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Sustainable finance study of bibliometric overview

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Abstract. Sustainable finance is one of the latest financial ideas to solve contemporary global financial problems with an entrepreneurial spirit. This research aims to map international level sustainable finance studies indexed by Scopus using a bibliometric overview. The method used is bibliometrics and data analysis and visualization using the analyze search results feature on Scopus and VOSViewer applications. Research data of 152 documents were published from 1992 to 2019 obtained from the Scopus database. The results showed that the most productive countries, research institutions and individual researchers in the publication of sustainable finance studies were the United Kingdom; Rheinisch-Westfälische Technische Hochschule Aachen; and Haigh, M. The most amount of funding sponsors in international publications in sustainable finance studies was the National Natural Science Foundation of China. The most intensive subject areas and publication sources in sustainable finance studies were Business, Management and Accounting, and Journal of Sustainable Finance and Investment. There were five collaborative researchers' group patterns. This research proposes a convergence axis classification consisting of sustainable finance studies to characterize the body of knowledge generated from three decades of studies: Bank, Country, Finance, Sustainable, and Policy, abbreviated as BCFSP themes.

Keywords: sustainable finance study, bibliometric, Scopus, research

1. Introduction

Sustainability is one thing that is important for the financial, business, and entrepreneurial markets. The problem of the 2008 financial crisis shows that the conventional financial model developed since 1950 is considered inadequate and cannot overcome contemporary financial and financial market problems [1]. Global financial thinking remains dominated by the traditional neoclassical paradigm as a totally free value discipline [2]. Higher education institutions, financial disciplines, and academic research play an important role in aligning market participants and financial institutions with long-term decision making needed to finance society and a sustainable economy [3]. Sustainable finance in business is one of the key solutions to achieve a better and more sustainable financial future [4].



Sustainable finance is the latest financial idea that is increasingly being discussed and developed [5]. here are different views about what the term Sustainable means in the field of finance. Thus, there is no global consensus on the definition of sustainable. The name Sustainable comes from the Latin *sustinere* which is to hold; survive with; maintain [6]. Sustainable finance takes the form of sustainable finance concepts, which addresses investment creation, environment, which institutional aspects that foster sustainable growth [7]. Sustainable finance works in a similar way to traditional finance through the incorporation of social interests in financial decision-making [8]. Sustainable finance offers a new opportunity for leveraging social change to optimize financial returns. Sustainable finance also reflects the prosocial decision-makers' intrinsic target, as well as financial development for significant sustainability supporters [9]. The benefits of sustainable finance applications are not only limited to environmental benefits. Sustainable finance is also able to reduce risk together with reducing costs and providing greater banking operational efficiency [10]. Rebuilding and adjusting the financial system with specific sustainable development is needed to achieve sustainable finance [2]. The adequate capacity of financial institutions in terms of human resources, institutions, and new financial literacy needs to be supported and enhanced for the implementation of sustainable finance [11]. Sustainable finance can be realized with an entrepreneurial spirit.

In scientific studies, the model of sustainable finances was not fully resolved [12]. Previous studies related to sustainable finance are generally limited to one institution [13] and one country [14]. There are no studies on sustainable finance that show the big picture visualized from year to year with data from all countries. Also, there are no studies in the field of sustainable finance that specifically address the relationship between affiliations, authors, the most cited, and the impact of their research. Therefore, this research aims to map international level sustainable finance studies indexed by Scopus using a bibliometric overview.

2. Methodology

This study has mapped the status of research in the field of sustainable finance published at the international level in the last 27 years. This research data was obtained from the Scopus database using document search services in March 2020 [15]. The study was conducted using bibliometric methods and data analysis and visualization using the analyze search results feature on Scopus and the VOSViewer application [16], [17].

This study identifies keywords related to sustainable finance to identify and search for articles in the Scopus database with 152 documents published from 1992 to 2019 at the international level. The study limited data collection to 2019 without looking at 2020 (exclude 2020) so that the annual data obtained illustrates the condition of the study in one whole year from January to December. The query command that is applied when mining data on Scopus is (TITLE-ABS-KEY ("sustainable finance") AND (PUBYEAR <2020)).

The study conducted an analysis of co-authorship with units of analysis of authors and full counting methods using VOSViewer to get the author's collaboration network. The study carried out an analysis of co-occurrence with analysis of keywords and a full calculation method using VOSViewer to obtain a network of keywords.

3. Results and discussions

This section will explain increasing data results based on affiliation, countries, subject areas, types of fields, documents per year from sources, documents per year from fields and document cited, co-occurrence, and author networks in the sustainable finance studies.

3.1. Documents based on higher education affiliates from the sustainable finance studies

The most productive research affiliates in sustainable finance studies were Rheinisch-Westfälische Technische Hochschule Aachen with 4 documents. Then, followed by the University of Oxford with 4 documents, Université de Neuchâtel with 3 documents, University of Electronic Science and Technology of China with 3 documents, Uniwersytet Szczeciński with 3 documents, SOAS University

of London with 3 documents, West Pomeranian University of Technology, Szczecin with 3 documents as shown in Figure 1.

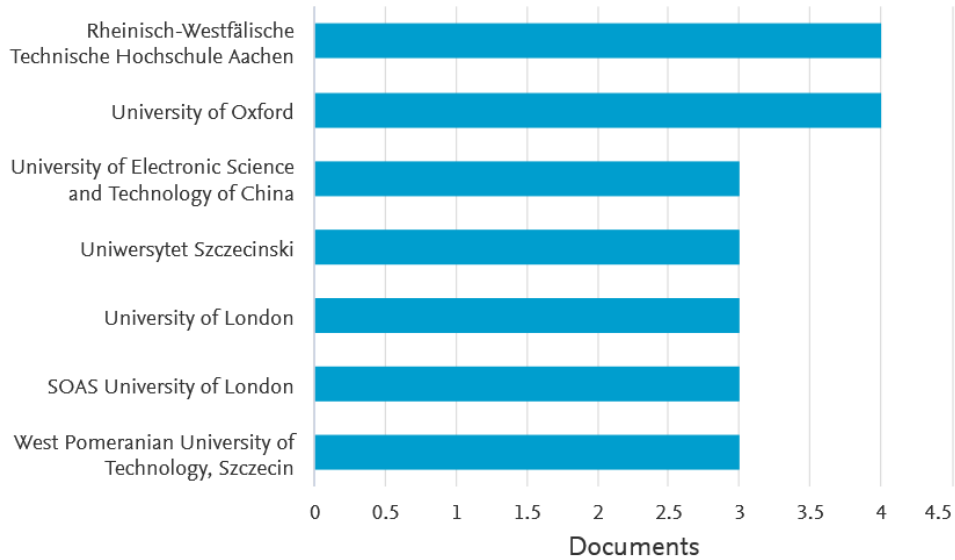


Figure 1. Documents Number based on Higher Education Affiliates from the Sustainable Finance Studies

3.2. Documents based on authors from the sustainable finance study

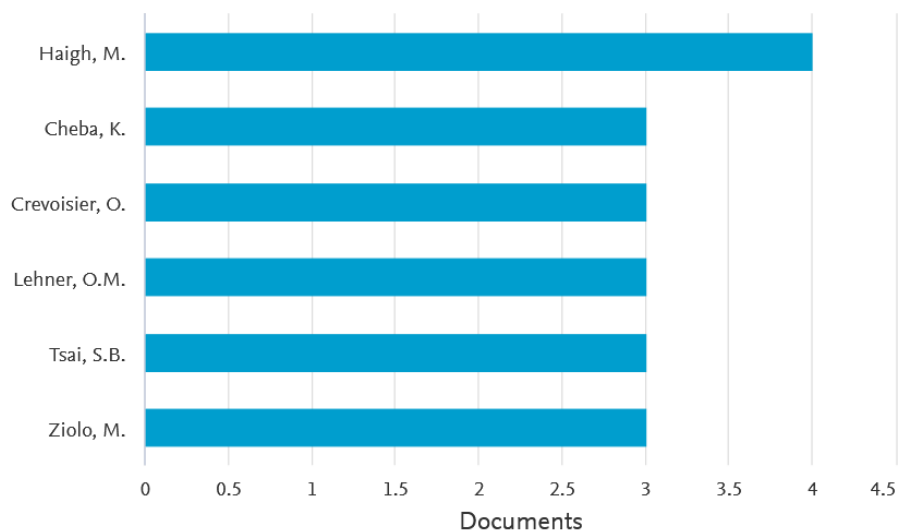


Figure 2. Documents Number based on Authors from the Sustainable Finance Studies

In Figure 2 it can be explained that the author with the most publications in the Sustainable Finance studies was Haigh, M., with 4 documents. Followed by Cheba, K., With 3 documents, Crevoisier, O., With 3 documents, Lehner, O.M., With 3 documents, Tsai, S.B., With 3 documents and Ziolo, M., with 3 documents.

3.3. Country based documents from the sustainable finance studies

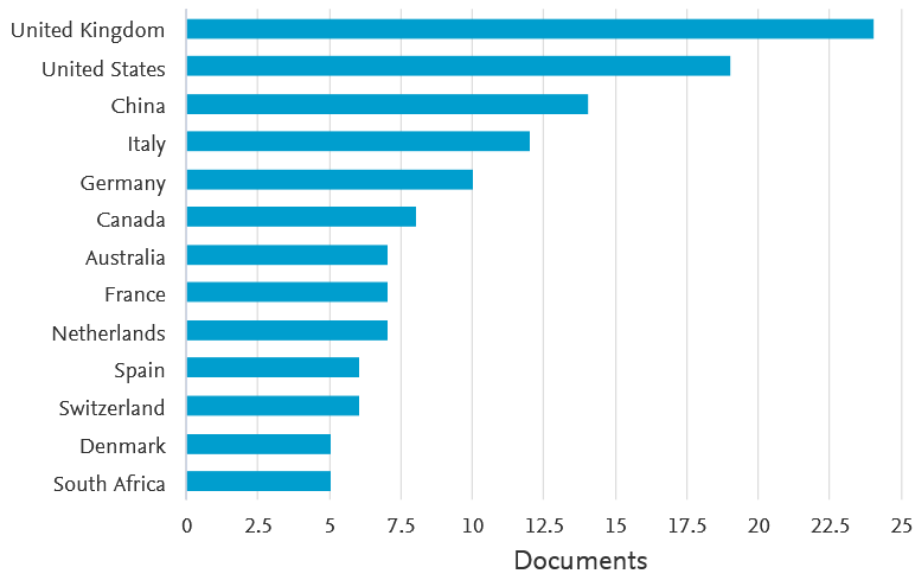


Figure 3. Number of Documents by Country from the Sustainable Finance Studies

From Figure 3, it can be explained that the country that contributed the most to making publications in the Sustainable Finance studies was the United Kingdom with 24 documents. Followed by the United States with 19 documents, China with 14 documents, Italy with 12 documents, Germany with 10 documents, Canada with 8 documents, Australia with 7 documents, France with 7 documents, the Netherlands with 7 documents, Spain with 6 documents, Switzerland with 6 documents, Denmark with 5 documents, and South Africa with 5 documents.

3.4 Document based on sponsoring funding from the sustainable finance study

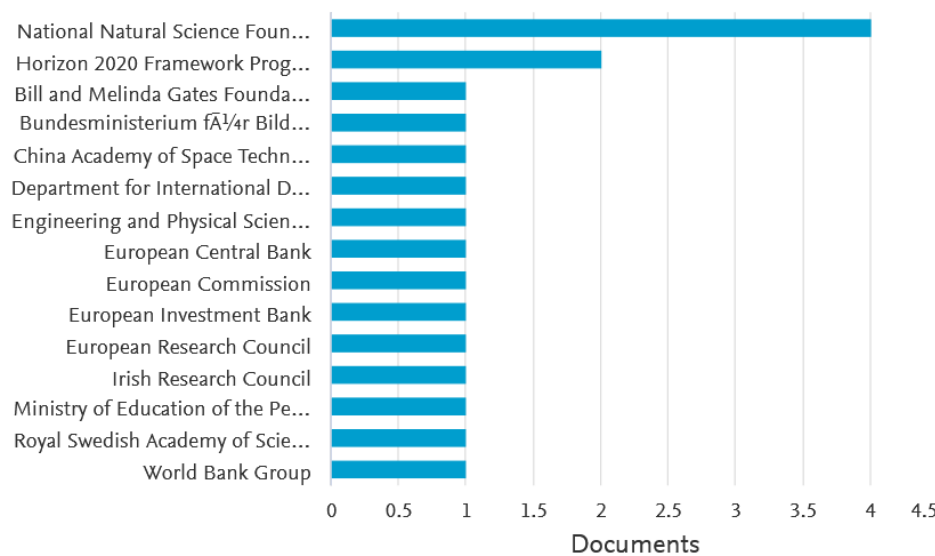


Figure 4. Number of Documents based on Sponsoring Funding from the Sustainable Finance Study

In Figure 4, it can be explained that there are top 15 Sponsoring institutions that assist in the study of sustainable finance namely the National Natural Science Foundation of China with 4 documents. Then followed by the Horizon 2020 Framework Program with 2 documents, the Bill and Melinda Gates Foundation with 1 document, China Academy of Space Technology with 1 document, Department for International Development with 1 document, Engineering and Physical Sciences Research Council with 1 document, European Central Bank with 1 document, European Commission with 1 document, European Investment Bank with 1 document, European Research Council with 1 document, Irish Research Council with 1 document, Ministry of Education of the People's Republic of China with 1 document, Royal Swedish Academy of Sciences with 1 document, Russian Foundation for Basic Research with 1 document and World Bank Group with 1 document.

3.5 Documents based on subject areas from the sustainable finance studies

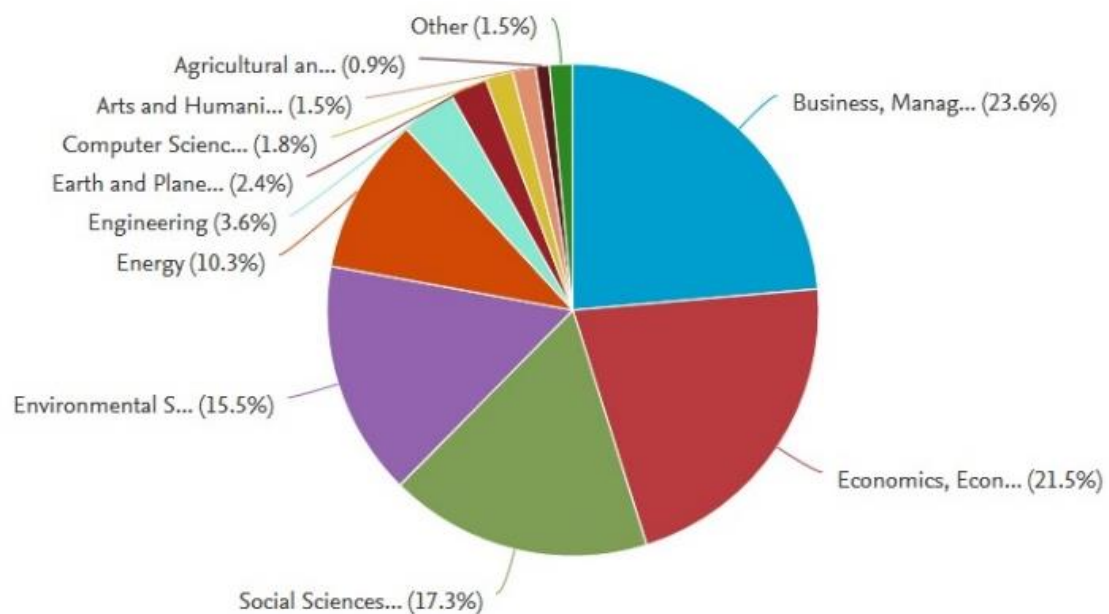


Figure 5. Number of Documents based on Subject Areas from the Sustainable Finance Studies

Figure 5 shows that the most subject areas in international academic publications in Sustainable Finance studies were Business, Management, and Accounting with 78 documents (23.6%). Followed by Economics, Econometrics and Finance with 71 documents (21.5%), Social Sciences with 57 documents (17.3%), Environmental Science with 51 documents (15.5%), Energy with 34 documents (10.3%), Engineering with 12 documents (3.6%), Earth and Planetary Sciences with 8 documents (2.4%), Computer Science with 6 documents (1.8%), Arts and Humanities with 5 documents (1.5%), Agricultural and Biological Sciences with 3 documents (0.9%), and others (1.5%).

3.6 Documents based on types of sustainable finance studies

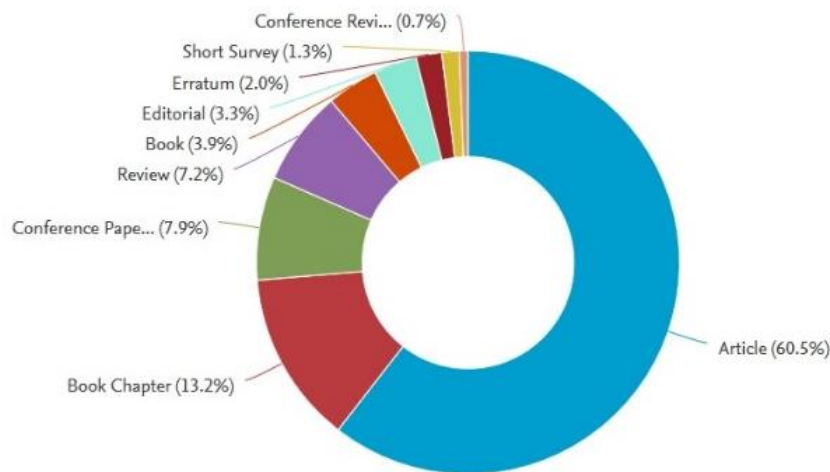


Figure 6. Number of Documents by Type of Sustainable Finance

As seen in Figure 6, the most types of documents in sustainable finance studies were article with 92 documents (60.5%), then book chapter with 20 documents (13.2%), conference paper with 12 documents (7.9%), review with 11 documents (7.2%), book with 6 documents (3.9%), editorial with 5 documents (3.3%), erratum with 3 documents (2.0%), short survey with 2 documents (1.3%) and conference review with 1 document (0.7%).

3.7 Documents per year based on sources from sustainable finance studies

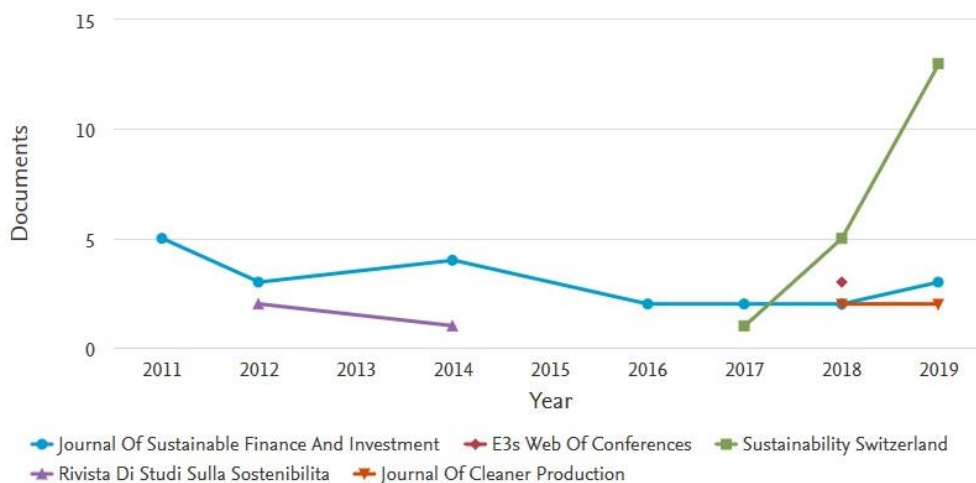


Figure 7. Number of Documents Per Year Based on Sources from the Sustainable Finance Study

Figure 7 shows the number of documents per year based on sources in the sustainable finance studies is the Journal of Sustainable Finance and Investment with 21 documents. Followed by Sustainability Switzerland with 19 documents, Journal of Cleaner Production with 4 documents, E3S Web of Conferences with 3 documents and Rivista in the Sulla Sostenibilita Study with 3 documents.

3.8 Annual documents from the sustainable finance studies

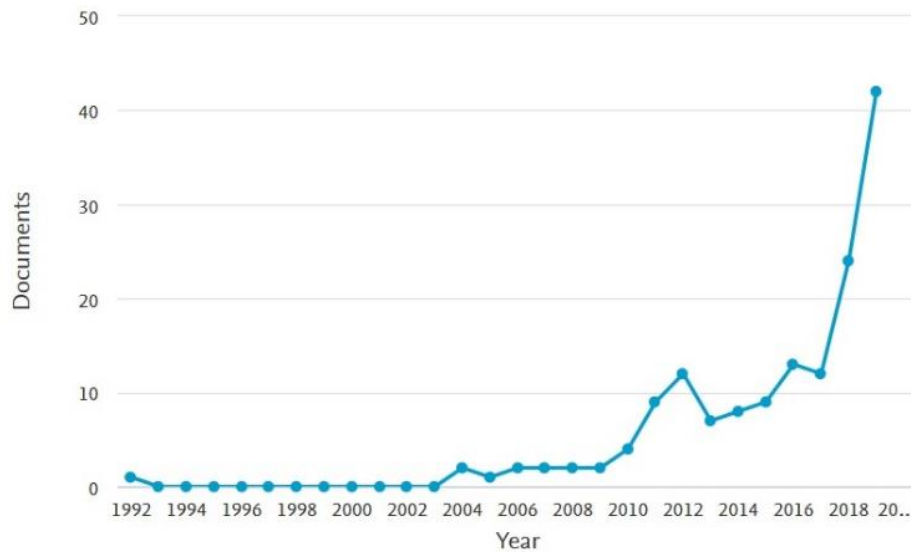


Figure 8. Number of Documents Per Year from the Sustainable Finance Studies

From Figure 8, the number of publications on sustainable finance studies has increased every year. The highest peak of international academic documents publication in the study of sustainable finance occurred in 2019 with 42 documents, it is also possible that in 2020 there will be an increase in research on sustainable finance. While in 2018 there were 24 documents, in 2017 there were 12 documents, in 2016 there were 13 documents, in 2015 there were 9 documents, in 2014 there were 8 documents, in 2013 there were 7 documents, in 2012 there were 12 documents.

3.9 Document cited from the sustainable finance studies

The most cited international publications in the sustainable finance study as a form of academic impact were the works of Marjorie Koblinsky, Cheryl A Moyer, Clara Calvert, James Campbell, Oona MR Campbell, Andrea B Feigl, Wendy J Graham, Laurel Hatt, Steve Hodgins, Zoe Matthews, Lori McDougall, Allisyn C. Moran, Allyala K Nandakumar, Ana Langer in 2016 entitled Quality maternity care for every woman, everywhere: a call to action with 111 document citations [18].

3.10 Map of study themes

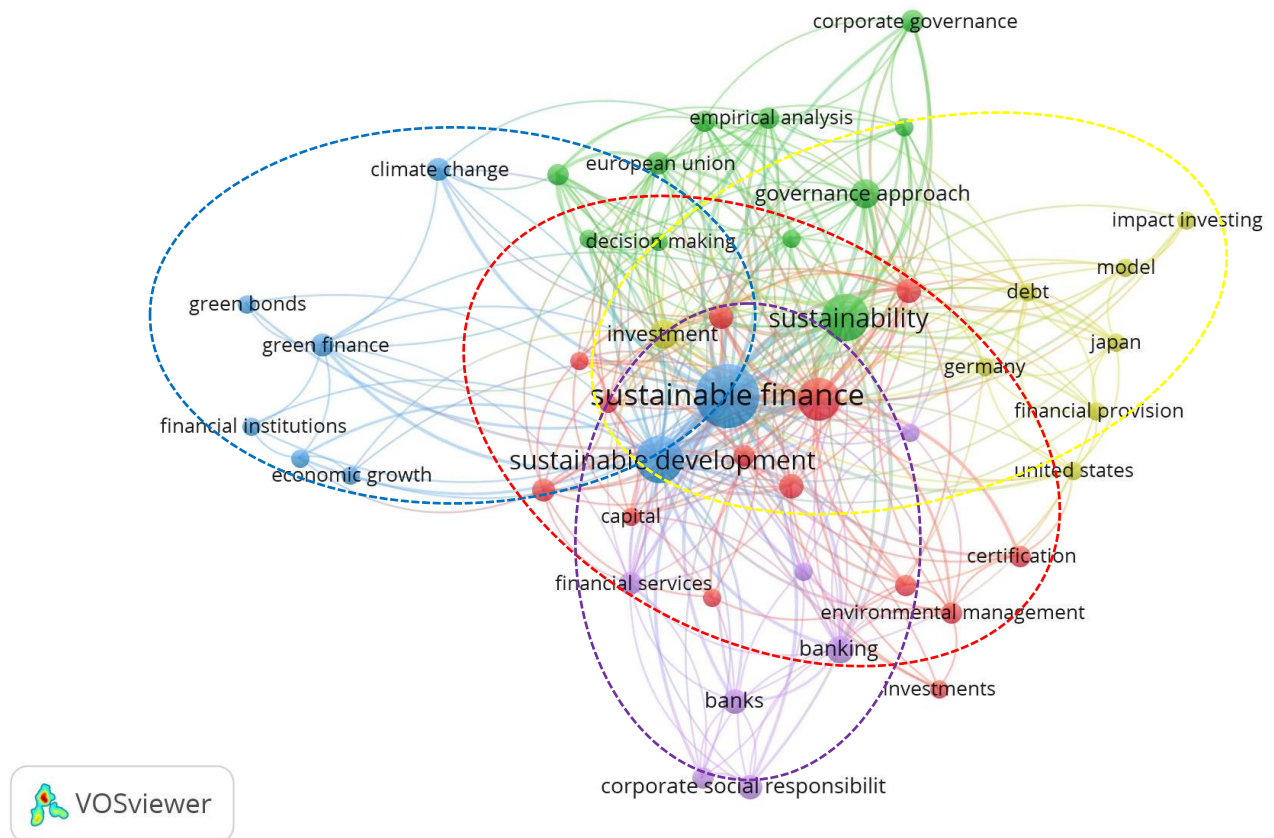


Figure 9. Map of Study Themes

Construction on the sustainable finance keyword network for the study theme map was built with the VOSViewer application. The criterion for a minimum number of documents related to keywords is three repetitions. So, from 796 keywords there are only 48 keywords that meet the thresholds.

From Figure 9. There were five groups of study themes based on research keywords related to sustainable finance study, abbreviated as BCFSP themes.

1. Bank cluster (purple). This cluster dominated by the keywords banks, banking, financial services, credit provision, and corporate social responsibility. Most of these keywords relate to bank themes.
2. Country cluster (yellow). In this cluster, we can find country themes. This cluster was related by the keywords United States, Japan, Germany, and model.
3. Finance cluster (red). In this cluster, we can find finance themes. This cluster was related by the keywords finance, financial system, capital, investments, risk assessment, planning, economic development, and economics.
4. Sustainable cluster (blue). This cluster dominated by the keywords sustainable finance, sustainable development, green finance, green bonds, and economic growth. Most of these keywords relate to sustainable themes.
5. Policy cluster (green). This cluster dominated by the keywords policy approach, financial policy, decision making, empirical analysis, governance approach, corporate governance, and corporate strategy. Most of these keywords relate to policy themes.

3.11 Author collaboration network

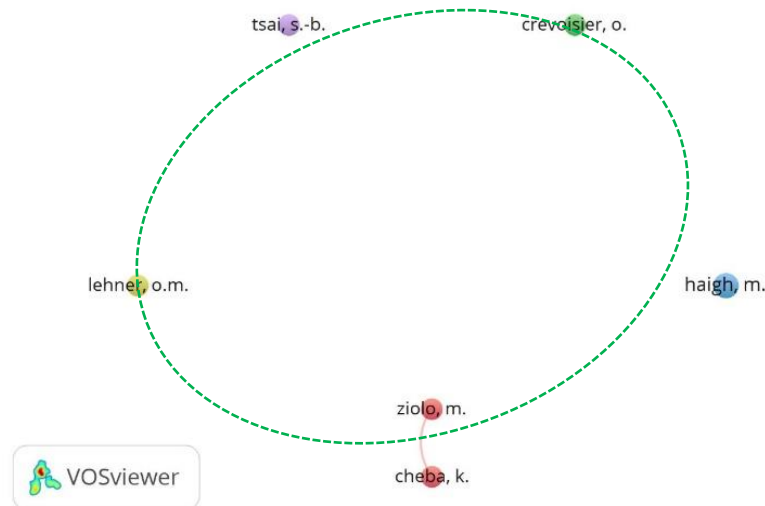


Figure 10. Author Collaboration Network

Figure 10 shows that there were 5 groups of construction patterns in the author's collaboration network in sustainable finance studies compiled with the VOSViewer application. The criteria for the minimum number of documents per author were three documents. Thus, from 283 writers, 6 writers were found who met the thresholds. There were five groups of collaboration patterns between researchers in sustainable finance studies as shown in Figure 10. Author Collaboration Network.

1. Green Cluster: Crevoisier, O.
2. Blue Cluster: Haigh, M.
3. Red Cluster: Ziolo, M.; Cheba, M.
4. Yellow Cluster: Lehner, O.M.
5. Purple Cluster: Tsai, S.-B.

4. Conclusion

The results of this study indicate that there were maps and visual trends in increasing the number of publications on sustainable finance studies at the international level. The country that has the largest contribution in making publications in sustainable finance studies was the United Kingdom with 24 documents. The most productive research institution in the publication of the sustainable finance studies was Rheinisch-Westfälische Technische Hochschule Aachen with 4 documents. The individual writer with the most publications in the sustainable finance study was Haigh, M., with 4 documents. The most widely studied areas published in the Sustainable Finance studies were Business, Management, and Accounting with 78 documents (23.6%). The most document types published are Articles with 92 documents (60.5%). Most documents per year by the source in international publications in the Sustainable Finance studies were the Journal of Sustainable Finance and Investment with 21 documents. The most sponsoring institution that helped in the study of the publication of Sustainable Finance is the National Natural Science Foundation of China with 4 documents. The highest publication of international academic documents in sustainable finance studies was in 2019 with 42 documents. Most publications with the most citations were the works of Marjorie Koblinsky et al in 2016 entitled Quality maternity care for every woman, everywhere: a call to action with 111 citations. There were five collaboration groups on research related to the field of Sustainable Finance.

In terms of contributing implications to knowledge, this research proposes a convergence axis classification consisting of sustainable finance studies to characterize the body of knowledge generated from three decades of studies: Bank, Country, Finance, Sustainable, and Policy, abbreviated as BCFSP themes. As implications for practical, identifying key themes in the sustainable finance sector leads to understanding the development of studies to understand common topics and contexts, as well as the research gaps. With all of this, new studies can be led to address a lack of study and advance knowledge in the areas. The themes most researched also demonstrate the sustainable finance contribution to finance, and bank practice.

Future research is to analyze contributions and explain the impact of sustainable finance studies based on a combination of data obtained from Scopus, Web of Science, EBSCO, and SciELO.

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