

Bibliometric Review of Global Research on Sustainable Finance and Carbon Taxation

Firmansyah Arifin^{1,*}, Dimas Pratama Putra²

Tridianti University, Indonesia^{1,2}

Corresponding e-mail: firmansyah_arifin@univ-tridianti.ac.id*

ABSTRACT

Purpose: Sustainable finance and carbon taxation represent a rich field of research. However, existing reviews are often constrained, offering piecemeal insights drawn from subsets of the literature rather than the entire body of work on these topics. To address this gap, this study seeks to comprehensively map the research dynamics surrounding carbon taxation and sustainable finance. By employing big data analytics and machine learning to analyze scholarly research, it explores the evolution of the field, assesses the impact of key publications, and examines collaborative efforts that drive innovation.

Method: This study employs bibliometric methods, using R Studio software, to analyze publication data from 2020 to 2024. It identifies keywords, emerging trends, author collaborations, and contributions from various countries.

Result: The findings reveal a significant increase in research on carbon taxation and sustainable finance, with China emerging as the largest contributor. The analysis also uncovers key trends in topics such as economic development and carbon dioxide emissions, which are central to global discussions. Furthermore, the findings emphasize the importance of international collaboration in tackling climate change and promoting economic sustainability. This study not only enriches academic literature but also offers valuable insights for policymakers, financial institutions, and other stakeholders addressing environmental and economic sustainability challenges.

Practical Implications for Economic Growth and Development: This research offers valuable insights for policymakers to promote environmentally friendly economic growth strategies through carbon tax policies and sustainable finance initiatives.

Keywords: *carbon tax, sustainable finance, bibliometrics, international collaboration, economic growth*

INTRODUCTION

Climate change brings about a shift in the concept of development toward sustainability (Kamel & Ugur, 2024). Several countries have recognized the importance of sustainable development following the implementation of the Paris Agreement signed in 2015 at COP21, which outlines climate policy goals to limit global warming (Pyka, 2021). The issue of climate change has prompted many countries to take initiatives to accelerate and coordinate actions in reducing its impact through public policy, including the introduction of carbon taxes as a strategic tool (Nsabiyeze et al., 2024). Carbon taxes are expected to stimulate companies and institutions to transition toward sustainable financial practices and encourage the shift to a more environmentally friendly economy (Subramoniam et al., 2024). Climate change has driven the transformation of development policies in many countries toward greater sustainability (Pinkse & Kolk, 2012). These efforts, including through carbon tax policies, aim to create a more sustainable and environmentally friendly economic environment. Thus, the carbon tax is expected not only to function as an emission control instrument but also to act as a catalyst for changing corporate and societal behavior toward more sustainable and environmentally friendly practices.



Sustainability is one of the most hotly debated issues today due to the impact of climate change (Heck et al., 2024). Sustainable finance is one solution that offers a way to achieve sustainability goals by integrating environmental, social, and governance (ESG) criteria into the financial decision-making process (Oyewole et al., 2024). This study continues previous research that identified one of the main themes in sustainable finance research—carbon finance (Kumar et al., 2022). Carbon tax and sustainable finance are closely linked in addressing climate change while fostering sustainable economic growth (Doğan et al., 2022; Sarker & Cadman, 2022). A carbon tax is a policy tool and an instrument to mitigate climate change, imposed on domestic fossil fuel production, distribution, and consumption (Digitemie & Ekemezie, 2024). Sustainable finance, through mechanisms such as carbon taxes, plays a crucial role in mitigating the impacts of climate change and promoting sustainable economic growth by integrating ESG criteria into financial decisions. It is expected to achieve synergy between environmental and economic goals, creating a sustainable development model.

Although sustainable finance is critical in achieving sustainable economic goals (T. Li et al., 2024), and despite the large number of publications on sustainable finance (Qin et al., 2022; Ren et al., 2023; Q. Li et al., 2022), the breadth of literature can make it difficult for researchers to understand the focus of research, often leading to the neglect of basic issues and the development of the field. The novelty of this study lies in linking carbon tax and sustainable finance through bibliometric analysis, focusing on the latest period and relatively underexplored database dimensions. Structured publication activities on carbon tax and sustainable finance have not been fully explored. By comprehensively examining research publications on structured publishing activities, this study aims to elucidate the development of research trends and improve practical understanding of current issues in sustainable finance and carbon tax.

This study also focuses on another important aspect: the identification of research clusters and key thematic areas within the broader scope of carbon tax and sustainable finance (Ayaz & Zahid, 2023). Through the application of co-citation and co-word analysis, this study will map the intellectual landscape, highlighting the interconnections between different subfields and revealing the emergence of new research frontiers (Fang & Lee, 2022). This approach not only confirms the multidisciplinary nature of the field but also helps identify key areas that require further exploration. In addition, this study will explore the role of international collaboration in accelerating research progress (Daraojimba et al., 2023) on carbon tax and sustainable finance. By analyzing authorship patterns and collaborative networks, this study will map how cross-border collaboration has contributed to the creation and dissemination of knowledge in the field of sustainable finance (Ren et al., 2023). Cross-border collaboration plays a crucial role in addressing complex global issues, such as climate change, where shared insights and collective efforts are needed to develop effective and sustainable solutions (Perz et al., 2010). Thus, the identification of research groups and the analysis of collaborative networks will enrich the understanding of the intellectual structure and dynamics of international collaboration that underpin research in the field of carbon taxation and sustainable finance (Punj et al., 2023). These findings are expected not only to contribute to the academic literature but also to provide insights for stakeholders in designing more efficient collaborative strategies to address global environmental challenges.

International collaboration plays a crucial role in accelerating research progress on carbon taxation and sustainable finance (Mashari et al., 2023). In this review, the extent and impact of cross-border collaboration will be evaluated by analyzing co-authorship patterns and collaborative networks formed (Liu et al., 2021). The identification of key international partnerships and hubs of collaboration will provide insights into the coordination of global efforts to address climate change and promote economic sustainability (Trencher et al., 2013). Furthermore, the analysis will reveal the benefits of international collaboration, including access to diverse perspectives, optimization of shared resources, and enhancement of research capacity. Cross-border collaboration not only enriches perspectives in policymaking but also strengthens the knowledge base in ways that cannot be achieved through isolated research efforts (Shroff et al., 2024). In the context of complex global environmental issues, such collaboration is a key pillar in generating relevant innovations and sustainable solutions.

This study will also explore the policy implications resulting from research on carbon taxation and sustainable finance. The findings on international collaboration and partnership patterns can provide a basis for developing more adaptive and effective policies in response to climate change challenges (D. L. Maria et al., 2020). In addition, mapping key partnerships is expected to help policymakers and stakeholders build sustainable cross-country collaboration strategies. Thus, this study not only contributes to scientific understanding but also provides insights for developing more targeted and coordinated international policies to achieve global economic sustainability.

In conclusion, this comprehensive review of structured publication activity in the field of carbon taxation and sustainable finance provides a deep understanding of the research landscape. It not only maps publication trends, contributions of leading researchers, collaborative networks, and emerging research themes, but also identifies knowledge gaps and development opportunities in the field. These findings are expected to be a valuable source of insights for researchers and other stakeholders focused on environmental and economic sustainability. With a thorough mapping of the intellectual landscape, this study aims to guide future research and strengthen the foundation for sustainable finance and carbon taxation. As the challenges of climate change become more pressing, a deep understanding of publication activity and research development directions in the field of carbon taxation and sustainable finance will play a vital role in shaping more adaptive and strategic solutions, supporting the transition to a greener and more sustainable future.

METHOD

Bibliometric analysis is a consistent quantitative method that helps researchers explore and examine a large number of scientific data sources. This method offers the potential to introduce a systematic, transparent, and reproducible review process based on statistical measurements of science, scientists, or scientific activity (Otten et al., 2020). It is widely used in various fields to provide an objective analysis of research trends, the impact of publications, and the relationships between different research themes. By applying this method, researchers can identify patterns in academic literature and gain valuable insights into the development of specific fields.

For this study, data will be collected from the Dimension database, which is one of the largest and most comprehensive peer-reviewed literature repositories, covering publications from 2020 to 2024. The search will focus on articles, reviews, and conference papers related to carbon tax and sustainable finance. Keywords such as “carbon tax” and “sustainable finance” will be used to filter relevant publications. The collected data will include metadata for each publication, including the title, authors, affiliations, abstracts, keywords, year of publication, journal, and number of citations. This data will then be processed using bibliometric software such as Bibliometrix (R Studio), which will allow for a detailed analysis of the trends and relationships within the literature.

The bibliometric study in this research will be conducted through a systematic process consisting of three main stages. The first stage involves establishing a bibliographic database and entering relevant keywords into the Dimension database search, applying inclusion and exclusion criteria to narrow the scope of the literature. The second stage is the bibliometric analysis, which will determine the most important research constituents in the sustainable finance and carbon tax literature, utilizing R Studio for this purpose. The third stage involves establishing a content analysis process for the research data set to identify and investigate key research themes in the literature on sustainable finance and carbon tax.

All of the aforementioned issues require in-depth analysis. To address these challenges, R Studio software will be used (Bhat, 2023). Bibliometrics offers a fresh perspective to understand the current status and trends of scientific development in a particular field (Akhil, 2022). In recent years, several visualization tools that support literature co-citation analysis and keyword co-occurrence analysis, such as R Studio and VOSviewer, have emerged. These tools are vital for conducting visual analyses in related fields (Kemeç & Altınay, 2023).

Although some studies have used bibliometric methods to review research on sustainable finance (Kashi, 2023) and carbon tax (Zhang et al., 2016), these studies typically address separate literature search problems. This study, however, intends to conduct a comprehensive search of the literature related to both sustainable finance and carbon tax. It aims to visualize the knowledge structure and developments in sustainable finance research using bibliometric analysis methods. The goal is to guide academics and practitioners in determining the research interests and emerging themes in these fields, thereby improving their understanding and evaluation of the subject.

Compared to other bibliometric analyses in sustainable finance (Kashi, 2023) and carbon tax (Zhang et al., 2016), this study presents several major contributions. First, the bibliometric search strategy employed is more systematic and comprehensive. Second, the search keywords are specifically focused on the topics of sustainable finance and carbon tax, enabling a more targeted analysis. Third, the literature period analyzed in this study covers the most recent years, from 2020 to 2024, ensuring that the results are more relevant to the latest developments in these areas. As a result, this study produces a knowledge mapping that helps readers better understand the trends and evolution of sustainable finance and carbon tax themes. The findings are expected to make it easier to identify research novelties and guide further studies into areas with potential for development, thereby contributing to the continued advancement of the field.

RESULT AND DISCUSSION

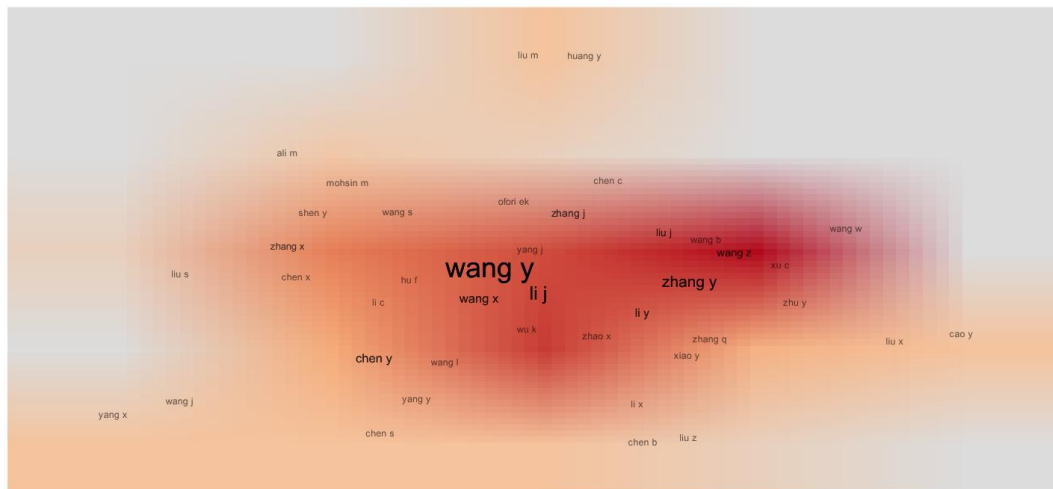
Publications Overview

A bibliometric analysis was conducted on 500 publications published between 2020 and 2024, with a primary focus on carbon taxation and sustainable finance, reflecting the diverse nature of the research field. The findings reveal a substantial increase of 237% in the number of annual publications, highlighting the growing interest in these topics. The average age of the published documents is 1.02 years, suggesting a rapid response from the scientific community to the evolving green economy. Each document receives an average of 9,638 citations, demonstrating the high impact and relevance of this body of work. The data further show the breadth of research coverage, represented by 272 "Plus Keywords" and 272 "Author Keywords." Authorship is distributed among 1,213 contributors, with 51 primary authors producing 55 documents. Collaboration is evident, with an average of 3.42 authors per document, approximately 25% of whom are international. Overall, these 500 publications and 55 conference papers contribute to an ongoing scientific dialogue on carbon taxation and sustainable finance.

Authors Collaboration

The authors collaboration shown in Figure 1 highlight the extensive connections among researchers in the field of carbon taxation and sustainable finance. Prominent scholars such as Wang Y, Chen Y, Zhang Y, Liu J, and Shen Y are recognized for their significant contributions to this area. The strong network of interaction among these authors underscores the importance of scientific collaboration, facilitating the exchange of resources and ideas. This collaboration not only fosters a spirit of cooperation in research but also empowers researchers to collectively address the challenges in carbon taxation and sustainable finance. As the field continues to grow and evolve, it is essential to integrate more researchers into this collaborative network. The inclusion of new scholars in the future is expected to strengthen existing connections, further advancing the discipline.

Figure 1. Authors Collaboration



Source: Processed data (2024)

Keywords and Thematic Map

Figure 2 presents the most frequently occurring keywords in the studied documents, highlighting the key issues in the fields of carbon tax and sustainable finance. The most commonly identified keywords include "economic development," "China," "carbon dioxide," "renewable energy," and "sustainable development," based on bibliometric analysis of publications from 2020 to 2024. This finding underscores a significant contribution to the ongoing discussions around carbon tax and sustainable finance. The analysis shows that keywords such as "economic development" rank among the top 10, confirming the strong link between economic development and both carbon tax and sustainable finance. Therefore, it is crucial to develop effective strategies for financial sustainability and carbon tax management to ensure organizational success. The top 10 keywords are listed in Figure 2. Understanding the relationship between economic development and carbon dioxide emissions is essential for finding solutions to foster sustainable global economic practices in today's era.

Figure 2. Word Cloud Visualization

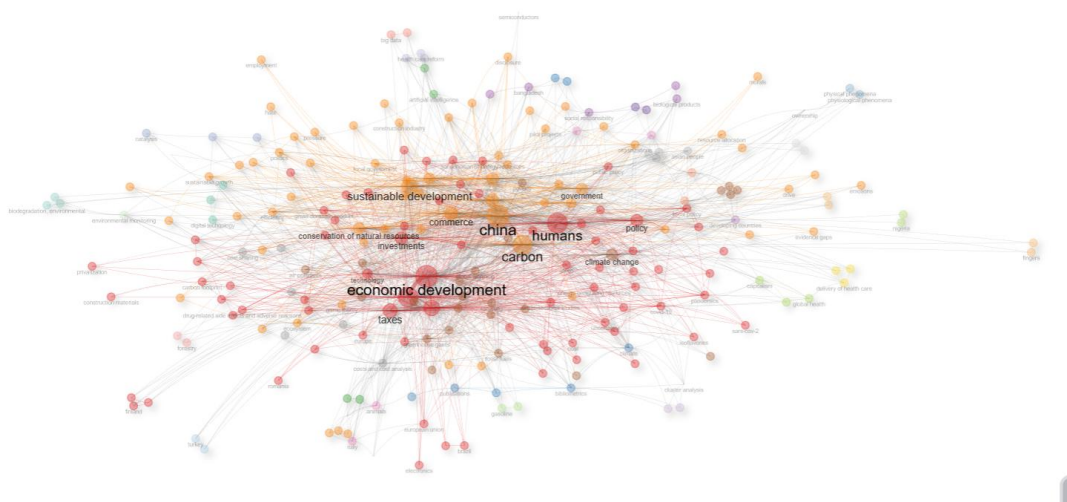


Source: Processed data (2024)

The close relationship between "economic development" and "carbon tax" indicates that many studies focus on the impact of carbon tax policies on the economic development of a country or region. This theme is critical in discussions about how carbon taxes can either hinder or support economic growth and how their implementation can be aligned with broader economic objectives. The thematic map reveals that research on carbon taxes and sustainable finance is multidisciplinary, covering a range of interconnected themes. The strong link between economic development and carbon tax policies reflects the challenge of balancing economic growth with environmental sustainability. Additionally, the high frequency of keywords related to "China" indicates that the country plays a significant role in the existing literature, both as a subject of research and as a contributor to the global scientific discussion on carbon policy.

These findings underscore the importance of international cooperation and policy coordination to achieve effective sustainability goals. The implementation of carbon taxes requires not only economic and environmental studies but also a deep understanding of social and political factors, such as societal behavior and the impact of policies on public welfare. Moreover, gaining a better understanding of the themes and trends in this literature will help researchers identify new areas that warrant further exploration, such as empirical studies investigating the real-world effects of carbon tax policies in different countries. Overall, this thematic map offers a comprehensive overview of the research landscape in the field of carbon taxation and sustainable finance, highlighting areas that need further attention to advance knowledge in the field.

Figure 3. Thematic Map



Source: Processed data (2024)

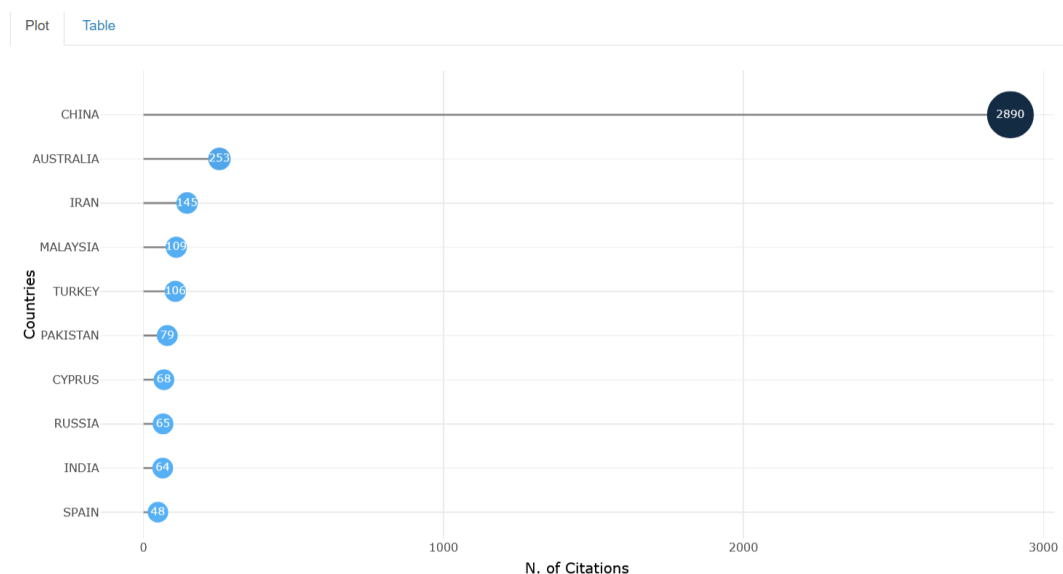
Most Cited Countries

The results of the bibliometric analysis reveal that the most cited country in research related to sustainable finance and carbon tax is China, with a dominant 2,890 citations. This high citation count indicates the significant contribution of Chinese research in shaping academic discussions and scientific developments in this field. Several factors may contribute to the high citation of Chinese research, including the country's intense focus on environmental studies, green economy initiatives, and its active role in implementing sustainability policies. Other countries with notable citation counts include Australia, Iran, and Malaysia, each receiving between 10 and 45 citations. While their contributions are smaller than China's, these countries still make relevant contributions. For example, Australia's high citation count could be attributed to its proactive carbon and environmental policies, while Iran, Malaysia, and other countries like Turkey and Pakistan may offer more regional or context-specific perspectives on sustainability policy implementation.

Countries such as Cyprus, Russia, India, and Spain have fewer citations, ranging from 8 to 15 each. Although these countries contribute less in terms of citations, their involvement in the cited research indicates broad participation in the global discussion on sustainable finance and carbon taxation. This citation distribution provides several key insights. First, the dominance of citations from China may reflect the country's large-scale research and policy efforts in the areas of sustainable finance and carbon taxation. Second, the inclusion of countries like Australia, a developed nation, and Iran and Malaysia, developing countries, shows a diverse range of contributions from different economic contexts, highlighting that sustainable finance and carbon taxation are global concerns. The relatively low citation numbers from countries like India and Spain suggest that research from these regions has room to grow and make a more substantial impact on international discussions.

These findings also underscore the importance of international collaboration in building a comprehensive and diverse literature on sustainable finance and carbon taxation. The involvement of a wide range of countries, each with unique challenges in implementing carbon tax policies, enriches the global discourse. Moreover, this analysis may encourage researchers from lower-citation countries to enhance their research engagement and visibility, particularly in the context of the increasingly urgent global sustainability policy discussions.

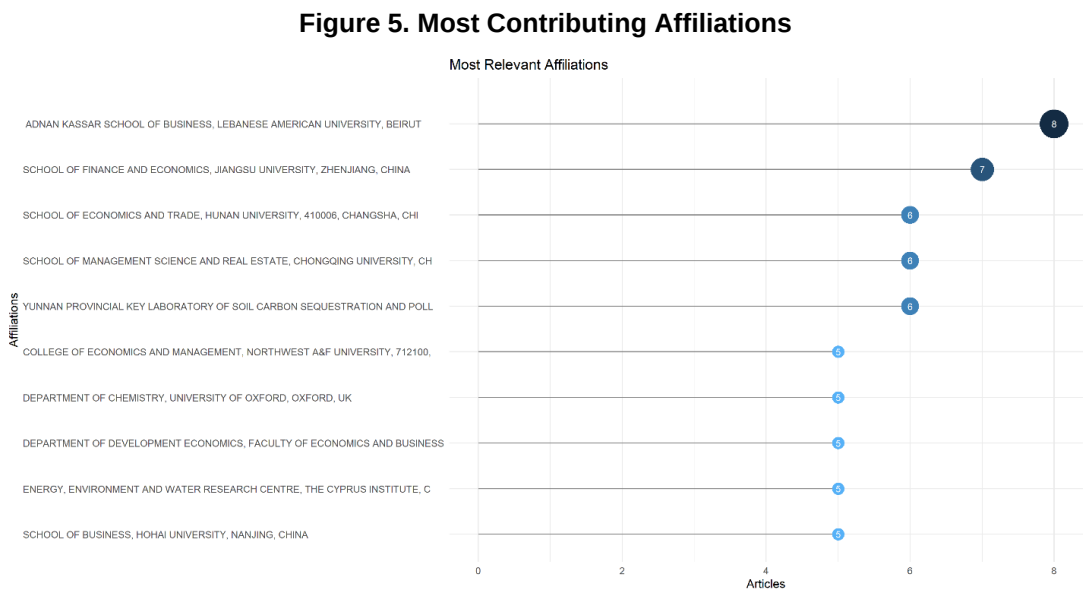
Figure 4. Most Cited Countries in Carbon Tax and Sustainable Finance Publications



Source: Processed data (2024)

Most Contributing Affiliations

This analysis underscores the significant contributions of global institutions to the research on carbon taxation and sustainable finance. The top 10 affiliations, based on the number of documents and citations, are presented in the table. The Adnan Kassar School leads with 8 documents, demonstrating a strong academic presence. Jiangsu University and Hunan University follow closely with 7 and 6 documents, respectively, signifying their influential research contributions. Chongqing University in China, with 6 documents, also highlights its global impact in this field. Other notable institutions include Kunming University in China, which also contributed 6 documents, further emphasizing the importance of their research. Additionally, Northwest A&F University and Oxford University each produced 5 documents, underlining their prominent roles in advancing academic research on sustainable finance and carbon taxation.

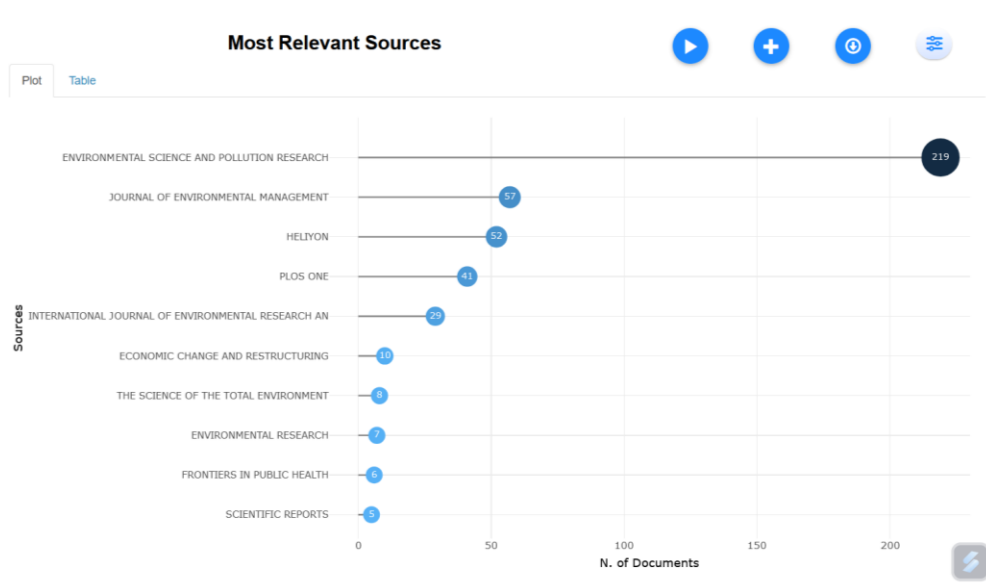


Source: Processed data (2024)

Most Contributing Sources

The results of the bibliometric analysis of the most influential academic journals highlight the extent of each journal's contribution and impact based on citation counts. *Annals of Operations Research* and *Environmental Science and Pollution* stand out for their significant roles in the fields of carbon tax and sustainable finance, with 179 and 153 papers published, respectively. *Annals of Operations Research* leads with the highest number of citations, totaling 179, underscoring the journal's considerable impact in this area. *Environmental Science and Pollution* follows closely with 153 citations. Other notable journals include *Environmental Management* and *Environmental Science and Pollution Research*, with 106 and 102 citations, respectively. *Economic Change and Restructuring* also contributes significantly, with 93 citations. A full breakdown of the top 10 journals is shown in Figure 6.

Figure 6. Most Contributing Sources

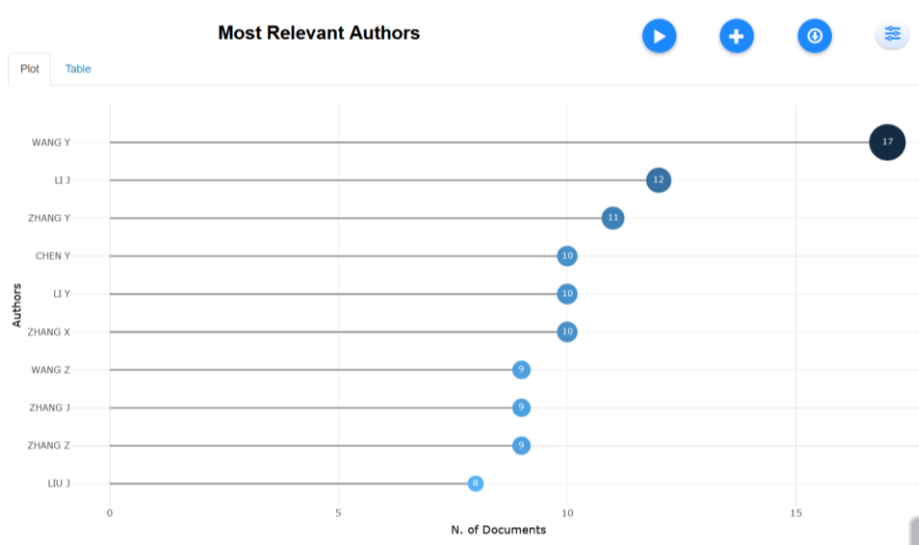


Source: Processed data (2024)

Most Influential Authors

Figure 7 presents a bibliometric analysis of the most influential authors, ranked by the number of documents published. The author with the highest contribution is WANG Y, with 17 documents, followed by LI J with 12, and ZHANG Y with 11. Other notable contributors include CHEN Y, LI Y, and ZHANG X, each with 10 documents, reflecting significant involvement in this research area. WANG Z and ZHANG J each have 9 documents, while ZHANG Z and LIU J each have 8. These findings highlight the key role these authors play in advancing literature on this topic, with WANG Y being the most active.

Figure 7. Most Influential Authors

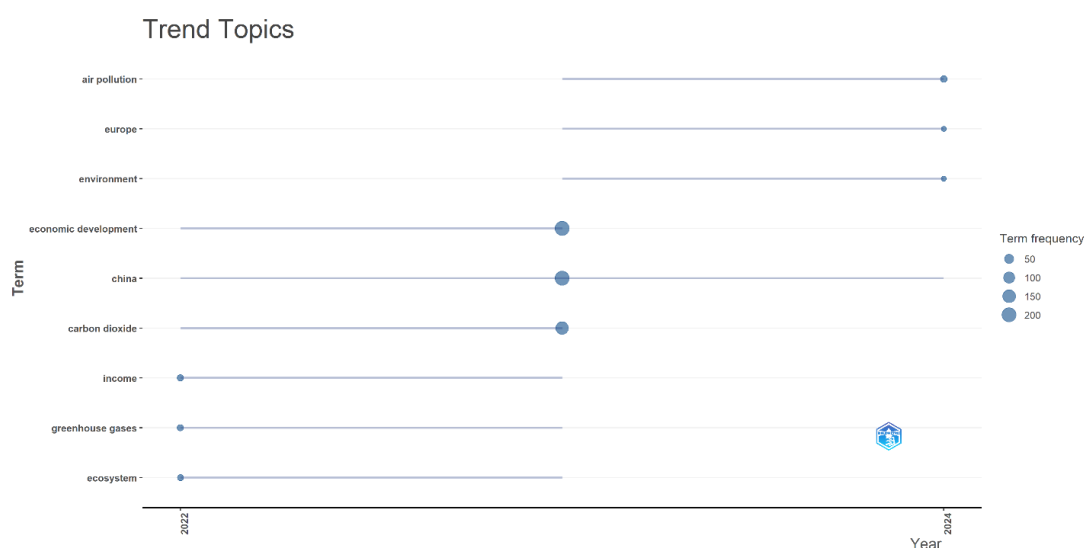


Source: Processed data (2024)

Trend Topics

Figure 8 illustrates the trending research topics from 2022 to 2024, with the size of each circle representing the frequency of each topic. "Air pollution" and "environment" emerged as the most frequent topics, consistently showing high interest throughout 2024. "Europe" also garnered considerable attention, though slightly less than "air pollution" and "environment." Topics like "economic development," "China," and "carbon dioxide" also had relatively high frequencies, reflecting ongoing interest in the economic, regional, and environmental aspects of carbon emissions. While the topics "income," "greenhouse gases," and "ecosystem" appeared less frequently, they remained relevant in current research trends. These findings highlight the growing focus on environmental issues, particularly air pollution and carbon emissions, with notable regional emphasis on Europe and China.

Figure 8. Trend Topics



Source: Processed data (2024)

Discussion

The bibliometric mapping in this study highlights the rapid growth of research on carbon taxation and sustainable finance between 2020 and 2024, with an impressive annual publication growth rate of 237%. The findings emphasize China's dominant role in this field, both in terms of research output and citations. This prominence is likely due to China's aggressive climate policies and large-scale sustainable finance initiatives, which are aligned with its economic transition goals. The thematic mapping reveals strong connections between carbon taxes, sustainable development, and economic growth. The frequent appearance of terms like "renewable energy," "carbon dioxide," and "policy" underscores the multidimensional nature of the field, where fiscal tools such as carbon taxes are crucial for advancing sustainability objectives. Existing literature supports this view, suggesting that integrating environmental, social, and governance (ESG) criteria into financial systems not only mitigates climate risks but also promotes economic stability (Oyewole et al., 2024). Additionally, the study highlights the importance of international collaboration, with 25% of global publications involving co-authorship, which fosters diverse perspectives and policy innovation. However, gaps persist in empirical studies that assess the real-world impacts of carbon tax implementation, pointing to the need for further research into the socio-economic outcomes in different regions.

CONCLUSION

This study provides a comprehensive mapping of the research dynamics in carbon taxation and sustainable finance, successfully meeting the objectives of identifying publication trends, key contributors, and thematic clusters. The findings reveal a multidisciplinary and collaborative research landscape, with China emerging as the global leader in contributions. The practical implications underscore the importance for policymakers and financial institutions to adopt integrated approaches that align carbon tax strategies with sustainable finance frameworks to meet both environmental and economic objectives. For future research, there is a need to explore the socio-political dimensions of carbon tax implementation, particularly its impact on equity and social welfare. Additionally, expanding cross-country comparative studies could offer deeper insights into the adaptability and effectiveness of policies. These recommendations aim to enrich the academic discourse and guide stakeholders toward more effective sustainability strategies.

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