, reaching a count of (1,177) articles followed by review based articles (32), whereas the lowest numbers fell in terms of qualitative articles (7) and mixed articles (6). Most of the quantitative studies have been centered on measuring the impact of ESG on firms' financial performance as well as portfolio returns; the second highest number accounts for review papers on the themes such as sustainable finance, green finance, green bonds, impact investment, and ESG disclosure. Qualitative studies have focused on the role of sustainable investment during and after Covid-19, factors that result in a low level of disclosure related to governance practices, and theoretical perspectives related to individual beliefs in the context of socially responsible investment. Finally mixed-method studies have provided substantial theoretical contributions in terms of frameworks and empirical models. Figure 8 shows the modes of research employed by scholars in sustainable investment research.

Figure 8 Research Methodologies Employed in Sustainable Investment Research During 2013-2023 (Source: Author's Own Elaboration n=1,222)

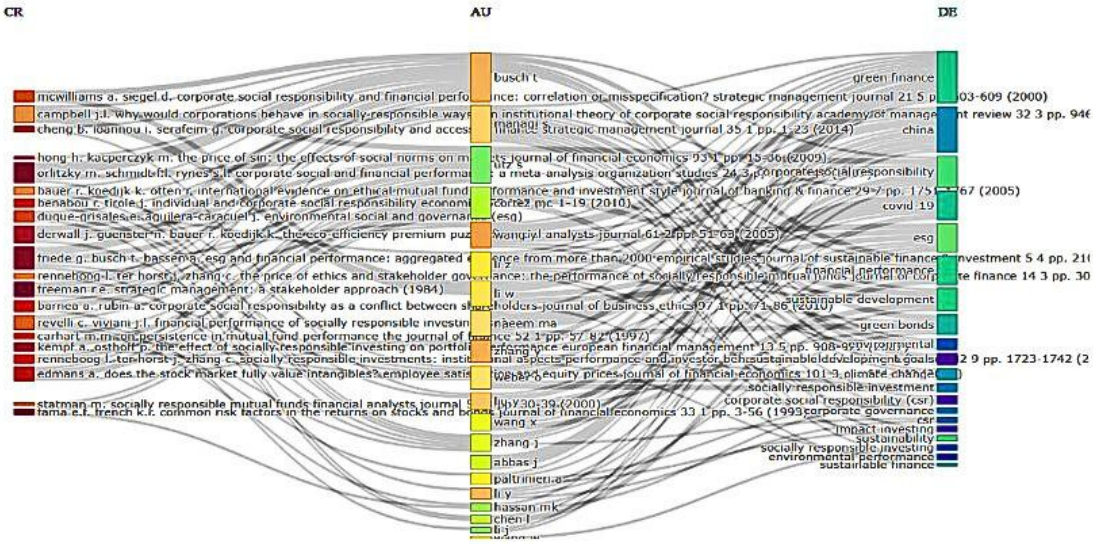


3.6 Three-Fields Plot

Figure 9, displays the prominent authors such as McWilliam, Siegel, Cheng, Cambell, Cheng, Hong, Friedge, Freeman, and Ravelli, with the highest number of publications with

keywords such as green finance, green bonds, corporate social responsibility, financial performance, ESG, SDGs, and socially responsible investment, published in research journals such as the Journal of Sustainable Finance & Investment, Strategic Management Journal, Journal of Corporate Finance, Journal of Banking & Finance, Corporate Social Responsibility and Environmental Management, and Academy of Management Review.

Figure 9 Three-Fields Plot (Source: R-package)



3.7 Most Cited Articles for Sustainable Investment Research During 2013-2023

The most cited articles in the sustainable investment discipline are listed in Table 4. Friede et al., (2015) article ranks on top with the highest citations (806) followed by Jamali and Karam (2018) and Fatemi et al., (2018) with total citations of 419 and 315 respectively. These three articles were published in the Journal of Sustainable Finance & Investment, the International Journal of Management Reviews and the Global Finance Journal, respectively. It is noteworthy that the top 17 publications in the subject with the most citations received a combined total of 4,397 citations, demonstrating the substantial impact of research on sustainable investment in the scientific discipline during 2013-2023.

Friede et al., (2015) conducted a second-order meta-analysis and vote count study to synthesize the possible effects of environmental, social, and governance facets, revealing the positive impact of ESG factors on corporate financial performance, particularly ESG facets outperformed in non-equity classes and for the regions of North America. Jamali and Karam (2016) reviewed 452 research articles based on Corporate Social Responsibility practices and perceptions in developing countries, concluding that many developing nations' local business setups do not fit within their attributes; this peculiarity is thought to come from dysfunctional subsystems, while macro-economic, sociopolitical, and historical facets were found to be critical. Gillan et al., (2021) performed a content analysis and concluded that leadership, structure of ownership, and risk perception are strongly related to firms' successful ESG execution. Fatemi et al., (2018) concluded that the positive outcomes of ESG raise company value, and vice versa; its disclosure lessens the benefits of favorable effects as the market could perceive extensive disclosure as the company's attempt to defend unnecessary investment in ESG initiatives. Zerbib (2019) studied the impact of investors' pro-environmental preferences on bond prices using a step regression model; the empirical findings suggested a lower return on green bonds compared to conventional bonds, particularly for low-rated bonds. Nofsinger and Varma

(2014) concluded that conventional funds outperform SRI funds in the absence of any crisis, and vice versa, driven by ESG funds that use positive rather than negative screening. Revelli and Viviani (2015) performed a meta-analysis of 85 studies, finding an insignificant association between SRI and portfolio performance due to other factors such as liquidity, market size, and investment time horizon; however, the portfolio performance of SRI funds was found to have a stronger link with managerial skills, diversified investment strategies, and cost minimization.

Aouadi and Marsat (2018) found positive a correlation between corporate social performance score and firm value, particularly for larger size firms located in countries where press freedom was evident. Stephan et al., (2016) performed a systematic review to uncover the strategic role of organizations in creating societal well-being and highlighted the importance of surface and deep-level strategies for positive social change. Pedersen et al., (2021) proposed an ESG frontier theory based on the Sharpe ratio, and the benefit of ESG information may be evaluated as a rise in the maximum, whereas the cost of ESG preferences may be calculated as the fall-off in the Sharpe ratio and vice versa. Duque-Grisales and Aguilera-Caracuel (2021) found a negative relationship between ESG scores and multinational firms' financial performance and a significant moderating impact of financial slack and geographical international diversification. Grewatsch and Kleindienst (2017) reviewed 32 articles to identify the mediators and moderators in relation to corporate sustainability and financial performance; both were categorized as internal and external characteristics of firms; distinctions between sustainability engagements, and managerial attributes were internal moderators, while external moderators included relationships with stakeholders, industry attributes, and business environment; internal mediators, were internal resources, and capabilities, while the external mediator was responses from stakeholders. Höchstädter and Scheck (2015) reviewed articles to explain the notion of impact investment by examining the field's definitional, terminological, and strategic commonalities and differences.

It was shown that the equilibrium returns on green assets were lower because investors preferred to hold them to hedge climate risk, investors who had strong ESG preferences were more inclined towards green or brown stocks, while green stocks outperformed brown stocks in the presence of positive macroeconomic factors (Pástor et al., 2021). Figure 10 illustrates a density visualization of the most cited authors along with research articles in the domain of sustainable investment. Figure 11 depicts the most cited authors in the domain of sustainable investment research during 2013-2023, while Figure 12 shows the Lotka Law, which describes the frequency of publication of the aforementioned authors in the field of sustainable investment.

Table 4 Most Cited Articles for Sustainable Investment Research During 2013-2023

S.NO	Article	Title	Source	Year	Total Citations	Focus
1	Friede G.; Busch T.; Bassen A.	ESG and financial performance: aggregated evidence from more than 2000 empirical studies	Journal of Sustainable Finance & Investment	2015	806	ESG Impact on Corporate Financial Performance
2	Jamali D.; Karam C.	Corporate Social Responsibility in Developing Countries as an Emerging Field of Study	International Journal of Management Reviews	2018	419	Corporate Social Responsibility Perception & Implementation in Developing Countries
3	Fatemi A.; Glaum M.; Kaiser S.	ESG performance and firm value: The moderating role of disclosure	Global Finance Journal	2018	315	Impact of ESG factors disclosure on firms' value

Table 4 (Continued)

S.NO	Article	Title	Source	Year	Total Citations	Focus
4	Zerbib O.D.	The Effect of Pro-Environmental Preferences on Bond Prices: Evidence from Green Bonds	Journal of Banking & Finance	2019	314	Investors' pro-environmental preferences impact of bond prices (green v/s conventional)
5	Gillan S.L.; Koch A.; Starks L.T.	Firms and social responsibility: A review of ESG and CSR research in corporate finance	Journal of Corporate Finance	2021	286	ESG in the context of corporate finance
6	Nofsinger J.; Varma A.	Socially Responsible Funds & Market Crises	Journal of Banking & Finance	2014	256	SRI funds' per-formance during market crises
7	Revelli C.; Viviani J.-L.	Financial Performance of Socially Responsible Investing (SRI): What Have We Learned? A Meta-Analysis	Business Ethics	2015	239	Impact of SRI on portfolio performance
8	Aouadi A.; Marsat S.	Do ESG Controversies Matter for Firm Value? Evidence from International Data	Journal of Business Ethics	2018	218	Impact of ESG on Firm Value
9	Stephan U.; Patterson M.; Kelly C.; Mair J.	Organizations Driving Positive Social Change: A Review & an Integrated Framework of Change Processes	Journal of Management	2016	193	Role of Organizations in Creating Positive Social Change
10	Pedersen L.H.; Fitzgibbons S.; Pomorski L.	Responsible Investing: The ESG Efficient- Frontier	Journal of Financial Economics	2021	191	Responsible Investment Decision and Portfolio Performance
11	Duque-Grisales E.; Aguilera-Caracuel J.	Environmental, Social and Governance (ESG) Scores and Financial Performance of Multilatinas: Moderating Effects of Geographic International Diversification and Financial Slack	Journal of Business Ethics	2021	181	Impact of ESG on multinationals firms' financial performance in Latin America
12	Grewatsch S.; Kleindienst I.	When Does It Pay to be Good? Moderators and Mediators in the Corporate Sustainability–Corporate Financial Performance Relationship: A Critical Review	Journal of Business Ethics	2017	176	Mediators and Moderators in The Context of Corporate Sustainability & Financial Performance
13	Höchstädter A.K.; Scheck B.	What's in a Name: An Analysis of Impact Investing Understandings by Academics and Practitioners	Journal of Business Ethics	2015	169	Impact Investment & Its related concepts
14	Pastor; Stambaugh R.F.; Taylor L.A.	Sustainable investing in equilibrium	Journal of Financial Economics	2021	166	Sustainable Investment & Green v/s Brown Stock Returns

Figure 10 Density Visualization Map for Most Cited Articles for Sustainable Investment Research During 2013-2023 (Source: VosViewer)

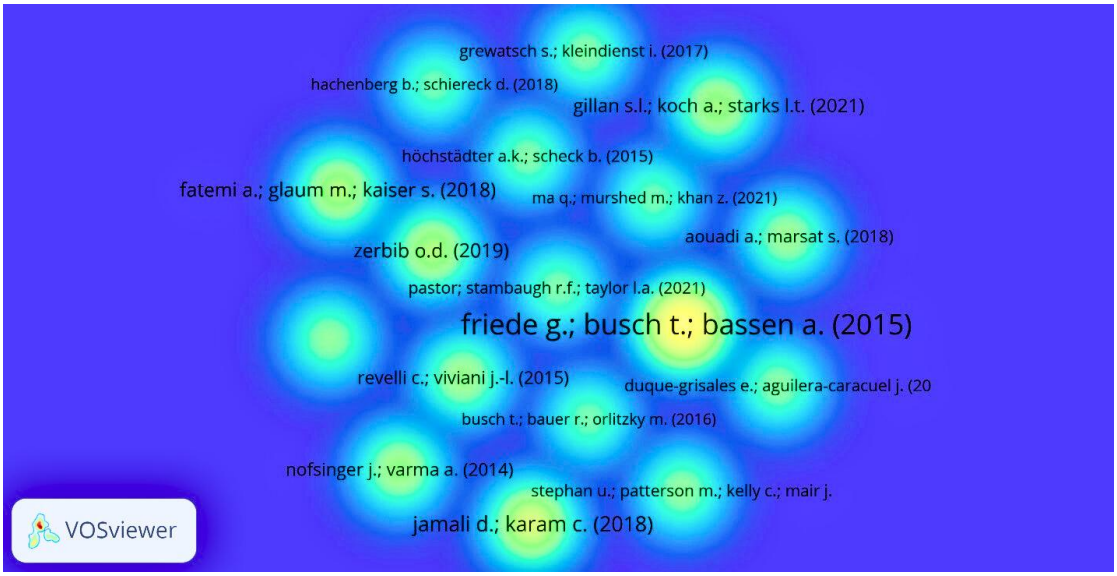


Figure 11 Most Cited Articles for Sustainable Investment Research During 2013-2023 (Source: R-package)

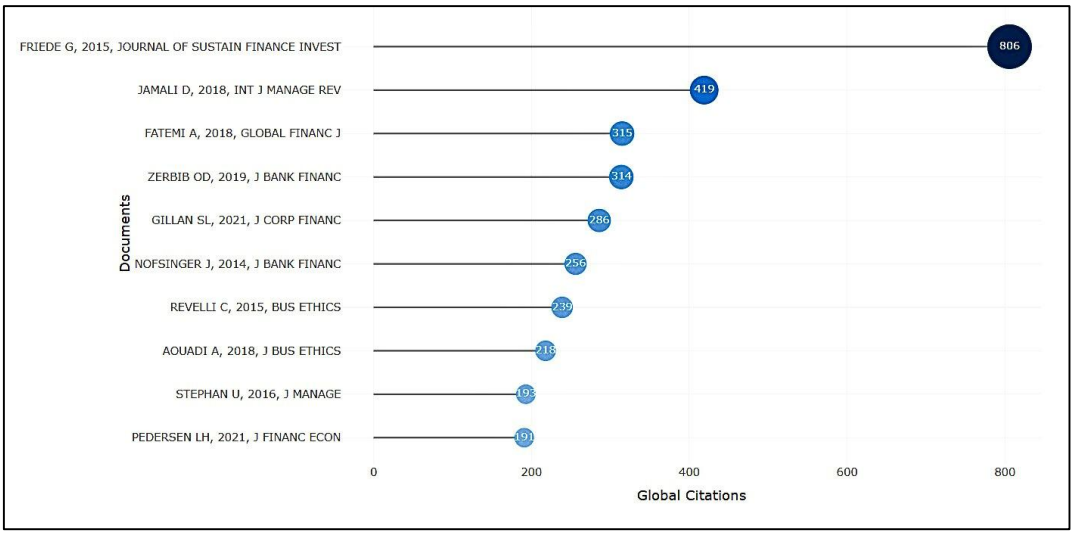
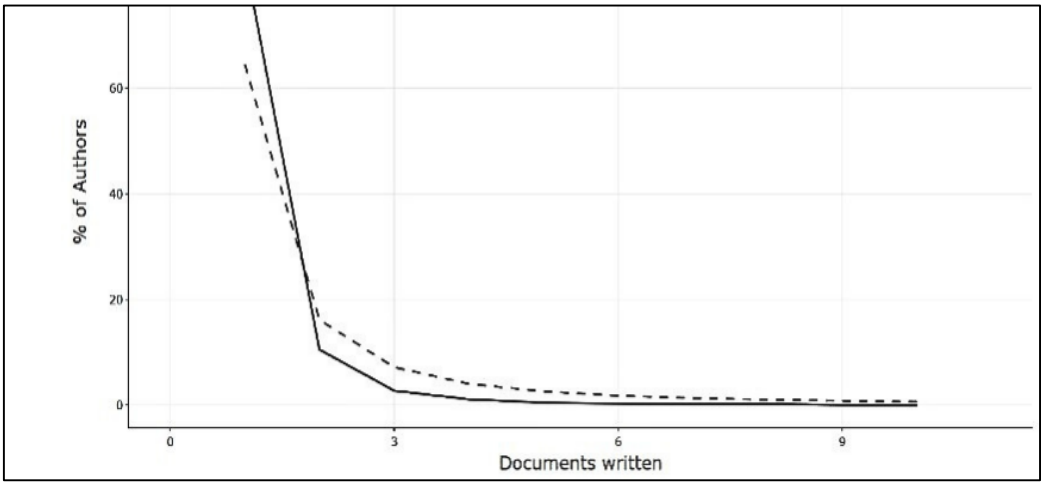


Figure 12 Lotka Law (Source: R-package)



3.8 Network Analysis Using Keyword Co-occurrence

Science mapping permits the visual illustration of a bibliometric network and proposes a recapitulation of the intellectual composition of literature involving the field of interest along with the interrelationship among several items (Donthu et al., 2021; Pallottino et al.,2020). For this purpose, network analysis employs keyword co-occurrence across the full quantity to identify the prominent clusters that describe the scholarly edifice of sustainable investment research from 2013 to 2023. It consolidates a broad variety of subjects, according to their thematic similarities. The primary themes that resulted from the network analysis were generated through VOSviewer keyword co-occurrences. In total 08 clusters were identified, including 62 items and 465 links. Figure 13 depicts the network analysis of the keyword co-occurrence in the sustainable investment domain.

3.8.1 Cluster 01: ESG

The largest cluster resulting from the network anaylsis was ‘ESG’ with a total occurrence of 134 and total link strength of 153, making it the most evident term. Related studies on ESG also included other well-liked terms, such as ‘socially responsible investment’, ‘corporate social performance’, ‘ethical investment’, ‘financial performance’, ‘firm value’, and ‘portfolio performance’. In this cluster, the authors explain the importance of ESG facets in enhancing the financial performance of corporations and individuals’ portfolio performance. Chen et al., (2023) found that, in the Chinese A-share stock market, equities with high ESG ratings outperformed those with low scores, and ESG ratings had a positive correlation with a company’s future financial performance. The long-term valuation of corporations does not solely depend on shareholder wealth maximization, but also on the integration of environmental, social, and governance facets (Sandberg et al., 2023).

3.8.2 Cluster 02: Climate Change

The second largest cluster was ‘Climate Change’ with a total occurance of 75 and total link strength of 110. Other predominant terms in this cluster were ‘climate risk’, ‘financial markets’, and ‘shareholders’. The authors emphasize the role of financial markets and, shareholder initiatives in mitigating climate risks. Jacob and Nerlinger (2021) concluded that investors consider climate risk while assessing stocks, particulalry in the presence of uncertainty, since carbon-intensified stocks were riskier and negatively affected during Covid-19. In the absence of legislative disclosure regulations, shareholder activism may enhance the voluntary disclosure of climate change risks, as companies that voluntarily reveal climate change risks are valued more highly (Flammer et al., 2019).

3.8.3 Cluster 03: Green Finance

‘Green Finance’ was the third largest cluster with a total occurrence of 69 and total link strength of 77. Related studies on green finance also included other well-liked terms such as ‘green bonds’, ‘global warming, ‘green house gases’, ‘carbon emissions’, and ‘economic development’. Ouyang et al., (2023) examined the link between green finance and economic growth in China discovering that economic growth can be improved through green finance, which may direct capital flow to high-tech sectors. Green bonds are one way to achieve sustainable development goals, and various environment friendly programs may access capital funding through the issuance of green bonds (Phuong et al., 2023).

3.8.4 Cluster 04: Stock Market

The fourth largest cluster resulting from the network anaylsis was ‘stock markest’ with a total occurrence of 51 and total link strength of 75. Other well-liked terms in this cluster were

'esg rating', 'esg score', 'financial crisis', 'idiosyncratic risk', 'industrial investment', 'portfolio diversification', 'risk assessment', 'risk perception', 'stock returns' and 'volatility'. During economic uncertainty, investors perceive firms with riskier profiles and high ESG ratings negatively, whereas when the stability of the economic situation is high, ESG ratings help firms to minimize systematic risk (Zarafat et al., 2022). Corporations with high ESG ratings witnessed lower stock return volatility; however, the disclosure of ESG data was found to be low and excessively centered on governance (Czerwińska & Kaźmierkiewicz, 2015).

3.8.5 Cluster 05: Sustainable Finance

The fifth largest cluster resulting from the network anaylsis was 'sustainable finance' with a total occurrence of 49 and total link strength of 73. Other well-liked terms or subjects in this cluster included 'climate finance', 'environmental finance', 'impact investing, 'responsible investing', and 'social finance'. Sustainable development goals are meaningfully aided by sustainable finance, particularly in countries where both the public and private sectors are involved in promoting sustainable finance mechanisms (Ziolo et al., 2021). Morelli & D'Ecclesia (2021) studied the impact of responsible investments on the volatility of stock returns in European countries, finding that responsible investment portfolios outperformed stocks with low environmentally friendly scores and were proven to be safer for minimizing the risk element, particularly in times of economic uncertainty.

3.8.6 Cluster 06: Environmental Protection

The sixth largest cluster was 'environmental protection' with a total occurrence of 40 and total link strength of 40. Other well-liked terms or subjects were 'sustainable investment', 'decision making', 'developing countries', 'regulatory framework', 'retail investors', and 'sustainable development'. Khan et al., (2022) studied the effect of ESG initiatives on the financial performance of listed firms in India's manufacturing and service sectors, discovering that investing money in sustainable processes had a considerable influence on the financial performance of enterprises, although the service sector generated greater revenue than the manufacturing sector. Chakraborty et al., (2023) examined the connection amid corporate governance mechanisms and the investment decisions of retail investors, finding a significant positive relationship between corporate governance mechanisms and retail investors' share holding; board composition and audit efficiency were the most prioritized attributes of corporate governance, while investors' concern for the quality of the corporate governance mechanism was more evident in standalone firms than in group-affiliated firms.

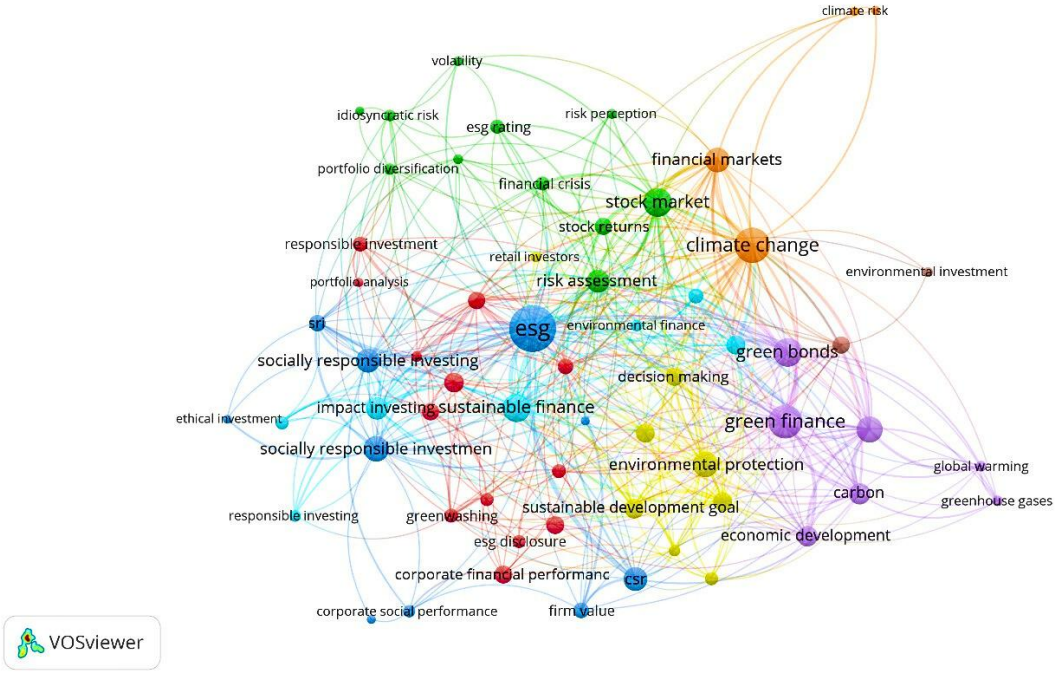
3.8.7 Cluster 07: Corporate Social Responsibility (CSR)

The seventh largest cluster, 'corporate social responsibilty' had a total occurrence of 24 with a total link strenth of 14, other notable items under this cluster were 'corporate financial performance', 'covid-19', 'ESG disclosure', 'ESG peformance', 'sustainable investing', 'shareholder engagement', 'portfolio analysis', 'social impact', 'greenwashing', and 'risk management'. Ghardallou and Alessa (2022) studied the affiliation among CSR and corporate performance, revealing a non-linear relationship between the two; a goal to achieve the desired threshold of CSR hinders firms' performance and vice versa. A successful strategic combination of corporate social responsibility and responsible investment is needed to overcome difficulties during periods of economic instability, reduce risk, and achieve development goals (Khoruzhy et al., 2022). CSR is an effective tool to mitigate firms' financial distress risk, particularly for those firms that pay attention to the aspects of community development, employee relations, diversity, and strong governance mechanisms, which witnessed lower financial distress risk (Boubaker et al., 2020).

3.8.8 Cluster 08: Green Investment

'Green Investment' was the last cluster resulting from the network analysis with a total occurence of 19 and total link strength of 27. Apart from green investment, 'environmental investment' was another evident item in this cluster. Li et al., (2022) found a substantial rapport amid green investment, green credit, return on assets, and return on stocks, in the top exporting countries in the context of China. Fan et al., (2023) studied the effect of green investment, information and communication technology, and economic growth on carbon dioxide (CO_2) emissions in the context of China, finding that that in the long-run, green investment, and information and communication technology, played a substantial role in reducing CO_2 emissions. Similar findings were concluded by Temesgen Hordofa et al., (2023) who showed that green investment and eco-innovation were proven significant in reducing CO_2 emissions in China.

Figure 13 Clusters Identification Based on Keyword Co-Occurrences in The Field of Sustainable Investment (Source: VosViewer)



4. A WAY FORWARD

Sustainable investment is an evolving field that has been and will remain a significant area of interest at both academic and managerial levels. Greater global emphasis in the form of legislative frameworks that link the financial sectors to the fulfilment of various sustainable development goals has further augmented the need for sustainable investment. In particular, the outbreak of Covid-19 and its aftershocks have significantly brought notable changes to investment goals. Based on the synthesis from 1,222 research articles, future research studies can consider the following suggested avenues:

4.1 Artificial Intelligence and Blockchain

The use of artificial intelligence (AI) and blockchain technologies to augment the transparency and reliability of sustainable investment is a potential avenue to be explored. The

execution of AI investors can enhance their understanding of companies' complex ESG metrics, minimizing the potential risks in portfolio selection, and achieving harmony between their investment and societal goals. Future studies may examine the impact of blockchain on enhancing transparency and promoting sustainability, and how this can benefit the revenue streams of corporations. This can help the portfolio firm to bring cutting-edge science to the market to accomplish the innovation required for sustainable development and quickening the time at which sustainable solutions become available.

4.2 Sustainable Investment v/s Conventional Investment

There is abundant literature available on the impact of ESG facets on stock returns; however, empirical evidence has yielded diverse results, as in some cases, sustainable investment outperforms conventional investment and vice versa. There is a need to study the extent to which sustainable investment leads to desirable returns and how it can be improved to prioritize this goal over conventional ones. To what extent is sustainable investment considered volatile when compared to conventional investments? A theoretical perspective is required to explore the underlying factors or causes that may result in either no difference or substantial differences, when comparing sustainable and conventional stock returns.

4.3 Need for a Unified Framework to Facilitate Sustainable Investment

There is an imperative need for a unified framework in which all efforts to promote sustainable investment can be well-coordinated. The role of ESG reporting in relation to SDG-related accomplishments needs to be investigated further in developing countries. Future studies can also examine the transparency of rating agencies when determining which ratings to give companies based on their disclosure.

4.4 Viewing Sustainable Investment through Behavioral Finance Lens

The behavioral perspective related to sustainable investment is considered to be scarce because various empirical evidences have suggested the presence of abnormal returns associated with sustainable investment; however, the underlying biases inherent in sustainable investment decisions have not been studied in a larger context. Moreover, the role of personality traits that may trigger sustainable investment can be examined in future studies.

4.5 Role of ESG or Green Venture Capitalists

Although institutional and retail investors have been the focus of studies on sustainable investment, there is still a need to investigate the significant role of green venture capitalists, often known as ESG venture capitalists. Given its features, venture capital is particularly suitable for sustainable investments. In addition to providing financial support, venture capital firms may give corporations extra value through their technical expertise and industry connections; future research can explore these attributes in relation to sustainable investment.

4.6 Critical Assessment of Shareholders Engagement to Promote Sustainable Investment

The corporate world has shifted its focus to including ESG factors, which have transformed how companies run. A significant component of this change is shareholder activism, whereby investors employ their power to persuade corporations to adopt sustainable and moral business practices. By using their shares and voting rights, investors can use

shareholder activism to alter a company's practices and policies. Future studies may examine the impact of shareholder engagement on corporate financial performance and sustainability.

4.7 Governance Aspect of Sustainable Investment Still in Dearth

Although there is an abundance of literature focusing on the importance of governance in the context of firms' financial performance, the strategic importance of governance in driving sustainable investment is yet to be explored. Appropriate governance safeguards investors from potential risks and promotes transparency and accountability, eventually facilitating sustainable investment decisions.

4.8 Driving Sustainable Investment in Developing Economies

In the context of developed economies, the literature has shown a rise in sustainable investment. Nevertheless, bringing this practice to developing economies and evaluating its substantial impact still poses a number of challenges. Future research can explore the obstacles to sustainable investment in the context of developing economies and how sustainable development can be linked with economic development, environmental protection, social equity, and long-term stability. Moreover, a strong regulatory framework is needed to ensure a successful path for sustainable investment, particularly in the context of developing economies, and in terms of reporting standards, and disclosure requirements.

4.9 Theoretical Evolvement- From Capitalism to Socialism

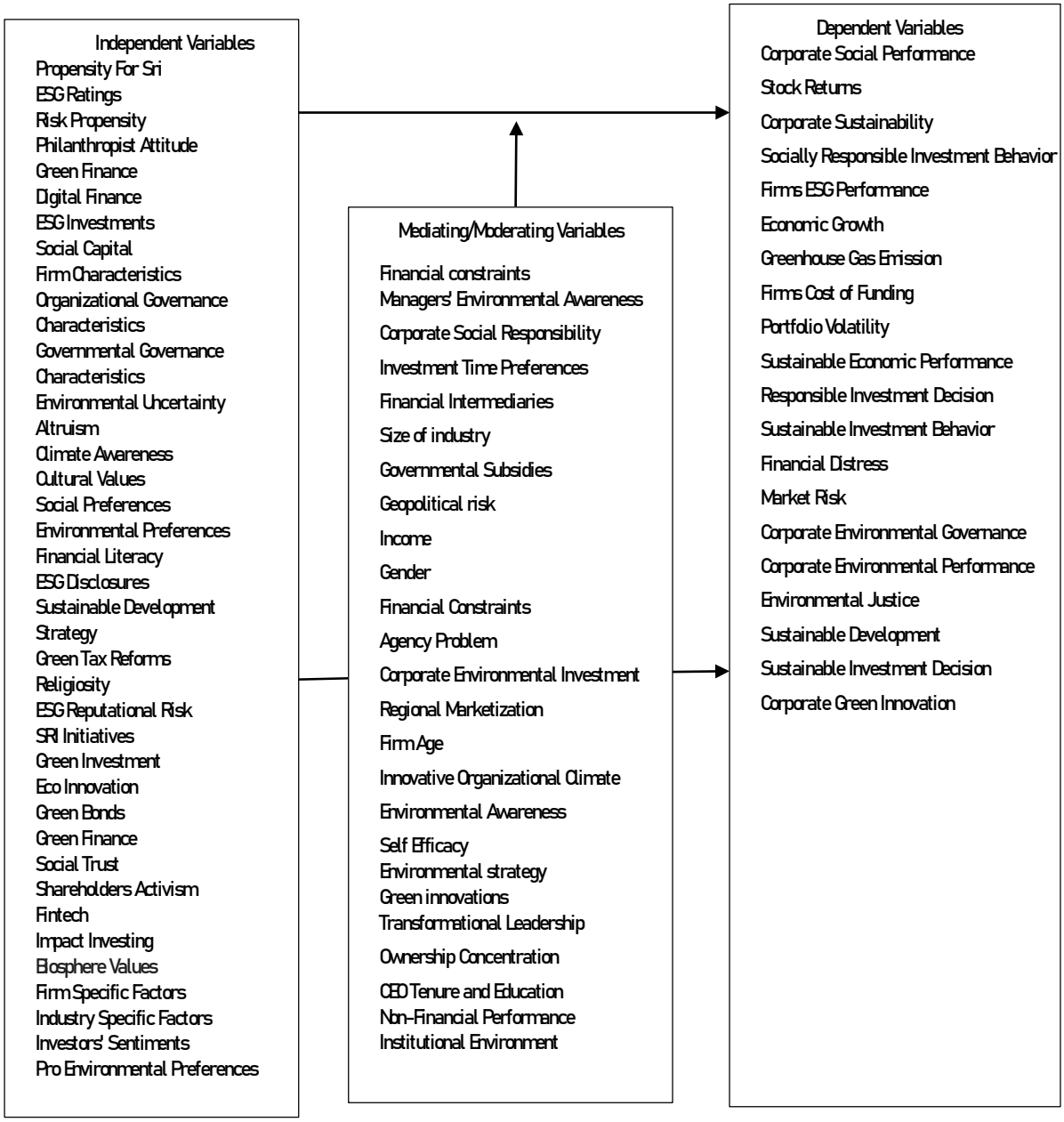
There has been a noticeable advancement in the theories and concepts related to sustainable investment. Prior studies have mostly focused on traditional financial theories such as Modern Portfolio Theory, which emphasized risk-return balance but ignored environmental, social, and governance (ESG) issues. As the area of sustainable investment has developed, there has been a discernible shift towards the integration of more comprehensive frameworks, such the social contract theory, resource-based approach, theory of reasoned action and stakeholder theory. This development suggests an increase in the importance of non-financial factors in determining investment decisions. Furthermore, the broad recognition of ESG integration as an underlying concept marks an important shift away from just financial considerations and towards a more inclusive strategy that takes sustainability into account. Future studies could gain insights by exploring the implementation of these evolving theories in various contexts and markets. There is also an opportunity to create new frameworks that can better grasp the intricacies of sustainable investment in light of emerging challenges such as climate change and social disparity. Based on synthesis from 1,222 research articles, Figure 14 portrays a causal taxonomy framework that includes various independent, moderating, mediating, and dependent variables that have been studied in the context of sustainable investment.

5. CONCLUSION

Since the notion of sustainable investment is changing and has many overlapping ideas, a systematic evaluation of the literature along with bibliometric analysis is advantageous. According to the results of the network analysis, the eight major clusters primarily focused on firms' financial performance, stock returns, contributions to climate change, economic growth, sustainable development goals, risk assessment, and CSR. This study demonstrates the use of artificial intelligence for performance analysis and science mapping, which results in factual

appraisal of available literature in the field of sustainable investment and provides a greater understanding to uncover the underpinnings of sustainable investment by identifying publication trends, leading journals, authors, institutions, countries, and methodological modes, and unveiling the intellectual structure of sustainable investment in the form of eight major themes. Moreover, a novel contribution of this study is the development of a taxonomy based on synthesis from 1,222 articles that depict the independent, moderating, mediating, and dependent variables, that have been studied under the concept of sustainable investment. The practical implications of this study are significant for both industry and academia as academicians can gain insights on the current state of knowledge, potential gaps, and future avenues for research advancement in the field of sustainable investment. Gaining a deep understanding of how ESG variables are incorporated into investment strategies may help practitioners to make better decisions and to come up with an adequate regulatory framework.

Figure 14 A Taxonomy Causal Model for Sustainable Investment Research



(Source: Author's Own Elaboration n=1,222)

Moreover, the empirical synthesis offered in this study would be helpful to investors, policy makers, and corporations aiming to align their financial goals with sustainable goals.

5.1 Limitations

Although the study attempts to impart a thorough understanding in the context of sustainable investment, it may be subject to certain limitations. First, future studies can expand the time horizon for the stated purpose. Second, the articles were retrieved solely through Scopus; although a thorough assessment from individual publisher websites has been done to minimize the mentioned limitations, future studies can also include other relevant databases.

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