Bibliometric Mapping of Green Economy in Development

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Abstract

This research presents a bibliometric analysis of the term "Green Economy on Development" in journals indexed by Scopus, using the VOSviewer and Biblioshiny tools. The main objective is to map research trends, identify keywords, collaborate between researchers, and geographically distribute publications related to the green economy in the development context. The methodology includes data collection from the Scopus database, bibliometric network analysis, and visualization with VOSviewer to assess inter-keyword relationships and collaboration patterns. Additionally, Biblioshiny is used for statistical and temporal analysis of publication trends. Search results found 5282 articles related to green economics. The article "Green innovation and organizational performance: The influence of big data and the moderating roles of management commitment and HR practices " is the most cited, with 648 citations since its publication in 2019. The results show that research on the green economy has increased significantly recently, focusing on sustainability, renewable energy and environmental policy. Collaboration analysis shows a robust international network between institutions and researchers. This study provides valuable insights for researchers and policymakers regarding the Development and directions of green economy research and highlights the importance of global cooperation in achieving sustainable development goals.

Keywords: *Green Economy; Bibliometrics; VOSviewer; Biblioshiny; Sustainable Development*

Introduction

The main principles of a green economy are rooted in the concept of sustainable Development, which aims to balance economic, social and environmental elements for the sake of continuity between humanity and the natural environment (Abrosimova et al., 2020; Al-Taai, 2021; Spilnichenko et al., 2023). The green economy approach is considered the best option to achieve sustainable Development, as it offers a concrete implementation roadmap while providing significant social and economic benefits and reducing environmental risks (Tovma, 2017; Vargas-Hernández & Vargas-González, 2023).

The term "green economy" was initiated by the United Nations (UN) in 2008. The UN proposed a Green Economy, which gained support at the country level and was included in the 2012 Rio + 20 agenda (Shahgiraev et al., 2022). The concept of a Green Economy has been highly discussed on international and national political agendas since 2008 (Neusteurer, 2016). The transition to a green economy is based on economic policy that aligns with economic Development, biodiversity, and climate change (Albino, 2013). The United Nations Environmental Program (UNEP) promoted the idea of "green stimulus packages" in 2008 to avoid a global recession (Neusteurer, 2016). The UN developed a comprehensive definition of the "green economy," emphasizing improving human well-being, increasing

social justice, and reducing environmental risks (Shahgiraev et al., 2022). The concept of a Green Economy embodies a new hegemonic project of neoliberal capitalism and represents a "passive revolution" to calm critics and prevent counter-hegemonic approaches.

The green economy concept answers current challenges, providing economic development opportunities and multiple benefits for the welfare of all humanity (Albino, 2013). Sustainable Development emphasizes increasing environmental, social and economic resources, with a green economic approach seen as the best option for achieving sustainable Development. The green economy concept promises a concrete road map towards implementing sustainable Development while providing significant social and economic benefits and reducing environmental risks (Tovma, 2017).

Concrete implementation roadmap while providing significant social and economic benefits and reducing environmental risks (Tovma, 2017). Efforts towards a green economy help reduce poverty and increase poor people's access to a healthy and safe environment. These measures not only improve general welfare, but also strengthen human security by preventing or resolving conflicts related to land, food, water, and other natural resources. By adopting environmentally friendly practices, countries can create new jobs, reduce the negative impacts of climate change, and ensure more sustainable use of resources. A green economy also supports the development of better infrastructure and wider access to green technology, ultimately improving the quality of life for poor people. A green economy promotes social inclusivity and environmental justice, by ensuring that the benefits of sustainable development are felt by all levels of society, including the most vulnerable (Yildirim & Yildirim, 2019). The green economy offers a practical and flexible approach to achieving real and measurable progress in economic and environmental principles. Every step towards sustainability not only benefits the economy and the environment, but also takes into account the social impacts that may arise. The green economy supports dynamic economic growth while maintaining a balance between economic profits, environmental sustainability and social welfare (Vargas-Hernández & Vargas-González, 2023).

The emerging discourse around the green economy is still debated and has not been fully interpreted in many countries' industrial, institutional and socio-economic realities, especially developing countries (Tovma, 2017). The transition to a green economy must be based on economic policies that align with long-term economic development, biodiversity, climate change and ecosystems, thus requiring several essential points to be considered to encourage long-term sustainable Development (Wilson et al., 2021). Depending on their respective levels of development, each country has different capacities to initiate and implement policy reforms and deal with transformational change. For this reason, support measures are needed that can increase capacity and strengthen institutions, provide training and improve skills for the workforce, and improve public education about sustainability. This support aims to ensure that all countries, regardless of their level of development, have the resources and knowledge necessary to adapt to change and implement sustainable practices effectively (Vargas-Hernández & Vargas-González, 2023).

Considering the importance of green economy issues, this research aims to present a bibliometric analysis of "Green Economy on Development" in indexed journals Scopus. Using the analysis tools VOSviewer and Biblioshiny, this research seeks to map research trends, identify main keywords, analyze research collaborations, and geographically distribute publications related to the green economy in the development context. The methodological approach used in this research involves data collection from the Scopus database, followed by bibliometric network analysis and visualization using VOSviewer to evaluate inter-keyword relationships and collaboration patterns.

Examining past research is fundamental for future research on Green Economy Development. Thus, our paper covers the following research questions:

RQ1. What is the urgency of bibliometric data analysis Green Economy in Development research?

RQ2. Which researchers played a key role in this field, and what were their key findings?

RQ3. What is our contribution to future research?

Answering these questions, bibliometric analysis methods are used to analyze research on the Green Economy on Development. Using a different approach, we performed a bibliometric analysis of all publications available in the database Scopus regarding Green Economy Development. This kind of analysis describes academic and scientific communication quantitatively

Literature Review

Green economy is a concept that emphasizes the importance of balance between economic development and environmental sustainability. Green economy aims to improve people's welfare and social equality, while significantly reducing the risk of environmental damage. This concept emerged in response to global challenges such as climate change, environmental degradation, and increasing social inequality. Green economy offers an approach that integrates sustainability into every aspect of economic development, including natural resource management, energy production, and financial policy (Mahrus Lutfi Adi Kurniawan & Suripto, 2022). Green economy is considered as an ideal model for sustainable development, which covers all aspects of life, economic, social, and environmental. This model emphasizes the transition from environmentally harmful economic practices to healthier and more environmentally friendly alternatives. For example, the implementation of pollution taxes, subsidies for waste management, and investment in renewable energy and natural resource management are some of the mechanisms used to support this transition. Green economy does not only focus on economic growth, but also on environmental protection and improving people's quality of life (Firmansyah, 2022). The concept of green economy also plays an important role in achieving sustainable development goals (SDGs). Green economy supports efforts to reduce environmental burdens while creating conditions conducive to social and economic progress. This involves the development of sustainable economic sectors such as organic agriculture, energy management, and environmentally friendly food production (Adamowicz, 2022).

In this literature review, the topic of bibliometric mapping of green economy in development is explored to provide an in-depth understanding of how research related to green economy has developed over the past decades. This study uses a bibliometric approach (Aria & Cuccurullo, 2017) that covers various aspects of green economy, ranging from thematic research, trends, to policy implications. The first study by Candra Pratama presents a comprehensive knowledge map of green economy globally based on data from the Scopus database. This study analyzes 657 academic documents over the past two decades (2000-2020) to map research themes on Green Economy. This analysis is important to understand how the concept of green economy has developed and how research in this field has increased significantly in the past two decades, especially in relation to sustainable development(Febby Candra Pratama, 2023). Another relevant study was conducted by Alsmadi and Alzoubi, who used bibliometric analysis to provide an overview of the progress of green economy research from 1990 to 2020. This study attempts to provide a strong conceptual framework to guide future research. The findings of this study indicate an increase in academic attention to the topic, especially since 2016, indicating its importance in the global research agenda(Alsmadi & Alzoubi, 2022). Zhu et al. (2023) identified Asia and Europe as leaders in green economy studies between 2016 and 2022, with academic attention to the topic increasing since 2016. This study highlights how these regions have played a role in leading the global discussion on green economy, which is becoming increasingly relevant in addressing the challenges of global climate change (Zhu et al., 2023). Furthermore, Rusydiana et al. (2022) examined the relationship between green economy and Islamic finance through bibliometric analysis, revealing a natural fit between the two fields. Sukuk, a financial instrument that complies with sharia principles, is identified as a potential tool to promote a green economy, which supports the implementation of sustainability in Islamic finance(Aam Slamet Rusydiana et al., 2022).

Method

Bibliometric analysis is a quantitative approach used to study the evolution of knowledge in different research fields based on the analysis of related publications (Marvi & Foroudi, 2023; Toaza & Esztergár-Kiss, 2024; Wulansari et al., 2020). Bibliometric analysis is a quantitative approach to conducting a literature review, providing a general picture of a research field classified by papers, authors, and journals (Marvi & Foroudi, 2023; Merigó et al., 2015; Merigó & Yang, 2017). It involves quantitatively studying bibliographic material, including analyzing publications, citations, authors, and institutions (Koo & Lin, 2023; Lazarides et al., 2023; Martínez-Toro et al., 2019). It is used to identify influential research, trends, and patterns in specific research areas, such as operations research, management science, and the fuzzy sciences (Martínez-Toro et al., 2019; Merigó et al., 2015; Merigó & Yang, 2017).

We use databases. Scopus is widely used for bibliometric studies and is a more comprehensive citation database (Kyriazis et al., 2020; Toaza & Esztergár-Kiss, 2024). We started our process by searching for the keywords " Green Economy " and " Development " in the article's title in the database Scopus. We limit the data search based on published documents from 2008 to 2024.

The search results produced 5,329 research articles from 1,576 document sources from 2008 to July 202 4, with an Annual Growth Rate of 42.57 per cent. A total of 11. 031 authors have contributed and have an average of 3.35 citations per document. The data collection completeness report shows " excellent " for the field: Author (AU), Document Type (DT), Language (LA), Publication Year (PY), Title (IT), Total Quotation (TC); " good " for Journal (SO), Abstract (AB), Affiliation (C1), DOI (DI); "Acceptable" for Keywords (DE), Corresponding author (RP); "Poor" 30.9 % Keyword Plus (ID); and Number of References Cited (CR), Science Category (WC) "completely missing." So, our final sample is 5,329 research articles.

We used bibliometric analysis techniques suggested by (Aria & Cuccurullo, 2017) and Donthu et al. (Donthu et al., 2021) for performance analysis and science mapping. For performance analysis, we use tools such as annual scientific production maps and total scientific literature produced by institutions, countries, sponsoring agencies, and country collaboration networks. These tools help us understand the demographic production of research articles on the Green Economy in Development. In addition, we also analyzed the number of articles published by each journal, the number of citations those articles received, and the number of articles that had been fractionated. This approach allowed us to identify leading journals, most frequently cited documents, and leading experts in the field of Green Economics in Development. Using these tools, we can provide a comprehensive picture of research trends and the contributions of individuals and institutions in the field. This analysis not only identifies the most influential works but also helps in understanding the dynamics of international collaboration and the geographical distribution of research on the Green Economy. It is hoped that the results of this study will provide valuable guidance for researchers and policy makers in developing more effective and sustainable research and policy strategies.

We utilized the features of Biblioshiny, a configurable web interface package of the R programming language, namely Bibliometrix, for bibliographic analysis (Aria & Cuccurullo, 2017). One of Biblioshiny's main advantages is its ability to present literature data with interactive visualization, which allows researchers to explore and understand patterns in the data more deeply and intuitively. In addition, we also used VOSviewer, as suggested by van Eck (van Eck & Waltman, 2010), to produce overlay visualizations of keyword analysis and bibliometric linking. VOSviewer allows us to map the relationships between various keywords and see how they interact in the research network. By using VOSviewer, we can identify research clusters, development trends, and collaboration between researchers in the field of Green Economy in Development. The combined use of Biblioshiny and VOSviewer provides a comprehensive and information-rich approach to bibliometric analysis. Interactive visualizations from Biblioshiny and overlay mapping from VOSviewer not only enhance our

understanding of literature data, but also help in identifying potential research areas for further exploration. It is hoped that the results of this analysis will provide valuable insights for the research community and policy makers in developing more effective and innovative strategies in the field of the Green Economy.

Results and Discussion

Bibliometric analysis has been classified into five main sections: Total Scientific Literature Production, Journal Level, Author Level, Document Level, and Thematic Level. Scientific Research Production includes the total production of literature by Countries, Affiliates, and institutions that fund research. This analysis also includes collaboration between affiliates and countries around the world. We sorted journals by number of scholarly productions to identify leading journals and used fractionated article data to identify leading authors in these research constituencies.

We used the local citation rates received by research articles to rank the most influential documents in green finance research. This approach allows us to determine the most significant works based on their impact in the local research community. In addition, we use various bib-biometric science mapping tools, such as Thematic Maps, Thematic Evolution Maps, Co-word analysis, and Co-citation analysis, to identify thematic groups and recommend possible future green finance research areas.

By comprehensively mapping scientific literature production, we are not only able to identify the most influential journals, authors, and documents, but also provide insight into global collaboration in this research. Our thematic analysis helps understand trends and patterns in green finance research, as well as identify existing gaps for future research to fill. It is hoped that the results of this analysis will provide valuable guidance for researchers and policy makers in developing more effective and sustainable research and policy strategies.

### *Scientific research production and collaborations*

Figure 1 shows growth in publication research in the Green Economy in Development field in January 2008 – 2024. Although slow over the years, output science has experienced a significant increase, with 1,376 publications in 2023, compared to years before, with a growth of 42.57%. This matter highlights the increasing interest of scientists in studying the development of the green economy. Among these countries, China occupies the top ranking with a total publication of 2,255 articles, followed by Russia (520), the United Kingdom (323), the United States (318), and other countries. Between institutes, the Chinese Academy of Sciences topped the list with the publication of 81 articles each, followed by Jiangsu University (60), Bucharest University of Economic Studies (51), Russian Academy of Sciences (45), Wuhan University (44) and other institutes other.
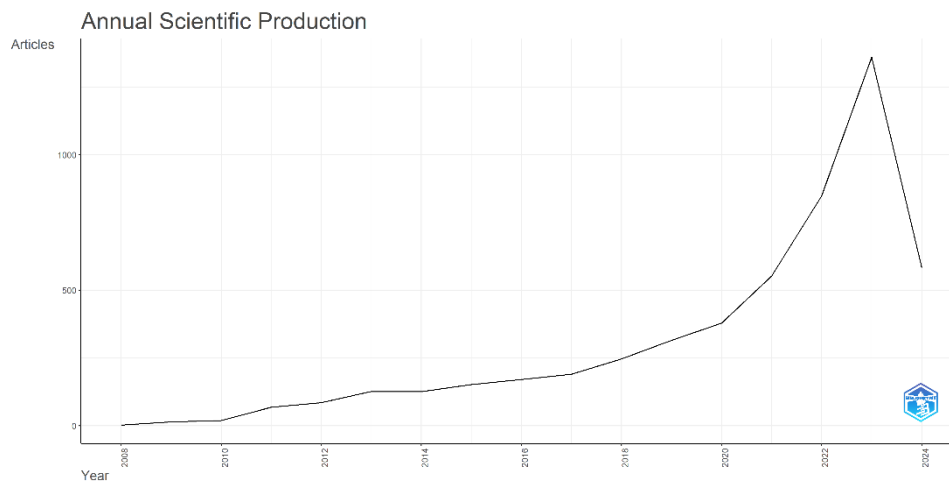
Figures 1. Publication growth

Figure 2. shows the collaboration between countries. China and Pakistan collaborated on 123 articles, followed by China and the United States (76), China and the United Kingdom (70), China and Malaysia (63), and collaboration of countries other. The results show that China is a critical player in thethe Green Economy in Developmentstudy field. Between collaboration carried out institution This (Figure 3) is based on ranking connectedness; China University Of Mining And Technology, Central University Of Finance And Economics, Shanghai Jiao Tong University, Xi'an Jiaotong University, East China Normal University are collaborator central. Second cluster followed by Ocean University Of China, Southwestern University Of Finance And Economics, Shandong University, Nanjing University Of Aeronautics And Astronautics, Anhui University Of Finance And Economics, Nanchang University, Shandong University Of Finance And Economics. The third cluster is Tsinghua University, University Of Chinese Academy Of Sciences, Shenzhen University, Zhengzhou University, and Beijing Normal University. Clusters of ten are Sichuan University and Chengdu University of Technology:
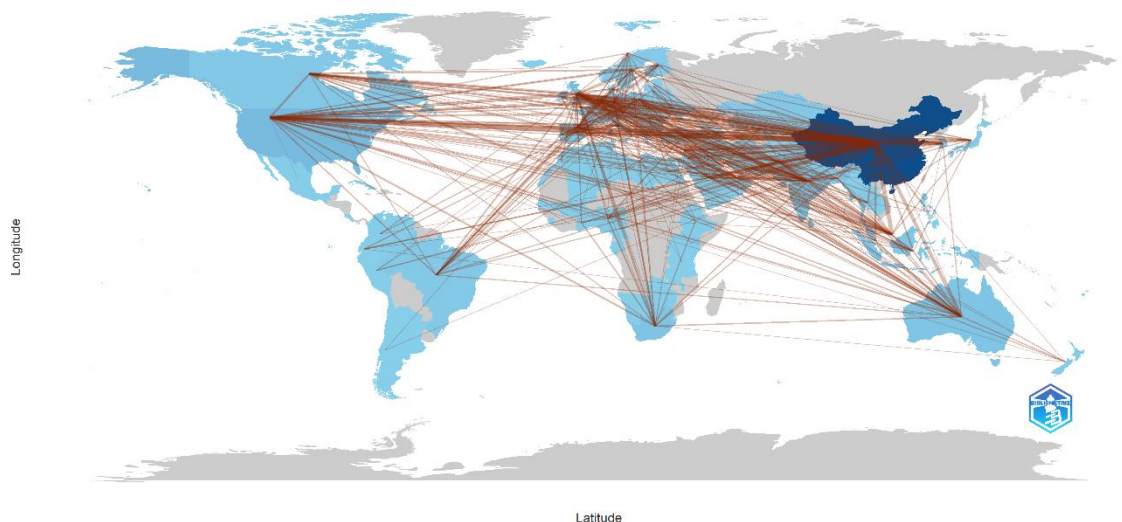
Figures 2. Country Collaboration
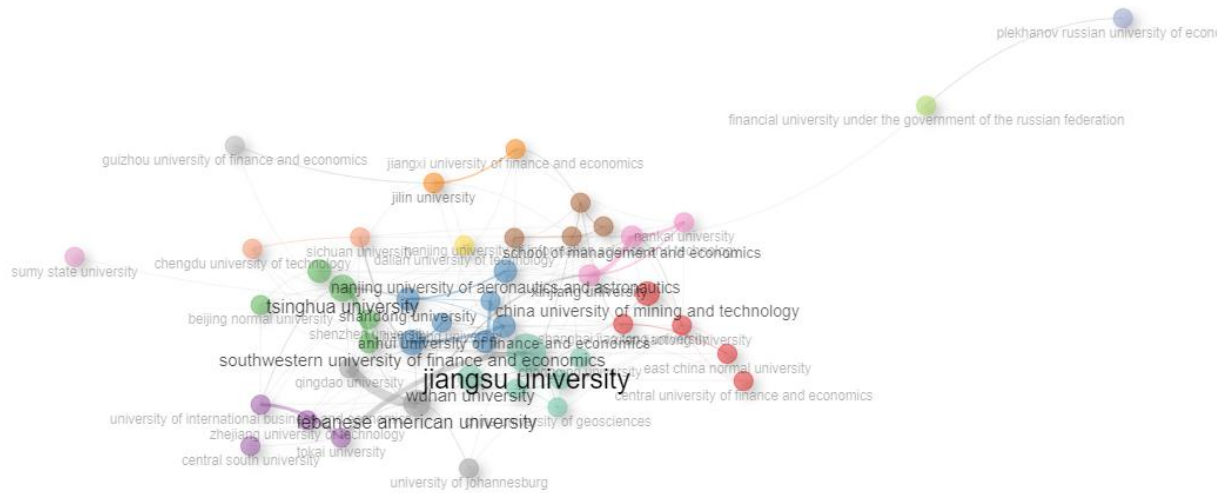
Figures 3. Institute Collaboration.

Leading journals

Below (Table 1) are the ten journals that have the most relevant results. Switzerland topped the list with 586 articles, followed by Environmental Science And Pollution Research (345), Resources Policy (201), International Journal Of Environmental Research And Public Health (149), IOP Conference Series Earth And Environmental Science (104), E3s Web Of Conferences (97), Journal Of Environmental Management (81), Energy Economics (78), Journal Of Cleaner Production (71) and Technological Forecasting And Social Change (57). In Cite Score 2023, Technological Forecasting And Social Change has the highest score, namely 21.3, followed by Journal Of Cleaner Production (20.4), Energy Economics (18.6), Journal Of Environmental Management (13.7) and Resources Policy (13.4). Of the top five journals based on citation scores, all are published by Elsevier. Interestingly, four of the ten most influential journals come from finance and economics, while the rest come from environmental sciences. This phenomenon can be explained by the following factors. First, green finance is an interdisciplinary field that combines financial science and environmental science, making it more appropriate to publish in environmental journals. This unique combination allows green finance research to bridge two different disciplines, providing a more comprehensive and relevant perspective on sustainability issues. Second, most research in green finance focuses on the impact of finance on the environment, including carbon emissions, sustainability, and renewable energy. These studies explore how investment and financial policies can reduce negative impacts on the environment and encourage more sustainable practices. Therefore, environmentally focused journals are often a more suitable platform for publishing such findings, as they have a more relevant audience interested in environmental issues. Finally, publications in environmental and sustainability journals often have a high impact factor, which attracts researchers to publish their work there. These journals not only have high levels of visibility and citations, but also place emphasis on research that can make a real contribution to global environmental challenges. This causes journals that focus on the environment and sustainability to become the leading choice. Finally, science journals often have higher impact factors and citation values, making it more attractive for researchers to publish their work in these journals.

Table 1. Leading journals

Rank	Sources	Articles	Publisher	SKY	CS 2023	SNiP 2023

Rank	Sources	Articles	Publisher	SKY	CS 2023	SNiP 2023
1	Sustainability Switzerland	586	Multidisciplinary Digital Publishing Institute (MDPI)	2009	6.8	1,086
2	Environmental Science And Pollution Research	345	Springer Nature	1994	8.7	1,141
3	Resources Policy	201	Elsevier	1974	13.4	2,083
4	International Journal Of Environmental Research And Public Health	149	Multidisciplinary Digital Publishing Institute (MDPI)	2004	7.3	1,077
5	IOP Conference Series Earth And Environmental Science	104	IOP Publishing	2010	1.0	0.325
6	E3s Web Of Conferences	97	EDP Sciences	2013	0.9	0.4
7	Journal of Environmental Management	81	Elsevier	1973	13.7	1,719
8	Energy Economics	78	Elsevier	1979	18.6	2,637
9	Journal Of Cleaner Production	71	Elsevier	1993	20.4	2.23
10	Technological Forecasting And Social Change	57	Elsevier	1970	21.3	2,945

Documents Artiles

Identifying the most relevant articles based on the number of citations is very important as this indicates a significant contribution to research in the field. A high number of citations indicates that the article is frequently referenced by other researchers, reflecting the influence and relevance of the research findings in the academic community. In this context, citation analysis can help direct attention to works that have had a major impact and stimulate further development in the field of study. Table 2 presents the ten most influential articles, ordered by total citations received. These articles are not only recognized by the research community, but also often form the basis for further research. By studying the most frequently cited articles; researchers can gain deep insight into research trends, effective methodologies, and key findings that have been widely recognized.

El-Kassar & Singh's article (El-Kassar & Singh, 2019)received the highest number of citations, namely 659. This research discusses the importance of identifying and implementing environmentally friendly practices to improve a company's competitive advantage, economic and environmental performance, including green innovation, technology, and supply chain management. This research develops and tests a holistic model

that describes the relationship between green innovation, its drivers, and the factors that help overcome technological challenges and influence companies' performance and competitive advantage, using data from a sample of respondents in the Middle East and North Africa (MENA) region and Gulf Cooperation Council (GCC) countries. D'Amato(D'Amato et al., 2017), the paper with the second highest number of citations, discusses the importance of identifying and implementing environmentally friendly practices to improve a company's competitive advantage, economic performance, and environmental performance. Pretty & Bharucha(Pretty & Bharucha, 2014), another paper with 572 citations, explores the concept and application of sustainable intensification (SI) in agricultural systems, with a focus on how increases in agricultural yields can be achieved without negative impacts on the environment and without additional non-agricultural land conversion. Mülhaupt Research (Mülhaupt, 2013) explored the increasing demand for renewable polymer products with a low carbon footprint in response to depleting fossil resources, increasing energy demand, and global warming and received 539 citations. It should be noted that this research is based on various topics and sources, indicating the interdisciplinary nature of the subject.

Table 2. Top 10 articles.

No	Articles	T.C
1	Green innovation and organizational performance: The influence of big data and the moderating role of management commitment and HR practices (El-Kassar & Singh, 2019)	656
2	Green, circular, bio-economy: A comparative analysis of sustainability avenues (D'Amato et al., 2017)	637
3	Sustainable intensification in agricultural systems (Pretty & Bharucha, 2014)	571
4	Green polymer chemistry and bio-based plastics: Dreams and reality (Mülhaupt, 2013)	537
5	How does green finance affect green total factor productivity? Evidence from China (Lee & Lee, 2022)	531
6	Public spending and green economic growth in BRI region: Mediating role of green finance (Zhang et al., 2021)	485
7	Institutional quality, green innovation and energy efficiency (Sun et al., 2019)	473
8	Green economy and related concepts: An overview (Loiseau et al., 2016)	446
9	Does green investment, financial development and natural resources rent limit carbon emissions? A provincial panel analysis of China (Shen et al., 2021)	445
10	A synthetic pathway for the fixation of carbon dioxide in vitro (Schwander et al., 2016)	429

Authors

An important goal of a bibliometric study is to identify authors who have made significant contributions to a particular field. Through this analysis, we can understand who has a big influence and makes important contributions to the development of science in this field. Table 3 presents a list of authors who contributed the most based on the fractional counting and complete counting methods. However, our authors' ranking was based on fractional counting because this method is considered more reliable than complete counting (Egghe et al., 2000). Fractional counting assigns proportional weights to authors based on their contributions to a

joint article, providing a more accurate picture of individual contributions to collaborative research.

Our research results show that Wang Y is the author who contributed the most with a fractional value of 22.60. Other authors who also had major contributions were Zhang Y with a score of 17.73, Zhang J with a score of 17.69, Li J with a score of 16.87, and Wang X with a score of 16.71. These authors have demonstrated high dedication and productivity in their research fields, and their work often serves as an important reference for other researchers. Identification of these prominent authors not only helps in understanding the current research landscape but also provides inspiration and direction for future research.

Table 3. Most contributing authors.

Rank	Authors	Articles Fractionalized	No of Articles
1	Wang Y	22.60	83
2	Zhang Y	17.73	67
3	Zhang J	17.69	64
4	Li J	16.87	60
5	Wang X	16.71	60
6	Li Y	15.25	58
7	Wang J	15.83	57
8	Zhang X	14.29	54
9	Liu Y	14.21	51
10	Chen Y	13.28	46

Thematical analysis

One of the main goals of this study is to identify the intellectual landscape of the research field, the current state of research, and future themes. To achieve this goal, we used four analysis techniques: thematic map (Figure 5), thematic evolution (Figure 6), and co-word analysis (Figure 7). In thematic analysis, we used the author's keywords as the unit of analysis. Figure 4 shows a word tree map created using Biblioshiny to analyze the most relevant keywords appearing in the article. This Word Tree Map is created from Author Keywords (DE). Keyword frequency is indicated by size and color on the map, where larger box sizes indicate more frequent occurrences of the keyword. The five keywords that appeared most frequently in articles were Green Economy (2,414 occurrences, 11%), China (11%), Sustainable Development (9%), Sustainable Development (7%), and Environmental Economics (4%). Other keywords include innovation, sustainability, carbon dioxide, environmental protection and green economy. These results show that China dominates research on green economy and sustainable development. These findings provide a clear picture of the current research focus and provide important clues regarding future research directions. The dominance of keywords such as Green Economy and Sustainable Development reflects the great attention to sustainability and environmental issues, and shows how research in this area is developing. This analysis not only helps in understanding current research trends but also provides a basis for researchers to identify areas that require further research and enables policy makers to make better decisions based on scientific evidence.
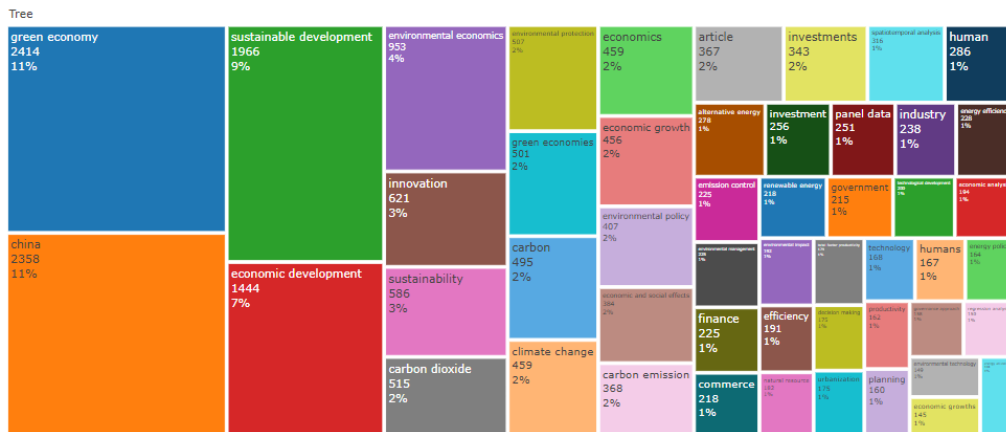
Figures 4. Word Tree Map .

Thematic maps help identify and document research theme areas, patterns, and trends within a discipline. These maps allow researchers to see an overall picture of how a particular research field develops and interacts with other subfields. By visualizing data in the form of a thematic map, researchers can identify key themes, relationships between various topics, and how research trends change over time. Figure 5 shows the thematic map generated using Biblioshiny software. This software enables interactive visualization of bibliometric data, thereby facilitating in-depth analysis of thematic patterns in scientific literature. The resulting thematic map not only shows the distribution of research topics but also reveals the interconnections and shifts in research focus within the discipline. This map identifies that " green finance " and "China" fall into the Niche category Themes, indicating that these topics have a more specific focus and often reach a more limited audience. Meanwhile, " green economy " and " sustainable development " are included in the Basic Themes category, which shows that these topics are an essential foundation in research and have more comprehensive coverage and high relevance in many studies.

To visualize the thematic path and possible scope of future studies on "Green Economy in Development", we used two visualization techniques: Thematic Evolution map using Biblioshiny and Co-word analysis using VOSviewer. Figure 6 shows the resulting thematic evolution map. This evolution map uses Author Keywords, with 2021 set as the internal cut-off point to identify the newest keywords after 2021. Meanwhile, Figure 7 displays Co-word analysis (Overlay Visualization) based on author keywords with a minimum threshold of 80 occurrences, from where 110 keywords met the threshold out of a total of 19,816 keywords. The Co-word analysis technique allows us to see the relationships between various keywords and how they interact in the research network. The resulting thematic evolution map provides insight into how research themes have developed over time and identifies new trends and emerging areas in Green Economy research. Meanwhile, the overlay visualization of Co-word analysis shows the most frequently used keywords and the relationships between these keywords. With this information, researchers can identify important topics that are on the rise, as well as areas that require further research. This visualization technique is very useful in planning future studies and understanding the dynamics of research in the field of Green Economy in Development.

Our research results show that in the early stages, Green Economy in Development research has Lots of themes including ; Green innovation, China, green Development, green technology, green finance, energy efficiency, environmental management, green economy, efficiency and environmental sustainability. Furthermore, in 2021 -2023, the scope of Green Economy in Development research focuses on three keywords: is Green finance, green economy and China. But in 2024, the theme Green Economy in Development the more Lots

develop into Green Economic Development, green economic efficiency, sustainable Development, green innovation, green finance, carbon emissions, sustainable development goals, environmental performance, recycling, decarbonization, spatial spillover effect, environmental pollution, green supply chain management, and green energy (Figure 5, Figure 6 and Figure 7).
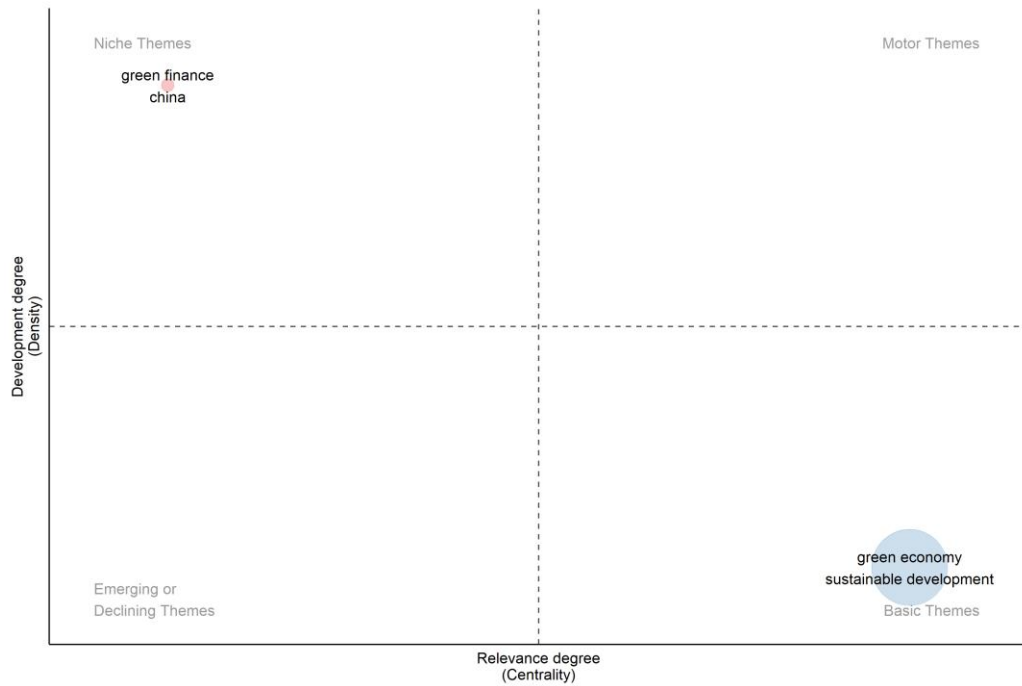
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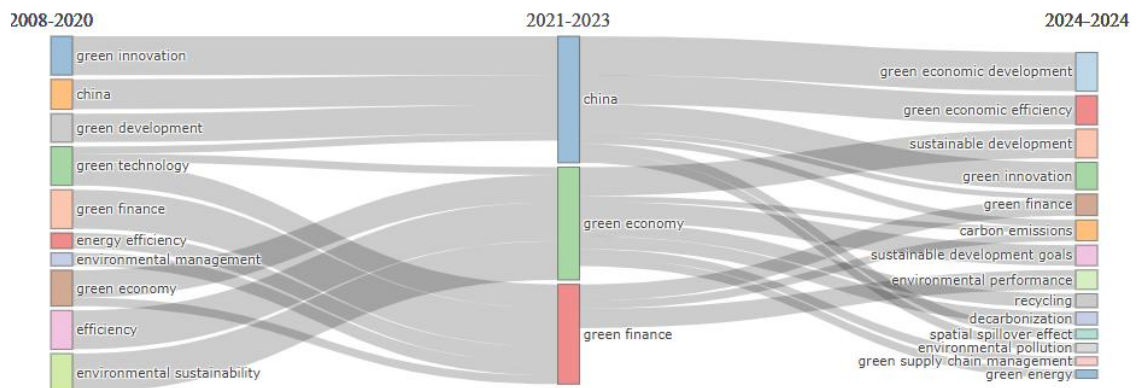
Figures 6. Thematic evolution map
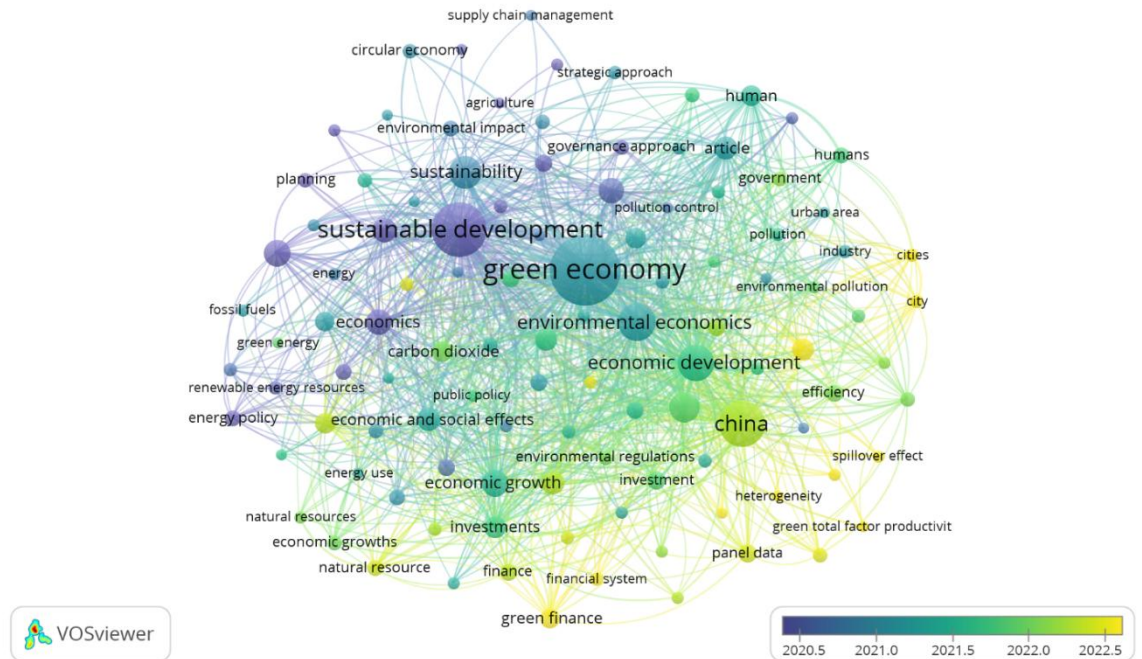
Figures 7. Co- word analysis

Conclusion

In facing current environmental and economic challenges, several aspects are essential to pay attention to. Become a must to increase energy efficiency and reduce using limited natural resources. The ever-increasing carbon emissions are becoming a severe problem that requires immediate handling through various mitigation strategies. The importance of recycling items that have economic value cannot be ignored, as this reduces waste and supports a circular economy. Increasing environmental pollution in urban areas threatens people's health and quality of life. Implementing green supply chain management (green supply chain management) has a vital role in improving the green economy by integrating sustainable practices throughout the supply chain to balance economic growth and environmental sustainability. This research uses bibliometric analysis to map the intellectual landscape of scientific developments in Green Economy in Development using 5,329 research articles from 1,576 document sources during the 2008 period - 202 4. China dominates Green Economy in Development research in independent articles and international collaborations.

Although this article covers extensive research on the Green Economy in Development using only datasets from Scopus, some studies from other important sources may be out of reach. This means that it is possible that data from important studies published outside Scopus were not included in this analysis, which could introduce bias in the study results. Additionally, this bibliometric study is based on keywords provided by the authors. Many writers may have included inappropriate keywords or omitted relevant keywords in their articles. These errors can affect the results of our analysis, especially in the process of clustering and identifying emerging themes. Inaccuracies in keywords can lead to an inaccurate representation of the relationships between research topics and cloud our understanding of true trends and patterns in the Green Economy field. Although this analysis provides valuable insights, limitations in data coverage and potential errors in keywords must be considered. To increase accuracy and coverage, future research should consider the use of multiple databases and efforts to verify and refine keywords used by authors. This will help in

producing a more comprehensive and accurate picture of the research landscape in Green Economy in Development.

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