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Sustainable Financing in Developing and Emerging Countries: A Bibliometric Analysis

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Abstract

Sustainable financing is crucial because it promotes economic development that respects environmental limits and enhances social well-being. By directing capital towards projects and initiatives prioritizing sustainability, developing and emerging economies can ensure that resources are used efficiently and responsibly for balanced and resilient economic growth. This study analyzes scholarly articles from the Scopus database to understand research patterns, geographical trends, collaboration links, and future policy implications of sustainable financing for emerging and developing economies. The research trend of sustainable financing has gained momentum in recent years for emerging economies. The leading contributors included Italy, India, China, and the UK, with Italy having the most papers and citations. Both developed and developing countries collaborated on sustainable financing research. The keyword trends reveal that impact investing was popular in the earlier period, while sustainable finance became more popular later. The thematic map shows that research on sustainable financing primarily covers themes related to sustainable activities that promote projects and companies that positively impact the environment and society. The study's recommendations emphasize the need for policymakers and regulators to conduct in-depth research into green funding, measure the impact of socially responsible investing, prioritize the development of robust infrastructure for sustainable financing, and expand climate financing initiatives.

Keywords: Sustainable Financing, Sustainability, Emerging economy, Bibliometric Analysis and Future research.

1. Introduction

The world faces significant social, environmental, and economic challenges that require substantial financial resources and investments. These challenges include extreme poverty, climate change, economic inequality, and pandemic threats (Levy, 2020; Pizzi et al., 2021). Therefore, raising new funds and directing available assets towards more sustainable investments are crucial but difficult tasks. Businesses, investors, governments, financial institutions, and other stakeholders have already taken advanced Initiatives for Sustainable Finance and

Vol. 8, No.07; 2024

ISSN: 2456-7760

Investment (SFI) in response to these sustainability issues. However, implementing standards for sustainable finance is quite challenging. Sustainable finance can be understood as "finance for sustainability," signifying a substantial shift from merely integrating sustainability considerations into investment decisions. According to Migliorelli (2021), sustainable finance involves allocating financial resources to sectors that encourage achieving or improving at least one critical dimension of sustainability, such as social equity, environmental health, or economic stability. Many International organizations and nations have established a global framework for the sustainable development of human society by introducing action plans in response to the growing challenges associated with sustainable development in the environment, culture, and financial market (Li et al., 2021). Environmental, Social, and Governance (ESG) portfolio screenings and engagement tactics used by socially and environmentally responsible investment funds create a lasting positive sustainability impact by integrating scholarly and practical perspectives (Juravle & Lewis, 2008; Saha et al., 2024). The expert group announced that "transforming the investment culture and behavior of all market participants" is necessary to reroute capital flows toward sustainable projects (HLEG, 2018). According to Segot (2019), academic research, higher education institutions, and the finance discipline would be crucial in assisting financial institutions and market players to align their actions with the long-term decision-making necessary to fund sustainable economies and societies.

Sustainable finance has the potential to considerably impact sustainability in emerging economies by encouraging green investments, boosting social development, encouraging corporate accountability, strengthening economic resilience, and drawing in foreign money to meet sustainable goals. It helps allocate capital towards eco-friendly projects such as renewable energy, composting businesses, waste management, eco-tourism, green finance, etc. This investment usually tends to focus on long-term outcomes for the well-being of society. For example, taking corporate social responsibilities (CRS) from industry management, improving infrastructure like affordable housing, medical treatment, life standards, etc. (Cerin & Dobers, 2008). Sustainable investment also dramatically contributes to sustainable development goals (SDG), which stimulate stability and resilience in the market by reducing economic shocks or disruption. It also supports innovation drive and development of eco-friendly technologies to accelerate economic growth smoothly by leapfrogging outdated infrastructure. (Folqué et al., 2023).

Sustainable finance is becoming increasingly important globally because it is one of the most innovative growth trends in the financial sector (Sharma et al., 2023). Based on many literature discussions, it is one of the new paradigms in the field of funding sources and one of the rising concerns for researchers (Tuyon et al., 2021). Though formal bibliometric analysis specifically for sustainable finance is either nonexistent or highly scarce, current research has a wealth of literature on green finance, the environment, and sustainable development. Since sustainable development is the global economy's direction, limited research on bibliometric analysis of sustainable finance is a critical research gap. Since sustainable development is strongly accelerated by sustainable finance, research in this area is essential.

Vol. 8, No.07; 2024

ISSN: 2456-7760

This study has significantly added to the body of knowledge in literature in two different ways. Firstly, it clarifies the important geographical factors, academics, journals, institutions, publishers, and research fields that are drawing more attention to activities about sustainable finance. This will expedite research development and assist future researchers in creating fresh, creative ideas. Secondly, this paper offers a thorough analysis of the features of sustainable financing in emerging economies, its significance to society, environmental, social, and governance aspects, and the advantages of putting sustainable financing into practice. As a result, users and industry players will be better equipped to comprehend the present state of green and sustainable finance. Finally, the study suggests a research agenda that prioritizes identifying viable initiatives for implementing sustainable strategies for financing, balancing environmental risks with profits, and creating value from green research and practice paths.

2. Literature Review

Previous literature shows that sustainable financing provides a stable and predictable source of resources essential for long-term growth and plays a crucial role in the economic development of developing countries (Ahamed et al., 2021; Albaker et al., 2022; Bhattacharyya, 2022; Greasley et al., 2014). Through investment in sustainable projects and initiatives, these nations can reduce their reliance on volatile external funding sources and effectively manage financial risks associated with climate change and environmental degradation. Moreover, embracing sustainable finance practices enables these countries to mitigate the financial risks of environmental degradation and unpredictable global markets, thus promoting economic stability and reducing vulnerability (Bhattacharyya, 2022; Liu et al., 2019). Therefore, there is an urgent need to significantly enhance the ability of countries, particularly developing ones, to finance sustainable development agendas. Addressing issues such as investment in disaster risk mitigation and establishing consistent climate change and sustainability policies are paramount in this pursuit. To reduce climate change vulnerabilities, many developing nations have initiated comprehensive plans to diminish their susceptibility to its adverse effects. As part of this effort, they have integrated climate change mitigation strategies into their national planning processes (Hunjra et al., 2022; Wang et al., 2016). Consequently, there is an urgent need to significantly enhance the financial capacity of countries, particularly those in the developing world, to support sustainable development agendas. Key focus areas include investing in disaster risk mitigation and establishing policy coherence between climate change and sustainability (Cho et al., 2018). The rising levels of income and population, combined with improved access to energy, underscore the critical importance of ramping up green financing to meet the escalating energy demands of developing countries, which are forecasted to drive two-thirds of the global energy demand increase by 2040 (Lee & Lee, 2022). Therefore, it is imperative to fortify green financing frameworks in developing nations. Additionally, many developing countries are grappling with significant climate change-induced disasters that have far-reaching impacts on inflation and welfare. Promoting financial inclusion can be pivotal in encouraging deposit and saving behaviors that contribute to society's overall well-being (Hussain et al., 2022)

Sustainable financing offers compelling solutions to urgent challenges faced by countries in the Middle East and North Africa (MENA) region. By promoting investments in renewable energy sources, sustainable financing reduces dependence on imported fossil fuels, enhances energy

Vol. 8, No.07; 2024

ISSN: 2456-7760

diversification, and mitigates greenhouse gas emissions, addressing critical environmental and climate vulnerabilities (Ben et al., 2021; Yan et al., 2023). It also supports critical water management and conservation initiatives in arid and semi-arid regions, helping secure water resources for agriculture, industry, and domestic consumption, ensuring food security and economic stability. Furthermore, sustainable financing fosters inclusive economic growth for ASIAN countries by encouraging private sector involvement in sustainable infrastructure projects, creating job opportunities, and driving economic diversification (Nasir et al., 2019; Liu, 2023; Saha et al., 2024). Ultimately, these measures contribute to stability, resource sustainability, and an improved quality of life in MENA countries. Despite facing challenges at the micro level, green financing in the BRICS countries is already showing promising results (Nawaz et al., 2024). Investments in green initiatives have led to reduced CO2 emissions, which is fantastic news for the environment (Udeagha & Muchapondwa, 2023). It is important to remember that in addition to green financing, investments in human capital and technological innovation are crucial for preserving our environment successfully. The role of green financing in achieving the climate change targets set by the Paris Agreement must be considered. Furthermore, the BRICS countries actively participate in global green finance projects, especially among emerging nations with stable political systems and moderate credit risk (Dong et al., 2023). However, there are concerns about the BRICS countries' capacity to lead the globe toward a sustainable future, given the worrying rise in CO2 emission levels. This is an issue that needs to be addressed for the benefit of our planet.

3. Methodology

Bibliometric studies are essential in modern research and provide comprehensive quantitative insights into academic literature's impact, influence, and trends (Mourao & Martinho, 2020; Ellegaard & Wallin, 2015). By analyzing metrics such as citation counts, h-index, and journal impact factors, bibliometrics allows researchers to evaluate the reach and visibility of their work thoroughly (Islam et al., 2024). Bibliometric analysis is a valuable tool for comprehending the intricacies of scholarly communication, mapping knowledge networks, and predicting the potential future impact of research findings. In addition to understanding existing research landscapes, bibliometrics provides valuable insights for benchmarking against established research leaders and institutions, offering guidance on applying innovative approaches and novel methodologies (Donthu et al.,2021; Sabuj et al., 2019)

This study collected historical scholarly articles on sustainable finance in developing and emerging economics from the Scopus database on April 28, 2024. *Scopus* is a valuable and extensive database that offers scholarly literature, including peer-reviewed journals, conference papers, books, and patents (Agrawal et al., 2023). Its reliability in providing comprehensive, accurate, and up-to-date information makes it an indispensable resource for researchers and academics conducting in-depth analyses (AIRyalat et al., 2019; AIS, 2018). Table 1 outlines the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) method, which uses a carefully structured and thorough process for reviewing literature and combining data (Mohel et al., 2015). This method follows a standardized system for finding relevant publications and data sources for bibliometric analysis. PRISMA emphasizes the importance of

Vol. 8, No.07; 2024

ISSN: 2456-7760

assessing quality to ensure reliable and valid results. This involves following five steps outlined in Table 1.

Table 1: Methodology Development

Steps	**Descriptions**
Step 1: Formulate well-defined research questions or hypothesis	-What are the essential research themes, key topics, global research themes, evolving trends, and geographical research collaborations for sustainable finance for developing and emerging economics? -What are the future research implications, including challenges and future research questions?
Step 2: Bibliographic databases and search keywords	Database: Scopus Search Keywords: Sustainable Financing or Investing and Developing or Emerging country.
Step 3: Screening and selection criteria	TITLE-ABS-KEY (("Sustainable Financing " OR "Sustainable Investing ") AND ("Developing " OR "Emerging")) Identification: 1359 documents Applying Inclusion and Exclusion criteria below: Subject Areas: Economics, Econometrics, Finance, Business Management, Accounting, and Social Sciences Time Frame: 2014-2023 Document Type: Article Language: English Source Type: Journals Research Stage: Final Screening: 432 documents Title and Abstract screening. Eligibility: 216 documents Defining scope, relevant, and context Full-Text screening: 122 documents
Step 4: Conduct bibliometric and content analysis	122 relevant documents were selected for bibliometric analysis in VosViewer and Biblioshiny.
Step 5: Data synthesis and analysis	Present valuable insights into the research trends, key contributors, prominent keywords, and potential future directions for sustainable finance in developing and emerging economies.

The statistical summary of the bibliometric analysis of sustainable investments was conducted from 2014 to 2023. This sample of research data from the Scopus database comprises 121

Vol. 8, No.07; 2024

ISSN: 2456-7760

documents, 321 authors, and 85 sources. All 121 documents used in this study are articles. These documents contain 440 authors' keywords, 7745 cited references, and 20 documents by a single author. This table also shows that the average number of citations per document is 16.81, and the annual production growth of scientific is 36.55%. The Total number of international co-authors is about 28.1%, and the number of co-authorships per document is 2.76.

4. Bibliometric Analysis and discussion

4.1 Publication over time

Figure1 visualizes the trend in sustainable investment and how many articles were published between 2014 and 2023. Many documents were issued between 2022 and 2023, accordingly 27 and 33. Interest in researching sustainable finance proliferated from 2018 to 2023. In 2017, only 1 article was brought out because it needed to incorporate sustainability and moved on to other themes of investments, which also had a significant effect on the publication sector. In 2018, the number of publications increased dramatically due to the extensive three ramped-up engagement activities of passive investment by Black Rock, SSGA, and Vanguard (Cunha et al., 2020). However, 2022 and 2023 were outperformed for the exponential growth of research articles on Sustainable Finance for tightly catching long-term investment strategies.

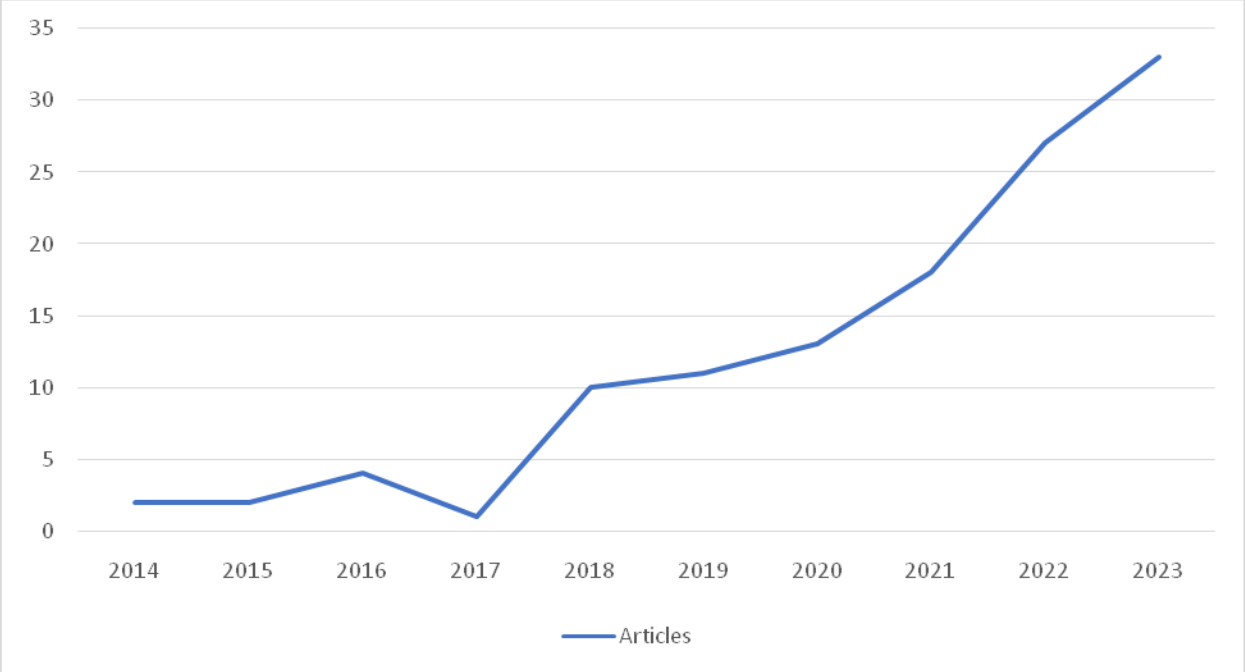

Figure 1: Publication over time

4.2 University affiliation

Figure 2 presents the affiliation of the university and department regarding the number of articles or documents published on sustainable investment research. According to Figure 2, the Stellenbosch University in South Africa is in the first position by publishing the highest number

Vol. 8, No.07; 2024

ISSN: 2456-7760

of papers, 6 papers, because this country has vast opportunities in this sustainable sector, such as renewable projects (Fedderke, 2010). After that, the second-highest papers were issued by the Ukrainian Catholic University in Ukraine, Universiti Sains Islam Malaysia, and the University Magna Graecia of Catanzaro in Italy, each publishing 5 articles. Lastly, the Capital University of Economics and Business in China, the Department of Architecture and Design, Kwame Nkrumah University of Science and Technology in Ghana, Universiti Putra Malaysia, the University College London, and the University of Pretoria in South Africa each published 4 articles.

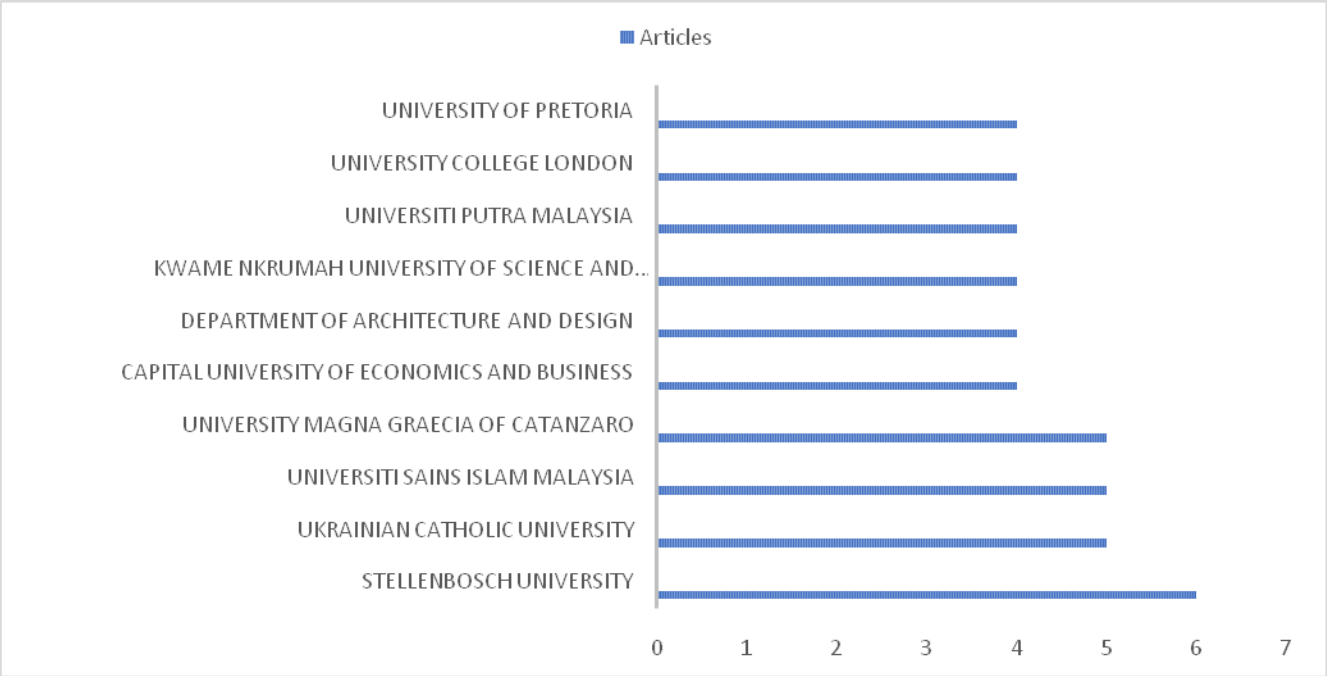

Figure 2: University affiliation

4.3 Article sources

Table 2 discusses the sources of the articles, including their total citations (TC), number of publications (NP), and the year their first publication appeared (PY_start). Since 2017, the most cited publication was Sustainability in Switzerland, which published 18 papers with 184 citations. Surprisingly, most were about food, health, and environmental research (Baur et al., 2022). Since 2014, the Journal of Sustainable Finance and Investment has published 6 papers cited 168 times. Journal of Risk and Financial Management also published 4 papers with 18 citations. The Social Responsibility Journal and Journal of Cleaner Production published 3 papers, and citations were 178 and 75, respectively, since 2019 and 2018. Accordingly, the European Business Organization Law Review and International Review of Financial Analysis published 2 papers since 2022, with a total number of citations of them were 40 and 27. Indian Journal of Corporate Governance also published 2 papers with total citations of 5 since 2018. Lastly, only 1 paper was published by the Academy of Accounting and Financial Studies Journal and Accounting and Finance, with 3 and 8 citations from 2021 and 2023.

Vol. 8, No.07; 2024

ISSN: 2456-7760

Table 2: Article sources

Element	TC	NP	PY_start
Sustainability (Switzerland)	184	18	2017
Journal Of Sustainable Finance and Investment	168	6	2014
Social Responsibility Journal	178	3	2019
European Business Organization Law Review	40	2	2022
Indian Journal of Corporate Governance	5	2	2018
International Review of Financial Analysis	27	2	2022
Journal Of Cleaner Production	75	3	2018
Journal Of Risk and Financial Management	18	4	2022
Academy Of Accounting and Financial Studies Journal	3	1	2021
Accounting And Finance	8	1	2023

4.4 Country Publications and Citations

The top 10 contributing countries that have written the maximum number of articles and have received the most citations for research on sustainable financing are shown in Table 3. Sustainable finance is the financing of investments that provide environmental benefits in the broader context of environmentally sustainable development, may significantly contribute to guaranteeing capital flow in the biomass sector, and enhance the sustainability of the overall financial system (Falcone& Sica, 2019). Italy has been recognized as the world's leading contributor, with 12 articles and 358 citations, reflecting its commitment to this field. Asian countries India comes in second position with 11 papers, ahead of China, which holds third place with 9 papers, followed by other top-performing countries, including the United Kingdom and Germany, which also became the top publishers with 7 and 5 papers, respectively, in the world. Australia and Brazil are other developed top-performing countries with 4 papers each. Luxembourg, Switzerland, and Japan are other developed nations on the top list, with 2,2 and 1 paper, respectively. Regarding citations, China holds the second position, with 188 citations, and Australia is in the third position, with 115 citations. Germany is in fourth place with close citations 111. China is the only Asian country on the list, with 188 citations. The other developed countries that have a position in the citation list are Brazil, India, Luxembourg, United Kingdom, Switzerland, and Japan, with 91, 86, 77, 77, 75, and 58 citations, respectively.

Vol. 8, No.07; 2024

ISSN: 2456-7760

Table 3: Country Publications and Citations

Country	Number of Publications	Country	Number of Citations
Italy	12	Italy	358
India	11	China	188
China	9	Australia	115
United Kingdom	7	Germani	111
Germani	5	Brazil	91
Australia	4	India	86
Brazil	4	Luxembourg	77
Luxembourg	2	United Kingdom	77
Switzerland	2	Switzerland	75
Japan	1	Japan	58

4.5 Country Collaboration Map

Figure 3 illustrates the country collaboration map, highlighting authors' affiliations in sustainable financing research. In the past decades, research collaboration has evolved with the development of communication technology; team science has increased considerably, and coauthored publications have become much more prevalent (Hu et al., 2020; Ahammed & Sabuj, 2018). In this collaboration map, the thickness of the lines indicates the frequency of collaboration among authors from different countries, and a country's number of publications is represented by the intensity of color. The collaboration between China and Australia resulted in 2 papers, followed by collaborations between France and the USA and Germany and France, each producing 2 papers. We observed collaborations between the UK-France and the UK-Germany, with each pair contributing 2 papers.

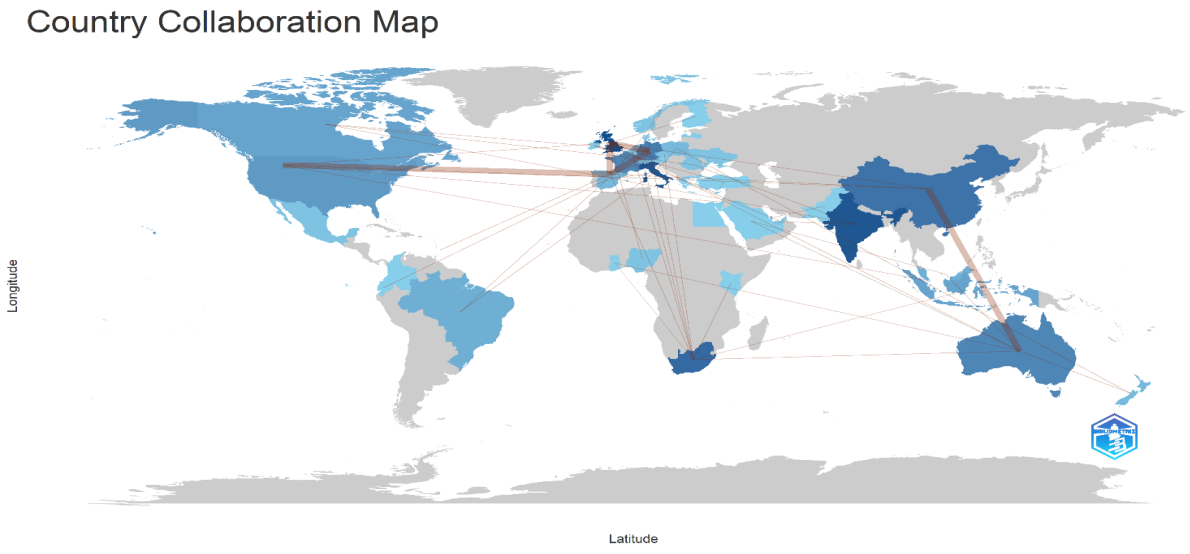

Figure 3: Country Collaboration Map

Vol. 8, No.07; 2024

ISSN: 2456-7760

4.6 Country Co-Authorship

Figure 4 illustrates the connections between authors from different nations through their co-authorship, particularly in the context of sustainable financing. By examining these co-authorship trends, we can determine the overall quantity of publications originating from each nation and the volume of their international cooperation. Figure 4 includes the co-authorship networks across 12 countries. These countries are divided into 4 distinct clusters, each represented by a different color. Cluster 1 is red and comprises Australia, China, Malaysia, and the Netherlands. Cluster 2, which is in green, includes Canada, Germany, and India. Cluster 3 is colored blue and consists of France, the United Kingdom, and the United States. Lastly, Cluster 4, shown in yellow, encompasses Indonesia and South Africa. The findings about the level of cooperation and the most widespread cross-border tendency among researchers from China—one of the world's most productive nations—along with those from Australia, the US, and the UK are shown in the figure. The United States, Australia, China, France, the United Kingdom, and Germany represent a robust pattern of collaboration within their own groups and with countries from other clusters and continents.

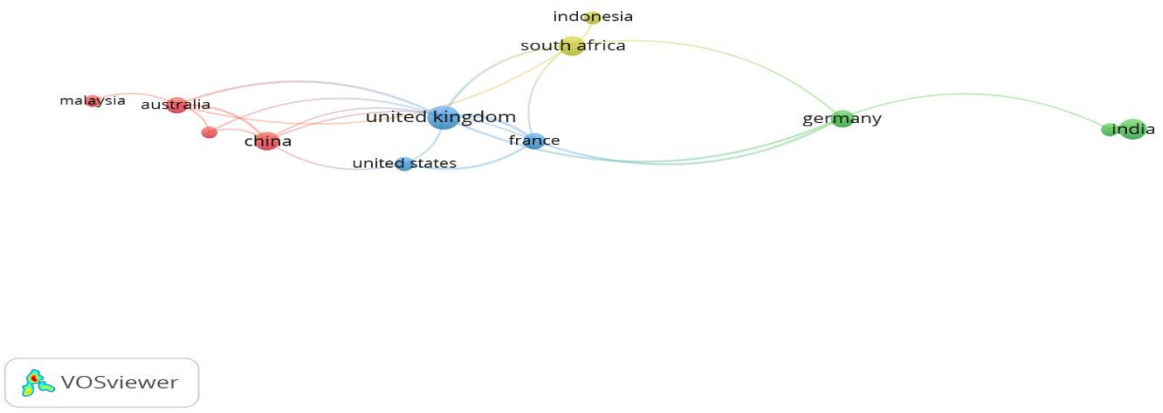

Figure 4: Country Co-Authorship

4.7 Authors Article and Authors Citation

Table 4 focuses on ten authors and includes their total citations (TC), number of publications (NP), and the year their first publication appeared (PY_start). LANDI G and SCIARELLI M have the highest total citations (196 each), indicating a significant impact in their research areas from 2019. Despite having fewer publications (2 each), the high citation count highlights the importance and influence of their work. Authors such as KABLI A, RIZZELLO A, and CHENET H, who started publishing in 2020, have garnered substantial citations (31, 31, and 160, respectively), showing a solid initial impact. Since 2021, TANJUNG M has 12 citations

Vol. 8, No.07; 2024

ISSN: 2456-7760

from 2 publications, suggesting a growing influence. Similarly, with 65 citations from 2 publications since 2020, VOLZ U also shows a promising impact. TSAI S-B and WANG J, starting in 2018, have relatively lower citations (6 each), indicating either a niche research focus or less impactful publications.

Table 4: Authors Article and Authors Citation

Element	TC	NP	PY_start
KABLI A	31	3	2020
RIZZELLO A	31	3	2020
CHENET H	160	2	2020
HARRER T	42	2	2019
LANDI G	196	2	2019
SCIARELLI M	196	2	2019
TANJUNG M	12	2	2021
TSAI S-B	6	2	2018
VOLZ U	65	2	2020
WANG J	6	2	2018

4.8 Keyword Occurrence

Table 5 shows a diverse range of keywords with varying frequencies, indicating the prominence and interconnectedness of these concepts within the field. "Sustainable finance" leads significantly with 43 occurrences, accounting for 34.96% of the total mentions. "Impact investing" follows with 21 mentions, representing 17.07% of the occurrences. "Sustainability" appears 12 times, reflecting 9.76% of the mentioned. The term "ESG" (environmental, social, and governance) is noted 10 times, making up 8.13% of the total. Keywords such as "social finance," "sustainable development goals," and "sustainable investing," each with 7 occurrences, constitute 5.69% each. Additionally, "climate change," "environmental," and "sustainable development," each occurring 6 times, making up 4.88% of the total mentions.

Table 5: Keyword Occurrence

Words	Occurrences
Sustainable Finance	43
Impact Investing	21
Sustainability	12
ESG	10
Social Finance	7
Sustainable Development Goals	7
Sustainable Investing	7
Climate Change	6
Environmental	6
Sustainable Development	6

Vol. 8, No.07; 2024

ISSN: 2456-7760

4.9 Keyword Co-occurrence

The term "sustainable finance" has been defined and interpreted in various ways over the years, leading to the development of different regulatory frameworks that aim to create a universally accepted definition. Terms like "climate finance," "green finance," and "sustainable finance" are often used interchangeably, all aiming to steer the global economy towards a sustainable future. However, the European Commission (2021) defined sustainable finance as a developing procedure integrating ESG considerations into financial and investment choices. ESG is a set of business operating guidelines that socially conscious investors use to evaluate potential investments. This covers a range of financial activities, including investments, lending, and capital allocation, all aimed at promoting long-term sustainable development and generating positive societal and environmental impacts. (Boffo et al., 2020).

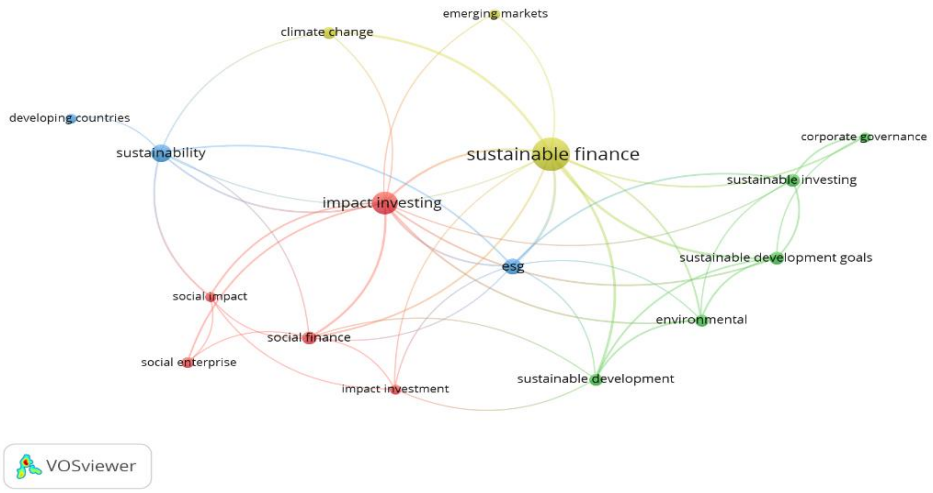

Figure 5: Keyword Co-occurrence

Figure 5 illustrates the clustering analyses of the co-occurrence of keywords using VOSviewer. This network visualization provides a detailed mapping of key terms and their interrelationships within Sustainable Financing and Sustainable Investment. The analysis identifies four main clusters, each representing a thematic area. Sustainable finance and investment are increasingly seen as crucial for long-term development, and they are key for bringing positive social and environmental impacts to ensure sustainable global development. (Cunha et al., 2021; Ormiston et al., 2015; Saha et al., 2019)

Vol. 8, No.07; 2024

ISSN: 2456-7760

Cluster 1: This cluster marked as red includes five items centering around "impact investing" and includes related terms such as "impact investment," "social enterprise," "social finance," and "social impact." This cluster focuses on the social aspects of sustainable finance, emphasizing investments that generate social and environmental benefits alongside financial returns.

Cluster 2: This cluster is built around "sustainable finance" and "corporate governance," incorporating five items in green such as "environmental," "sustainable development," "sustainable development goals," and "sustainable investing." It highlights the intersection of sustainability with corporate practices and broader development goals.

Cluster 3: Featuring terms, shown through blue lines, like "sustainability," "developing countries," and "ESG" (Environmental, Social, and Governance), this cluster emphasizes the broader concept of sustainability and its application in various contexts, including the specific challenges faced by developing countries.

Cluster 4: This cluster, marked through yellow lines, includes "climate change," "emerging markets," and "sustainable finance," highlighting the critical role of sustainable finance in addressing climate change and supporting emerging markets.

4.10 Keyword Trend

Research trends and commonly used keywords have been found using VOSviewer. The keyword trends in research from 2016 to 2023 are displayed in Figure 6. Terms like impact investing, social finance, sustainability, and social enterprise dominated the pertinent literature throughout the early stages (2016–2020) of sustainable financing-related study. With 21 references, impact investing was the most popular of these four terms. Between 2020 and 2023, "sustainable finance" received 43 mentions and dominated the research interest. However, other keywords that have also been prominently included are sustainability (12 times) and ESG (10 times). Social finance and sustainable development goals are used 7 times. In addition, Sustainable development and social enterprise occur 6 times. Hence, these keywords are used less frequently in research.

Vol. 8, No.07; 2024

ISSN: 2456-7760

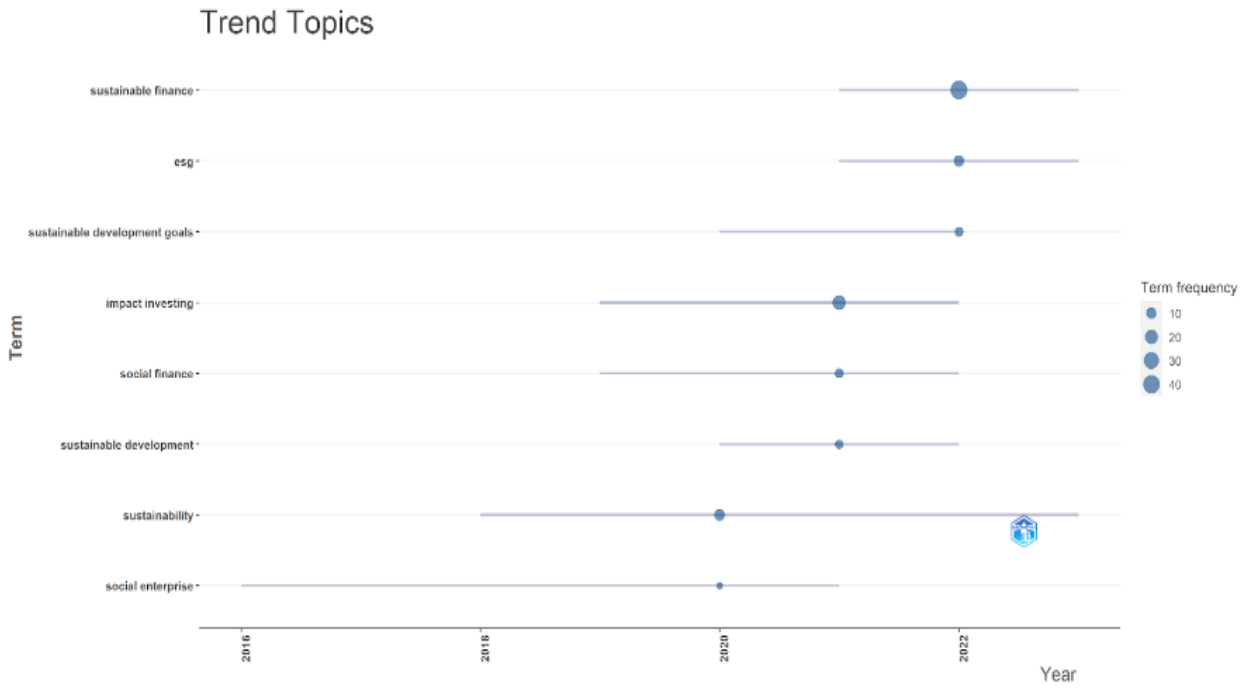

Figure 6: Keyword Trend

4.11 Thematic Map Analysis:

A thematic or strategic map analysis incorporates the formation of strategic networks using keyword co-occurrence analysis to investigate and analyze the dynamics and advancement of research clusters (Rejeb et al., 2022). The researchers utilized RStudio to create a thematic chart. Keywords for sustainable financing are shown in Figure 7. The mapping approach draws attention to the main issues that the journals discussed. Plotting the themes according to their levels and placements on the X and Y axes resulted in four quadrants in the suggestion by reference. The centrality measure highlights the significance of sustainable financing throughout the study. In contrast, density uses the internal strength of the network to decide how far articles may develop.

Vol. 8, No.07; 2024

ISSN: 2456-7760

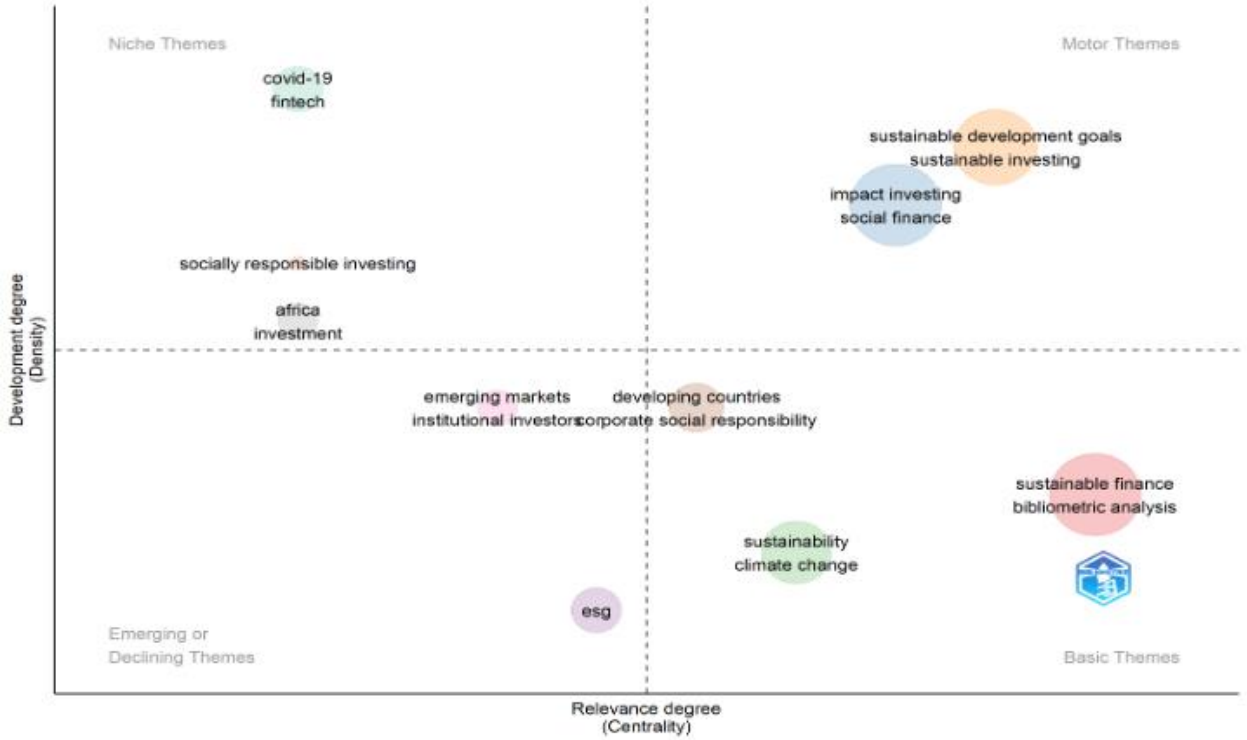

Figure 7: Thematic Map Analysis

The subjects that are well-developed, well-researched, and essential to the field are represented in the first quadrant through the motor themes, which have a high density and centrality. These themes in the sustainable financing field include sustainable investing, sustainable development goals, impact investing, and social finance. Aligning financial systems and investments with sustainable development goals is the progressive approach to sustainable finance. Therefore, the theme of sustainable development goals is central to discussing sustainable finance. In addition, Sustainable investing, impact investing, and social finance are among a few of the many activities that fall under the umbrella of sustainable finance. These financial tools and procedures are intended to assist firms and programs that benefit the environment and society (Luo et al., 2022). Hence, these themes are well-developed and essential in sustainable financing research.

The second quadrant of the niche theme highlights the essential subjects that receive less attention in the area and have high density but low centrality. Socially responsible investing, fintech, COVID-19, and African investment are among the themes with the highest level of development, as indicated by the graph's data. They do, therefore, require more links to studies on sustainable financing. Utilizing fintech for sustainable financing, socially responsible investing, and African investment are the instruments that encourage and promote sustainable activities, resulting in a more resilient, inclusive, and sustainable economy. COVID-19 has a significant impact on sustainable financing. Therefore, Future studies in these areas will benefit the discipline because these concerns are essential to sustainable financing.

Vol. 8, No.07; 2024

ISSN: 2456-7760

The third quadrant's themes are less influential and have low centrality. These subjects may become less common in literature or offer more significant opportunities for future study. Topics closely connected to sustainable finance that scholars are concentrating on or are no longer interested in looking into include developing markets, institutional investors, and ESG.

The fourth quadrant contains basic themes that are low in density yet central. These subjects are essential to understanding sustainable financing and advancing the field. Keywords such as developing nations, corporate social responsibility, sustainability, climate change, sustainable finance, and bibliometric analysis promote the development of sustainable financing research.

Overall, the thematic map indicates that sustainable financing research primarily covers themes related to sustainable activities designed to encourage projects and companies that positively impact the environment and society. These themes are sustainable investing, impact investing, social finance, fintech, Africa investment, and socially responsible investing. Sustainable investing and impact investing that support social responsibility and long-term environmental sustainability are already well-developed and highly relevant themes.

Two well-developed themes are socially responsible investing and fintech. They may be expanded upon in subsequent research, but they must be more pertinent to the study of sustainable financing. By leveraging innovative technologies, Fintech transforms how businesses approach sustainable finance by incorporating social and environmental considerations into investment decisions (Macchiavello & Siri, 2022). On the other hand, socially responsible financing may help with initiatives that boost the economy and provide jobs in underprivileged societies (Sciarelli et al., 2021). Besides themes related to sustainable finance-related activities, other relevant themes include ESG, sustainability, and sustainable development goals. The blending of social justice, environmental health, and economic vitality is known as sustainability (Barua & Chiesa, 2019). Sustainability must be ensured in sustainable financing. Hence, it is a well-discussed topic in sustainable financing. Sustainable development goals are the prime elements for sustainable financing. Therefore, it is the central theme in sustainable financing studies. To balance social justice, environmental conservation, and economic growth, sustainable finance incorporates environmental, social, and governance (ESG) factors into financial strategy (Gao et al., 2021). Therefore, Future research on the theme of ESG offers more room for advancement.

4.12 Bibliometric Coupling

The notion of bibliographic coupling of themes is a variant that concentrates more on thematic similarities between texts than the usual bibliographic coupling approach (Saha et al., 2024). According to Figure 8, this method considers the references shared by two texts and how these references are employed in any topic context. With the aid of the VOSviewer program, bibliographic coupling of the documents was carried out, resulting in the formation of clusters based on common themes found via study similarities. The 11 articles most often mentioned were selected for in-depth cluster analysis out of the original pool of 121 articles. Based on the selection and citation patterns found in the articles, these 11 articles were subsequently grouped into four clusters, each classified by a common thematic theme.

Vol. 8, No.07; 2024

ISSN: 2456-7760

Cluster 1 covers articles discussing impact and socially responsible investing. Agrawal and Hockerts (2019) highlight the evolution of impact investing, identifying six distinct factors: capital invested, degree of engagement with the investee, selection process, social and commercial outcomes, reporting outcomes, and government role. They distinguish it from microfinance, philanthropy, social impact bonds, and socially responsible investing in more than two criteria. Mersland et al. (2020) discussed the international market selection of impact investing organizations. They found that impact investing firms focus on less developed, weaker institutions and avoid high-risk countries for financial intermediation services. Globalizing into countries with good social and economic prospects is the best option.

Cluster 2 highlights green financing. Tao et al. (2022) provide a holistic view of environmental finance and clarify that green financing is those financial policies that aid businesses in enhancing their environmental performance, mitigating climate change impacts, and conserving resources. Wang and Li (2022) found that the impact of green finance as an innovation incentive is more significant in higher market growth sub-regions and state-owned businesses, highlighting its diverse role in the regional market environment and corporate ownership.

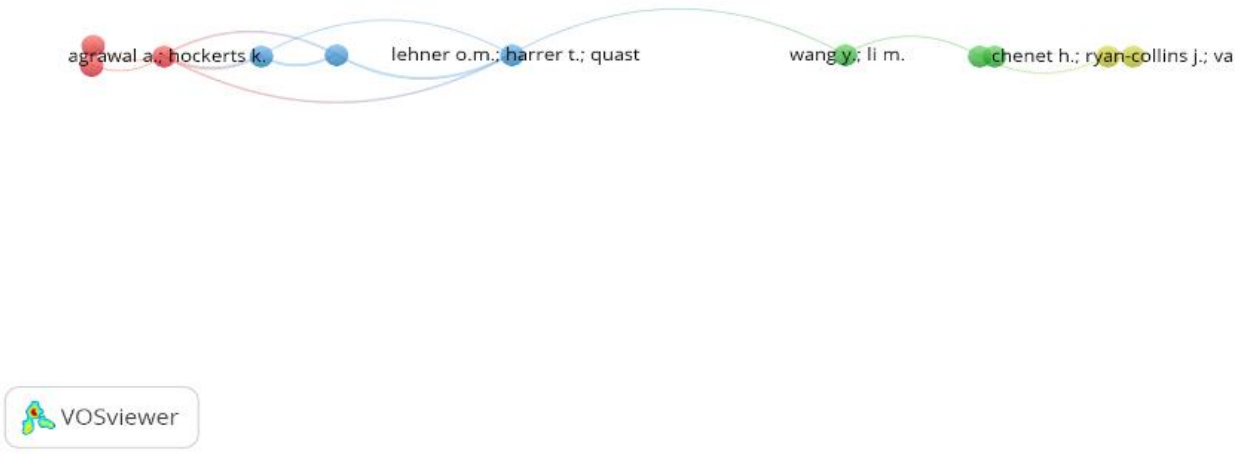

Figure 8: Bibliometric Coupling

Cluster 3 revealed the impediments of impact investing. Ormiston et al. (2015) have pointed out five impediments to impact investing: lawful and regulatory compliance, placement within

Vol. 8, No.07; 2024

ISSN: 2456-7760

modern investment portfolios, underdeveloped infrastructure, minimal investment opportunities, and a scarcity of human capital for impact strategy management. They suggested focusing on financial-first investments, establishing due diligence processes, aligning the mission and values, and ensuring that networks and collaboration are needed to overcome those challenges. According to Glänzel and Scheuerle (2015), Germany's social impact investment industry still confronts several challenges concerning valuing social and economic gains on both sides, as well as the required infrastructure and interpersonal concerns.

Cluster 4 discusses financial policy to mitigate climate-related financial risk. Chenet et al. (2021) highlight the growing concern of climate-related financial risks (CRFR) for central banks and financial regulators, proposing the "precautionary principle" and contemporary macro-prudential policy as foundations for integrating CRFR into prudential, macro-prudential, and monetary policy frameworks. Schumacher et al. (2020) emphasize Japan's need for sustainable finance and investment to transition the economy to a low-carbon, sustainable path while mitigating climate risk. They propose policy proposals to align Japan's financial industry with sustainable development and the Paris Agreement.

Finally, all of the studies in these four clusters ran throughout a single theme: the need for implementing sustainable financing. Sustainable financing supports gender equality, enhances health and well-being, and lessens poverty. Furthermore, they lower financial risks and enhance long-term profitability while assisting in fulfilling the UN's Sustainable Development Goal (SDG). In general, the papers highlight sustainable financing activities like impact investing, socially responsible investing, and green financing, as well as the challenges of implementation and how to overcome those challenges. This understanding suggests using a multidisciplinary approach to create efficient policies for implementing sustainable financing by incorporating notions from finance, accounting, law, and economics.

5. Future Research Direction

The study thoroughly reviews the literature on sustainable finance in emerging economies in bibliometric coupling (Figure 8) and develops four clusters addressing their challenges and future research questions described in Table 6.

Vol. 8, No.07; 2024

ISSN: 2456-7760

Table 6: Challenges and Proposed Research Questions

Clusters	Challenges	Proposed Research Questions (PRQ)
Impact Investing and Socially Responsible Investing (SRI)	1. Lack of well-defined regulatory frameworks that create uncertainties for investors. 2. Fewer and less established markets may be riskier due to reduced liquidity and fewer investment opportunities. 3. The lack of standardized measures makes society and the environment more challenging. 4. Investor ignorance of SRI advantages and prospects might decrease the demand for these investments. 5. A common perception of emerging economies is that they are high-risk because of their political, economic, and social volatility. 6. The formation of an ecosystem that supports impact investment can be hampered by a lack of cooperation among stakeholders, including NGOs, governments, and businesses.	PRQ1. Which legal frameworks are most suited to encourage impact investment and SRI in developing nations? PRQ2. What financial products may be created to make SRI more appealing to emerging markets? PRQ 3. What are the best ways to use standardized measures for environmental and social impact in various market settings? PRQ 4. What approaches may be used in emerging economies to raise investor knowledge and demand for SRI? PRQ 5. Which risk-reduction strategies work best for impact investment in high-risk situations? PRQ 6. What kinds of collaborative models can build an environment favorable to impact investing?
Green Financing	1. Prolonged policy changes or lax enforcement may discourage long-term investments in sustainability. 2. Financial products designed specifically for green finance are few. 3. Inadequate training programs and resources for investors and financial experts about green finance. 4. Organizing and managing green initiatives might come at an unaffordable cost.	PRQ 1. How might long-term sustainability investments be supported by improving policy enforcement? PRQ 2. How can the market be more flexible in encouraging green finance? PRQ 3. How can training and educational initiatives be strengthened to help the development of green finance? PRQ 4. How might green finance become more widely available by lowering transaction costs?
Impediments of Impact Investing	1. It is difficult to evaluate the success of investments when there is limited access to trustworthy data and impact-measuring tools. 2. Resistance might arise when local traditions and practices don't follow the impact investment principles.	PRQ 1. What techniques may be created to improve effect assessment and data gathering in emerging economies? PRQ 2. How might cultural barriers be addressed in various locations to facilitate impact investing?

	3. Establishing and maintaining relationships in emerging nations may be challenging for impact investors. 4. Stakeholders and local communities may be skeptical of or unwilling to adopt new investment strategies.	PRQ 3. What are some ways to cultivate and sustain collaborations across governments, non-governmental organizations, and the corporate sector? PRQ 4. What are the best ways to make impact investment more socially acceptable in the community?
Financial Policy to Mitigate Climate-related Financial Risk	1. Many developing nations do not have clear financial policies regarding climate change. 2. Financing tools created expressly to manage risks associated with climate change are few. 3. Inadequate financial instruments and solutions available to reduce climate-related risks. 4. Prioritizing and funding climate-related financial policies is challenging in emerging nations as they frequently experience economic volatility. 5. High national debt levels may hamper emerging economies' capacity to invest in climate risk mitigation strategies.	PRQ 1. Which legal frameworks are most suited to reducing financial risks associated with climate change in emerging economies? PRQ 2. What kind of financial products can be created to help developing markets manage risks associated with climate change? PRQ 3. In what ways might proactive risk management be promoted by controlling the perception of climate-related risks? PRQ 4. How can policies be formulated in rising economies to compromise between mitigating climate risk and maintaining economic stability? PRQ 5. How may financial limitations be handled to fund strategies to reduce climate risk?

6. Conclusion

The research paper on the bibliometric analysis of sustainable financing was conducted between the timespan 2014 to 2023. One third of the documents were published from 2022 to 2023. The journal Sustainability published the most papers on this topic, with 18 papers and 184 citations. Italy, India, China, and the UK were some of the leading contributors. Italy had the most papers and citations. Both developed and developing countries worked together on sustainable financing research. Since 2019, Landi G and Sciarelli M have been cited most frequently. The keywords analysis showed that "sustainable finance" and "impact investing" are the main research topics in this field. The clustering analysis highlighted the significance and interconnectedness of four main thematic areas: social finance, corporate governance, broader sustainability, and climate change. The research also tracked the trends of keywords from 2016 to 2023, showing that "impact investing" was the most popular keyword in the earlier period (2016-2020) and "sustainable finance" became the most popular in the later period (2020-2023). The thematic map shows that research on sustainable financing primarily covers themes related to sustainable activities aimed at promoting projects and companies that positively impact the environment and

Vol. 8, No.07; 2024

ISSN: 2456-7760

society. Sustainable development goals are the map's focus, while socially responsible investing, fintech, COVID-19, and African investment are significant themes. These themes require more connections to studies on sustainable financing. On the other hand, developing markets, institutional investors, and ESG are less influential and have low centrality. Keywords such as developing nations, corporate social responsibility, sustainability, climate change, and sustainable finance promote research development in sustainable financing. The study's recommendations suggest that policymakers and regulators should emphasize conducting in-depth research into green funding. This research should aim to comprehensively measure the impact of socially responsible investing, explicitly focusing on enhancing businesses' commitment to improving their environmental performance. Furthermore, there is a need to prioritize the development of robust infrastructure to facilitate sustainable financing mechanisms, as well as an expansion of climate financing initiatives. It is worth noting that all these studies underscore the critical importance of implementing sustainable funding models to not only promote gender equality but also to improve overall health and well-being while simultaneously mitigating poverty.

The bibliometric analysis of sustainable financing has limitations, such as focusing mainly on the Scopus database and overlooking insights from other sources like the Web of Science. It also hasn't considered the various forms of sustainable financing, particularly their different applications in developed and developing countries. Future research should delve into sustainable financing dynamics, analyze clean energy transition, and expand the research agenda to include economic and political issues.

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