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Research Article

Mapping the Landscape of Green Investment Research

K. M. Mohammed Radeef [1], G. Velmurugan[2]*

[1]Department of Social Sciences, School of Social Sciences and Languages, Vellore Institute of Technology, Vellore, Tamil Nadu, India-632 014
Email: mohammedradeef.km@vit.ac.in - **ORCID:** 0009-0001-8789-3045

[2]Department of Social Sciences, School of Social Sciences and Languages, Vellore Institute of Technology, Vellore, Tamil Nadu, India-632 014
*** Corresponding Author Email:** gvelmurugan@vit.ac.in - **ORCID**: 0000-0002-1327-0523

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Abstract:

This study examines the evolution and current state of green investment research through bibliometric analysis and a systematic review. A bibliometric analysis can examine the intellectual landscape of this field including publication trends, leading countries and institutions, collaboration patterns, and key themes. Green investment research has grown significantly since the year 2014 with China leading in publication and citations. Strong international collaborations were observed, particularly between China, United States and United Kingdom. The analysis also highlights the central themes of Green Investment, Sustainable Investment, and Sustainability, along with the increasing prominence of areas like Green Finance, ESG, and Green Bonds. To get a better understanding of this rapidly evolving topic, a thorough review of the 25 most cited papers is done. This review focuses on green investment drivers and obstacles. This study gives an overview of green investment research and the interplay of enabling and constraining variables, with implications for investors, policymakers, and businesses, seeking a more sustainable future.

1. Introduction

In recent decades the global community has become increasingly aware of the pressing ecological issues facing by our planet. Climate change, resource depletion, and ecological degradation have emerged as a critical issue that demand immediate attention and action [1]. In response to these challenges, a paradigm shift has occurred in the financial sector which rise to the concept of green investment. This approach is also known as sustainable investing or socially responsible investing (SRI), represents a fundamental change in how financial decisions are made, incorporating environmental, social, and governance (ESG) factors alongside traditional financial analysis [2].

Green investment encompasses a wide range of financial activities that prioritize environmental sustainability and social responsibility. Eyraud et al., [3] offer a broad definition of green investment, which includes both traditional energy sources such as hydropower, and new technologies aimed at reducing carbon emissions and promoting environmental sustainability. This definition aligns with the growing consensus that addressing climate change and its associated risks requires a comprehensive approach to investment and economic development. At its core, green investment involves the application of a set of investment screens to select or exclude assets based on environmental, social, corporate governance, or ethical criteria [4]. This approach often extends beyond mere asset selection, engaging in local communities and shareholder activism to further corporate strategies aligned with sustainability goals. The ultimate aim of green investment is to generate financial returns while simultaneously creating positive environmental impact [5].

The motivation for green investment stems from the growing recognition of the severe consequences of unchecked climate change and environmental degradation [6]. As highlighted by Eyraud et al., [3] climate change poses significant risks to global economic stability and productivity. Rising temperatures, sea levels, and the increased

occurrence of severe weather-related events have the potential to severely impair output and productivity across various sectors. These environmental challenges not only threaten economic growth but also have profound implications for human health, food security, and social stability. Moreover, the shift to a low-carbon economy requires significant capital expenditures, especially in alternative energy sources. Green technologies, such wind turbines and solar panels, require substantial capital investment, particularly during their initial development phases. [7]. This reality underscores the critical role that green investment plays in facilitating the shift towards more sustainable economic models.

The scale of the global green economy has grown significantly in recent years, reflecting its increasing importance in global financial markets [8]. As of Q1 2024, the total market capitalization reached US$7.2 trillion, with the United States accounting for the majority at 60% ($4.32 trillion). Taiwan has emerged as the second-largest market at 6% ($432 billion), followed by China at 5% ($360 billion). Despite the US s dominance in absolute terms, countries like Germany, Canada, and China demonstrate higher green exposure relative to their economic output, exceeding the global average of 9% [9].

The growing importance of green investment has sparked significant academic interest, leading to a burgeoning body of literature exploring various aspects of this field. Researchers have investigated how corporate green investment is affected by interest rate liberalization. [10], the link between climate change vulnerability and green investment under energy supply constraints [11], factors influencing firms environmental protection investments [12] and the connection between green investment and green innovation in Chinese companies [13] Despite this scholarly attention, there remains a need for a comprehensive bibliometric analysis of the green investment literature to map the intellectual landscape of this rapidly evolving field. Bibliometric analysis serves as a powerful tool for defining the structure and dynamics of academic research in green investment [14]. Analysing publication patterns, citation networks, and keyword analysis provides insights into key contributors, major works, and emerging trends in this domain. This analysis allows us to recognize research gaps, emphasize interdisciplinary connections, and direct future investigations in this important field of study [15].

This study seeks to conduct a mixed-method analysis combining bibliometric and systematic review approaches to examine Green Investment research. The study conducts a quantitative bibliometric analysis to examine the evolution of green investment research, identify leading countries and collaborations, and discern research themes and trends. The researcher presents a comprehensive review of the drivers and barriers to green investment, along with suggestions for future research to enhance the field of green investment studies.

2. Methodology

This research study offers a multifaceted approach to thoroughly examine the evolution and landscape of green investment research. The publication trend is analysed to understand the fields growth and progress over time. The study then identifies the top nations and organizations contributing to green investment research using publication and citation data which provides insights into the global distribution of research activity. Collaboration patterns are also investigated using co-authorship analysis to reveal the nature and scope of international research collaborations. Keyword analysis is used to identify major themes and track their evolution, offering light on key concepts. Furthermore, the methodology includes assessing the most widely referenced publications to provide insights into the influential research that has changed our understanding of green investing. The usage of a three-field plot, which provides a visual depiction of the links between authors, keywords and sources, adds to the research s value by providing an in-depth understanding of the green investment research environment is also included in the study. Finally, the study conducts a systematic review of the 25 most frequently cited publications to identify the primary drivers and barriers to green investment.

Throughout the investigation, specific bibliometric software such as VOS viewer and the Bibliometrix R-packages are used. By combining these methodologies, the research aims to provide a comprehensive assessment of the past, present situation, and future directions of green investment literature. The insights gathered can contribute to improve our awareness of the research environment and provide significant suggestions for future research initiatives in this rapidly evolving topic.

2.1 Database, Search, and Inclusion Criteria

The study examined at research papers on green or The search was run with the keywords "Green Investment" OR "Sustainable Investment” in the title, abstract, and keywords fields. Originally, 737

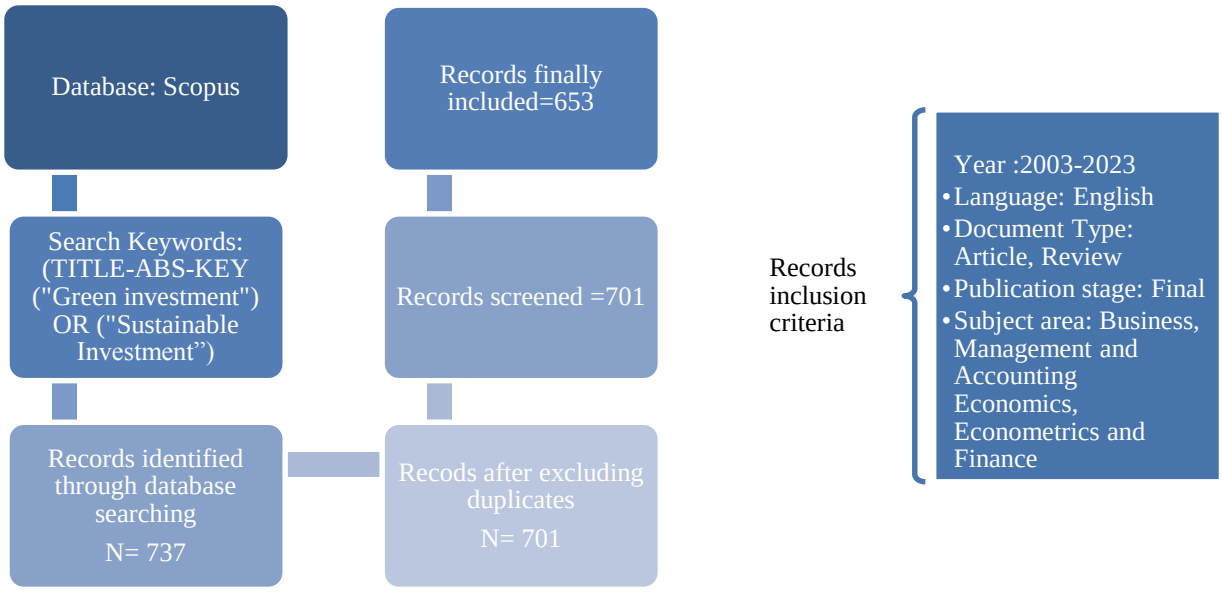

Figure 1. *Selection criteria of papers.*

Table 1. *Overview of research objectives and methodology.*

Analysis Type	**Research Objectives**	**Research Methodology**
Bibliometric Investigation	To Examine evolution of green investment research	Publication trend
	To Identify the leading countries/orgs, impactful publications and journals	Citation analysis
	To analyse collaboration patterns of countries	Collaboration network analysis
	To Uncover research themes and trends	Keyword analysis
Systematic Analysis	To identify the main drivers and barriers of green investment	Citation analysis

documents were identified. After eliminating duplicates, 701 records remained for screening. The dataset was refined using the inclusion criteria. Only English-language papers and reviews in their final publication stage were examined, specifically in the subjects of Business, Management, and Accounting, as well as Economics, Econometrics, and Finance. This methodical technique yielded a total of 653 documents for bibliometric analysis. Figure 1 is the selection criteria of papers and table 1 is overview of research objectives and methodology.

3. Bibliometric Analysis and Discussions

3.1 Performance evaluation of Green Investment

Chronological Publication Trend

Figure 2 depicts the publication trend of green investment research during the last two decades. From 2003 to 2013, the green investment research domain exhibited minimal activity, with fewer than ten articles published each year. However, the trend began to change between 2014 and 2015, indicating the beginning of an acceleration phase. This was followed by a period of rapid growth beginning in 2018, with publication numbers scaling at an exponential rate. The years 2021-2023 exhibited the most significant growth, with the number of publications increasing over three times annually, culminating in approximately 209 articles in 2023.

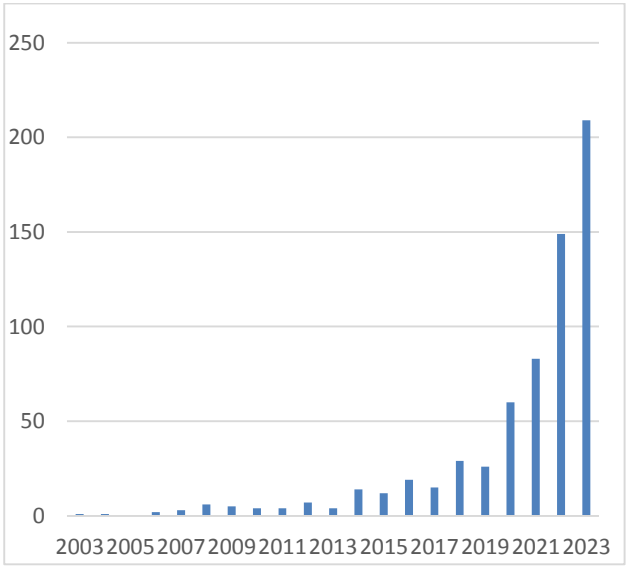

Figure 2*. Publishing trend in green investment research. Source: Authors analysis using Scopus data.*

This notable increase is likely due to the growing worldwide attention on sustainability, climate change mitigation, and the continuous shift of financial markets towards environmentally responsible investing. The exponential surge in publications indicates that green investment has become an emerging field of interest in academics and the finance sector, possibly due to evolving policies, greater data availability, and changed priorities in the finance sector. As this discipline grows, it promises to provide major new insights and approaches that will impact the future of sustainable finance.

3.1.1 Analysis of Journal Quality

Table 2 displays the top 15 journals that contribute to the literature on socially responsible investment, along with some of their most important attributes. An analysis of the data can reveal a clear hierarchy in publication volume among the top journals in the field of green investment.

As highlighted in the Figure 3 The Journal of Cleaner Production stands out as the top journal with 62 articles published. Following by Energy Economics and Resources Policy in the second position, each contributing 25 publications to the field. Close on their heels is the Journal of Sustainable Finance and Investment, with 24 publications, demonstrating its significant role in the dissemination of research in this area. This distribution of publications highlights the key journals where researchers in Green Investment are most actively sharing their findings and insights.

When considering the h-index, which measures both the productivity and impact of published work, the Journal of Cleaner Production again leads with an h-index of 32. Energy Economics follows with an h-index of 20, while Journal of Sustainable Finance and Investment, Resources Policy, and Technological Forecasting and Social Change all have an h-index of 14. The g-index, another measure of scientific impact, shows a similar pattern with the Journal of Cleaner. Production leading (g-index of 61), followed by Energy Economics and Resources Policy (both with a g-index of 25). In terms of total citations (TC), the Journal of Cleaner Production significantly outperforms other journals with 3,840 citations. Ecological Economics, despite having fewer publications, ranks second in total citations with 1,547, followed by Energy Economics with 1,390

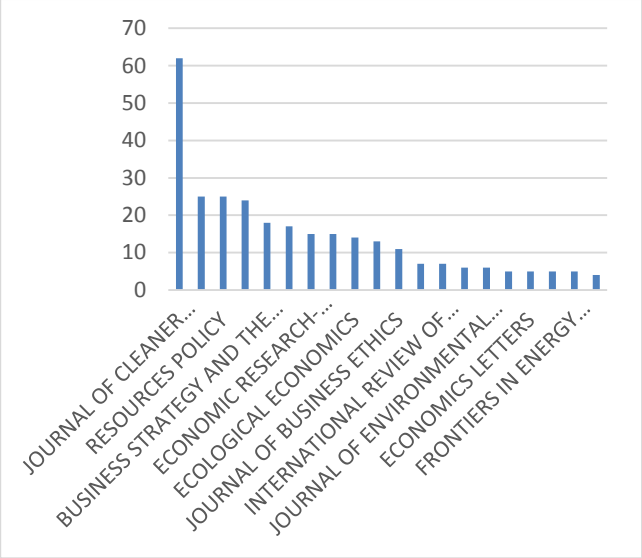

Figure 3. *Top journals production over time. Source: Authors analysis using Scopus data*

Table 2. *Top journals in the area of Green investment.*

SL. No	Source	TPN	h_index	g_index	m_index	TC
1	Journal of Cleaner Production	62	32	61	1.45	3840
2	Energy Economics	25	20	25	1.82	1390
3	Journal of Sustainable Finance and Investment	24	14	24	1.08	695
4	Resources Policy	25	14	25	3.50	633
5	Technological Forecasting and Social Change	15	14	15	0.67	740
6	Business Strategy and The Environment	18	13	18	1.44	710
7	Ecological Economics	14	12	14	0.67	1547
8	Finance Research Letters	17	11	17	1.22	795
9	Economic Research-Ekonomska Istrazivanja	15	10	15	3.33	250
10	Journal of Business Ethics	11	9	11	0.50	791
11	Journal of Risk and Financial Management	13	8	13	1.60	207
12	International Review of Financial Analysis	7	7	7	0.54	168
13	Corporate Social Responsibility and Environmental Management	7	6	7	0.86	287
14	Applied Economics	5	5	5	0.56	215
15	Environmental and Resource Economics	5	5	5	0.71	382

citations. The m-index, which quantifies the h-index in relation to the number of years since the initial publication, exhibits several interesting patterns. Resources Policy leads in this metric with an m-index of 3.50, followed closely by Economic Research-Ekonomska Istrazivanja with 3.33. This suggests these journals have had a significant recent impact in the field.

Leading Countries and Organizations

Figure 4 depicts the density visualization of leading countries contributing to the Green Investment research. The figure 5 discloses that China emerges as the dominant contributor with 166 documents and 6583 citations. The United States and United Kingdom follow just after china with 61 and 64 documents respectively, each garnering over 3000 citations. Additionally, Table 3 present the major organizations contributing to the field of Green Investment research. China dominates with two leading institutions: The Center for Energy and Environmental Policy Research and the Sustainable Development Research Institute, both producing high-impact work with 2 documents and 324 citations each. The Excelia business school, la rochelle, france leads in productivity with 5 documents. European institutions are well-represented, indicating strong continental involvement. This snapshot reveals China s prominence in the field, alongside significant global participation, particularly from Europe. It suggests a research landscape characterized by impactful contributions from a diverse set of international institutions.

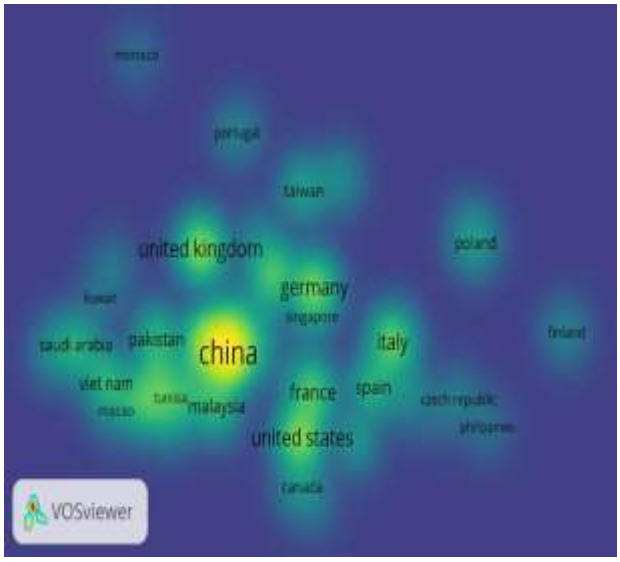

Figure 4*. Density visualization of top countries. Source: VOS viewer.*

Country Collaboration

This section investigates country collaboration in green investment literature using co-authorship analysis (Table 4). The data identifies the total publications (TPN), total citations (TCN), and total link strength (TLS) for each country's collaborative efforts. China demonstrates the strongest overall presence in the field, with the highest number of publications (166) and an overwhelming lead in total citations (6583). Despite this dominance in output and impact, China s total link strength (155) suggests a relatively focused collaboration network. The United Kingdom and United States show comparable collaborative patterns, with similar citation counts (3277 and 3308 respectively) but differing in their collaboration approaches. The UK has fewer publications (64) compared to China but maintains a robust link strength (95), indicating efficient and impactful international collaborations. The United States, with 61 publications and a link strength of 72, demonstrates a slightly different collaboration pattern.

Top Documents

Table 5 depicts the top documents in the field of green investment. "Beyond carbon pricing: The role of banking and monetary policy in financing the transition to a low-carbon economy" by Campiglio [16] is the top document with 399 citations. This is followed by Moore [17] with 339 citations, discussing "strategy development in small and medium sized enterprises for sustainability and increased value creation". Ren [18], with 310 citations, studies the "nexus between green finance, non-fossil energy use, and carbon intensity", offering empirical evidence from China using a vector error correction mode.

Dafermos [19] cited 305 times, examines the relationships between Climate Change, Financial Stability and Monetary Policy. Zhou [20] investigates the impact of fintech innovation on green growth in China, specifically looking at the mediating effect of green finance. Despite being a recent publication, it has garnered 296 citations, indicating the growing importance of this research area. Gianfrate [21] with 294 citations, explores what they term the "green advantage" by examining the convenience of issuing green bonds. Biresselioglu [22] provides a substantial contribution to the field by conducting a thorough examination of the factors that motivate and prevent the decision-making process for electric mobility in Europe. This research, published in Transportation Research Part A: Policy and Practice, has received 284 citations. Arner [23] examined the financial technology aspect in his article "Sustainability, FinTech and Financial Inclusion", which was published in the European Business Organisation Law Review and received 270 citations.

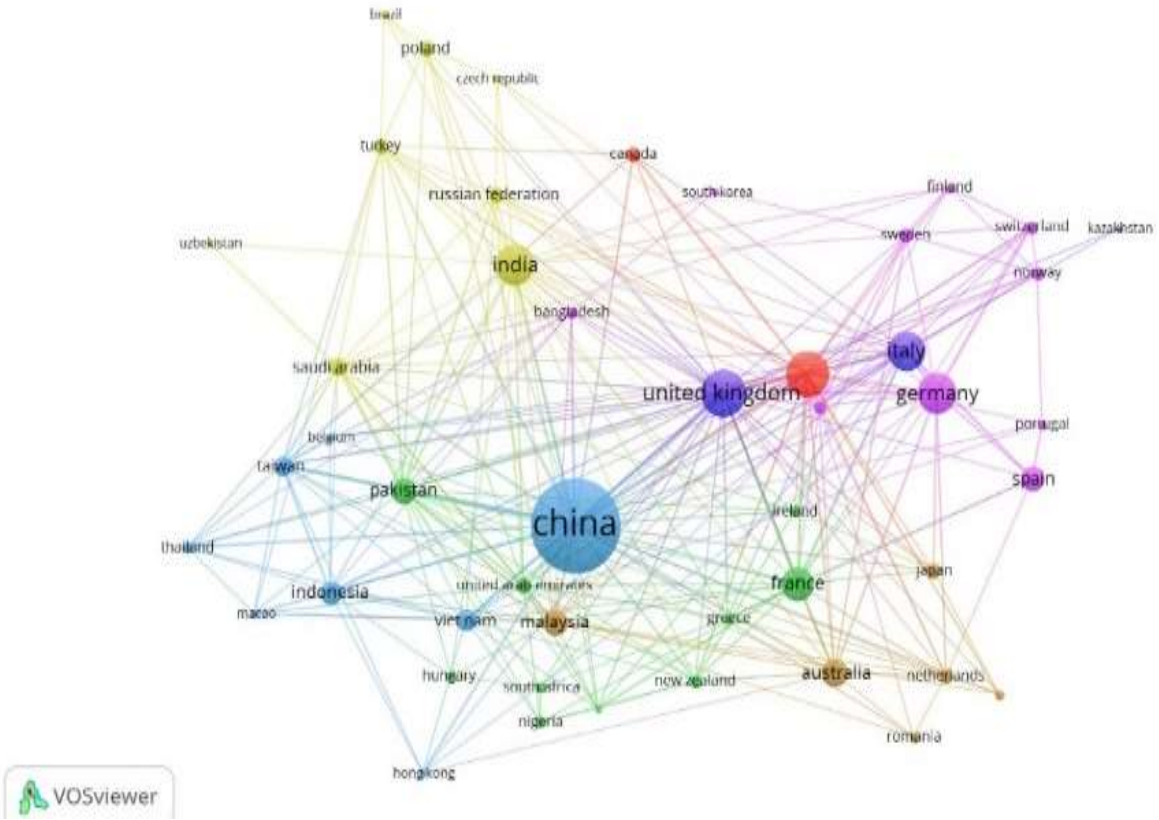

Figure 5. *Network visualization of top countries.Source: VOS viewer*

Table 3. *Contribution of countries and organizations to Green Investment*

Country	Documents	Citations	Organization	Documents	Citations
China	166	6583	"Center for energy and environmental policy research, beijing institute of technology, beijing, 100081, china"	2	324
United states	61	3308	"Sustainable development research institute for economy and society of beijing, beijing, 100081, china"	2	324
United Kingdom	64	3277	"College of management and economics, tianjin university, tianjin, 300072, china"	4	293
Germany	53	2113	"School of government, university of economics ho chi minh city, ho chi minh city, Vietnam"	3	227
Italy	50	2045	"Smurfit graduate school of business, university college dublin, ireland	2	220
Australia	31	1337	University of ghana business school, accra, ghana"	2	200
France	40	1289	"School of economics and management, southeast university, nanjing, china"	2	195
India	52	1198	"Excelia business school, la rochelle, France"	5	175
Pakistan	28	1002	"School of accounting and finance, university of vaasa, finland"	2	171
Vietnam	22	900	"University of cambridge, cambridge, United Kingdom"	2	170

Table 4. *Co-authorship of countries*

Country	TPN	TCN	TLS
China	166	6583	155
United Kingdom	64	3277	95
United States	61	3308	72
Pakistan	28	1002	63
France	40	1289	48
India	52	1198	47
Saudi Arabia	18	543	45
Germany	53	2113	42
Italy	50	2045	42
Taiwan	19	448	42

The research investigates how financial technology can contribute to sustainable development while promoting financial inclusion. In the realm of responsible investment, Sandberg [24] examines The Heterogeneity of Socially Responsible Investment, receiving 234 citations. This work is complemented by Busch [25], who explores Sustainable Development and Financial Markets with 232 citations, focusing on old paths and new avenues in the field. More recent contributions include Huang and (Martin & Moser, [26,27], investigating how environmental regulations affect corporate green investment with evidence from China. This research, despite its recency, has already accumulated 189 citations, highlighting the growing interest in regulatory impacts on green investment decisions.

The Most Frequent and Relevant Themes

The co-occurrence analysis of author keywords reveals the most frequently used terms in paper titles and abstracts. As shown in Table 6, "Green Investment" emerges as the top keyword with 140 occurrences, followed closely by "Sustainable Investment" with 119 occurrences. "Sustainability" ranks third with 50 times. This indicates that green investment is at the core of the research focus, with

Table 5. *Top documents in green investment field.*

Document	Paper title	Journal	TCN
(Campiglio, 2016) [16]	Beyond carbon pricing: The role of banking and monetary policy in financing the transition to a low-carbon economy"	Ecological Economics	399
(Moore & Manring, 2009)[17]	Strategy development in small and medium sized enterprises for sustainability and increased value creation"	Journal of Cleaner Production	339
(Ren et al., 2020) [18]	"Nexus between green finance, non-fossil energy use, and carbon intensity: Empirical evidence from China based on a vector error correction model"	Journal of Cleaner Production	310
(Dafermos et al., 2018) [19]	"Climate Change, Financial Stability and Monetary Policy"	Ecological Economics	305
(Zhou et al., 2022) [20]	"The impact of fintech innovation on green growth in China: Mediating effect of green finance"	Ecological Economics	296
(Gianfrate & Peri, 2019) [21]	"The green advantage: Exploring the convenience of issuing green bonds"	Journal of Cleaner Production	294
(Biresselioglu et al., 2018) [22]	"Electric mobility in Europe: A comprehensive review of motivators and barriers in decision making processes"	Transportation Research Part A: Policy and Practice	284
(Arner et al., 2020) [23]	"Sustainability, FinTech and Financial Inclusion"	European Business Organization Law Review	270
(Sandberg et al., 2009) [24]	"The Heterogeneity of Socially Responsible Investment"	Journal of Business Ethics	234
(Busch et al., 2016) [25]	"Sustainable Development and Financial Markets: Old Paths and New Avenues"	Business & Society	232
(Martin & Moser, 2016) [26]	"Managers green investment disclosures and investors reaction"	Journal of Accounting and Economics	200
(Huang & Lei, 2021) [27]	"How environmental regulation affect corporate green investment: Evidence from China"	Journal of Cleaner Production	189
(Gershoff & Frels, 2015) [28]	"What Makes It Green? The Role of Centrality of Green Attributes in Evaluations of the Greenness of Products"	Journal of Marketing	183
(Fowler & Hope, 2007) [29]	"A Critical Review of Sustainable Business Indices and their Impact"	Journal of Business Ethics	183
(Petrick & Echols, 2004) [30]	"Technology road mapping in review: A tool for making sustainable new product development decisions"	Technological Forecasting and Social Change	181

Table 6*. Co-occurrence analysis of authors keywords.*

Keyword	Occurrences	Total link strength
Green Investment	140	135
Sustainable Investment	119	130
Sustainability	50	56
Green Finance	42	59
Sustainable Development	36	54
ESG	34	56
Green Bonds	29	36
Climate Change	27	43
CSR	26	47
Sustainable Finance	25	42
Investments	24	24

sustainability and sustainable investment practices being closely related themes. The overlay visualization in Figure 6 illustrates the interconnectedness of various concepts within the field of green investment. We can observe that "green investment" occupies a central position, with strong connections to other key themes such as "sustainability", "climate change", "renewable energy", and "ESG" (Environmental, Social, and Governance). This suggests that green investment is deeply intertwined with environmental concerns and sustainable business practices. The Figure 7 depicts the growth trends of various keywords over time. It is evident that interest in green investment and related concepts has seen a significant increase, particularly from 2020 onwards. The sharp rise in the curves for " Green Investment", "Sustainable Investment", and "Sustainability" indicates a surge in research and attention to these areas in recent years. This trend aligns with the growing global focus on addressing climate change and promoting sustainable development. Other notable themes that emerge from the keyword analysis include "Green Finance", "Sustainable Development", "ESG" and "Green Bonds". These concepts are less frequent than the top keywords but still show considerable link strength, which indicates their importance in the broader discourse on green investment. The visualization also highlights the interconnections between green investment

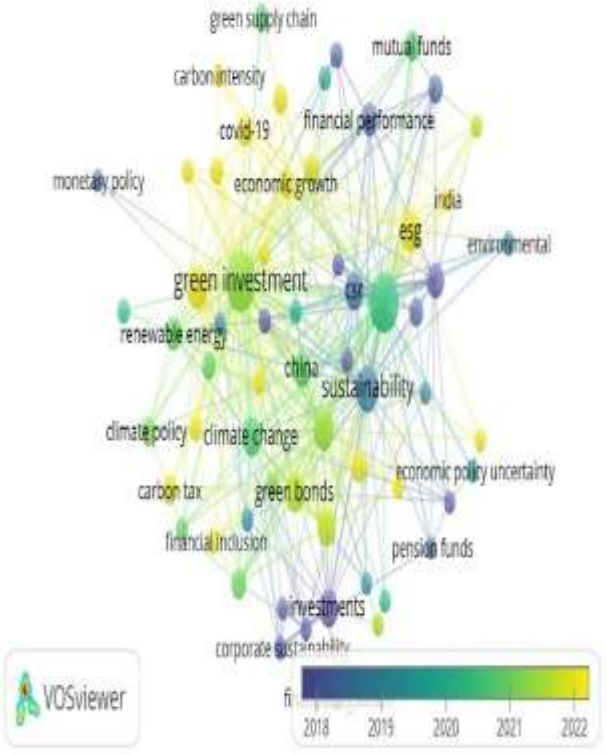

Figure 6. *Overlay visualization of author keywords. Source: VOS viewer*

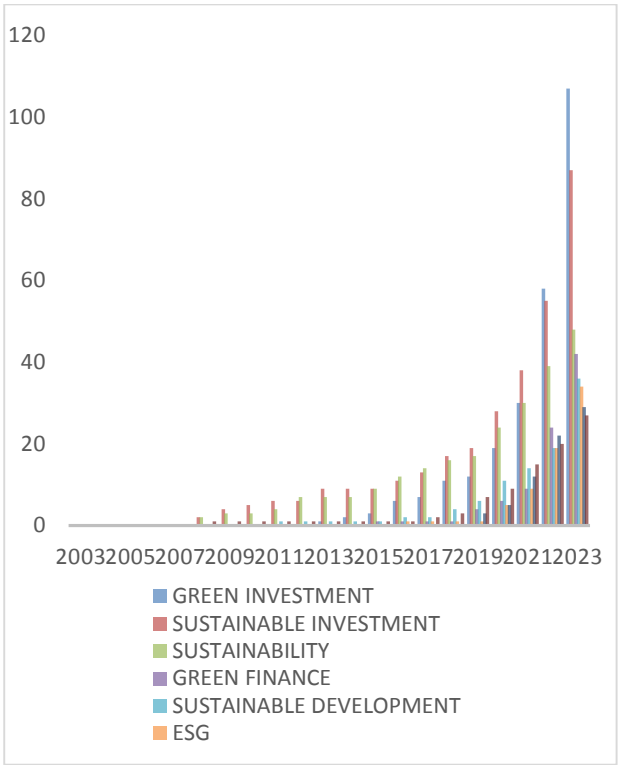

Figure 7. *Development of top keywords over the period. Source: VOS viewer.*

and various economic and policy factors. Terms like "economic growth", "monetary policy", and "financial performance" appear in the network, suggesting that researchers are exploring the economic implications and financial outcomes of green investment strategies. Additionally, Figure 8 (trend topic) illustrates the most popular topics within this field of study. Overall, this analysis reveals that green investment has become a central topic in sustainable finance research, with a growing emphasis on its role in addressing environmental challenges and promoting sustainable economic development.

Three Field Plot

Figure 9 presents a three-field plot illustrating the interconnections between key authors, descriptors, and sources in green investment research. The left field (AU) shows prominent authors in the field and the middle field (DE) displays the most frequent keywords, with green investment, sustainable investment, and green finance being the most prominent keyword. The right field (SO) represents the key sources or journals publishing articles in this area, with Journal of Cleaner Production, Journal of Sustainable Finance and Investment, and Resources Policy standing out as major journals. The lines connecting the fields demonstrate the relationships between authors, the area of their study, and where they publish their work.

For instance, we can observe that several authors are working on topics related to green investment and sustainable finance, with their work being published across multiple journals in the field. This visualization helps to identify the main themes, key researchers, and important publication outlets in green investment research. The density of connections between certain keywords and journals suggests areas of concentrated research focus. The green investment and sustainable investment appear to have strong connections to multiple journals, indicating their centrality to the particular field. This three-field plot provides valuable insights into the structure of green investment research, helping to identify potential collaborations, emerging topics, and influential journals in the field.

4. Systematic Review

This section presents a systematic review of highly cited documents in the field of green investment. This review can assist researchers in understanding the main drivers and barriers of green investment. Table 7 presents the literature review of the 25 most frequently cited research papers in this field. It will aid researchers in the identification of the gaps in the field of green investment research. The study outlines the research type, objective, method, statistical tool, and findings in a table.

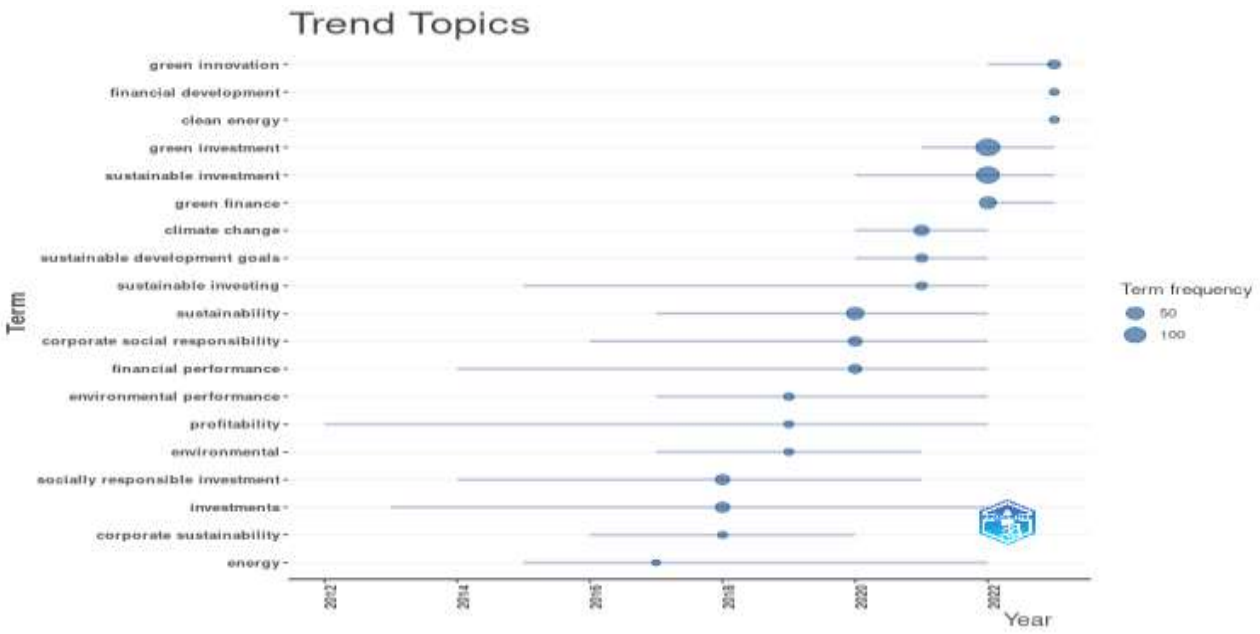

Figure 8. *Trending topics in the domain of green investment. Source: Biblioshiny.*

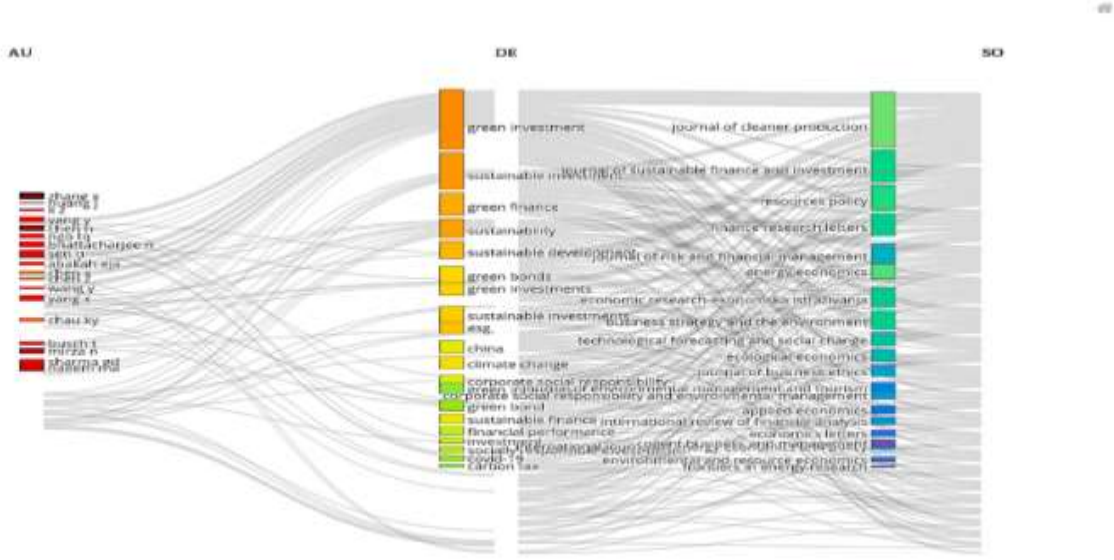

Figure 9. *Three field plot diagram. Source: Biblioshiny*

Table 7. *Systematic Review*

Author Name and Research Type	Journal Name	Citations	Main Research Goal/Purpose	Method/ Specific Statistical Tests Applied	Primary Results & Significant Outcomes
(Martin & Moser, 2016) [26] Empirical Quantitative	Journal of Accounting and Economics	200	Investigate how investors react to managers disclosure of green investments that do not directly impact future cash flows but instead generate societal benefits. The study also examines whether managers anticipate these reactions when making investment and disclosure decisions.	experimental market settings, T-tests and regression analysis	Investors are willing to pay a premium for companies with disclosed green investments even when those investments are known to be unprofitable. Investors react more positively to disclosures that emphasize on the societal benefits of green investments rather than the costs to the company. The managers anticipate investors positive reaction to green investment disclosures and lead them to overwhelmingly disclose these investments.
(Huang & Lei, 2021) [27] Empirical Quantitative	Journal of Cleaner Production	189	Investigate the impact of various forms of environmental regulation, including market-based, command-control, and public-participation, on corporate green investment in China.	panel data regression analysis, generalized method of moments, Fisher s Permutation Test	Command and control Corporate green investment is inverted U-shaped in relation to environmental regulation. Corporate green investment is significantly and positively influenced by both market-based and public-participation environmental regulations. The relationship between environmental regulation and green investment is positively moderated by the regional marketisation process, with a more pronounced effect on non-state-owned enterprises.
(Ren et al., 2022)[31] Empirical Quantitative	Environmental Science and Pollution Research	162	To evaluate the influence of green investment on environmental pollution in China. The study also examines the mediating role of energy savings and emission reduction efficiency, innovation efficiency, and industrial structure upgrading. Green investment and environmental regulation have a more significant impact on non-state-owned enterprises.	Spatial Durbin model (SDM, - Mediation analysis, Dynamic Threshold Panel Model, Ordinary Least Squares (OLS) Regression	Study analyses the panel data from 30 Chinese provinces (2006-2017) and found that green investment leads to a significant decrease in local environmental pollution. This impact is primarily attributed to green investments role in fostering technological innovation, facilitating industrial structure upgrades and enhancing energy savings and emission reduction efficiency. Notably the spatial analysis reveals that the pollution reduction effects of green investment are localized with no significant impact on neighbouring provinces

(Zhang & Yousaf, 2020) [32] Theoretical	Journal of Cleaner Production	162	This study examines the coordination of green supply chains in the petroleum industry, with a focus on government intervention, green investment, and customer preferences, in order to enhance supply chain performance and encourage green improvements.	examines scenarios, mathematical modeling	The research revealed that a two-part tariff contract that includes government intervention (such as taxes or subsidies) can facilitate green improvements and optimise the global supply chain. Factors such as the strength of government intervention, the cost of green technology investment, and the additional demand generated by customer green preferences all contribute to the optimal degree of green improvement. It is important to note that the research indicates that increased green improvement levels are not always the result of stronger government intervention.
(D Orazio & Popoyan, 2019) [33] Systematic Review	Ecological Economics	159	This research investigates the potential of financial regulation particularly macroprudential policies in promoting a green economic transition by fostering green investments and mitigating climate related financial risks.	critical review of literature and policy documents	The study found that current macroprudential policies may not be sufficiently "green" and suggests several modifications to existing frameworks to enhance support for low-carbon transition including, countercyclical capital buffers, sectoral leverage requirements, adjusted liquidity regulations, credit limits, and large exposure limits.
(Sun et al., 2019) [34] Theoretical	Journal of Cleaner Production	154	This research explores the strategic decisions surrounding green investment within a two-echelon supply chain, considering the impact of government subsidies and aiming to optimize these policies to encourage greater green investment from suppliers and manufacturers.	evolutionary game theory, acobian matrix analysis	The study demonstrates that alterations in factors such as the green investment input-output ratios of suppliers and manufacturers, government subsidies, and initial market proportions can lead the system to evolve towards different evolutionarily stable strategies that highlight the complex interplay between these factors in driving green investment behavior.
(Deng & Wu, 2014) [35] Empirical Quantitative	Regional Science and Urban Economics	135	The study investigates the economic returns of green building investments from the perspective of housing developers, particularly focusing on the difference in price premiums between the presale and resale stages in Singapore.	Propensity Score Matching (PSM), Hedonic Model, Difference-in-Differences (DID) Analysis	The research found a significant green price premium for GM-rated units is substantially larger at the resale stage (9.9%) compared to the presale stage (4.1%), indicating a mismatch in the timing of costs and benefits for developers.
(Dutta et al., 2020) [36] Empirical Quantitative	Journal of Cleaner Production	127	This study investigates whether green investments are significantly impacted by oil price shocks.	Markov Regime Switching (MRS) Regression, Phillips-Perron (PP) and Augmented Dickey-Fuller (ADF) tests, Zivot-	The study found no significant relationship between oil prices and green investment returns, but a significant negative relationship was identified between oil price volatility (OVX) and green investment returns in volatility regimes.

				Andrews unit root test	
(Yadav et al., 2016) [37] Empirical Quantitative	Business Strategy and the Environment	125	The study aims to investigate how a firm s environmental performance influences its value from the perspective of investors.	Standardized Cumulative Abnormal Returns, Multivariate Regression Analysis	Investors react positively to the announcement of environmental performance that leads to significant positive SCARs in a three-day event window. A positive correlation exists between a firm s green score and its SCARs, indicating that higher environmental performance is associated with higher firm value. Firms that consistently improve their environmental performance (score-up and rank-up firms) experience significantly higher SCARs than those that do not.
(Gu et al., 2021) [38] Empirical Quantitative	Energy Economics	125	This study examines the impact of heightened public environmental concern (PEC) on corporate green investments, specifically exploring the role of CEO turnover in this relationship.	Difference-in-Differences (DID) model, Robustness tests, Triple Difference (DDD) model	The study found that there was a notable rise in CEO turnover in heavily polluting companies following a surge in PM, with approximately 25% more turnovers compared to non-heavily polluting companies. Heavily polluting companies responded by increasing their green investment expenditures, which helped alleviate the pressure on CEO turnover. Regional differences were also observed, indicating that areas with escalating smog intensity experienced more significant impacts on CEO turnover.
(Lundgren et al., 2018) [39] Empirical Quantitative	Energy Economics	112	This study examines the correlation between the returns of renewable energy stocks and four significant investment asset classes: oil, US Treasury bonds, currency, and stocks. The research also investigates the influence of a variety of uncertainties on renewable energy investments.	Nonlinear Causality Test, Connectedness Network Analysis, Granger Causality Test, Generalized VAR Spillover Approach	This study examined the correlations between the returns of renewable energy stocks and other financial assets and determined that the European stock market is significantly impacted by the prices of renewable energy stocks. The research also revealed that energy investments are significantly influenced by economic and financial uncertainties, and that the majority of uncertainties are net transmitters of volatility connectedness during financial crises.
(Cunha et al., 2020) [40] Empirical Quantitative	Business Strategy and the Environment	101	Assess the performance of sustainable investments compared to traditional benchmarks, utilizing data from global stock markets and sustainability indices.	annualized returns, standard deviation, Sharpe ratio, Treynor ratio, Omega ratio	Mixed results were observed regarding the outperformance of sustainable investments over traditional benchmarks. Some sustainability indices demonstrated higher risk-adjusted returns, while others did not. The study highlights the heterogeneity in the performance of sustainable investments across different markets and time periods

(Escrig-Olmedo et al., 2017) [41] Empirical Quantitative	Journal of Cleaner Production	91	To develop a methodological approach for integrating multiple Environmental, Social, and Corporate Governance (ESG) investor preferences into sustainable investment decisions.	(Multi-Criteria Decision-Making (MCDM) Methods Combination, Fuzzy Inference System (FIS), Fuzzy Inference System (FIS)	The findings show that the proposed method effectively combined diverse investors financial and Environmental, Social, and Governance (ESG) preferences to evaluate corporate sustainability performance. The fuzzy TOPSIS solution showed a notably strong and statistically significant correlation with the rankings that individual investors would generate independently. This method demonstrated superior alignment with the preferences of various investors when compared to solely relying on the Thomson Reuters ASSET4 database rankings.
(Gutsche & Ziegler, 2019) [42] Empirical Quantitative	Journal of Banking and Finance	80	Investigate the willingness of private investors in Germany to pay a premium for sustainable investments, utilizing stated choice experiments for fixed-interest products and equity funds. The research also explores the role of psychological factors and individual characteristics in shaping investor preferences.	Mixed Logit Models, Latent Class Logit Models, Willingness to Pay (WTP) estimation	Private investors in Germany exhibit a significant WTP for sustainable investment products. The research identifies heterogeneous investor groups, including those driven by financial performance, sustainability concerns, and a desire for transparency. Psychological factors like warm glow and social expectations, alongside political orientation and environmental awareness play a crucial role in influencing investors WTP for sustainable investments
(Jain et al., 2019) [43] Empirical Quantitative	Risks	76	To determine whether sustainable investment alternatives provide superior financial returns in comparison to conventional indices from both developed and emerging markets.	Unit-root tests (Augmented Dickey-Fuller (ADF)), Grangers Causality Model, Johansens Cointegration test, Auto-regressive Conditional Heteroskedasticity (ARCH)-GARCH type modeling	The integration of sustainable indices with conventional indices facilitates the exchange of information between the two systems. There is no significant variance in performance that has been observed between sustainable and traditional indices. All ten indices in the study exhibit characteristics of non-normality and stationarity. Furthermore, the substantial evidence indicates a bi-directional volatility spillover effect between sustainable and conventional indices.
(Stoever & Weche, 2018) [44] Empirical Quantitative	Environmental and Resource Economics	72	Analyze the effects of environmental regulation on firm competitiveness and investment behavior, focusing on green investments in the context of the Porter Hypothesis.	Difference-in-Differences (DID) estimation - Fixed Effects Regression	The study emphasizes the importance of considering different types of green investments (add-on vs. integrated) when examining the relationship between environmental regulation and firm performance. The research contributes to the debate on the Porter Hypothesis by providing a detailed examination of firm-level responses to specific

					environmental regulations.
(Zhang et al., 2021) [45] Empirical Quantitative	Economics Letters	67	Investigate the relationship between green policies and green investment in China, specifically focusing on the mediating role of ESG investing developments.	Fama-MacBeth regression, portfolio analysis, panel regression	The study found that ESG investing became significantly more profitable in China after the implementation of the "Guidelines for Establishing a Green Financial System" in 2016. Prior to 2016, ESG performance had little impact on investment returns. However, after the guidelines were introduced, high-ESG portfolios earned significantly higher abnormal returns. This outperformance was primarily due to a reduction in the cost of equity capital for firms with good ESG profiles.
(Atif et al., 2020) [46] Empirical Quantitative	Business Strategy and the Environment	67	Explore the impact of board gender diversity, specifically the percentage of women on boards (WOBP), on the level of firm's sustainable investments	Ordinary Least Squares (OLS) regression analysis, Tobit regression analysis, Two-Stage Least Squares (2SLS), Generalized Method of Moments (GMM)	A positive and significant relationship exists between WOBP and sustainable investment. This positive relationship holds even after controlling for endogeneity, suggesting a causal link. The study supports the gender socializing theory, which holds that women s socializing influences increase their likelihood of advocating for environmentally friendly behavior.
(Paetzold & Busch, 2014) [47] Empirical Qualitative	Organization & Environment	61	To understand why private investors are disengaged from sustainable investing (SI) despite apparent interest.	Semi-structured interviews, inductive, theory-building approach, analytical induction and pattern matching	The study found that investment advisors play a critical role in shaping private investors engagement in sustainable investing (SI). Even when advisors are trained on SI and encouraged to discuss it with their clients, they may withhold relevant information, hindering investors from acting on their intention to invest in SI. This barrier highlights the importance of training and motivating advisors to effectively communicate about SI and cater to clients diverse understanding of this investment approach.
(Siedschlag & Yan, 2021) [12] Empirical Quantitative	Journal of Cleaner Production	45	To examine the factors influencing firm's decisions to engage in green investments, focusing on internal factors and external influences.	Probit Model, Instrumental Variable (IV) Probit Model, Bootstrapping Standard Errors	The study findings show that firm size, importing activities, and industry competition significantly influence firms' green investments. Larger firms and importers are more likely to engage in both pollution control and cleaner technology investments. Additionally, competition within an industry encourages firms to invest in equipment linked to cleaner technologies, suggesting its role in

					driving green innovation.
(Schaltenbrand et al., 2018) [48] Empirical Quantitative	Journal of Business Ethics	44	To investigate the correlation between managerial experience and green investment decisions, with a particular emphasis on the ways in which experience influences managers' willingness to invest in environmentally friendly initiatives and their perceptions of stakeholder pressure.	Vignette-based experiment, ANOVA, Regression analysis, Confirmatory Factor Analysis (CFA), Split Sample ANOVA	The sources find that managerial experience significantly affects decisions regarding green investments. Managers at financially well-performing companies are more likely to invest in green initiatives, potentially due to the perception of abundant resources. Interestingly, managers from firms with high market performance show heightened responsiveness to consumer pressure but invest less in response to community pressure.
(Dutta et al., 2021) [49] Empirical Quantitative	Journal of Cleaner Production	44	To examine the risk spillovers from crude oil, gold & silver markets to Indian green equity indexes.	Univariate GARCH-based model, Quantile regression (QR)	The sources indicate that risk is significantly transmitted from the crude oil, gold, and silver markets to Indian green stock indexes, particularly during bearish market periods. This implies that volatility is more likely to affect green stock indexes during periods of high uncertainty in these commodity markets. The authors propose that the increased risk transmission during bearish periods may be a result of investors' transition to precious metals such as gold and silver as safe havens during periods of economic instability.
(Khalil & Nimmanunta, 2023) [50] Empirical Quantitative	Journal of Sustainable Finance & Investment	44	To examine the influence of conventional innovation intensity and green innovation on the financial and environmental performance of firms in seven Asian economies.	Time and firm fixed effects panel regression with country and sectoral dummies.	The findings revealed that both conventional innovation and green innovation positively impact a firm s financial performance. However, conventional innovation focused on R&D can negatively affect environmental performance by increasing carbon emissions. Conversely, green innovation improves both financial and environmental performance, suggesting that firms should prioritize green investments for a more sustainable and profitable future.
(Zhang et al., 2020) [51] Theoretical	Journal of Cleaner Production	39	To analyze how green investment decisions by manufacturers affect firms' decisions and profitability in a competitive market setting with a common retailer.	game-theoretic framework	The study found that retailers consistently benefit from manufacturers green investments. Manufacturers are more likely to invest in green technologies when the investment is efficient, there is a higher proportion of green consumers and those consumers have a strong preference for green products. The sources also note that retailers can encourage wider adoption of green technology through targeted subsidy programs.

(Braga et al., 2021) [52] Empirical Quantitative	Journal of Economic Dynamics & Control	33	The primary objective is to assess the effectiveness of government de-risking policies in stimulating green investments, with a particular emphasis on the green bond market.	Dynamic Model, nonlinear model predictive control (NMPC)	The findings indicate that governments and multilateral organizations can effectively reduce the risk associated with green investments by issuing green bonds, particularly those with long maturities. These kinds of bonds offer lower yields and volatility compared to private green bonds, making them more attractive to the investors. The lower risk associated with this type of bond can lead to lower capital costs for green projects and promote wider adoption of renewable energy technologies.

This systematic review analyses the studies (Table 7) that were identified as significant to the adoption of green investments. The following section presents and characterizes each of these elements. The objective of the present investigation is to demonstrate the primary variables that influence green investment.

Government policies and regulations are crucial for shaping green investment decisions among different stakeholders. Instruments like green bonds can make sustainable projects more financially viable by lowering the cost of capital and attracting investors who seek stable returns [53]. Moreover, support from governments and multilateral organizations during the issuance of green bonds can further reduce their risk and attract investors [52]. According to Zhang et al., [45] in his study titled "Do green policies catalyze green investment? Evidence from ESG investing developments in China" indicates that the government's commitment to fostering sustainable development is evident in Chinas Guidelines for Establishing a Green Financial System and subsequent policies promoting ESG investing. However, further research is required to evaluate the impact of these policies on tangible enhancements in ESG investing performance. Furthermore, the type of environmental regulation employed can influence corporate green investment differently. For instance, regulations like command-and-control, which were initially effective in encouraging compliance, may reach a point where further investment becomes less attractive for companies if the cost of exceeding emission limits is lower than the cost of further investment [27]. Conversely, market-oriented regulations such as emissions trading schemes and those involving public participation like environmental petitions, generally exhibit a more favorable and stable correlation with corporate green investment [54]. Additionally, investor attitudes toward sustainable investments are changing; however, there is no clear consensus on whether investors are consistently prepared to forgo lower financial returns for environmental advantages. when Some investors prioritize socially responsible investments, while others may focus solely on financial performance [49,42]. Furthermore, the integration of sustainable indices with traditional indices offers investors better transparency and access to the ESG data regarding companies' environmental performance. This integration can enhance informed investment decisions that allow financial managers to diversify their portfolios while taking sustainability factors into account when making an investment decision [40,55]. Finally, the market dynamics, specifically risk spillovers from commodity markets such as crude oil, gold, and silver, can significantly impact the volatility of green investments [56]. Evidence indicates that these spillovers are more significant during bearish market phases, underscoring the vulnerability of green investments to wider economic uncertainties [49]. Investments in renewable energy, though crucial for combating climate change, frequently encounter difficulties in attracting investors due to perceptions of diminished risk-adjusted returns. This is due to the capital-intensive characteristics of these projects, technological risks, and policy ambiguities [57]. Figure 10 shows factors influencing green investments. Apart from this Internal factor related to firm characteristics and strategies plays a vital role in green investment decisions. Larger firms, importers, and firms that are part of enterprise groups tend to invest more in pollution control equipment and cleaner technologies. the size of these firms, resources, and access to international markets can provide them the capacity to adopt more environmentally friendly practices. [12]. Additionally, competition within the industry can act as a catalyst for green innovation, as companies may seek to gain a competitive advantage by

Figure 10. *Factors Influencing Green Investments.*

appealing to environmentally conscious consumers. Moreover, the presence of a common retailer can further influence manufacturers green technology adoption, potentially through cost-sharing agreements or financial incentives [51]. Furthermore, a company s financial performance and the decisions of its managers can significantly impact its commitment to green initiatives. Companies with stronger financial performance may have more resources available to allocate to green investments, [48] also managerial decisions, shaped by factors like job tenure, professional background, and past experiences, can influence a company s approach to green investments. The Growing public concern for the environment and pressure from stakeholders are becoming increasingly influential in driving corporate green investments. As awareness of environmental issues rises, companies face greater scrutiny and demands for transparency regarding their sustainability practices [38]. Financial advisors can raise awareness and engagement among private investors for sustainable, responsible investing by educating clients about sustainable investment options and incorporating sustainability factors into their investment recommendations [58].

Advancements in green technologies and their efficiency are key drivers of green investment. Breakthroughs in green technologies can make them more effective in reducing environmental impact and more cost-competitive compared to traditional technologies. This can create a stronger business case for green investments and encourage wider adoption of these kind of investment [31]. Furthermore, the cost-effectiveness of green technologies is a critical factor in investment decisions. When green technologies are expensive and their impact on emission reduction is limited, companies may be hesitant to invest. In such situations, government subsidies can potentially help to bridge the cost gap and incentivize adoption, but careful consideration is needed to ensure that the subsidies are environmentally sound and target technologies with proven effectiveness [32].

5. Discussion

The results suggest that study findings have implications for many stakeholders and offer suggestions for further study in this field. The researcher highlights the growing number of sustainable investment alternatives available to investors, the need of evaluating risk-adjusted returns, and the significance of financial advisers in supporting well-informed decision-making. Through laws and regulations, policymakers should focus on developing frameworks that encourage green investment and taking targeted actions to advance these environments. Since green investments may enhance both financial and environmental outcomes, businesses may benefit from incorporating sustainability into their business planning. The results indicate that future research should focus on addressing the issues raised and investigating new developments in the field. The result demands expanding our knowledge of investor behaviour, creating cutting-edge financial products, and assessing the long-term impacts of green investments. Through expanding the existing body of knowledge, researchers could aid in to create a more prosperous and sustainable future. Bibliometric analysis is applied in different fields [59-66].

6. Conclusion

The emerging subject of green investing research is on a clear upward trajectory, reflecting the increasing worldwide importance of sustainability and climate change mitigation. The rapid increase of publications, particularly since 2014, indicates that green investment has moved from a niche to a prominent emphasis in finance world. China, United States and United Kingdom’s dominant position in both research publications and citations highlights the shift in global priorities towards environmentally responsible investing. The bibliometric research in this study not only maps the field s intellectual environment, but it also identifies major trends. The prominence of Green Investment, Sustainable Investment, ESG, and Green Bond suggest that the topic is becoming more specialized which reflects a mature research landscape. The links between green investment and economic indicators such as economic growth and

financial performance shows that scholars are particularly interested in the financial consequences of sustainable practices.

The systematic review of frequently referenced articles sheds light on factors that affect green investment decisions. Government laws and regulations are seen as critical drivers, with instruments such as green bonds playing an important role in raising money for sustainable initiatives. Internal factors such as firm's characteristics and strategies also have an impact, since larger organizations and those operating in competitive contexts are more likely to invest in green initiatives. Technological developments and efficiency increase in green technologies are critical for making them more appealing to investors, although cost remains a substantial obstacle that may be addressed by government subsidies. Growing public awareness about the environment, as well as evolving investor preferences for sustainable choices, all contribute to the field's momentum. However, for a sustainable future, it is important to address the lack of ongoing involvement from private investors and the potential influence of investment advisors.

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- **Ethical approval:** The conducted research is not related to either human or animal use.
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