

CARBON TAX AND SUSTAINABILITY: A BIBLIOMETRIC ANALYSIS

Avia Tamara Shabirina¹, Ibrahim Fatwa Wijaya²

^{1,2} Master of Accounting Program, Faculty of Economics and Business,
Universitas Sebelas Maret
E-mail: aviatamaras@gmail.com¹, ibrahimfatwa@staff.uns.ac.id²

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Abstract:

This study aims to map the development of the literature on carbon tax. The method employed is a bibliometric study using the PRISMA approach, drawing on data from the Scopus database, with a total of 233 articles analyzed using VOSviewer. The results indicate that publications on carbon tax have increased significantly, particularly after 2023, and are predominantly contributed by countries such as China, India, the United States, and the United Kingdom. The research focus generally covers aspects of sustainability economics, tax policy, and carbon emission control. In addition, this study identifies research opportunities in relatively underexplored topics, such as profitability, environmental economics, and economic growth, as well as emerging issues like the green economy and emission reduction. This study provides a comprehensive overview of global trends and their implications for future research and policy development, although it is limited by the use of a single database and a bibliometric approach.

Keywords: Carbon Tax, Green Innovation, Sustainable Development, Bibliometric Analysis

Abstrak

Penelitian ini bertujuan untuk memetakan perkembangan literatur mengenai pajak karbon. Metode yang digunakan adalah studi bibliografi dengan pendekatan PRISMA menggunakan data dari database Scopus, dengan total 233 artikel yang dianalisis menggunakan VOSviewer. Hasil penelitian menunjukkan bahwa publikasi terkait pajak karbon mengalami peningkatan signifikan, terutama setelah tahun 2023, serta didominasi oleh negara seperti China, India, Amerika Serikat, dan Inggris. Fokus penelitian umumnya mencakup aspek ekonomi keberlanjutan, kebijakan perpajakan, dan pengendalian emisi karbon. Selain itu, ditemukan peluang penelitian pada topik yang masih kurang dieksplorasi, seperti *profitability*, *environmental economics*, dan *economic growth*, serta munculnya isu baru seperti *green economy* dan *emission reduction*. Penelitian ini memberikan gambaran komprehensif mengenai tren global serta implikasi bagi pengembangan riset dan kebijakan, meskipun memiliki keterbatasan pada penggunaan satu database dan pendekatan bibliometrik.

Kata Kunci: Pajak Karbon; Inovasi Hijau; Pembangunan Berkelanjutan; Analisis Bibliometrik

1. Introduction

Climate change has become one of the most pressing global challenges faced by the international community today. The increase in greenhouse gas (GHG) emissions driven by economic activities has prompted many countries to adopt policies that balance economic growth with environmental sustainability (Muqattash et al., 2026). Among the various policy instruments available, the carbon tax has emerged as one of the most widely implemented mechanisms across countries (Febrianti & Karlinah, 2025). A carbon tax is a levy imposed on carbon dioxide (CO₂) emissions generated from the use of fossil fuels, such as oil, coal, and natural gas, with the aim of mitigating the impacts of global climate change (Sulistiyanti & Falikhatun, 2023). By assigning a cost to carbon emissions, this tax is designed to internalize environmental externalities, thereby encouraging polluters to reduce emission levels and shift toward more environmentally friendly technologies (Meila et al., 2024). In addition to serving as a source of government revenue, a carbon tax also functions as a strategic instrument to influence behavioral change at both the corporate and individual levels (Xie & Jamaani, 2022).

Over the past few decades, academic research on carbon tax has experienced significant growth. The discussion is no longer confined to the perspective of environmental economics but has expanded to encompass public policy, finance, and corporate governance. This development reflects the increasing recognition of carbon tax as an instrument that not only regulates economic activity but also shapes the

direction of more sustainable development. Beyond serving merely as a fiscal tool to increase government revenue (Meila et al., 2024), carbon tax is now regarded as a strategic instrument capable of driving behavioral change among economic agents (Furqon & Halizah, 2024). Through the mechanism of pricing carbon emissions, this policy provides incentives for firms to invest in environmentally friendly technologies, improve energy efficiency, and foster green innovation. At the same time, green innovation is closely linked to efforts to achieve the Sustainable Development Goals (SDGs) (Trukhachev & Dzhikiya, 2023). This policy not only plays a role in reducing greenhouse gas emissions but also supports the transformation of economic systems toward a low-carbon, resource-efficient, and long-term-oriented model.

As the number of scientific publications in this field continues to grow, there is a need to systematically organize and map the existing literature. In this context, a bibliometric approach is employed to identify, classify, and document relevant scientific sources within a particular field of study (Hesford et al., 2007). Through this approach, a comprehensive overview of research developments, topic trends, and publication distribution can be obtained. This study compiles a bibliometric analysis of carbon tax, green innovation, and sustainable development using the Scopus database as the primary source. The selection of Scopus is based on its extensive coverage of reputable international journals, allowing for a more comprehensive global perspective compared to studies that focus on a single country or region. By adopting this approach, the resulting bibliometric analysis is expected to reflect the dynamics of research at the international level, including contributions from both developed and developing countries.

This study is designed to address the following research questions: (1) What are the recent research trends related to carbon tax, green innovation, and sustainable development? (2) Which publications and articles are the most influential in this field? (3) Which countries and authors contribute most frequently to this area of study? (4) What variables are most commonly examined in research on these topics?

Through the development of this bibliometric analysis, the study aims to provide a structured reference for various stakeholders. For researchers, this study offers an initial mapping of the literature and helps identify existing research gaps. For academics, the findings can serve as a foundation for curriculum development, teaching materials, and the strengthening of scholarly work in related fields. Meanwhile, for policymakers, this bibliometric analysis provides an evidence-based overview of the development of issues surrounding carbon tax, green innovation, and sustainable development, thereby supporting the formulation of more effective and data-driven policies.

2. Research Methods

This study is a bibliometric analysis aimed at identifying, classifying, and mapping the development of literature related to carbon tax, green innovation, and sustainable development. The bibliometric approach is employed to provide a comprehensive overview of research trends, topic distribution, and the interrelationships among concepts within the scientific literature in this field (Hesford et al., 2007). This study adopts the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol as a guideline for conducting the research stages, including identification, screening, eligibility assessment, and inclusion (Hansen et al., 2022).

This study does not impose a restriction on the publication period in order to broaden the scope of analysis and capture the dynamics of research development comprehensively. It enables the examination of topic evolution, research intensity, and shifting research focus over time in the areas of carbon tax, green innovation, and sustainable development. The primary data source used in this study is the Scopus database. The selection of Scopus is based on several considerations. First, Scopus is one of the largest scientific databases, covering reputable international journals across various disciplines. Second, it provides comprehensive and standardized metadata, including information on authors, affiliations, keywords, abstracts, and citations, thereby supporting accurate bibliometric analysis. Third, its global coverage allows this study to represent the development of literature at the international level, encompassing both developed and developing countries.

Data collection was conducted using keywords relevant to the research topic. The search query applied was: TITLE-ABS-KEY ("carbon tax") AND TITLE-ABS-KEY ("green innovation") OR TITLE-ABS-KEY ("sustainable development"). These keywords were used to identify articles addressing the relationship between carbon tax and either green innovation or sustainable development. The search was performed within the title, abstract, and keywords to ensure the relevance of the retrieved data. The collected data were then subjected to a selection process based on topic relevance. Articles that did not align with the research focus were excluded, ensuring that only those directly addressing carbon

tax, green innovation, and sustainable development were included for further analysis. Subsequently, the metadata of the selected articles were exported in a suitable format for analysis.

Data analysis was conducted using VOSviewer software, which was utilized to map and visualize bibliometric networks, particularly through keyword co-occurrence analysis. This analysis enables the identification of major topic clusters, relationships among concepts, and dominant themes within the literature. The resulting visualizations also facilitate a more systematic understanding of the research structure, including emerging topics and potential directions for future research. Through this approach, the study presents a comprehensive mapping of the literature on carbon tax, green innovation, and sustainable development in a global context. The findings are expected to serve as a valuable reference for academics and policymakers in understanding research developments and supporting evidence-based decision-making.

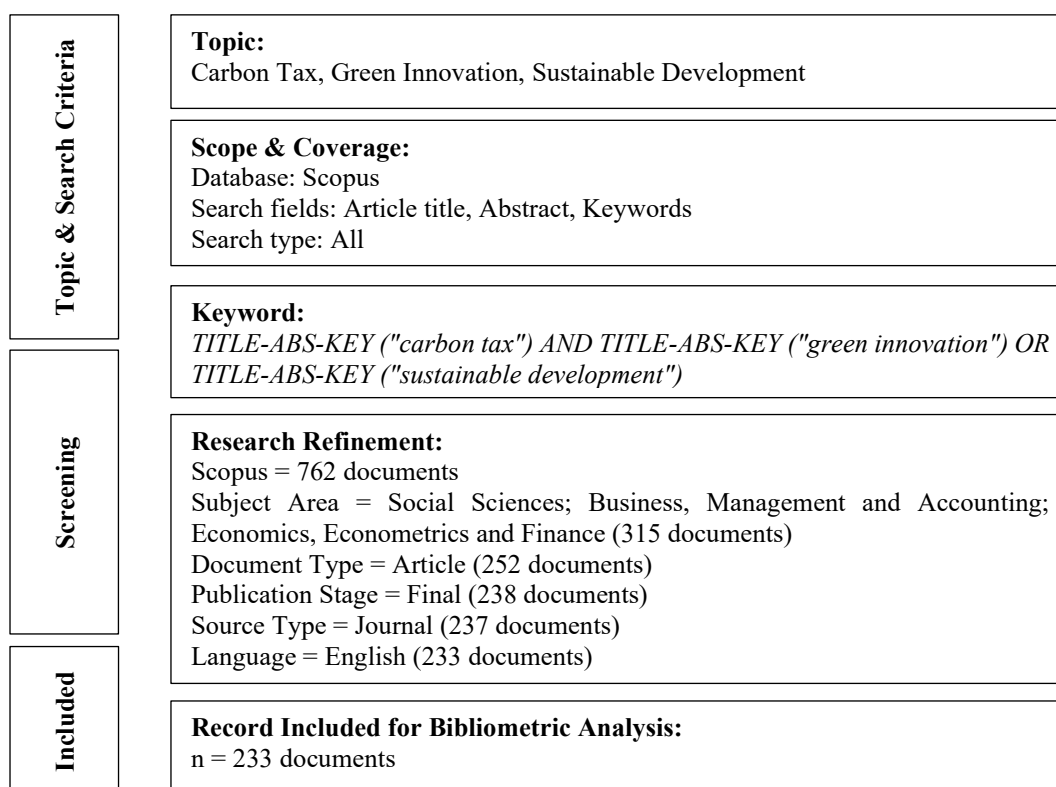


Figure 1. PRISMA
Protocol Source: Data Processed (2026)

The figure presents a PRISMA-style flow diagram illustrating the article selection process for the bibliometric analysis on carbon tax, green innovation, and sustainable development. In the identification stage, the study defined the scope and search strategy. Data were collected from the Scopus database, focusing on article titles, abstracts, and keywords without any restriction on the publication period. The search query combined the terms “carbon tax,” “green innovation,” and “sustainable development,” resulting in an initial dataset of 762 documents. During the screening and refinement stages, the dataset was filtered based on several criteria to ensure relevance and quality. The selection was first limited to specific subject areas, namely Social Sciences; Business, Management and Accounting; and Economics, Econometrics, and Finance, reducing the dataset to 315 documents. Further filtering was conducted based on document type (articles), resulting in 252 documents; publication stage (final), yielding 238 documents; source type (journals), yielding 237 documents; and language (English), resulting in 233 documents. At the inclusion stage, a total of 233 documents met all the criteria and were included in the bibliometric analysis. Overall, the figure demonstrates a systematic and rigorous selection process, ensuring that only relevant, high-quality, and internationally accessible articles were analyzed. This approach enhances the reliability and validity of the bibliometric mapping results in this study.

3. Results and Discussion

Trends in Research Publications

The development of scientific publications on carbon tax shows a consistently increasing trend from 1997 to 2026. This reflects the growing attention of academics and researchers to climate change issues and the policy instruments that can be used to address them. Based on Figure 2, there is a noticeable surge in the number of publications after 2023, where the number of articles reached 22 and then increased significantly to 50 articles in 2024. This increase is closely associated with the rising global focus on achieving the Sustainable Development Goals (SDGs), particularly those related to climate action. The momentum of SDG reporting and evaluation has encouraged a greater volume of research focusing on environmental policies (Bahuguna & Tayal, 2026), including carbon tax as a key instrument for emission control. In addition, the growing commitment of countries to reduce carbon emissions has further strengthened the relevance of this topic in academic studies. Given this continuously increasing trend, research on carbon tax is expected to offer substantial opportunities for future studies.

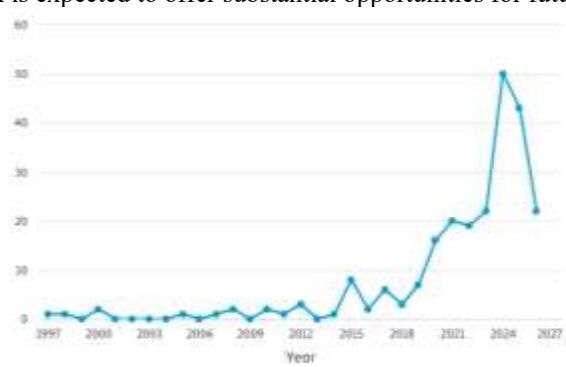


Figure 2. Trends in research publications

Global Distribution of Publications

Figure 3 illustrates that the largest contributions to carbon tax research publications come from several key countries, namely China and India representing Asia, the United States from North America, and the United Kingdom from Europe. The dominance of these countries indicates that attention to carbon tax issues is not concentrated in a single region but is distributed across various regions with different levels of economic development. The increase in the number of publications is also driven by the existence of various regulations and policies that require climate-related reporting. Over the past three decades, carbon tax research publications have tended to be dominated by countries with strong research capacities, particularly developed countries and several major developing economies. China is recorded as the largest contributor with a total of 88 publications, followed by India with 22 publications. The United States contributed 21 publications, while the United Kingdom accounted for 18 publications. China's dominance in publication output can be associated with its high emission levels as well as its strong commitment to developing carbon control policies, which in turn encourages a higher intensity of research in this area.

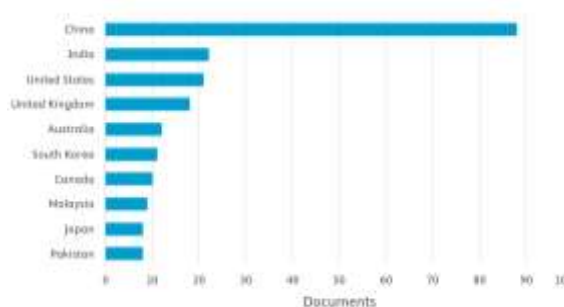


Figure 3. Global distribution of publications

Journal Analysis

Table 1 presents the ten leading journals that serve as primary outlets for publications related to carbon tax research. Over the period 1997–2026, the *Journal of Cleaner Production* ranks first with a total of 44 publications. It is followed by *Sustainability (Switzerland)* with 26 articles, and *Resources Policy* with 13 articles. In fourth place is the *International Journal of Production Economics* with 10

publications, while *Energy Economics* ranks next with 9 articles. Overall, the top ten journals with the highest number of publications are predominantly internationally reputable journals classified within the Q1 and Q2 categories. This indicates that carbon tax is a highly attractive research topic and is well-recognized at the global academic level. Furthermore, this condition highlights substantial opportunities for future researchers to publish studies related to carbon tax in these high-impact journals.

Table 1. Leading journals on carbon tax literature

No	Journal	Total Publication	Quartile
1	Journal of Cleaner Production	44	Q1
2	Sustainability Switzerland	26	Q1
3	Resources Policy	13	Q1
4	International Journal of Production Economics	10	Q1
5	Energy Economics	9	Q1
6	Environment Development and Sustainability	6	Q1
7	Process Integration and Optimization for Sustainability	6	Q2
8	Sustainable Development	5	Q1
9	Sustainable Cities and Society	4	Q1
10	International Journal of Production Research	3	Q1

Co-Occurrence Network Analysis

Co-occurrence network analysis is employed to identify the most frequently appearing keywords in research articles. Table 2 presents the ten most dominant keywords in carbon tax studies. Among these, “sustainable development” and “carbon” rank highest, with 164 and 78 occurrences, respectively, and total link strengths of 2,043 and 1,178. Overall, the distribution of these keywords indicates that academic research is concentrated on several key aspects. First, the sustainability economics dimension, reflected in keywords such as sustainable development and carbon. Second, the taxation policy dimension, which includes terms such as pollution tax and carbon tax. Third, the environmental dimension related to emissions, represented by keywords such as carbon, carbon emissions, and carbon dioxide. These findings suggest that carbon tax research is not solely focused on fiscal instruments but is also integrated with sustainability issues and emission control, reflecting a multidimensional approach in academic studies.

Table 2. Top 10 most frequently used keywords

No	Keyword	Total link strength	Occurrences
1	Sustainable development	2043	164
2	Carbon	1178	78
3	Taxation	911	57
4	Pollution tax	900	73
5	Carbon taxes	849	59
6	Emission control	784	54
7	Sustainability	744	54
8	Carbon tax	705	72
9	Carbon emission	672	45
10	Cost	645	46

Figure 4 presents a co-occurrence network visualization generated using VOSviewer, consisting of nodes (points) and edges (lines). The size of each node reflects the frequency of a keyword’s occurrence, while the connecting lines represent the relationships and strength of association among research topics. The visualization reveals that several keywords, such as “profitability,” “environmental economics,” and “economic growth,” appear relatively infrequently, indicating their potential as promising areas for future research development.

Meanwhile, the time-based visualization in Figure 5 shows that brighter colors represent more recent keywords. Keywords that began to emerge around 2022 include “green economy,” “environmental tax,” and “emission reduction.” The emergence of these terms reflects a shift in research focus toward more contemporary issues, while also opening up opportunities for further exploration in the fields of carbon tax and sustainability.

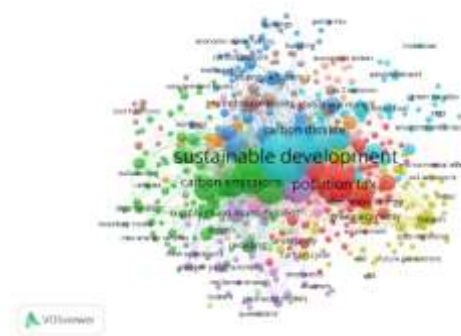


Figure 4. Keyword Occurrence Visualization

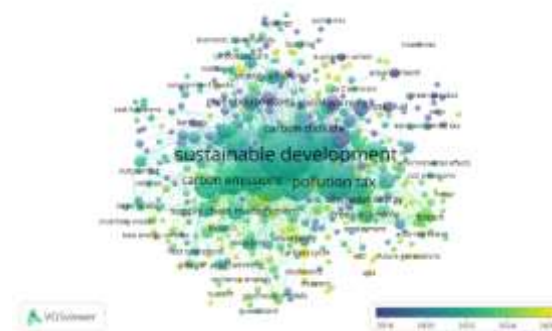


Figure 5. Visualization based on the time horizon

Co-Authorship Network Analysis

Table 3 presents the ten most productive authors in the field of carbon tax research. Adrian Cantemir Calin, Adnan Khurshid, and Sadia Qayyum occupy the top three positions, with 3, 3, and 2 publications, respectively. In terms of total link strength, these authors also demonstrate the highest values, each scoring 6, which indicates a strong level of collaboration with other researchers.

Table 3. Top 10 Most Productive Authors

No	Author	Total link strength	Citations
1	Calin, adrian cantermir	6	144
2	Khurshid, adnan	6	203
3	Qayyum, sadia	6	144
4	Rauf, abdur	6	144
5	As'ad, rami	4	212
6	Babagolzadeh, mahla	4	153
7	Handa, nidhi	4	29
8	Hariga, moncer	4	212
9	Shamayleh, abdulrahim	4	153
10	Shrestha, anup	4	29

Furthermore, Figure 6 illustrates the authorship network, which depicts the clustering of authors based on similarities in research focus or specific thematic areas. This visualization helps in understanding collaboration patterns as well as the concentration of expertise within the field of carbon tax research.

Meanwhile, Figure 7 illustrates the temporal distribution of research publications, where nodes with brighter colors represent more recent publications. This visualization provides insight into the evolution of research over time, highlighting how certain topics have emerged or gained prominence in recent years. It also enables the identification of current research trends and shifting academic interests, particularly in areas related to carbon tax, green innovation, and sustainable development. Furthermore, the temporal mapping helps researchers recognize emerging themes that are gaining attention, thereby offering direction for future studies and potential research opportunities in this field.

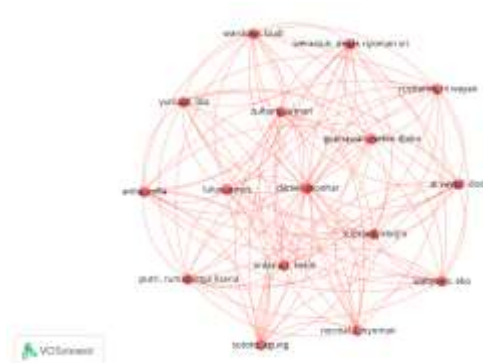


Figure 6. Co-Authorship Network

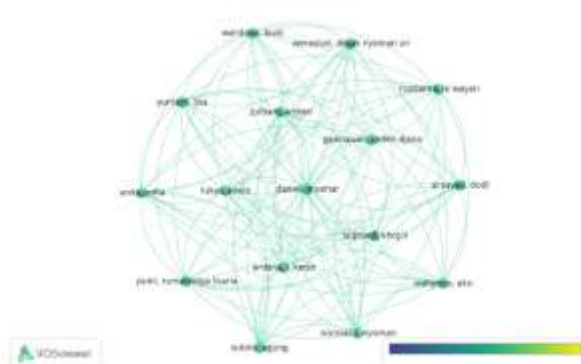


Figure 7. Time Horizon of Research Publications

4. Conclusion

This study demonstrates that carbon tax has become an increasingly important policy instrument in addressing climate change while promoting the transition toward sustainable development. Beyond functioning as a fiscal tool, carbon tax also plays a strategic role in influencing economic behavior, encouraging green innovation, and supporting the achievement of the Sustainable Development Goals (SDGs). As the urgency of global environmental issues intensifies, academic research on carbon tax has expanded significantly and extended across multiple disciplines.

Based on a bibliometric analysis of 233 articles sourced from the Scopus database, the findings reveal a consistent upward trend in publications related to carbon tax, green innovation, and sustainable development, particularly after 2023. This trend reflects the growing global concern over climate change and emission control policies. In terms of geographical distribution, research contributions are dominated by countries with strong research capacities, such as China, India, the United States, and the United Kingdom, indicating that this issue has attracted attention across regions.

The results also show that a large proportion of publications appear in high-impact journals (Q1 and Q2), highlighting the relevance and quality of research in this field. Furthermore, keyword analysis indicates that the primary research focus lies in sustainability economics, taxation policy, and carbon emission control, demonstrating that carbon tax research is multidisciplinary and closely integrated with global environmental issues.

The co-occurrence and co-authorship network visualizations reveal strong interconnections among research topics as well as relatively intensive collaboration among scholars. However, several topics remain underexplored, such as profitability, environmental economics, and economic growth, which present opportunities for future research. Additionally, the emergence of new keywords such as green economy, environmental tax, and emission reduction indicates a shift in research focus toward more contemporary issues.

These findings carry several important implications. From an academic perspective, this literature mapping can serve as a foundation for identifying research gaps and developing more focused studies, particularly in underexplored areas. For academics, the results can be utilized in curriculum development and the preparation of teaching materials related to sustainability and environmental policy. Meanwhile, for policymakers, this study provides an evidence-based overview of global developments in carbon tax,

supporting the formulation of more effective policies, particularly in promoting green innovation and facilitating the transition toward a low-carbon economy.

This study also has several limitations. First, the use of a single database, namely Scopus, may limit the scope of the literature, as not all scientific publications are indexed in this database. Second, the study only includes English-language journal articles, potentially overlooking contributions from other sources such as conference proceedings, books, or publications in other languages. Third, the bibliometric approach primarily focuses on quantitative analysis of metadata and does not deeply examine the substantive content or quality of individual studies. Therefore, future research is recommended to combine bibliometric methods with qualitative analysis to achieve a more comprehensive understanding.

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