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Performance Evaluation and Scientific Mapping in Sustainability-Focused Green Finance and Literacy

Avaliação de Desempenho e Mapeamento Científico em Finanças e Alfabetização Verdes com Foco na Sustentabilidade

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Abstract

This study presents a comprehensive bibliometric analysis along with a systematic literature review to explore climate finance by addressing two critical challenges of contemporary society: environmental improvement and subjective well-being from a cluster view. This study exported articles from Scopus from 1993 to 2023. Based on Preferred Reporting for Systematic Reviews and Meta-Analysis (PRISMA), 310 articles were carefully analyzed or selected to use advanced bibliometric tools and techniques, such as biblioshiny (R software), to explore this study and verified using Vos viewer software. The results of the performance analysis and scientific mapping reveal that publications on green investment and financial literacy have risen dramatically in the few years since 2020, which can be seen as the effect of COVID-2019 and the Paris Climate Agreement. The scientific publication of word clouds has depicted a significant impact on literacy in the financial market, reducing biases and making sound financial decisions by considering the environment. This study examines green finance, financial systems, and financial literacy to demonstrate the interdisciplinary nature of climate finance research. This holistic approach emphasizes how economic, environmental, and social variables affect sustainability goals. This study informs policymakers and strategic planners to underline green finance for a robust and sustainable economy while making investment decisions. This study focused on the Scopus database up to 2023. Relevant publications from other databases or external factors that influence trends might have been excluded from the analysis.

Keywords: Green finance; Financial literacy; Investment decision-making

Resumo

Este estudo apresenta uma análise bibliométrica abrangente, juntamente com uma revisão sistemática da literatura para explorar o financiamento climático, abordando dois desafios críticos da sociedade contemporânea: melhoria ambiental e bem-estar subjetivo a partir de uma visão de cluster. Esse estudo exportou artigos do Scopus de 1993 a 2023. Com base no Preferred Reporting for Systematic Reviews and Meta-Analysis (PRISMA), 310 artigos foram cuidadosamente analisados ou selecionados para usar ferramentas e técnicas bibliométricas avançadas, como o biblioshiny (*software* R), para explorar este estudo e verificados usando o *software* Vos viewer. Os resultados da análise de desempenho e do mapeamento científico revelam que as publicações sobre investimento verde e literacia financeira aumentaram dramaticamente nos poucos anos desde 2020, o que pode ser visto como o efeito da COVID-2019 e do Acordo Climático de Paris. A publicação científica de nuvens de palavras retratou um impacto significativo na alfabetização no mercado financeiro, reduzindo preconceitos e tomando decisões financeiras sólidas considerando o meio ambiente. Este estudo examina as finanças verdes, os sistemas financeiros e a literacia financeira para demonstrar a natureza interdisciplinar da investigação sobre financiamento climático. Esta abordagem holística enfatiza como as variáveis económicas, ambientais e sociais afectam os objectivos de sustentabilidade. Este estudo informa os decisores políticos e os planeadores estratégicos para sublinharem o financiamento verde para uma economia robusta e sustentável ao mesmo tempo que tomam decisões de investimento. Este estudo concentrou-se na base de dados Scopus até 2023. Publicações relevantes de outras bases de dados ou fatores externos que influenciam as tendências podem ter sido excluídos da análise.

Palavras-chave: Financiamento verde; Literacia financeira; Tomada de decisões de investimento

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1 Introduction

Climate change poses significant risks to communities, the economy, and ecosystems worldwide. To mitigate these risks and adapt to changing conditions, urgent action across various sectors is required (Mo, Ullah & Ozturk 2023; Ramnath, Rock & Shane 2008; Kaiser & Lusardi 2024). The steel and power industries are growing carbon footprints that are highlighted as key players in this climate issue. The solution to reducing the problem of climate change is to force organizations and industries to adopt procedures and practices (Kaur & Dhiman 2024; Nicolini, Cude & Chatterjee2013). Addressing this issue requires significant financial resources to implement mitigation projects (such as renewable energy initiatives) and adaptation measures (such as building a resilient infrastructure). These funds are essential for transitioning into a sustainable, low-carbon economy. Thus, green finance has become a significant investment in supporting this transition. According to the United Nations Environment Program, money flows through multilateral development banks, carbon markets, private investments, and philanthropic contributions to sustainable development goals from the public, private, and NGOs**.**

Despite growing awareness and commitment, there are challenges in effectively mobilizing and allocating climate finance (Eyraud, Clements & Wane 2013; Hailiang *et al.* 2023; Mokoaleli-Mokoteli, Taffler & Agarwal 2009). These include issues related to literacy, awareness, transparency, accountability, access to funding, and the prioritization of climate-related projects**.** The goal of India's National Determined Contributions to reduce emissions and adopt climate consequences is to lower the nation's carbon intensity by more than 45% from the 2005 levels by 2030. India would require around $403 billion in renewable finance by 2030 to meet its renewable ambitions according to projections made by the International Finance Corporation. In fiscal year 2023, the Indian government selected projects with Rs. 25,000 core funding from sovereign green bonds (supported by the Credit Rating Agency Fitch). This can be a major business benefit in gaining public attention, boosting brand value, and providing a competitive advantage (Jackson 2003; Kaur & Dhiman 2024).

As digital technologies continue to revolutionize the financial landscape, investors increasingly focus on sustainable and socially responsible ventures. However, navigating the landscape of green investment demands a firm grasp of financial concepts and a nuanced understanding of environmental impact. This study has become a focal point of interest for researchers, policymakers, and investors.

This study provides a thorough bibliometric analysis of climate finance reviewers from 1993 to 2023, utilizing sophisticated tools like Biblioshiny and VOS viewer. It delineates important trends contributors to green finance research, emphasizing the multidisciplinary character of climate finance that integrated economic, environmental, and social factors. Moreover, it offers essential insights for policymakers concerning the incorporation of financial literacy into climate finance programs.

In addition to that, this reseach specifically examine the influence of economic literacy on investor perceptions of green investments. It indicates a substantial rise in articles about green finance since 2020, possibly catalyzed by global occurrence such as the COVID-19 epidemic and the Paris Climate Agreement. Furthermore, it examines how digital technologies and online platforms equitable access, invest in, and support environmentally friendly and socially responsible ventures, while underscoring the necessity of comprehending financial tools to alleviate biases in investment choices. Through stock markets, crowdfunding platforms, robo-advisors, and blockchain technology, individuals and institutions can access a wide range of green investment opportunities with greater ease and efficiency (Nicolini, Cude & Chatterjee 2013). The purpose of this research is to provide light into the dynamic domain of sustainability-oriented finance and to elucidate how financial literacy might enable investors to make educated decisions that fit with sustainability objectives. (Suresh 2021) . As per the study of (Villarreal-Torres *et al.* 2023) financail literacy helps to understand investors's . financial knowledge, skills, and perceptions to gain valuable insights into their motivations for allocating capital to environmentally sustainable stocks. It is becoming an emerging topic among researchers and publishers related to educating and increasing awareness of sustainable financing. The result od the study found that India and China required dynamic change to achieve the objectives (Behura *et al.* 2023; Hoang, Achache & Jain 2023) . Research Questions

Fresh insights into potential research areas can be gained by enlightening the following research questions:

What is the current research trend in the realm of literacy and green investment regarding the stock market to know the writers and journals contributing the most to each year?

Which citations were used to find the most crucial records?

What are the emerging themes and goals of future research?

2 Review of Literature

The broad research review of financial literacy and green investments is explained as follows.

2.1 Literacy

Financial literacy is acknowledged as a crucial instrument for stakeholders to make accurate economic choices, and several studies have highlighted its significance (Kaiser & Lusardi 2024). However, little research has predominantly concentrated on the influence of economic understanding on investment choices, specifically on green investing behaviour. Consequently, a substantial gap exists in the review discussing the effects of economic understanding on green investment.

Nyakurukwa and Seetharam (2022) state that financial literacy helps investors and motivates them to participate in the stock market, resulting in increased social interaction. Iram *et al.* (2023) identify and try to reduce the number of biases with the help of financial literacy while trading in stock market investments, such as anchor, herd, and mental accounting bias. Various studies based on gender and linking it with financial education, skills, and behavior, such as Hervé *et al.* (2019), Aren and Zengin (2016), and Bucher-Koenen *et al.* (2017), found that women are more conservative when dealing with financial decisions relating to the stock market or retirement planning. Men are overconfident, more risk takers, and have large social interactions to process information quickly. Additionally, men have numerous sources of investment or participation in equity crowdfunding. All of these things are possible only with the help of technology that creates social groups and social media to make active all the time (Raut 2020) . This is why the government and policymakers increase awareness, launch campaigns, webinars, etc. for financial literacy towards individuals or organizations, not only for self-development but also for securing the future (Hassan Al-Tamimi & Anood Bin Kalli 2009). (Chanda & Ghosh 2024; Kumar & Goyal 2015; Sachdeva & Gangwar 2023) conducted SLR and bibliometric analysis on financial literacy to explore quantitative and qualitative knowledge by studying 502 articles. In his study, a cluster of financial planning, financial behavior, and the cause or effect of literacy were used to make future references.

The study of Beny *et al.* (2023) on green innovation identified no substantial association between monetary expertise and green investment. It facilitates the adoption of sustainable practices by illustrating them with battery electric vehicles. Moreover, Kaiser and Lusardi (2024) add another contribution to economic understanding that enables educated judgements about investing in low-carbon electric equipment and the monetory market. Sustainable financial literacy helps to access finance towards sustainable projects without greenwashing and boosts the stock market by mobilizing private wealth (Filippini, Leippold & Wekhof 2024). It improves economic outcomes as the financial market provides dedication or benefits towards pension savings and development (Kar & Patro 2024). Thus, highly sustainable economic understanding prevents negative resale value implications from greenwashing claims.

2.2 Green Investment or Sustainable Investment

An empirical study was conducted on green investment to review the trend from 2000 to 2013 and examine the effects on economic growth, interest rates, and fuel prices. In this study, feed-in tariffs and carbon pricing schemes positively impact green investment (Eyraud, Clements & Wane 2013). To emphasize this statement, Pastor *et al.* (2022) conducted a study on green stocks in the German and US stock markets and revealed that these stocks outperform when climate concern is increased. With the advent of technology, investors can easily understand and check national or international companies' policies and guidelines to buy shares or debt for sustainable investments (Brown, Henchoz & Spycher 2018; Pritpal Singh *et al.* 2023). The perception or view of sustainability is only possible through the efforts of investors to learn and invest in green stocks (Murendo & Mutsonziwa 2017). Thus, they can raise their asset portfolios and earn abnormal returns. There is no doubt that education and knowledge are considered while dealing with this market or checking the greenwashing deception of companies to raise money.

On the eve of this perception, blockchain technology develops to be informed and know everything simultaneously (Sulistianingsih & Santi 2023). Because a coin has two faces, this technology has several issues. To illustrate Gatti *et al.* (2021), companies use greenwashing deception to highlight green investment, an innovation that has no result and is done only to attract investors to raise funds and affect the psychology as well as the company profile on a large scale with the invention of technology (Ramiah, Martin & Moosa 2013). Thus, those with high financial literacy, including differences in interest, compound interest, stock, and debt, can find this type of deception (Van Rooij, Lusardi & Alessie 2011). Although it is a statutory disclosing policy towards the company, climate policy can develop workers' technical skills to increase their knowledge, as well as standard or reduce carbon transition, and this is only transforming with the

help of the ICT revolution and globalization (Marin & Vona 2019). The SLR was also conducted for 10 years to check the impact of awareness of sustainable finance on long-term development (Hafner *et al.* 2020). There is a lot of attraction to green bonds for environmental improvement and the performance of investors if bonds are certified by third parties, as these green stocks and bonds increase creditworthiness as well as economic development due to abnormal returns and help to check the adaptability of ethics of collectivism, environmentalism, and the social efficacy of environmentally sustainable growth (ESG). Undoubtedly, the market reflects differences before announcing green policies, and a study of 19 announcements investigated in the Australian stock exchange found that abnormal returns were recorded in the energy sector, whereas mixed effects were found in other sectors (Ramiah, Martin & Moosa 2013). In addition to that, this investment in energy technologies can transform the energy sector by increasing sustainable energy generation (Caglar *et al.* 2024) . It reduces fossil fuel consumption, boosts economic growth and security, and safeguards the climate. The literature review on green finance has focused on macroeconomy that includes environmentally sustainable economic development (Zhang *et al.* 2024), economic growth (Li *et al.* 2023), geographical carbon emissions coping (Ye & Dela 2023), export rise in trade and efficiency improvements (Piluso 2023).

3 Research Methods

A Systematic Literature Review (SLR) were used to examine the publishing growth rate, three field studies in terms of prominent regions, top journals, eminent papers, significant keywords, and the author's research hub structure. In SLR planning, interest identification for investigation is the first part of the issue, dealing with studies, trends, and rules for integrating research as represent in Figure 1. In this section, SLRs determine that no publication addresses the terms "literacy and green finance."

The second stage involves the creation of search records and methods for choosing articles that are appropriate for bibliometric analysis to describe literacy and green finance. This analysis begins by searching for a suitable database. In today's era, numerous databases are available to access the volumes of scholarly publications and metadata, such as Web of Science, Scopus, and Dimensions. To review the research field, we selected the Scopus database as it provides comprehensive coverage and has a valuable impact on scholarly work. In the initial stage, different synonyms related to literacy, green investment, and numerous financing products are available to create the keyword phase "Financial knowledge," "Financial education," "financial awareness," and "investment awareness," are for financial literacy whereas "energy-efficiency investments," "climate change," "green stock,"

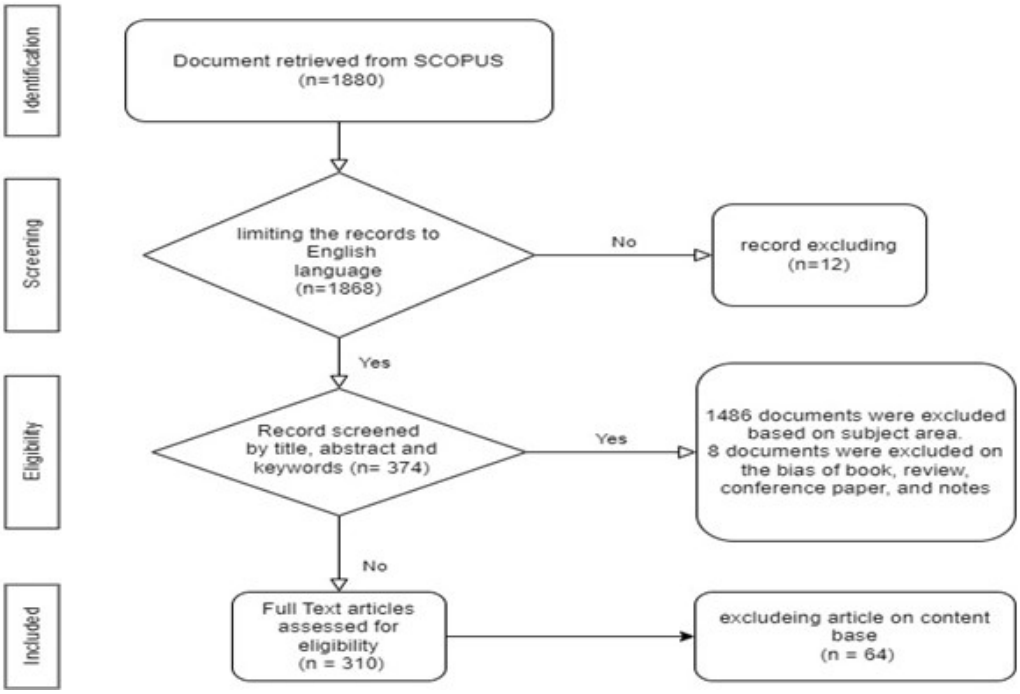

Figure 1 Systematic review selection. Source: Author.

"green bond," "climate finance," "digital financial literacy," digital financial products", "financial technology, ""clean energy stocks, ""sustainable finance, "etc. use for green investments.

Figure 1 is revealing the Preferred Reporting for Systematic Reviews and Meta-Analysis (PRISMA) chart where four steps such as identification, screening, and eligibility represent the search process. In the first stage, 1880 articles were downloaded from the Scopus database. During the screening process, 12 articles were excluded based on the English language. Subsequently, researchers devote a huge amount of time that takes one year to select and analyze carefully to make these papers eligible for study and categories of finance, economics, marketing, business, accounting, energy, and sustainable economy. Thus, 1486 documents were excluded (notes, books, conference papers, book chapters, and other journals). 64 Out of 374 documents were extracted for content analysis, and 310 papers were selected for this study.

The final stage of the SLR is to disseminate the results in a detailed analysis of the features. This process includes a VOS viewer or spreadsheet to check the volume of articles produced, the cluster network, etc.

4 Results and Discussion

The features of bibliometric analysis can be divided into performance analysis and scientific mapping. The results were verified using R studio and Vos viewer software. The details of publishers, authors, and their citations are disclosed in the performance analysis, whereas scientific mapping creates a cluster to easily capture the attributes of the research (G *et al.* 2023).

4.1 Performance Analysis

The scientific productivity of the study, a three-field plot in the form of author, keywords, or countries, and the impact of journals are described in detail.

• **Scientific productivity**:

The scientific productivity related to this research field increases over time, as shown in Figure 2 The growth trend of this topic arose in 2015 but from the year 2020, its dramatic growth took place, and enormous speed in publications reached 90. All these articles focused on investing in green projects and literacy in the digital age of the stock market. It depicts the interest in sustainability and skill development to face inflation in the emerging economy after experiencing or learning from the contagious effects of the financial crisis and COVID-19 phase-out.

• **Three-field plot**

Figure 3 describes the pro-life view of authors along with keywords and countries on the topic of knowledge and green investment under the stock trading platform. It is a three-field plot set designed by authors, keywords, and nations. This figure depicted the scope of green investment and financial education in India, China, and the USA. The author Abakah Eja is alone and contributes his study towards green investment, whereas Chen H and Zhang Y work on both to increase awareness and change behavior towards green finance. The rest of the researchers such as Lu X, Merkoulova Y, Veld C, and Chatterjee S, etc. work largely on financial education and the stock market. By analysis, this paper required further researchers to work on green finance along with education factors to reduce carbon emissions in China, India, etc. There is a need to test the impact ability of climate policy by a comparative study on India and China, India and the USA, or the USA and China.

Figure 2 Scientific productivity of publication. Source: bibilioshiny.

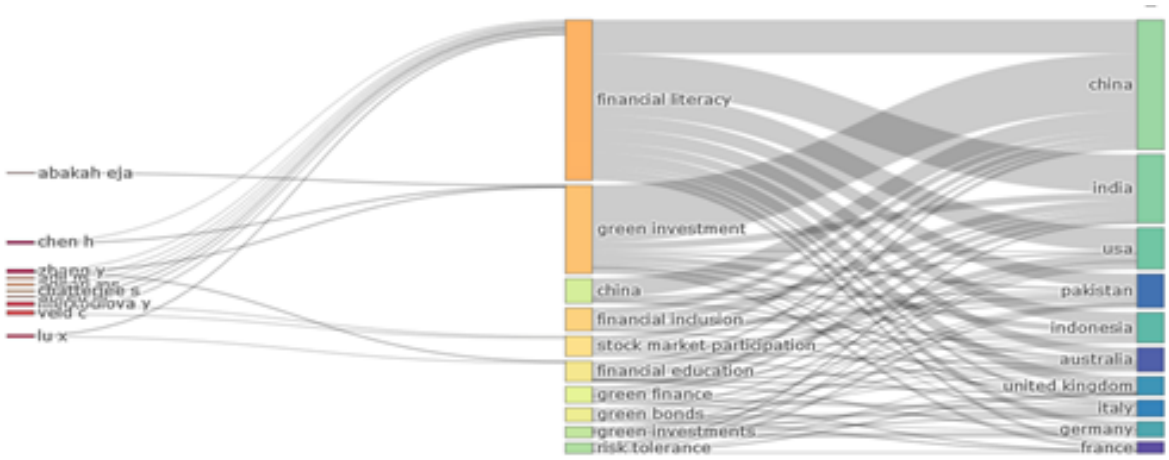

Figure 3 Three field plots. Source: biblioshiny.

• Impact of journals

The performance of the journal can be described in Table 1 which contains the top ten journals along with the h index to find the impact in this field of study. The energy economics journal contains many research papers with a high H index. The economic research and resources policy have the same collection of papers but are slightly different in an index. The performance of the Journal of Risk and Finance Management, Cogent Economic and Finance, and Finance Research letters contain more than 5 papers relating to this field whereas the differences in the index change the view regarding its impact. After comparing or analyzing this study, only energy economics became an impactful journal regarding this research field that contains a 6 in h-index. No doubt, rest of the journal realise vary index but seems to be increase when future researchers write paper to publish for eco-financial aspects.

4.2 Scientific Mapping

The next step is to use co-occurrence and bibliography coupling with the help of software.

We were able to identify three main topic clusters after using an analytical technique to compare the keywords used by various writers. Though the study initially revealed several clusters, only three of them-defined as cluster with 10 or more papers—were substantial clusters. These topics collectively comprised 310 articles, giving a trustworthy representation of the primary subjects investigated by the writers. In these three clusters, major topics of green finance, investment, literacy, and the stock market are covered. The theme of these topics is represented in following clusters. .

• Cluster 1: Green Finance

Scholars tend to promote literacy and sustainable financing as one of the primary debating points. The primary focus of their study is on financial literacy, green investment, and financial inclusion as shown in Figure 4. An author such as Piluso (2023) contribution emphasizes the execution of the Paris Agreement and the European investment bank that takes the initiative to float the carbon tax to raise awareness among the corporates to minimize the use of carbon emission, reconciling the ecological and economic efficiency. There is a need to achieve low carbon emissions by using environment-friendly technology to promote and achieve sustainable development.

Several companies now issue cryptocurrencies to change the climate but found an asymmetric relation between cryptocurrencies and biofuel usage in both the short and long run. The researcher Ye *et al.* (2023a) state that trading in cryptocurrencies increase CO2 emissions in the USA by a significant amount. Therefore, our research suggests limiting the number of cryptocurrencies or making them environmentally benign by implementing renewable energy sources. The role of institutional investors and corporate innovation can contribute to significant improvement in the capital markets to provide important insight into green investment funds. As green finance focus on environmental financing and other products or services, aimed at achieving environmental goals, including industrial waste administration, biodiversity and ecosystem conservation

Table 1 Relevant journals with h index.

Relevant Journals and Their Impact		
Sources	**Articles**	**h_index**
Energy Economics	14	6
Economic Research-Ekonomska Istrazivanja	10	5
Resources Policy	10	4
Journal of Risk and Financial Management	7	2
Cogent Economics and Finance	6	3
Finance Research Letters	6	4
Applied Economics	5	3
Ecological Economics	5	3
Pacific Basin Finance Journal	5	3
Environment, Development and Sustainability	4	2

Figure 4 Word Cloud for Cluster 1.

becoming major role in the economy (Caglar *et al.* 2024). The circular economy business model consider by (Kumar *et al.* 2023) highlighted the complexities on the economic sectors, companies seeks opportunities within the sector or partnering that shift towards profit. The study of (Zhang *et al.* 2024) considered environmental requirements that can lead negative impact of cashflow and reduce market value, thus demonstrating how firms sustainability performance can influence financial position.

• **Cluster 2: Financial System**

As most of the argument around climate policy is tied to it functioning as a barrier to economic development, financing as a tool to support sustainability-related enterprises as well as the impact of sustainability regulations on the reputation of a corporation are essential sets of themes. The second cluster in Figure 5 focuses on the role of the financial system in sustainability. To reach the Paris Agreement, the emphasis is primarily on using laws in the post office, banking, insurance, IT sector, etc. to promote green finance. Several authors contribute to implementing and analyzing the carbo policy, and monetary policy to promote green bonds in the financial market.

The different regulators can reduce and maintain climate or eco–friendly environment by promoting the green bond by passing the current burden of debt to future generations to achieve the climate goal. Another noticeable aspect of this group is its emphasis on emerging nations, particularly China. Every economy has created its own

Figure 5 Word Cloud for Cluster 2.

rules and regulations to make better development of the economy and make efficient decisions for a smooth flow of trade. The study conducted by Mo, Ullah & Ozturk (2023) on Asian countries found that China has long- term growth in green investment, financial institutions, and financial markets. Whereas India and Russia putting efforts to make green growth in this above area. The study of (Delle Foglie & Keshminder 2024) states that SRI sukuks combine the environmental ideals of a green bond with the Shariah-compliant financial structure of a sukuk, a crucial intersection of sustainable and Islamic finance. Based on a "pay for success" basis in the traditional structure, these instruments match profit-and-lost sharing (PLS) ethicality, Islamic finance sustainability principles, and Islamic law religious values. The another study such as (Zhang *et al.* 2024) states how Green Finance Reform and Innovation Pilot Zones cause green investment. The result of this study provides the favourable influence towards external financing, corporate environmental consciousness, and government environmental attention.

• **Cluster 3: Promote Financial Literacy**.

The last cluster shown in Figure 6, dealt with the literacy level of investors to raise their contribution to the financial market. The number of literatures have primarily concentrated on this topic. To illustrate, Zahid *et al.* (2023) investigate the role of financial education among Pakistani women to improve their financial inclusion. Different aspects of knowledge such as saving, investments, debt management practices, financial planning, etc. increase self-efficacy among the genders. Thus, the gap in gender or biases can be attenuated through the dissemination of education and knowledge.

Another author Zhang *et al.* (2021); (Van Rooij, Lusardi & Alessie 2011) states that literacy help to improve risk tolerance level to trade in stock markets. The experience of trade leads the investors to focus on the time-frequency co-movements. The word cloud for the cluster adds to topics with word environment appearing prominently. This indicates that the writer's main concern is the financial shocks caused by the epidemic and the ensuring future saving can be ripple by sorbing education and protecting the environment. The study of (Zahid *et al.* 2023) highlighted the literacy gap due to influence of demographical factors based on age, gender, education, and experience that exhibit to study more on women's economic understanding. To support this study, another authors such as (Akande *et al.* 2023; Filippini, Leippold & Wekhof 2024; Sulistianingsih & Santi 2023; Kaiser & Lusardi 2024) identified ,martial status and residential location as beneficial factors affecting education. No doubt, the level of education leads to success in both business and life. But it helps to rise risk tolerance, job experience, income, training class attendance. The major contribution of this cluster tends to do worse on economic education exams and confidence in individual talents compared to men (Kar & Patro 2024). The study found that illiterate families or those with cognitive limitations face difficulty managing daily expenses. It is important to consider in future research how to impoverish choices and obstacles and develop effective coping mechanisms. Sufficient time or dedication to education is required to develop capital. Thus, self-efficacy is becoming an emerging area to check the relation with economic knowledge (Lone & Bhat 2024). In addition to this, digital financial literacy uses technology, AI, to safely utilize financial products or services. The study of (Akande *et al.* 2023; Delle Foglie & Keshminder 2024; Kaur & Dhiman 2024) found a significant and positive relation to economic knowledge and fintech. Furthermore, green digital literacy is becoming contemporary finance for sustainability. Table 2 Describe the summary to create all the above three clusters.

Figure 6 Word Cloud for Cluster 3.

Table 2 Summary of Cluster.

	Author name	Title of paper	Year	Journal	TP	DOI
	Wei Zhang	Greening through finance: Green finance policies and firms' green investment	2024	Energy Economics	13	https://doi.org/10.1016/j.eneco.2024.107401
	Massimo Filippini, Markus Leippold, Tobias Wekhof	Sustainable finance literacy and the determinants of sustainable investing	2024	Journal of Banking & Finance	54	https://doi.org/10.1016/j.jbankfin.2024.107167
	Oyku Yucel, Gizem Celik, Zafer Yilmaz	Sustainable Investment Attitudes Based on Sustainable Finance Literacy and Perceived Environmental Impact	2023	Sustainability	12	https://doi.org/ 10.3390/su152216026
	Claire J. Li	Green innovation, environmental governance and green investment in China: Exploring the intrinsic mechanisms under the framework of COP26	2023	Technological Forecasting and Social Change	35	https://doi.org/10.1016/j.techfore.2023.122708
Cluster 1	Piluso N.	"Why should the carbon tax be floating? A Tobin's Q model applied to green investment".	2023	Environmental Economics	32	10.21511/ee.14(1).2023.08
	Ye W.; Wong W.-K.; Arnone G.; Nassani A.A.; Haffar M.; Faiz M.F.	Cryptocurrency and green investment impact on global environment: A time series analysis	2023	International Review of Economics and Finance	28	https://doi.org/10.1016/j.iref.2023.01.030
Cluster 2	Mo Y.; Ullah S.; Ozturk I.	Green investment and its influence on green growth in highly polluted Asian economies: Do financial markets and institutions matter?	2023	Green investment and its influence on green growth in highly polluted Asian economies: Do financial markets and institutions matter?	14	https://doi.org/10.1080/1331677X.2022.2140302
	D'Orazio P.; Popoyan L.	Fostering green investments and tackling climate-related financial risks: Which role for macroprudential policies?	2019	Ecological Economics	230	https://doi.org/10.1016/j.ecolecon.2019.01.029

Table 2 Cont.

	Author name	Title of paper	Year	Journal	TP	DOI
Cluster 3	Zahid R.M.A.; Rafique S.; Khurshid M.; Khan W.; Ullah I.	Do Women's Financial Literacy Accelerate Financial Inclusion? Evidence from Pakistan	2023	Journal of the Knowledge Economy	12	https://doi.org/10.1007/s13132-023-01272-2
	Zhang Y.; Jia Q.; Chen C.	Risk attitude, financial literacy, and household consumption: Evidence from stock market crash in China	2021	Economic Modelling	64	https://doi.org/10.1016/j.econmod.2020.02.040
	van Rooij M.; Lusardi A.; Alessie R.	Financial literacy and stock market participation	2011	Journal of Financial Economics	1202	https://doi.org/10.1016/j.jfineco.2011.03.006

• **Network Analysis**

Network metrics can be used to enrich the assessment of the research field to shed light on the relative importance of research constituents. Figure 7 represents the degree of centrality such as network analysis to constituent the relational ties of the research study. There is major 4 clusters developed with the help of data in red, blue, green, and yellow colour. The green colour cluster highlighted literacy with trust, stock market, inclusions, behavior so on. Whereas the blue cluster represents the green investment tied with economic growth (Chapman & Johnson 1994; Tranfield, Denyer & Smart 2003; Ye *et al.* 2023b). The red and yellow clusters show a relationship between the financial market with green or sustainable finance. This network represents the emerging area of green investment along with education and knowledge to make effective decisions regarding cost, innovation, sustainable finance, green bonds, and environment. Major areas are emerging by researchers such as the level of literacy in China and India to make effective investment decision as depict in diagram. The role of technology and innovation extrapolate environmental economics to the intricacies of the financial system. This network supports the word clouds as well as clusters to authenticate the scope for further analysis.

5 Future Research Direction

5.1 Future direction for Cluster 1

The education, and financial inclusion discussion surrounding the trade-offs between environmental and economic concerns is the main dispute investigated in this cluster. As a result, emerging economies have been the focus of most of the studies on this subject; This is the foundation upon which future research can be developed (Brown *et al.* 2015). Although risk tolerance and sustainability development have central to this discourse, there exists considerable potential for further investigation in this domain. . Firstly, there is a need for further articulation of development between financial inclusion and green investment. Authors need to better explore the avenues as well as the profitability effect of green investment on the output of climate finance. Regulators blindly follow international mandates without concern for local economics. Factors such as corporate green tax can be explored in this regard. According to the study of (Caglar *et al.* 2024; Chi, Lu & Yang 2021; Li *et al.* 2023; Ye *et al.* 2023a) emphasise to study more on governemental and private sector to promote green transformation. In addition to this, environmentall degradation should be segregated into different forms instead of CO2 emission. It become interesting topic to devote time towards expanding more green funding options along with risk and return relationship. The proposition for these is as follows:

- Preposition 1. Does environmental change necessitate green investment? Does this investment cause societal change?
- Preposition 2. How can digital platforms, private sectors and fintech developments be used to give individualized and accessible financial education on green investing and finance?
- Preposition 3. Does the presence or absence of government back impact the relationship between green investment and environmental outcomes?
- Preposition 4. Is it needed to determine the ideal regulation level for green enterprises and innovation?

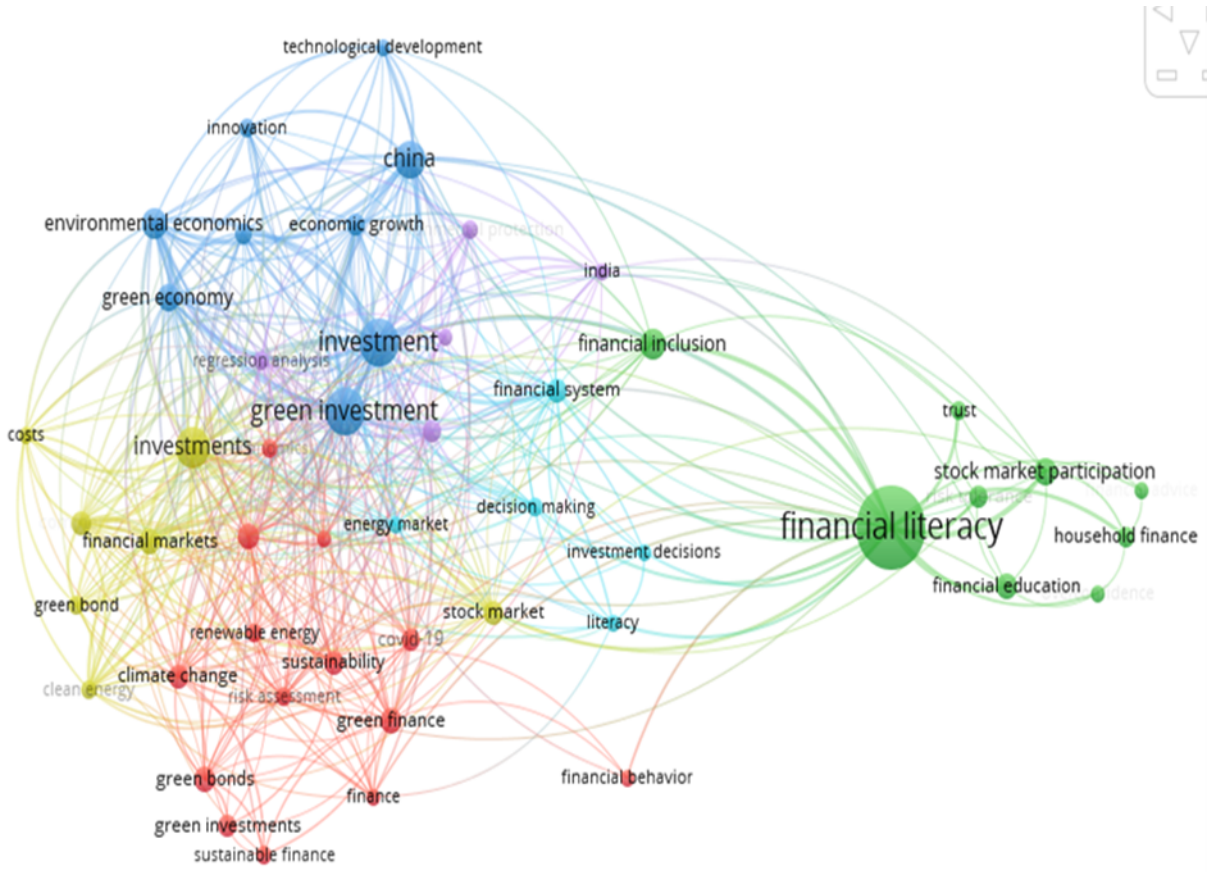

Figure 7 Network analysis.

5.2 Future Direction for Cluster 2

The second cluster deals with the financial system and the green economy that works largely in China. . There has been much debate surrounding the issue of green bonds, climate financing climate risk disclosures, sustainable banking standards, and green finance regulations. There has been much debate surrounding the issue of climate financing about the policy frameworks under which it can operate well (Chi, Lu & Yang 2021). The global initiative is mainstreaming the financial system's response to climate change. The governor of the bank of England acknowledges that climate change impacts economic health. By increase this awareness among investors, start diverting trillions from fossil fuel corporation to anti-fossil fuel campaign, result devaluing the coal industry investment rating (Caglar *et al.* 2024; Long *et al.* 2022; Marin & Vona 2019). Through laws and programs focused on lowering greenhouse gas emissions, enhancing air and water quality, and encouraging renewable energy sources, China has shown a significant commitment to green investment. there has been a debate on the identification of barriers and enablers to sustainable finance and the of regulators to combat climate change. Any climate finance-related actions may effectively be viewed as investigations of public spending thanks to China's governmental system. Examining other economies in the area and contrasting their governing structures with the Chinese environment might help to further examine. Additional research on the effectiveness of such expenditures can be done about sustainable development and green innovation. The following are suggestions for future research:

Preposition 1. What are the current data quality and reporting standards for ESG factors in China and India and how can they improved to meet international standards?

Preposition 2. To what extent are banks and financial institutions incorporating climate risk into their lending and investment decisions?

Preposition 3. How can China play a more significant role in facilitating green finance as a global financial leader?

Preposition 4. What assumptions underpin financial initiatives to address the challenges of climate finance along with solutions?

Preposition 5. How will new financial practices impact systems over time? What are the new finance techniques lead to specialist sections that integrate functional system.

5.3 Future Directions for Cluster 3

The third cluster covers topics of literacy on green or brown stocks, and debts along with the investor's behaviors with a stress on how the changes at the education level can spur investment in green ventures, green technology, and green household schemes. Several literature reveals that digitalisation affects finance and manage economic understanding among the individuals.Households with strong pro-environmental attitudes and behaviors tend to be financially disengaged and uninterested in money problems. They are less likely than others to tick a box in a national retirement plan with required participation (Alshater et al 2023). Moreover, they are unable to choose an active allocation strategy because they are depending on the default. This can be explored by finding causes and remedies in comparison with other countries' contexts such as the USA, Pakistan, etc. A more sustainable economy and society are the results of economic understanding that promote the sustainable behaviour regarding financial products. Thus, it plays a paramount role in facilitating a shift in strategy that involve sustainable finance or adoption of environmental practices (Akande *et al.* 2023; Beny *et al.* 2023; Filippini, Leippold & Wekhof 2024; Lone & Bhat 2024). Further questions regarding such cluster represent as follow:

Proposition 1. What are the main factors that impact people's propensity to invest in green financial products, and how can programs to promote financial literacy affect these factors?

Proposition 2. How might cutting-edge strategies, such as gamification or social learning platforms, be applied to encourage people to learn about green finance and sustainable investing methods?

Proposition 3. What are the best methods for incorporating green finance and sustainability ideas into academic programs and adult education initiatives to raise financial literacy levels overall?

Proposition 4. What is difference in index rate for financial literacy in developed or developing countries to implement sustainable investing practices.

Proposition 5. What kind of curriculum to be added that enhance the skill or awareness regarding new financial products or services?

Proposition 6. How to get individual with low digital access to utilize teaching materials produce by institutions, central banks other government bodies?

6 Conclusions

This study presents a comprehensive bibliometric analysis along with a Systematic literature review to explore climate finance by addressing two critical challenges of contemporary society such as environmental improvement and subjective well-being. This study provides a performance and scientific analysis of scholarly publications, research papers, and academic articles on literacy and green investment by employing a data-driven bibliometric perspective in a cluster view. A total of 1880 articles were exported from Scopus from 1993 to 2023. On the base of PRISMA, 310 articles were analyzed using advanced bibliometric tools and techniques such as biblioshiny (R software) and verified with Vos viewer software. The result of the performance analysis and scientific mapping reveals that the publication on green investment and financial literacy has risen dramatically in the few years since 2020, which can be seen as the effect of COVID-2019 and the Paris Climate Agreement. There are significant impacts of green finance and technology on sustainable economic growth. The performance analysis represents the scientific productivity of this study along with three field plots of author, keywords, and countries whereas the impact of journals has come from around the globe with China, India, and the USA. The science mapping suggests that three themes exist in this area namely, green finance, financial system, and literacy. The network analysis and future directions are provided to invite the researchers to contribute to this study.

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