Jurnal Akuntansi dan Bisnis
Vol 25, No. 2, Agustus 2025: 240—255
https://jab.fe.uns.ac.id/

TRACING THE EVOLUTION OF CARBON TAX RESEARCH: A BIBLIOMETRIC ANALYSIS OF GLOBAL PUBLICATION TRENDS

Siti Maghfiroh (siti.maghfiroh@unsoed.ac.id)
Aprilia Nastiti Rahayu

Accounting Departement, Faculty of Economics and Business, Universitas Jenderal Soedirman, Indonesia

A B S T R A C T

Greenhouse gas (GHG) emissions have increased in all sectors since 2010. A carbon tax is one of the policies that tackle carbon emissions. Research on the carbon tax is growing along with climate change mitigation commitments. This study aims to identify the historical development of carbon tax literature and map future research directions using bibliometric methods. This research tries to answer questions related to the trends and historical development of carbon tax literature from 2010-2024. This research uses the Scopus and NVivo databases as additional tools to justify the articles used. This research applied the PRISMA protocol and bibliometric analysis approach. The Scopus database was explored to analyze trends, co-occurrence, co-authorship, co-citation, citation analysis of 2,406 articles, with publication years 2010-2024. The keyword "carbon tax" was the most frequently occurring keyword, with a total of 193 occurrences. In terms of collaboration, Edenhofer, Ottmar is the highest collaborating author. The United States had the highest international collaboration with a total of 211 documents and 30 relationships. Publications by Stern, (2008), Acemoglu et al., (2012), and Golosov et al., (2014) were frequently cited together. Articles by Aghion et al. (2016) and Energy Economics were the most cited documents and journals in carbon tax research. Overall carbon tax research has increased. Future research could explore the phenomenon of disparity between countries that have implemented carbon tax policies and countries that are widely researched in this topic, as well as sub-topics that remain under-researched.

Keywords : *bibliometric; tax; carbon*

Emisi Gas Rumah Kaca (GRK) telah meningkat di semua sektor sejak tahun 2010. Pajak karbon menjadi salah satu kebijakan untuk menanggulangi emisi karbon. Penelitian tentang pajak karbon berkembang seiring dengan komitmen mitigasi perubahan iklim. Penelitian ini bertujuan untuk mengidentifikasi perkembangan historis literatur pajak karbon dan memetakan arah penelitian di masa mendatang menggunakan metode bibliometrik. Penelitian ini mencoba menjawab pertanyaan terkait tren dan perkembangan historis literatur pajak karbon dari 2010-2024. Penelitian ini menggunakan basis data scopus dan NVivo sebagai alat tambahan untuk menjustifikasi artikel yang akan digunakan. Penelitian ini menerapkan protokol PRISMA dan pendekatan analisis bibliometrik. Basis data scopus dieskplorasi untuk menganalisis trend, co-occurrence, co-authorship, co-citation, citation analysis dari 2.406 artikel, dengan tahun terbit 2010-2024. Kata kunci "pajak karbon" menjadi kata kunci yang paling sering muncul, dengan total kemunculan 193 kali. Dalam hal kolaborasi, Edenhofer, Ottmar menjadi penulis dengan tingkat kolaborasi tertinggi. Amerika Serikat memiliki kolaborasi internasional tertinggi dengan total 211 dokumen dan 30 hubungan. Publikasi oleh Stern, (2008), Acemoglu *et al.*, (2012), dan Golosov *et al.*, (2014) sering dikutip bersamaan. Artikel oleh Aghion et al., (2016) dan Journal of Energy Economics menjadi dokumen dan jurnal yang paling banyak dikutip dalam penelitian pajak karbon. Penelitian pajak karbon secara keseluruhan mengalami peningkatan. Penelitian di masa mendatang dapat mengeksplorasi fenomena kesenjangan antara negara yang sudah menerapkan kebijakan pajak karbon dan negara yang banyak diteliti dalam topik ini, serta sub-topik yang masih jarang diteliti.
Kata kunci: bibliometrik, pajak, karbon

Received:
12 May 2025
Revised:
8 June 2025
8 Oktober 2025
17 November 2025
Accepted:
24 November 2025

INTRODUCTION

Global surface temperatures in 2011-2020 have increased by 1.1ºC compared to 1850-1900. Warming, caused by Greenhouse Gases (GHGs), is dominated by CO2 (reaching 410 ppm) and CH4 (reaching

1,866 ppb). GHG emissions have increased across all sectors since 2010. In 2019, the energy sector accounted for 34% of net global GHG emissions, the industrial sector 24%, and the transportation sector 15% (Calvin et al., 2023). Based on this situation, governments worldwide consider carbon emissions a serious problem that must be addressed immediately.

Governments in various countries are trying to tackle carbon emissions through various policies. An example of a policy that is being developed and implemented is a carbon tax. According to World Bank data, by 2023, 30 countries around the world will have implemented a carbon tax (World Bank Group, 2024). Finland was the first country to introduce a carbon tax, with an initial rate of US$1.41/ton CO2e (Nachmany et al., 2015). Finland's carbon tax is included in the energy tax component and strengthens the European Union Emissions Trading System (EU-ETS) implementation. Currently, Finland's carbon tax rate is the 5th highest in Europe, at US$99.99/ton CO2e. Meanwhile, in the Asian region, carbon taxes have only been implemented in Japan and Singapore, with rates of US$1.91/tCO2e and US$18.48/tCOe respectively (World Bank Group, 2024).

The carbon tax in Indonesia is imposed on the purchase of goods that contain or activities that produce a certain amount of carbon emissions in a certain period (Law No. 7 of 2021: Harmonization of Tax Regulations, 2021). Based on the carbon tax roadmap, Indonesia is currently in the limited implementation stage of the carbon tax on the coal-fired power plant sector with an average price of IDR 30,000/ tCO2e. Furthermore, in 2025 carbon trading will be fully implemented through the Carbon Exchange and the expansion of sectors to be taxed according to the readiness of the relevant sectors (Sri Suryani, 2022).

Research by Khastar et al., (2020) through GTAP-E (Global Trade Analysis Project) database data modeling explained that at a tax rate of US$150/ton CO2 in Finland, it succeeded in reducing carbon emissions by 30% compared to the no-tax scenario. The effectiveness of carbon tax is strongly influenced by several factors, one of which is tax exemptions for energy-intensive industries. Research by Lin & Li, (2011), revealed that carbon taxes in Denmark, Sweden, the Netherlands, and Norway did not significantly reduce carbon emissions because there are many tax exemptions for energy-intensive industries.

This research uses the period 2010-2024 with the Scopus database as a data source. Previous research used the period 1989-2014, so this study updates the period used, namely 2010-2024 (Zhang et al., 2016). Previous research still uses other databases, such as Web of Science and has not used the Scopus database as a data source, so this study updates previous research in terms of using the Scopus database (Ozyurek, 2024a). Previous research has not used tools to justify the articles used, so this study uses NVivo as an additional tool to justify the articles to be used (Sulistiyanti & Falikhatun, 2023).

This study differs from previous research because it comprehensively maps the development, dynamics, and evolution of carbon tax research themes through a bibliometric approach based on global data from Scopus or Web of Science. While previous studies have focused more on economic impact analysis, policy evaluation, or empirical studies based on economic models, this study instead explores publication patterns, citation networks, collaborations between researchers, and keyword changes over time. Thus, this study offers a novelty in providing an intellectual map and global trends in carbon tax, a practice rarely explored in previous literature. It also provides directions for future research based on a quantitative analysis of the theme's evolution. Furthermore, this study differs in greater detail from previous research because it not only examines the policy substance or economic impact of carbon tax, as many previous studies have done, but also specifically maps the development of the global literature through a bibliometric analysis that includes publication performance, citation patterns, collaboration networks between

countries and authors, keyword co-occurrence maps, and the evolution of the research theme from the early to the current period. Unlike previous studies that generally focus on empirical models (such as CGE/DSGE), evaluations of specific country policies, or narrative reviews without an intellectual map, this study uses international data from reputable index databases to reveal how the carbon tax scientific landscape is structured, how key topics are evolving or declining, and how research clusters are interconnected. With this approach, this study offers a novel, holistic understanding of the scientific trajectory of carbon tax and provides a stronger basis for mapping future research opportunities that have not been widely explored in the previous literature.

This research aims to provide an overview of the historical development of carbon tax literature and map future research directions using bibliometric methods. This research attempts to answer the following questions related to carbon tax. i) What was the historical development of carbon tax literature from 2010-2024? ii) What are the trends in terms of keywords, number of citations, most prolific authors and countries, co-citations in carbon tax research, and future carbon tax research opportunities? iii) Future research directions related to carbon tax. This research is intended to contribute to the carbon tax literature by presenting a comprehensive mapping of carbon tax studies from 2010-2024.

LITERATURE REVIEW

The implementation of carbon tax is the government's effort to tackle carbon emissions. This is in line with public policy theory and stakeholder theory. Public policy is the government's choice to do or not do something, in this case, carbon emission reduction efforts (Dye, 1987). However, the government's interests often conflict with other stakeholders, namely companies. Stakeholder theory explains the relationship between companies and their stakeholders. One of them is the influence that may be opposite, in this case the government that has an interest in reducing carbon emissions and companies that do not want to pay carbon taxes for their operational activities that produce carbon emissions (Freeman, 1984).

Research on carbon tax is growing along with climate change mitigation commitments of all countries in the world. This development is motivated by international agreements related to climate change mitigation, such as the Paris Agreement in 2015 which aims to keep global temperature rise below 2ºC and limit it to 1.5ºC above pre-industrial levels (The Paris Agreement, 2016). In addition, the Glasgow Climate Pact of 2021 also aims to reduce carbon emissions by 45% by 2030 and reach net zero by 2050 with a low-emission energy transition and encourage developed countries to provide financial support to developing countries in climate mitigation efforts (Glasgow Climate Pact, 2021)

RESEARCH METHODS

This research uses a qualitative method with a bibliometric analysis approach. According to Hérubel, (2012), bibliometrics involves by analyzing certain phenomena through various publications. This study uses the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol to ensure an objective and detailed review process (Page et al., 2021), including identification, screening, eligibility, and inclusion of relevant research (Paschou et al., 2020).

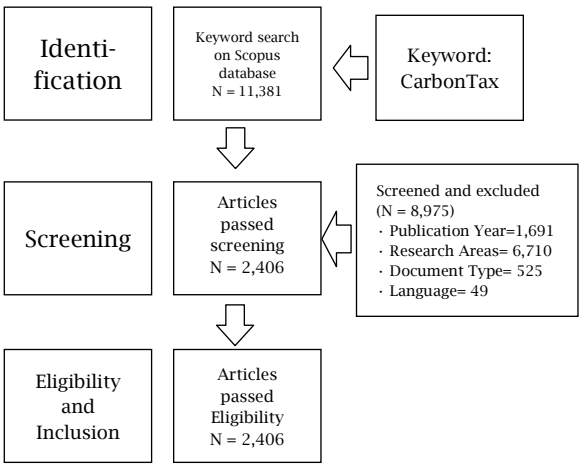


Figure 1.
Protocol PRISMA

The identification process includes searching using the keyword carbon tax (Sulistiyanti, 2023). Data collection begins in January - April 2025. The search was conducted through the Scopus database, considering that Scopus has strict indexing criteria and provides comprehensive bibliometric data for the publications it indexes. Furthermore, the screening process considers the year of publication, document type, language, and research area. The publication year of the article is in the range 2010-2024. The language used is English to facilitate the research process involving large datasets such as bibliometrics (Kumar et al., 2021). This analysis only involves document types in the form of journal publications, so documents such as seminar proceedings, book chapters, reports, and news items are excluded (Paschou et al., 2020). The selected research areas include economics, econometrics, finance, business, management, and accounting.

The identification process resulted in 11,381 documents. Furthermore, the final data of 2,406 documents were filtered by considering the criteria of publication year (the research used only research from 2010 - 2024), research area (only research related to carbon tax), document type, and language used (only research written in English). Finally, the 2,406 eligible documents will go through the inclusion stage using VOS Viewer and NVivo tools. The inclusion stage includes validation, statistical analysis of publications, and bibliometric analysis.

In this study, articles were selected based on certain criteria, namely publications that focus on the topic of carbon tax, published in internationally reputable journals indexed by Scopus or Web of Science, have relevant keywords such as "carbon tax", "carbon pricing", or "emission taxation", and are included in the category of scientific articles, conference papers, or reviews that provide complete bibliometric data; furthermore, bibliometric analysis techniques used include co-occurrence analysis to identify conceptual relationships between keywords, co-authorship analysis to map patterns of scientific collaboration, and co-citation analysis to reveal intellectual structures by looking at articles or authors that are frequently cited together, thus forming the intellectual base of a research field. The selection of the 2010–2024 period is based on the consideration that the issue of carbon tax began to experience a significant increase after various global policies related to climate change such as the Paris Agreement (2015) encouraged countries to adopt carbon pricing mechanisms, so that this time span represents the most relevant and dynamic development phase in the carbon tax literature and allows for a more accurate and up-to-date mapping of the topic's evolution.

In addition to the 4 PRISMA protocols, bibliometric analysis also involves citation analysis, co-citation analysis, co-authorship analysis, and co-occurrence analysis. Citation analysis maps the relationship, impact, and popularity of an article. Open-access journals are relatively more cited than closed-access. Co -citation analysis shows two articles that are cited together in one document. Co-authorship analysis shows the collaboration between researchers in a study. Authors who collaborate in conducting a study are called co-authors. Co-occurrence analysis explains the relationship between keywords and their frequency of occurrence in a particular article (Ozyurek, 2024).

ANALYSIS AND DISCUSSION

Trends in Research Publications

The overall trend of carbon tax research shows a significant increase, although it has fluctuated in some years (Figure 2). This trend can be divided into three periods: 2010-2014, 2015-2019, and 2020-2024. At the beginning of the period (2010-2013), the number of publications on carbon tax topics was still low, but continued to grow slowly. However, starting in 2014, the publication trend increased more steadily and grew more rapidly after 2018. A significant increase occurred in 2020-2023, with the number of publi-cations in 2020 of 57 jumping

sharply to 138 in 2023, before declining slightly in 2024 to 137. If this trend continues, future carbon tax research opportunities will continue to increase, in line with the climate mit-igation goals ratified through the Paris Agreement in 2015 (The Paris Agreement, 2016). Overall, the trend in carbon tax research shows a consistent increase, despite some years of fluctuation (Figure 2).

Co-occurrence

Co-occurrence analysis serves to identify and map conceptual relationships between terms or keywords that appear simultaneously in a collection of publications, thereby comprehensively revealing the main themes, sub-themes, topical linkage patterns, and the intellectual structure of a research field; this technique helps display thematic clusters, detect emerging topics, and identify underexplored research gaps. This approach is widely used in modern bibliometric studies and is supported by leading methodological literature such as Callon et al. (1991) who laid the foundation for co-word analysis, Van Eck & Waltman (2010) who reinforced its implementation through the VOSviewer software, Zupic & Čater (2015) who explained its role in science mapping, and Aria & Cuccurullo (2017) who outlined its implementation through the R package bibliometrix. The results of co-occurrence analysis using NVivo show that the articles used in this study consistently discuss the topic of carbon tax. This is evidenced by the word cloud visualization, which shows the word "carbon tax" appears as the keyword with the largest visualization, accompanied by re-lated words, such as "emissions", "government", "reduction", and "co2" (Figure 3). The dominance of these keywords indicates that the previous research used focused on carbon tax, making it valid for fur-ther analysis in this bibliometric analysis.

Co-occurrence analysis was conducted on author keywords with the full-counting method and set the minimum criteria for the occurrence of a keyword is 5. The criteria were met by 102 keywords divided into 10 clusters, with a total of 633 links and a total link strength of 986 (figure 4). Table 1 presents data on the 10 most frequently occurring keywords in carbon tax research.

The keywords "carbon tax", "climate change", and "climate policy" are the top 3 most frequently oc-curring keywords in carbon tax publications, with a total of 193, 95, and 80 occurrences respectively. These three keywords were popularly used in articles published in 2019. This finding

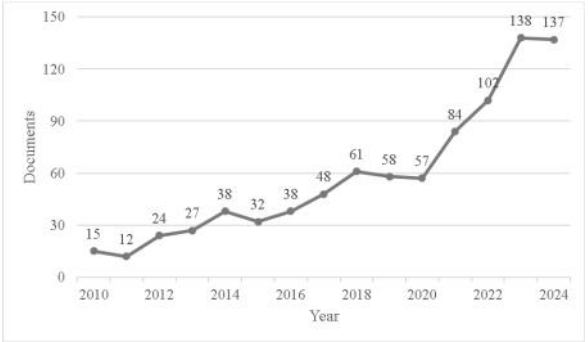


Figure 2.
The Publication Trends of Carbon Tax Documents



Figure 3.
Word Cloud Analysis of Carbon Tax Research Using NVivo

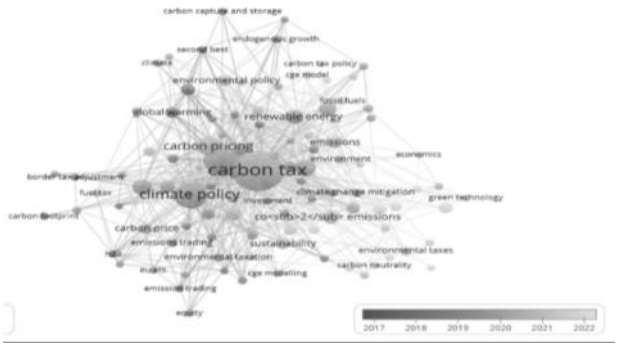


Figure 4.
Co-occurrence of Author Keyword

indicates that car-bon tax research is closely related to global climate change commitments and environmental policy in general. The dominance of the keywords "climate change" and "climate policy" along with "carbon tax" confirms that carbon tax policy is an integral part of climate change mitigation strategies, not just as a fiscal policy. Based on this trend, it can be projected that the focus of future research will likely be on the integration of carbon tax policy with broader emission reduction targets, in line with the carbon emission reduction targets ratified through the Paris Agreement.

However, in terms of keywords related to the most researched countries in this topic, there is a con-tradiction with the data on carbon tax implementation in various countries (World Bank Group, 2024). Table 2 presents data on 5 countries that have implemented carbon taxes, but are still under-researched. Sweden, a country that has implemented a carbon tax since 1991, only appears in ten carbon tax-related publications. This finding indicates that there is still a gap in the academic literature, with most studies focusing on countries that have recently implemented carbon tax policies. Future research could explore this phenomenon, i.e. the reasons for the low level of research in the pioneer countries that implemented carbon taxes, while examining the effectiveness, policy evolution, and long-term impacts of carbon tax implementation in these countries. Thus, future research should not only focus on expanding the geo-graphical scope of carbon tax studies, but also deepen the understanding of the successes and challenges of carbon tax implementation over a period of time (Gong et al., 2024).

Co-authorship – author

Analysis of co-authorship of authors using the full counting method involves authors who have at least 3 publications to understand collaboration between authors. Co-authorship analysis serves to map collaboration patterns between authors, institutions, and countries within a research field by analyzing co-authored publications. This analysis can reveal the structure of scientific networks, the level of researcher productivity, centers of collaboration, and the dynamics of academic relationships that influence the development of a discipline. This analysis helps identify key actors (key authors), collaborative groups, and potential new research partnerships based on

Table 1.
Co-occurrence Analysis of Author Keyword

No.	Keyword	Occurrences	Average Publication Year	Total link strength
1.	Carbon Tax	193	2019	249
2.	Climate Change	95	2019	156
3.	Climate Policy	80	2019	113
4.	Carbon Pricing	44	2020	67
5.	Carbon Taxes	33	2019	53
6.	Carbon Leakage	28	2018	49
7.	Renewable Energy	23	2019	43
8.	Carbon Emissions	22	2019	22
9.	Co2 Emissions	21	2020	28
10.	Social Cost of Carbon	19	2018	28

Table 2.
Total Occurrence – Countries

No.	Countries	Implementing Status	Total Occurrence
1.	Swedia	*Implemented in* 1991	10
2.	Switzerland	*Implemented in* 2008	8
3.	Jepang	*Implemented in* 2012	6
4.	British Columbia	*Implemented in* 2008	4
5.	Denmark	*Implemented in* 1992	3

connections within the publication network. Literature widely used as a methodological basis includes Van Eck & Waltman (2010), who provide a visualization framework through VOSviewer; Zupic & Čater (2015), who explain the function of co-authorship in science mapping; and Donthu et al. (2021) and Aria & Cuccurullo (2017), who outline the technical procedures and interpretation of co-authorship in modern bibliometric analysis. This criterion was only met by 78 authors, with 17 of them being connected (co-authoring publications) and grouped into 5 clusters (figure 5). The size of the circle represents the total link strength (strength of collaborative authorship relation-ships between authors). Lines indicate the collaboration relationship between two authors. The color of the circle represents the publication period.

Based on total link strength, Edenhofer, Ottmar is the author with the highest level of authorship collaboration. This is indicated by the circle size, which is larger than other authors. This means that Edenhofer, Ottmar colaborate strongly with other authors. Based on the collaboration relationship, Edenhofer, Ottmar has a high collaboration relationship with Kalkuhl, Matthias. The thicker connecting line indicates this than the other lines. In terms of publication period, Edenhofer, Ottmar is in the publi-cation year 2017, while Franks, Max is in the publication year 2022.

This finding indicates that carbon tax research is still centered on a few key figures, such as Edenho-fer. The high collaboration strength of Edenhofer and his colleagues indicates that the development of carbon tax research depends not only on individual productivity, but also on the strength of global col-laboration that supports the development of ideas and knowledge. Future research could explore cross-author and cross-country collaboration to enrich the perspective of carbon tax studies at the global level (Kusumawati et al., 2025).

Co-authorship – countries

Analysis of co-authorship of countries with full counting method involves countries with at least 5 publication documents to understand collaboration between countries. The criteria are met by 44 countries and are interconnected (figure 6). There are 7 clusters, 299 links, and 862 total link strength from 44 countries that meet the criteria. The size of the circle represents the research productivity of a country based on the number of published documents. The line represents the strength of the collaborative relationship between countries.

Based on the total link strength, the United States is the country with the highest level of collaboration. This is evidenced by its largest circle size and extensive relationships (many connected with other countries through lines). The United States has published 211 documents with a total of 30 links to other countries (most often collaborating with Germany, China, and the UK). Regarding citations, the UK is the second most cited country, but the strength of collaboration is ranked 4th. This finding indicates that there is still a dominance of developed countries in the global collaboration

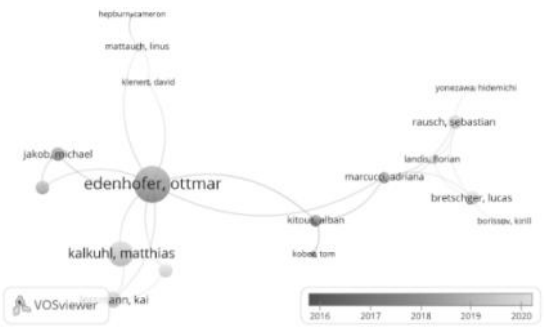


Figure 5.
Co-authorship of Author

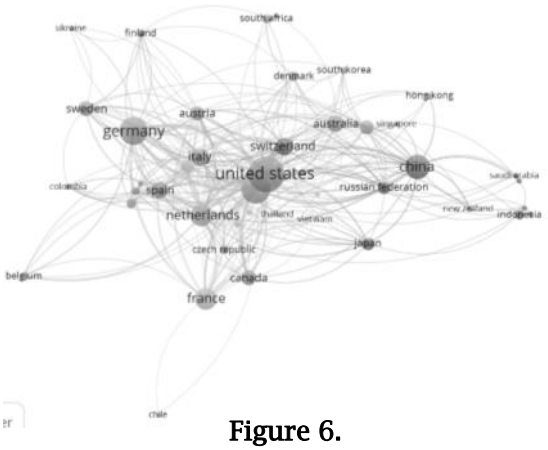


Figure 6.
Co-authorship of Countries

network. To gain a comprehensive understanding of carbon tax policy, there is a need for broad collaboration involving many developing countries. Developing countries often face challenges in policy implementation, such as institutional capacity and supporting infrastructure. Therefore, inclusive inter-national collaboration allows for a mix of knowledge, technology and resources, and ensures that carbon tax implementation is tailored to each country's local conditions (Kusumawati et al., 2025). Research topics and research patterns studied by researchers from the United States, Germany, China, and the United Kingdom based on global research trends on carbon tax, climate policy, and environmental economics (Kusumawati et al., 2025). Based on their research focus, they can be described in Table 3.

Co-citation

Co-citation is the frequency of two publications being cited simultaneously in a single document (Small, 1973). Co-citation identifies the relationship between cited publications and/or critical research issues in a field (Passas, 2024). The strength of co-citation is indicated by how often publications are cited together in new research. When two publications are cited more than once in another publication, it indicates that the topics, theories, approaches, and empirical disciplines used are similar (Nobanee & Ullah, 2023).

Figure 7.
Co-citations of cited references

Co-citation analysis of cited references was conducted on documents with at least 10 citations, resulting in 9 interlinked cited references (figure 7). Based on the thickness of the line, which represents how often publications are cited together, publications by Stern, (2008), Acemoglu et al., (2012), and Golosov et al., (2014) are three publications that are often cited together and connected. The publication by Stern, (2008) acts as a central study as it discusses the economic framework of climate change extensively. Then, and Golosov et al., (2014) and Acemoglu et al., (2012) extend the previous study on optimal carbon tax modeling using general equilibrium and technological innovation to support green economy transition.

Citation Analysis

Citation analysis analyzes the relationship between publications through specific citations to determine important works and patterns in a particular field (Passas, 2024). This analysis includes article citation graphs, frequency analysis, and trends. Scientific publications are interconnected through citations. Open access publications tend to have more citation rates than closed access publications (Nobanee & Ullah, 2023

Figure 8 shows the most cited documents in carbon tax research, with a minimum of 5 citations. Articles by Aghion et al. (2016), Acemoglu et al. (2016), and Campiglio (2016) are the top three most cited documents, with a publication year of 2016 and a total of 596, 474, and 424 citations, respectively. The high number of citations for these three documents

Table 3.
Most research topics

Country	Main Focus of Research	Distinctive Character
United States of America	Economic impact, policy politics, model simulation	Macroeconomics and policy
German	Renewable energy, EU ETS, industrial technology	European Union policy integration
China	Macroeconomic impact, health, regional differences	Developing countries & economic models
English	Real policy evaluation (CPF), impact distribution	Evidence-based policy

demonstrates their significant scientific impact. Aghion et al.'s (2016) publication successfully extended the theory of directed technical change to explain how carbon tax policies can direct technological innovation toward more environmentally friendly sectors, thus providing an important theoretical framework for research on green innovation and the dynamics of the energy transition. Acemoglu et al.'s (2016) article offers a comprehensive model of the transition mechanisms from polluting to clean technologies through a combination of fiscal and regulatory policies. Meanwhile, Campiglio's (2016) work is widely used because it connects the issue of carbon taxes with the global financial system, presenting a new perspective that the effectiveness of climate policy is also determined by the behavior of financial institutions, the allocation of green finance, and climate risk in capital markets. The impact of these three studies is extensive, ranging from establishing a theoretical foundation for subsequent empirical studies to influencing the design of energy transition policies, low-carbon innovation, and the development of green finance frameworks at the international level. Furthermore, these three publications were published during a crucial period, namely the early implementation of the Paris Agreement, so many studies in the field of climate policy use these articles as their primary theoretical foundation..

Furthermore, when viewed from the most recent publication years, 2020-2024, the research articles by Ohlendorf et al. (2021), Dogan et al. (2022), and Köppl & Schratzenstaller (2023) are the three most cited documents with the most recent publication year. The total citations for each of these documents are 84, 65, and 59, respectively. Although the number of citations is not as high as the classic article from 2016, this research has received widespread attention because it addresses more contemporary research areas, such as the fairness of the distribution of the carbon tax burden, the interaction of carbon pricing policies with modern ETS mechanisms, and the impact of current climate policy implementation. Furthermore, the phenomenon of citation time lag explains why newer articles have not yet achieved as high a citation rate as older articles, given that the process of citation accumulation takes several years. Nevertheless, the relatively high citations in the most recent period indicate that the development of the carbon tax discourse is beginning to move towards new, more applicable and contextual issues.

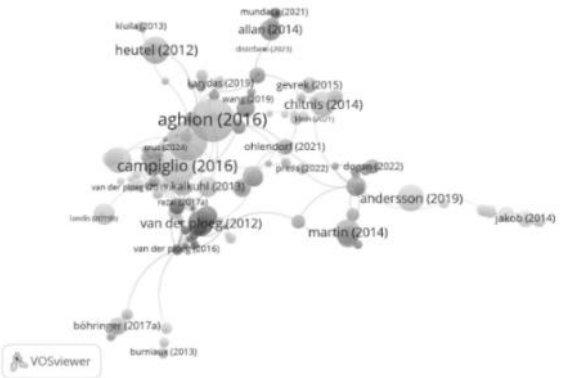


Figure 8.
Citation Analysis of Documents

While these articles serve as key references on the topic of carbon taxation, future research should explore new perspectives and approaches to carbon tax studies to address the increasingly complex and rapidly evolving challenges of climate policy. Changes in global economic structure, the emergence of new green technologies, the dynamics of carbon markets, and the increasingly significant role of the financial sector demand more adaptive, interdisciplinary, and contextual analytical frameworks. Empirical approaches based on big data, analyses of consumer and industry behavior, and policy models that consider socio-political dimensions are also needed to complement the conventional economic perspective that has dominated so far. Furthermore, open-access publications tend to have higher citation rates, demonstrating the importance of accessibility to carbon tax publications (Nobanee & Ullah, 2023). Open -access publications tend to have higher citation rates because they are more readily accessible to researchers, policymakers, practitioners, and the global public without cost barriers. Wider accessibility allows

new ideas, methods, and findings to spread more rapidly, fostering cross-border collaboration and enriching the range of approaches used in carbon tax research. Thus, the exploration of new perspectives supported by open access publication not only enhances the quality and relevance of research, but also strengthens its impact on developing more effective and inclusive climate policies.

Table 4 shows the list of the top 5 most cited journals on the topic of carbon tax. The Journal Energy Economics is ranked as the most published and cited journal on carbon tax, with 90 documents and 2,570 citations. Ecological economics followed second, with 40 documents and 2215 citations. Journal of envi-ronmental economics and management, journal of cleaner production, and international journal of pro-duction economics published 49, 48, and 8 papers, respectively, and were cited 1905, 1768, and 953 times, respectively. The more often a journal is cited, the more significant its impact on research trends and en-courages research on carbon tax topics (Nobanee & Ullah, 2023).

Citation analysis of sources shows that Energy Economics, Ecological Economics, and Journal of En-vironmental Economics and Management are the main centers for publishing and referencing carbon tax research. This indicates that these journals play a strategic role in shaping the direction and academic legitimacy of carbon tax studies. However, the dominance of a few journals also poses a risk of limited scientific concentration perspectives. Therefore, it is necessary to diversify publications in various jour-nals across disciplines, including from developing countries (Kusumawati et al., 2025).

Based on the stages in bibliometric research which include determining the criteria for selecting articles, collecting and cleaning data from reputable databases, and applying performance analysis, co-occurrence, co-authorship, and co-citation, the study "Tracing the Evolution of Carbon Tax Research: A Bibliometric Analysis of Global Publication Trends" concluded that research on carbon tax has grown significantly both in terms of the number of publications, the diversity of themes, and global collaboration networks. Bibliometric analysis shows a dominance of the topics of carbon tax, "climate change," and "climate policy." This finding indicates that carbon tax research is closely related to global climate change commitments and environmental policy in general. The dominance of the keywords "climate change" and "climate policy" along with "carbon tax" confirms that carbon tax policy is an integral part of climate change mitigation strategies, not just as a fiscal policy. Furthermore, mapping collaborative networks and intellectual structures through co-authorship and co-citation reveals research groups and countries that are centers of scientific contribution, such as Sweden and Switzerland, while also highlighting emerging topics and areas with research gaps. Overall, this series of bibliometric steps provides a comprehensive understanding of the evolution, direction, and dynamics of carbon tax-related science, and offers a solid foundation for developing a future research agenda.

Future Research Opportunities

Future research opportunities lie in exploring keywords that are rarely used in carbon tax research. Some keywords that are still rarely used and have opportunities to be researched in future carbon tax research are presented in Table 5.

Table 4.
Citations Analysis of Sources

Journal	Documents	Citations
energy economics	90	2570
ecological economics	40	2215
journal of environmental economics and management	49	1905
journal of cleaner production	48	1768
international journal of production economics	8	953

Based on these keywords, the following are possible future research directions related to carbon tax:

Computable General Equilibrium Model (CGE)

CGE models consider the application of carbon tax in terms of energy, economy, and environment and can describe the interaction between micro and macro variables (Zhang et al., 2016). Future research can explore the application of CGE models to determine the dynamic effects of carbon taxes at the regional and global levels. Several studies have used CGE models to analyze the impact of carbon tax implementa-tion in developed and developing countries (Lin & Jia, 2018; Nguyen, 2023).

Distributional Impacts

Distributional impacts in the carbon tax topic relate to the burden and benefits of carbon taxes felt at different levels of society. Future research could explore this sub-topic on carbon tax revenue recycling mechanisms that affect different income groups. Research by Fried et al., (2018) shows that carbon taxes are more burdensome for low-income groups without a tax revenue recycling mechanism. A lump-sum rebate mechanism can reduce social inequality as all income groups receive the same amount of compen-sation for the taxes they pay.

Tax Incidence

Tax incidence in the carbon tax space relates to the effect of carbon taxes on the price of goods and services, as well as the distribution of the tax burden among economic actors. Opportunities to explore this sub-topic lie in the carbon tax burden on consumers and the redistribution of carbon tax revenues. Research by ten Raa & Stahlie, (2024) revealed that the impact of carbon taxes is proportional to the price of products with their respective carbon footprint levels. In addition, carbon tax is regressive to low-income groups. Therefore, there is a need for compensation strategies to reduce the regressivity of carbon tax, especially for low-income groups.

Emissions Trading

Emissions-Trading System (ETS) is one of the carbon emission reduction schemes where the govern-ment sets an upper limit on the amount of emissions allowed and issues tradable emission permits (Dechezleprêtre et al., 2023). Future research on this sub-topic could integrate ETS with carbon tax and compare their effectiveness in reducing carbon emissions. Research by Ahmad et al., (2024) revealed that carbon tax is more effective in Asia (except Japan) than in the US and Europe, while ETS is more effective in the US than in China or Europe.

Carbon Capture and Storage (CCS)

CCS is a technology that can simultaneously reduce carbon emissions and utilize sustainable fossil fuels. The technology allows CO2 to be “captured” from stationary sources, including power plant flue gas, to prevent the release of CO2 into the atmosphere. Once captured,

Table 5.
Further Carbon Tax Research Opportunities

No.	Keyword	Occurrences	Average Publication Year	Total link strength
1.	Computable General Equilibrium Model	9	2017	15
2.	Distributional Impacts	9	2018	26
3.	Tax Incidence	8	2019	15
4.	Emissions Trading	8	2017	14
5.	Carbon Capture and Storage	7	2017	7
6.	Carbon Footprint	7	2017	2
7.	Border Tax Adjustment	6	2016	9
8.	Carbon Sequestration	6	2017	5
9.	Unilateral Climate Policy	5	2018	5
10.	Double Dividend	5	2014	13

the CO2 would be compressed and stored in deep seas, deep aquifers, and oil reservoirs (Das & Kumar, 2016). Future research could explore the topic of CCS in terms of its integration with carbon tax systems. For example, research by Wang & Zhang, (2018) revealed that the imposition of a carbon tax would have a positive impact on CCS investment.

Carbon Footprint

Carbon footprint refers to the amount of gas emissions associated with human production or con-sumption activities and climate change (Wiedmann & Minx, 2008). Future research can explore the sub-topic of carbon footprint related to the development of more accurate methods and standards for measur-ing carbon footprints in various sectors. Research by Yang et al., (2024) developed a computational-based numerical simulation (CFD) technique in measuring carbon footprint. However, the implementation of CFD requires high computational power and produces a significant carbon footprint. Therefore, it is nec-essary to conduct further research related to carbon footprint measurement methods.

Border Tax Adjustment (BTA)

BTA is a mechanism that aims to promote carbon pricing in BTA countries and close the carbon price gap between local and imported goods in the EU (Lan & Tao, 2024). Future research could explore the effectiveness of BTA in reducing emissions and its economic implications (Haitao & Jota, 2021). For ex-ample, in Zhang et al., (2024) study, it showed that implementing BTAs lowered GDP in various regions, reduced household welfare (in the EU), and undermined sectoral competitiveness in 8 regions, including the United States, China, and Asia.

Carbon Sequestration

The mechanism by which carbon sequestration works is by capturing and storing carbon in the soil. A carbon tax can support this mechanism in terms of providing incentives for farmers to adopt sustainable soil management techniques. Research by Nazir et al., (2024) revealed that sustainable agricultural meth-ods such as marginal land conversion, crop rotation, and biochar use can increase soil carbon stocks (SOC). SOC restoration can also reduce atmospheric CO2 by up to 10% per year if widely implemented.

Unilateral Climate Policy

Unilateral climate policies implemented in a country or region aim to reduce greenhouse gas emis-sions (Lépissier & Mildenberger, 2021). Opportunities for future research in exploring this sub-topic are related to the implications of climate policies on the domestic economy, global emissions, and potential carbon leakage. Research by Mehling et al., (2019) on one climate policy, Border Carbon Adjustments (BCAs), revealed that BCAs can balance the carbon price between domestic and imported products by imposing additional taxes on imported goods based on their carbon footprint.

Double Dividend

The double dividend hypothesis states that environmental tax (ETR) reforms that raise environmental taxes while lowering other taxes and maintaining government revenues, have two benefits: improving the economy and reducing adverse environmental impacts. Future research could explore this sub-topic in terms of how the double dividend works in developing countries. For example, the double dividend in developing countries can be achieved through direct subsidy schemes or reduced labor taxes (Freire-González, 2018).

CONCLUSION

This study aims to identify trends in carbon tax research by identifying the most influential authors, countries and references in this field. It also analyzes patterns of co-authorship, co-occurrence, and co-citation networks to chart the future direction of carbon tax research. This research uses bibliometric analysis method using PRISMA protocol, Vos Viewer, and NVivo. Based on the bibliometric analysis, several key findings

related to carbon tax research trends were identified.

Research on carbon tax has fluctuated in some years, but overall still shows an increase. A significant increase began in 2021, with 84 publications and continued to increase until 138 publications in 2023. This shows the increasing interest of academics to research this topic. The Journal of Energy Economics is in the first tier of journals that publish the most carbon tax articles, as well as the most cited on this topic, with 90 submissions and 2,570 citations. The most frequently occurring keywords in carbon tax publica-tions include “carbon tax”, “climate change” and “climate policy”, with 193, 95 and 80 occurrences respec-tively. These keywords appeared mostly in carbon tax research in 2019

The most cited publications in carbon tax research are those of Aghion, Acemoglu and Campiglio, with 596, 474 and 424 citations respectively. The high number of citations indicates that the publications have significant implications for the topic. When viewed from the co-citation analysis, publications by Stern, Acemoglu et al, and Golosov et al are three publications that are often cited together and connected to each other. Stern's publication is the central point between Acemoglu's work on incentives for green economy transition and Golosov's work on optimal carbon tax models. There are still many keywords that are rarely used in carbon tax research, including “border tax adjustment”, “cge model”, “carbon cap-ture and storage”, and so on. This opens up opportunities for future carbon tax research to examine these under-researched sub-topics.

LIMITATIONS AND SUGGESTIONS.

While this study provides a comprehensive overview of carbon tax research trends, it has several limita-tions. First, the use of the Scopus database may exclude relevant research from other databases, such as Web of Sciences. Therefore, future research may combine the Scopus and Web of Science databases to obtain relevant and comprehensive research data. Secondly, while the bibliometric approach offers quan-titative insights, it does not fully address the qualitative nature of research, such as case studies or policy implications. Future research could combine bibliometric analysis with systematic literature review (SLR method) or meta-analysis. In addition, future research could explore the interaction between carbon tax policy and emerging issues such as border tax adjustment, carbon capture and storage, and other under-explored sub-topics.

REFERENCES

Acemoglu, D., Aghion, P., Bursztyn, L., & Hemous, D. (2012). The environment and directed technical change. In American Economic Review (Vol. 102, Issue 1, pp. 131–166). https://doi.org/10.1257/aer.102.1.131

Acemoglu, D., Akcigit, U., Hanley, D., & Kerr, W. (2016). Transition to clean technology. Journal of Political Economy, 124(1), 52–104. https://doi.org/10.1086/684511

Aghion, P., Dechezleprêtre, A., Hémous, D., Martin, R., & van Reenen, J. (2016). Carbon taxes, path dependency, and directed technical change: Evidence from the auto industry. Journal of Political Economy, 124(1), 1–51. https://doi.org/10.1086/684581

Ahmad, M., Li, X. F., & Wu, Q. (2024). Carbon taxes and emission trading systems: Which one is more effective in reducing carbon emissions?—A meta-analysis. In Journal of Cleaner Production (Vol. 476). Elsevier Ltd. https://doi.org/10.1016/j.jclepro.2024.143761

Calvin, K., Dasgupta, D., Krinner, …….. R. Stavins. Eds.. https://doi.org/10.59327/IPCC/AR6-9789291691647

Campiglio, E. (2016). Beyond carbon pricing: The role of banking and monetary policy in financing the transition to a low-carbon economy. Ecological Economics, 121, 220–230. https://doi.org/10.1016/j.ecolecon.2015.03.020

Das, S., & Kumar, J. (2016). Carbon Capture and Storage. International Journal of Scientific & Engineering Research, 7 (10). http://www.ijser.org

Dechezleprêtre, A., Nachtigall, D., & Venmans, F. (2023). The joint impact of the European Union emissions trading system on carbon emissions and

economic performance. Journal of Environmental Economics and Management, 118. https://doi.org/10.1016/j.jeem.2022.102758

Dogan, E., Hodžić, S., & Šikić, T. F. (2022). A way forward in reducing carbon emissions in environmentally friendly countries: the role of green growth and environmental taxes. Economic Research-Ekonomska Istrazivanja, 35 (1), 5879–5894. https://doi.org/10.1080/1331677X.2022.2039261

Dye, Thomas. R. (1987). Understanding Public Policy. Pearson Education, Inc.

Freeman, R. E. (1984). Strategic management: A stakeholder approach (I). Pitman Publishing Inc.

Freire-González, J. (2018). Environmental taxation and the double dividend hypothesis in CGE modelling literature: A critical review. Journal of Policy Modeling, 40(1), 194–223. https://doi.org/10.1016/j.jpolmod.2017.11.002

Fried, S., Novan, K., & Peterman, W. B. (2018). The distributional effects of a carbon tax on current and future generations. Review of Economic Dynamics, 30, 30–46. https://doi.org/10.1016/j.red.2018.02.001

Glasgow Climate Pact. (2021). https://www.ipcc.ch/report/ar6/wg1/.

Golosov, M., Hassler, J., Krusell, P., & Tsyvinski, A. (2014). Optimal Taxes on Fossil Fuel in General Equilibrium. Econometrica, 82(1), 41–88. https://doi.org/10.3982/ecta10217

Gong, Y., Li, Y., Liu, J., & Sun, Y. (2024). Overcoming public resistance to carbon taxes: A cost-efficient solution built on a pre-existing reward-based climate policy. Journal of Environmental Management, 352. https://doi.org/10.1016/j.jenvman.2024.120025

Haitao, C., & Jota, I. (2021). Carbon Tax and Border Tax Adjustments with Technology and Location Choices. RIETI Discussion Paper Series .

Hérubel, J.-P. V. M. (2012). Historical Bibliometrics: Its Purpose and Significance to the History of Disciplines. Libraries & Culture, 34, 380–388.

Khastar, M., Aslani, A., & Nejati, M. (2020). How does carbon tax affect social welfare and emission reduction in Finland? Energy Reports, 6, 736–744. https://doi.org/10.1016/j.egyr.2020.03.001

Köppl, A., & Schratzenstaller, M. (2023). Carbon taxation: A review of the empirical literature. Journal of Economic Surveys, 37(4), 1353–1388. https://doi.org/10.1111/joes.12531

Kumar, S., Pandey, N., Lim, W. M., Chatterjee, A. N., & Pandey, N. (2021). What do we know about transfer pricing? Insights from bibliometric analysis. Journal of Business Research, 134, 275–287. https://doi.org/10.1016/j.jbusres.2021.05.041

Kusumawati, A., Suhanda, Darmawati, Natsir, A. I. P., & Juanda, I. S. K. (2025). Bibliometric Analysis of Research Trends and Networks in Carbon Tax Studies: Insights into Environmental and Economic Policy Implications. Environmental Economics, 16(1), 43–58. https://doi.org/10.21511/ee.16(1).2025.04

Lan, T., & Tao, R. (2024). Research on the Inhibitory Effect of the EU's Carbon Border Adjustment Mechanism on Carbon Leakage. Sustainability (Switzerland), 16(17). https://doi.org/10.3390/su16177429

Law No. 7 of 2021: Harmonization of Tax Regulations, Pub. L. No. Law No. 7 of 2021: Harmonization of Tax Regulations (2021).

Lépissier, A., & Mildenberger, M. (2021). Unilateral climate policies can substantially reduce national carbon pollution. Climatic Change, 166(3–4). https://doi.org/10.1007/s10584-021-03111-2

Lin, B., & Jia, Z. (2018). The energy, environmental and economic impacts of carbon tax rate and taxation industry: A CGE based study in China. Energy, 159, 558–568. https://doi.org/10.1016/j.energy.2018.06.167

Lin, B., & Li, X. (2011). The effect of carbon tax on per capita CO2 emissions. Energy Policy, 39(9), 5137–5146. https://doi.org/10.1016/j.enpol.2011.05.050

Mehling, M. A., Van Asselt, H., Das, K., Droege, S., & Verkuijl, C. (2019). Designing Border Carbon Adjustments for Enhanced Climate Action. American Journal of International Law, 113(3), 433–481. https://doi.org/10.1017/ajil.2019.22

Nachmany, M., Fankhauser, S., Davidová, J., Kingsmill, N., Landesman, T., Roppongi, H., Schleifer, P., Setzer, J., Sharman, A., Singleton, C. S., Sundaresan, J., & Townshend, T. (2015). The 2015 Global Climate Legislation Study A Review of

Climate Change Legislation in 99 Countries. Climate Change Legislation in Finland An Excerpt from The 2015 Global Climate Legislation Study A Review of Climate Change Legislation in 99 Countries.

Nazir, M. J., Li, G., Nazir, M. M., Zulfiqar, F., Siddique, K. H. M., Iqbal, B., & Du, D. (2024). Harnessing soil carbon sequestration to address climate change challenges in agriculture. In Soil and Tillage Research (Vol. 237). Elsevier B.V. https://doi.org/10.1016/j.still.2023.105959

Nguyen, P. T. (2023). Simulating the environmental and economic effects of a carbon tax in Vietnam: a static computable general equilibrium analysis. Management of Environmental Quality: An International Journal, 34(6), 1647–1667. https://doi.org/10.1108/MEQ-01-2023-0001

Nobanee, H., & Ullah, S. (2023). Mapping green tax: A bibliometric analysis and visualization of relevant research. In Sustainable Futures (Vol. 6). Elsevier Ltd. https://doi.org/10.1016/j.sftr.2023.100129

Ohlendorf, N., Jakob, M., Minx, J. C., Schröder, C., & Steckel, J. C. (2021). Distributional Impacts of Carbon Pricing: A Meta-Analysis. Environmental and Resource Economics, 78(1), 1–42. https://doi.org/10.1007/s10640-020-00521-1

Ozyurek, H. (2024). The Trends in Carbon Emissions, Climate Change, Carbon Footprint, Carbon Tax, Green Technology Diffusion from 2015 to 2024: A Bibliometric and Visual Analysis. The Eurasia Proceedings of Science, Technology, Engineering & Mathematics (EPSTEM), 27. www.isres.org

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., … Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. Systematic Reviews, 10(1). https://doi.org/10.1186/s13643-021-01626-4

Paschou, T., Rapaccini, M., Adrodegari, F., & Saccani, N. (2020). Digital servitization in manufacturing: A systematic literature review and research agenda. Industrial Marketing Management, 89, 278–292. https://doi.org/10.1016/j.indmarman.2020.02.012

Passas, I. (2024). Bibliometric Analysis: The Main Steps. Encyclopedia, 4(2), 1014–1025. https://doi.org/10.3390/encyclopedia4020065

Small, H. (1973). Co-citation in the scientific literature: A new measure of the relationship between two documents. Journal of the American Society for Information Science, 24(4), 265–269. https://doi.org/10.1002/asi.4630240406

Sri Suryani, A. (2022). Persiapan Implementasi Pajak Karbon di Indonesia.

Stern, N. (2008). The Economics of Climate Change. American Economic Review: Papers & Proceedings, 98(2), 37. http://www.aeaweb.org/articles.php?doi=0.257/aer.98.2.

Sulistiyanti, U. (2023). Carbon tax: A bibliometric analysis for future research in Indonesia. Jurnal Akuntansi Dan Auditing Indonesia, 27(2), 2023. https://doi.org/10.20885/jaai

Sulistiyanti, U., & Falikhatun. (2023). Carbon tax: A bibliometric analysis for future research in Indonesia. Jurnal Akuntansi Dan Auditing Indonesia, 27 (2), 2023. https://doi.org/10.20885/jaai

ten Raa, T., & Stahlie, R. (2024). Footprint analysis and the incidence of emission taxes. Ecological Economics, 224. https://doi.org/10.1016/j.ecolecon.2024.108214

The Paris Agreement. (2016). https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-7-

Wang, X., & Zhang, H. (2018). Optimal design of carbon tax to stimulate CCS investment in China's coal-fired power plants: A real options analysis. Greenhouse Gases: Science and Technology, 8(5), 863–875. https://doi.org/10.1002/ghg.1814

Wiedmann, T., & Minx, J. C. (2008). A Definition of Carbon Footprint. https://www.novapublishers.com/catalog/product_info.php?products_id=5999.

World Bank Group. (2024). State and Trends of Carbon Pricing Dashboard. https://carbonpricingdashboard.worldbank.org/compliance/factsheets?instrument=Tax_FI

Yang, X. I. A., Zhang, W., Abkar, M., & Anderson, W. (2024). Computational

Fluid Dynamics: its Carbon Footprint and Role in Carbon Emission Reduction. http://arxiv.org/abs/2402.05985

Zhang, K., Wang, Q., Liang, Q. M., & Chen, H. (2016). A bibliometric analysis of research on carbon tax from 1989 to 2014. Renewable and Sustainable Energy Reviews, 58, 297–310. https://doi.org/10.1016/j.rser.2015.12.089

Zhang, K., Yao, Y.-F., Qian, X.-Y., Zhang, Y.-F., Liang, Q.-M., & Wei, Y.-M. (2024). Could the EU carbon border adjustment mechanism promote climate mitigation? An economy-wide analysis. Advances in Climate Change Research, 15(3), 557–571. https://doi.org/10.1016/j.accre.2024.05.002