A BIBLIOMETRIC STUDY ON RECENT TRENDS IN CARBON EMISSIONS AND DYNAMICS OF CARBON TRADING

*Shaifali Bareja, Research Scholar, Amity University, Haryana

Contact-(shaifalibareja17@gmail.com), 7065183465, Membership No. ANU-589

**Prof. (Dr.) Vidhi Bhargava, Professor, Amity College of Commerce, Director, Amity Directorate of Online Education, Amity University, Haryana

Contact-(vbhargava@ggn.amity.edu), 9650705353, Membership No. JD-33

Abstract

Purpose- The purpose of the study is to provide a comprehensive analysis on carbon trading, carbon emission reductions and carbon policy and to identify current developments, potential research areas and future directions. The focus is on the identification of annual growth of publications, country-wise distribution, publication pattern and intellectual structure of scientific production in this field.

Methodology-The authors have used Bibliometric approach to show the magnitude of research conducted in the area of carbon trading. The study emphasized on identification of the research hotspots based on the occurrence of indexed keywords, productive authors and journals for the period 2000-2023(Aggarwal & Karwasra, 2023).

Findings-China leads in the number of researches related to carbon trading and also dominates the list of top ten educational institutions contributing to researches in this domain. Zhang Y and Wang Y are the authors producing maximum articles with h-index of 17 and 11 respectively. Journal of Cleaner Production is on the first position in terms of publications as well as in terms of h index with very good number of citations followed by International Journal of Production Economics. Emission control, carbon, carbon emissions, carbon emission reductions are the most frequently used terms by the researchers in their articles.

Originality/Value- The study presents an updated review of research on carbon emissions, trading and related issues, emphasizing significant contributions and recent advances that have added new perspectives to the academic conversation about this crucial environmental and economic issue.

Limitations of the study-The data for the study has been retrieved from Scopus Database. Only Software R has been used for data analysis.

Keywords: Carbon Trading, Carbon Emission Reduction, Carbon Policy, Bibliometric Analysis, Biblioshiny R

Abbreviations used: Green House Gas (GHG), Carbon di-oxide (CO_2), Intergovernmental Panel on Climate Change (IPCC)

Introduction

Global warming stands as a critical environmental challenge, posing numerous threats to our planet. It is responsible for continuous rise in the earth temperature which results in severe environmental conditions like melting of glaciers, rising of sea level, extinction of species, numerous numbers of viruses, diseases, and so on. As per Intergovernmental Panel on Climate Change (IPCC), "emissions resulting from human activities are substantially increasing the atmospheric concentrations of greenhouse gases (GHGs), which will enhance the greenhouse effect, resulting on average in an additional warming of the earth's surface"(Solomon *et al.*, 2007). Recognizing the urgent need to address this issue, some strategies should be developed to mitigate GHG emissions. The mitigation efforts aim to reduce the adverse impacts of climate change stemming from the overarching problem of global warming (H. Pathak, 2009). There is a rising awareness among various stakeholders regarding the imperative to conserve and safeguard the environment. Consequently, there is a growing consensus about the responsibility of each individual to assess its contribution towards environmental degradation and to actively pursue efforts towards environmental protection and welfare(Dileep Kumar S D, 2022).

Since 1990 there has been a continuous rise in the amount of global net anthropogenic GHG emissions and the major contributor to this emission is Carbon di oxide from fossil fuel and industry(Shukla *et al.*, 2022). So, the major focus of the nations is to reduce the level of carbon emissions and bring economic viability in this field. In order to control carbon emission from various sources there has to be its measurement in quantifiable units first as to which sector is responsible for how much emissions. With the growing emphasis on carbon emission reduction technology as an important solution to combat climate change, numerous researchers are directing their attention to various aspects aimed at achieving emission reduction goals. Governments are turning to carbon pricing as a strategy to mitigate pollution from fossil fuels and promote investments in cleaner technology. According to the World Bank there are 104 direct carbon pricing instruments around the world operating as of March 2024 comprising 38

carbon tax regimes, 37 emissions trading systems (ETS) and 29 government crediting mechanisms("State and Trends of Carbon Pricing Dashboard", 2024). The discussion and debate among the various carbon pricing policies is continuously rising(Elkins and Baker, 2001; Ermolieva *et al.*, 2010; He *et al.*, 2012). Different countries have different requirements on the allowance cap, allocation method, the amount and source of carbon offsets, banking and borrowing allowances and market reserve mechanism (Ji *et al.*, 2019). Various studies showed that carbon price is often asymmetric(Feng *et al.*, 2011; Tang *et al.*, 2017; Zhu *et al.*, 2015).

In 1992, the United Nations Framework Convention on Climate Change (UNFCCC) produced an international treaty focused on stabilizing GHG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system(Du *et al.*, 2015). Following the adoption of the Kyoto Protocol in February 2005, the landscape for emission reduction underwent a transformative shift with the introduction of structured Clean Development Mechanism (CDM) projects. This initiative not only redefined approaches to emission reduction but also presented a lucrative avenue for generating revenue. According to this, if a developed country fails to reduce GHG emissions at a desired level, they have to pay the penalty and the developed nations which have exceeded the levels have to cut the emission rate or borrow carbon credits from developing countries(Bhanawat & Vardia, 2015). This process of controlling carbon emission through trading of carbon credits is known as Carbon trading. Carbon credits are certificates given to those countries which are successful in reducing the emissions, serving the dual purpose of environment protection as well as the source of revenue(Gorain *et al.*, 2021). India is one of the major players in the global market on the supply side of CERs after China and likely to be the biggest seller of carbon credits and Europe is going to be the biggest buyer of carbon credits (Kansal & Modi, 2012). Further many other frameworks like Paris Agreement, Energy Conservation (Amendment) Act 2022 etc. are also working in this regard. The present study has been divided in the following parts i.e. Introduction of the topic (covers Objectives and Research Questions), the Research Methodology for defining the research layout, Data Analysis and results, Future scope of the study and Conclusion.

Objective of the study

The main objective is to provide a comprehensive analysis on carbon trading, carbon emission reduction and carbon policy and to identify current developments, potential research area and future directions. The focus is on identifying the annual growth of publications, the distribution

across countries, publication patterns within this field to strengthen the research in the area and help policy-makers develop strong policies and methods to mitigate climate change.

Research Questions

This study will address the following research questions:

RQ1. What is the current publication trend in Carbon trading, carbon policy and carbon emission reduction?

RQ2. How the publications related to carbon trading are distributed globally and which countries top the list in terms of citations?

RQ3. Which are the relevant journals in this area?

RQ4. Who are the most influential authors in this field?

RQ5. Which are the most cited articles in this area?

RQ6. What is the intellectual structure of current research on carbon trading?

Data and Methodology

Data retrieved

The information utilized in this study was sourced from the Scopus database. As on November 23, 2023, a set of 968 articles was gathered, containing terms such as "carbon trading" or "carbon credits" or "CERs" or "certified emission reduction certificates" or "renewable energy certificates" or "carbon policy," or "carbon emission reduction."

Methodology: bibliometric analysis

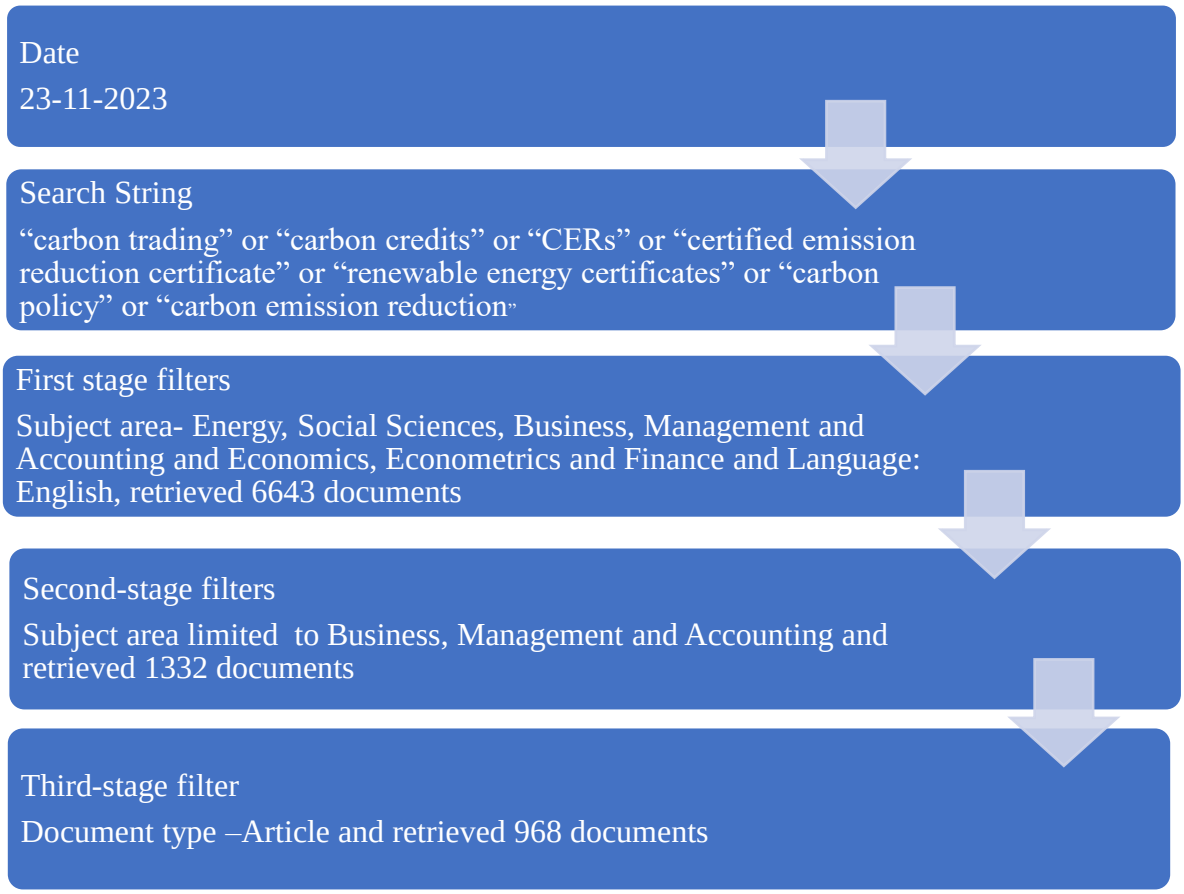
The study used the bibliometric mapping to show the structural features of scientific production(Cobo et al., 2011).Bibliometric analysis stands out as a pivotal research domain within the realm of social sciences, employing quantitative methods to scrutinize various patterns in academic literature, encompassing journals, books, conference proceedings, and articles. The primary objective is to gain insights into "global trends and the knowledge structure of a research domain (Amirbagheri et al., 2019; Baier-Fuentes et al., 2019; Bonilla et al., 2015; Donthu et al., 2021; Ellegaard & Wallin, 2015; Gaitán-Angulo et al., 2018; Hood & Wilson, 2001; Martínez-López et al., 2018). It is an extensive method for literature analysis that encompasses a range of disciplines, including mathematics, statistics, philology, and various other subjects. This technique has grown into an indispensable tool for assessing scientific progress. It is

important to highlight that bibliometric, inherently quantitative, is employed to draw conclusions about qualitative aspects. The themes of study encompass various types of literature, and the discernible characteristics involve topics, authors, publication dates, referenced literature, content, and more (Du et al., 2015).

Search strategy

The study devised a search strategy incorporating specific parameters and constraints. Opting for the Scopus database as the primary data source, given its expansive coverage and widespread usage for evaluating scientific research in this domain, a data query was conducted using keywords such as "carbon trading" or "carbon credits" or "CERs" or "certified emission reduction certificate" or "renewable energy certificates" or "carbon policy" or "carbon emission reduction" spanning the years 2000-2024. After setting up the query, first filter was applied on the subject area (Energy, Business Management & Accounting, Social Sciences and Economics, Econometrics & Finance and retrieved 6643 documents) and then subject area was limited to only Business, Management & Accounting and 1332 documents were retrieved. Then, filter was applied on document type and only 968 articles were retrieved. To measure the impact of these articles on the scientific community, year-wise growth of publications in this area, country-wise distribution of publications, the number of citations these publications receive, h-index, authors analysis, journal analysis, publication pattern and intellectual structure in this field were evaluated. Regarding the scientific production on this theme, the study focused only on articles in the domain of Business, Management and Accounting. A total of 968 articles were selected after cleaning the data set using the search strategy given in Figure 1.

Figure1 Search strategy and process of data retrieval from **Scopus Database**



Source- Author's own elaboration

The data retrieved was then processed using Biblioshiny R software. The results on running the query revealed various facts about the data that are summarised below:

Table 1 Main information about data

Description	**Results**
Timespan	2000:2024
Sources (Journals, Books, etc)	192
Documents	968
Annual Growth Rate %	1.7
Document Average Age	3.82
Average citations per doc	30.44

References	1
Keywords Plus (ID)	4676
Author's Keywords (DE)	2986
Authors	2051
Authors of single-authored docs	87
Single-authored docs	98
Co-Authors per Doc	3.58
International co-authorships %	27.58
Article	968

Source- Author's calculation using Biblioshiny R

Data analysis and results

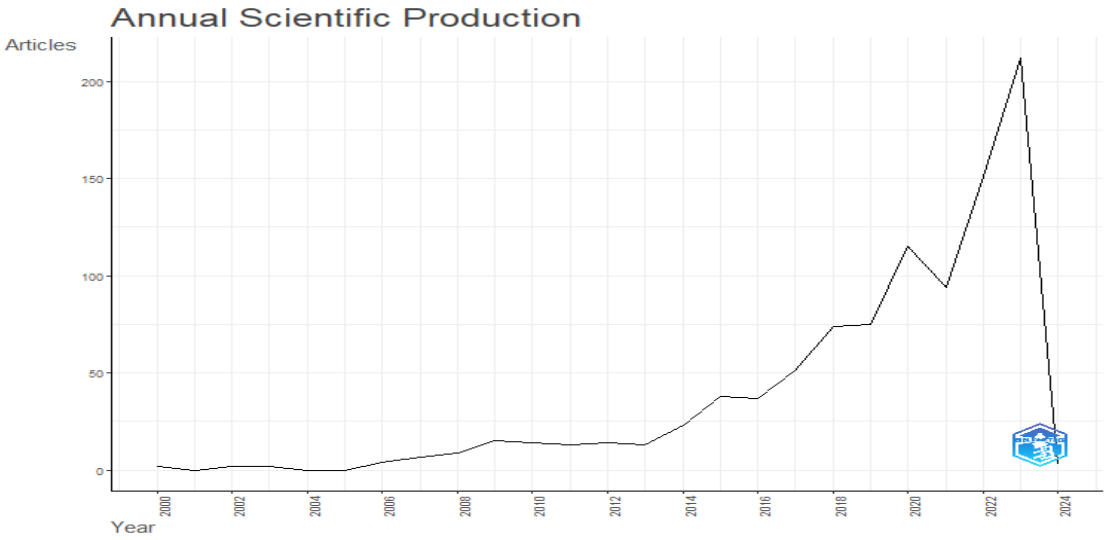
The various articles that have been used for the purpose of this study revealed great results. The analysis using Biblioshiny R software has produced results which will be summarised in the following sections. The Data analysis has been conducted under various heads like annual evolution of publications, country-wise distribution of publications, journal analysis, author analysis, most cited publications and keyword analysis.

1.Annual evolution of publications

To answer about current publication trend in Carbon trading, carbon policy and ways to reduce carbon emission, the authors analysed the annual growth in publications based on Scopus database on carbon trading and carbon policy as shown in Figure 2. In the year 2000, only 2 articles were published, showing minimal significance of this issue. After the successful implementation of Kyoto Protocol and Paris Agreement subsequently, the number experienced a steady rise, reaching 38 articles in 2015 and further escalating to 74 articles in 2018. However, in 2021, the annual growth in publications slightly decreased to 94 articles. Nevertheless, the trend reversed in 2022, with a notable surge, resulting in 212 articles published in 2023. This recent upswing in publications serves as an indicator of the expanding interest in this field and

underscores the significance of carbon trading for fostering sustainable development in the society.

Figure 2



Source: Author's calculation using Biblioshiny R

2.Country-wise distribution of publications

The second research question about the publications related to carbon trading and countries topping the list in terms of citations is addressed by table 2,3 and 4. Table 2 shows the list of top ten countries with maximum contribution in this field. As indicated in Table 2, China holds the first position, contributing 1440 publications, followed by the USA with 143, Australia with 97, the UK with 92, and India securing the fifth position with 75 articles. Countries with the least number of publications (each having one publication) include Austria, Azerbaijan, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Lithuania, Nigeria, Peru, Philippines, and Uzbekistan.

Table 2- Country-wise distribution of publications

Serial No.	**Country**	**Publications**
1	China	1440
2	USA	143
3	Australia	97
4	United Kingdom	92

5	India	75
6	Brazil	54
7	Canada	43
8	Malaysia	30
9	South Korea	26
10	France	25

Source- Author's elaboration

Table 3 highlights the top ten countries based on the total number of citations, with China securing the first position with 19026 total citations, followed by Australia with 1680, the USA with 816, and India in the seventh position with 353 total citations.

Table 3- Country-wise publications based on citations

Serial no.	**Country**	**TC**	**Average Article Citations**
1	China	19026	35
2	Australia	1680	49.4
3	USA	816	21.5
4	United Kingdom	662	28.8
5	France	483	80.5
6	Canada	429	25.2
7	India	353	10.4
8	Hong Kong	335	37.2
9	United Arab Emirates	315	63
10	Korea	290	18.1

Source- Author's elaboration

Moving on to influential institutions, Table 4 showcases the top ten educational institutions with a high number of total publications, all of these institutions are established in China. This aligns with China being the country with the maximum publications in the study of carbon trading and carbon policy (given in Table 3).

Table 4- Top educational institutions

Serial no.	Affiliation	Articles

1	North China Electric Power University	31
2	Sichuan University	23
3	Tsinghua University	22
4	Beijing Normal University	21
5	Dalian University of Technology	21
6	School of Management and Economics	21
7	China University of Mining and Technology	20
8	Tianjin University	20
9	Chongqing University	19
10	Jiangsu University	18

Source- Author's elaboration

Inspite of being the largest supplier of carbon credits after China, India considerably lags way too behind in terms of research in this domain as clearly seen in Table 2 China producing 1440 documents and India producing only 75. Hence, this study throws light on this research gap and emphasizes researchers to focus much in this domain.

3.Journal analysis

The third research question talks about the relevant journals in this area. The list of top ten journals producing articles on carbon trading, carbon policy and related topics indicates the Journal of Cleaner Production has an exceptionally high citation count and scores number one both in terms of publications and h index. This journal has proven to be a platform for highlighting environmental and sustainability issues in corporate businesses ,educational institutions, governments, regions and societies by producing 509 articles in this domain during the purview period of this study. Next comes, International Journal of Production Economics dealing in topics related to engineering and management, **manufacturing**, **process industries,** and **production** with 25 total publications and h-index as 19. The journal Technological Forecasting and Social Change ranks third, with an h-index of 18 and 35 total publications focusing mainly on methodologies and practice of technological forecasting and serves as planning tool for social, environmental and technological factors.

Table 5- Main journals of publications (2000-2024early access; source- Scopus database)

Serial No.	Journals	h_index	TC	NP	PY start
1	Journal of Cleaner Production	74	19172	509	2011
2	International journal of Production Economics	19	2175	25	2013
3	Technological Forecasting and Social Change	18	1076	35	2010
4	Transportation Research Part E: Logistics and Transportation Review	11	547	16	2014
5	International Journal of Production Research	10	886	18	2000
6	Electricity Journal	6	68	12	2006
7	Clean Technologies and Environmental Policy	5	101	13	2018
8	Journal of Industrial and Management Optimisation	5	56	10	2020
9	Business Strategy and The Environment	4	141	8	2003
10	Journal of Air Transport Management	4	127	5	2016

Source- Author's elaboration

4.Author analysis

Most cited authors along with h index are depicted in following table. Table 6 shows top cited authors in the field of carbon trading and carbon policy. Most influential authors based on number of citations are Zhang Y with 954 citations, Zhang X with 948 citations, Li Y with 897 citations and Chen X with 851 citations. Further, the most relevant authors based on h-index are Zhang Y with 17 h-index. Li Y, Zhang X, Wang Q with h-index of 14, 12 and 11 respectively. Figure 3 given below shows Wang Y and Zhang Y are the most relevant author producing 31 articles 9 (both) in carbon trading field with 11 and 17 h-index respectively and 555 and 954 total citations. Further, map in Figure 4 shows various well-defined clusters and the lines show how the writers research work are associated with other writers. Red and blue cluster in figure 4 show Zhang Y and Wang Y are producing maximum articles with h-index of

17 and 11 respectively. Zhang Y is associated with many other writers like Li Y, Chen X etc.They both have h-index of 14 and 10 respectively and 897 and 851 citations respectively.

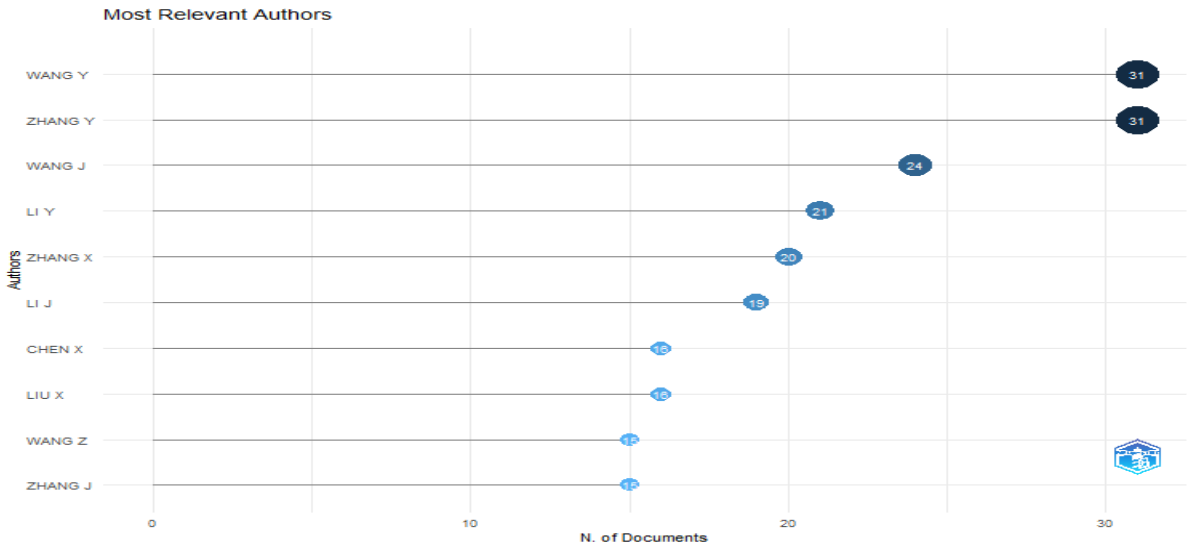
Here a direct correlation is seen between the author's nationality and the number of publications produced. All the influential authors of this domain are Chinese. As has been pointed out earlier in this study that most studies related to carbon emissions have been conducted in China and hence by Chinese researchers. Now, the most important concern is that although India is such a strong contributor in carbon trading, the government focusing so much on Carbon emission reduction certificates, ban on export of carbon credits to enhance domestic carbon emission control point towards why there are few studies in this domain.

Table 6- Top authors producing work on carbon trading and carbon policy by h-index and citations

Serial no.	**Authors**	**h_index**	**g_index**	**m_index**	**TC**	**NP**	**PY_start**
1	Zhang Y	17	30	1.888889	954	31	2015
2	Li Y	14	21	1.4	897	21	2014
3	Zhang X	12	20	1.5	948	20	2016
4	Wang Q	11	14	0.458333	605	14	2000
5	Wang X	11	14	1.375	780	14	2016
6	Wang Y	11	23	1.571429	555	31	2017
7	Chen X	10	16	1.111111	851	16	2015
8	Li J	10	19	1.111111	377	19	2015
9	Liu Y	10	14	1.428571	572	14	2017
10	Wang B	10	13	1.666667	249	13	2018

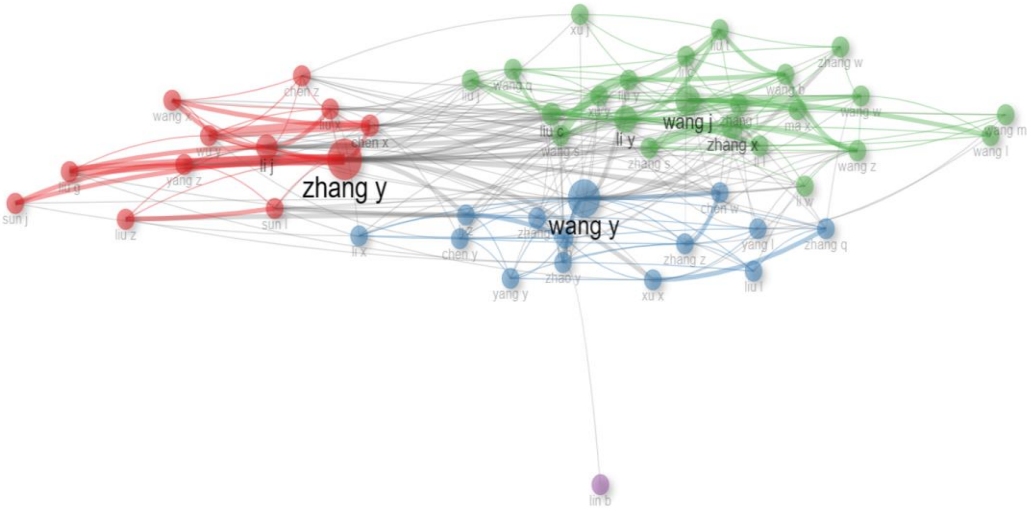
Source- Author's elaboration

Figure 3- Most relevant authors in the field of carbon trading and carbon policy



Source- Author's calculation using Biblioshiny R

Figure 4 Authors' collaboration



Source- Author's calculation using Biblioshiny R

5.Most cited publications

The most cited article was given by Ans Kolk, David Levy, and Jonatan Pinkse in 2008. The authors focused on corporate responses to climate change with development of reporting mechanism specially for carbon disclosure with much focus on understanding the role of carbon disclosure and carbon disclosure project (CDP)(Kolk et al., 2008).

The second most cited article was given by Rubayyat Hashmi and Khorshed Alam in 2019, that highlighted the environmental regulations, innovations and their impact on reduction of carbon emissions in OECD countries. The researcher also developed a model stochastic impact by regression on population, affluence, regulation, and technology" (STIRPART) to extend the analysis on the evaluation of factors influencing carbon emissions(Hashmi & Alam, 2019).

Third most cited article was given by Xiaoping Xu, Ping He, Hao Xu and Quanpeng Zhang in 2016 that focused on the production and emission abatement decisions within a Make-To-Order supply chain comprising a manufacturer and a retailer, operating under cap-and-trade regulation. The collaboration with the retailer involves specific contracts, and together, they cater to environment-concerned consumers by selling products aligned with sustainable practices (Xu et al., 2017).Other important articles are also given in Table 7 regarding carbon trading and carbon policy.

Table 7- Most influential publications regarding carbon trading and carbon policy

Serial no.	Authors	Title	TC	Year
1	Ans Kolk, David Levy, and Jonatan Pinkse	Corporate responses in an emerging climate regime: the institutionalization and commensuration of carbon disclosure	471	2008
2	Rubayyat Hashmi and Khorshed Alam	Dynamic relationship among environmental regulation, innovation, CO2 emissions, population, and economic growth in OECD countries: A panel investigation	406	2019

3	Xiaoping Xu, Ping He, Hao Xu and Quanpeng Zhang	Supply chain coordination with green technology under cap-and-trade regulation	366	2016
4	Michel Callon	Civilizing markets: Carbon trading between in vitro and in vivo experiments	350	2008
5	Jingna Ji, Zhiyong Zhang and Lei Yang	Carbon emission reduction decisions in the retail-/dual-channel supply chain with consumers' preference	325	2017
6	Donald Huisingh, Zhihua Zhang, John C. Moore, Qi Qiao and Qi Li	Recent advances in carbon emissions reduction: policies, technologies, monitoring, assessment and modeling	295	2015
7	Aysegul Toptal, Hasim Ozlu and Dincer Konur	Joint decisions on inventory replenishment and emission reduction investment under different emission regulations	283	2013
8	SADIA BANO, YUHUAN ZHAO, ASHFAQ AHMAD, SONG WANG AND YA LIU	Identifying the impacts of human capital on carbon emissions in Pakistan	254	2018
9	Bin Zhang, Liang Xu	Multi-item production planning with carbon cap and trade mechanism	250	2013
10	Lei Yang, Qin Zhang and Jingna Ji	Pricing and carbon emission reduction decisions in supply chains with vertical and horizontal cooperation	249	2017

Source- Author's elaboration

6. Keyword analysis

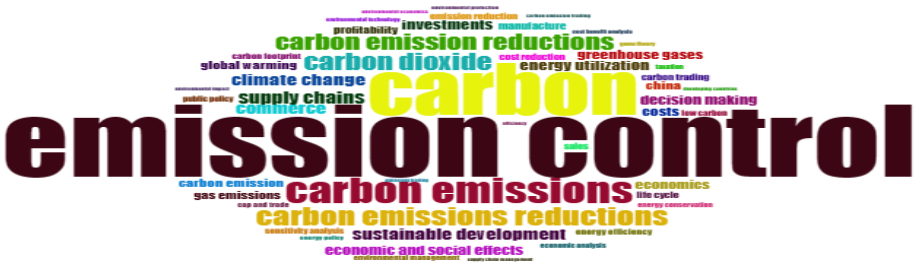
Intellectual structure of current research on carbon trading that shows the occurrence of keywords is detailed in Table 8. “Emission control” is the word which is used by most of the researchers in their articles with occurrence of 636 times, word “carbon” with frequency of 450 followed by carbon emissions, carbon emission reductions etc. Figure 5 presents the keyword analysis of the Scopus Database through Biblioshiny R. In addition to the frequently used terms, Figure 4 reveals other words employed by researchers, such as climate change, global warming, energy utilization, investments, profitability, and more.

Table 8- Keywords with minimum frequency of 99

Serial no.	Keywords	Frequency
1	emission control	636
2	Carbon	450
3	carbon emissions	229
4	carbon emissions reductions	166
5	carbon dioxide	149
6	carbon emission reductions	142
7	supply chains	107
8	climate change	102
9	Commerce	99
10	sustainable development	99

Source- Author’s elaboration

Figure 5 Keywords



Source- Author's calculation using Biblioshiny R

Future scope of the study

For the purpose of this study the data have been retrieved from Scopus database only. Other databases like Web of Science, PubMed etc. can also be used. Software R has been used to analyse the data, while researchers in the future may opt for different software or a combination of different available softwares. Next, the authors in this study mainly focussed on Bibliometric analysis while more detailed analysis of this domain can be done using literature reviews, meta-analysis, or in-depth content analyses. The study also reveals most of the studies are produced by Chinese authors and there is a lot of scope for Indian authors to produce more studies in this domain. Another aspect that has largely been observed is carbon trading and its mechanism. These terms have gained a lot of popularity recently due to the enlarging emphasis that is being given to the subject of carbon and its emissions and its control keeping in mind the global impacts of climate change.

Conclusion

The impacts of climate change are varied among nations; some are coping with desertification, deforestation, and land degradation; while others are facing melting of glaciers and increasing sea levels. It therefore requires a variety of distinctive solutions to tackle these consequences(Fattouh & Hasan Muslemani, 2023). One important solution identified is carbon trading. Carbon trading is not a new concept or new mechanism rather it was implemented/originated under the Kyoto Protocol in 1990s(Al-Chalabi, 2023).This research delves into the domain of carbon trading and carbon policy spanning the years 2000-2023, employing bibliometric analysis to discern authorship, citation patterns, sources, and country-wise contributions. Utilizing the Scopus database and Biblioshiny, a web-based application of the Bibliometrix package in R software, the investigation underscores China's pre-eminence in document production, citations, and the presence of top institutions engaged in this field.

The findings of the study reveal that China not only leads in the sheer number of produced documents but also dominates the list of top ten institutions contributing to this domain. Noteworthy journals in this field include the Journal of Cleaner Production, identified as the most significant, followed by the International Journal of Production Economics.

In terms of influential authors, Zhang Y and Li Y emerge as key figures in the discourse on carbon trading, carbon policy, and related subjects. Zhang Y boasts an impressive h-index of

17, with a total of 954 citations, while Li Y follows closely with an h-index of 14 and 897 citations.

Furthermore, the research highlights a notable gap in contributions from India, signalling the need for increased research efforts in this field. The paper seeks to provide a roadmap for both academicians and practitioners, offering valuable insights into existing knowledge while pinpointing areas ripe for further exploration. In essence, this study not only tracks the evolution of the field but also lays the groundwork for a comprehensive knowledge base. It aims to inspire additional research endeavours by various stakeholders, contributing to the ongoing discourse on carbon trading and carbon policy.

References

Aggarwal, V., & Karwasra, N. (2023). A bibliometric analysis on trade openness and economic growth: current dynamics and future direction. *Competitiveness Review*. https://doi.org/10.1108/CR-11-2022-0177

Al-Chalabi, M. (2023). *How Carbon Trading Can Unlock Carbon Dioxide Removals*.

Amirbagheri, K., Núñez-Carballosa, A., Guitart-Tarrés, L., & Merigó, J. M. (2019). Research on green supply chain: a bibliometric analysis. *Clean Technologies and Environmental Policy*, *21*(1), 3–22. https://doi.org/10.1007/s10098-018-1624-1

Baier-Fuentes, H., Merigó, J. M., Amorós, J. E., & Gaviria-Marín, M. (2019). International entrepreneurship: a bibliometric overview. *International Entrepreneurship and Management Journal*, *15*(2), 385–429. https://doi.org/10.1007/s11365-017-0487-y

Bhanawat, S., & Vardia, S. (2015). An analysis of carbon credit revenue practices in Indian corporate sector. *Pacific Business Review International*, *8*(6), 24–30.

Bonilla, C. A., Merigó, J. M., & Torres-Abad, C. (2015). Economics in Latin America: a bibliometric analysis. *Scientometrics*, *105*(2), 1239–1252. https://doi.org/10.1007/s11192-015-1747-7

Cobo, M. J., López-Herrera, A. G., Herrera-Viedma, E., & Herrera, F. (2011). Science mapping software tools: Review, analysis, and cooperative study among tools. *Journal of the American Society for Information Science and Technology*, *62*(7), 1382–1402. https://doi.org/https://doi.org/10.1002/asi.21525

Dileep Kumar S D. (2022). ENVIRONMENTAL ACCOUNTING PRACTICES IN INDIAN COMPANIES – A PERCEPTIONAL ANALYSIS . *Indian Journal of Accounting*, *54*(2), 80–89.

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, *133*, 285–296. https://doi.org/https://doi.org/10.1016/j.jbusres.2021.04.070

Du, H., Li, B., Brown, M. A., Mao, G., Rameezdeen, R., & Chen, H. (2015). Expanding and shifting trends in carbon market research: A quantitative bibliometric study. *Journal of Cleaner Production*, *103*, 104–111. https://doi.org/10.1016/j.jclepro.2014.05.094

Elkins, P., & Baker, T. (2001). Carbon Taxes and Carbon Emissions Trading. *Journal of Economic Surveys*, *15*(3), 325–376. https://doi.org/https://doi.org/10.1111/1467-6419.00142

Ellegaard, O., & Wallin, J. A. (2015). The bibliometric analysis of scholarly production: How great is the impact? *Scientometrics*, *105*(3), 1809–1831. https://doi.org/10.1007/s11192-015-1645-z

Ellerbeck, S. (2022, July 8). *Explainer: Which countries have introduced a carbon tax?* World Economic Forum.

Ermolieva, T., Ermoliev, Y., Fischer, G., Jonas, M., Makowski, M., & Wagner, F. (2010). Carbon emission trading and carbon taxes under uncertainties. *Climatic Change*, *103*(1), 277–289. https://doi.org/10.1007/s10584-010-9910-x

Fattouh, B., & Hasan Muslemani, O. (2023). *Energy Insight: 136 Hannah Hauman, Global Head of Carbon Trading, Trafigura The creation of a global carbon market: A taxonomy of carbon pricing under Article 6*.

Feng, Z.-H., Zou, L.-L., & Wei, Y.-M. (2011). Carbon price volatility: Evidence from EU ETS. *Applied Energy*, *88*(3), 590–598. https://doi.org/https://doi.org/10.1016/j.apenergy.2010.06.017

Gaitán-Angulo, M., Cubillos Díaz, J., Viloria, A., Lis-Gutiérrez, J.-P., & Rodríguez-Garnica, P. A. (2018). Bibliometric Analysis of Social Innovation and Complexity (Databases Scopus and Dialnet 2007–2017). In Y. Tan, Y. Shi, & Q. Tang (Eds.), *Data Mining and Big Data* (pp. 23–30). Springer International Publishing.

Gorain, S., Malakar, A., & Chanda, S. (2021). An Analysis of Carbon Market and Carbon Credits in India. *Asian Journal of Agricultural Extension, Economics & Sociology*, 40–49. https://doi.org/10.9734/ajaees/2021/v39i230528

Hashmi, R., & Alam, K. (2019). Dynamic relationship among environmental regulation, innovation, CO2 emissions, population, and economic growth in OECD countries: A panel investigation. *Journal of Cleaner Production*, *231*, 1100–1109. https://doi.org/10.1016/j.jclepro.2019.05.325

He, Y., Wang, L., & Wang, J. (2012). Cap-and-trade vs. carbon taxes: A quantitative comparison from a generation expansion planning perspective. *Computers & Industrial Engineering*, *63*(3), 708–716. https://doi.org/https://doi.org/10.1016/j.cie.2011.10.005

Hood, W., & Wilson, C. (2001). The Literature of Bibliometrics, Scientometrics, and Informetrics. *Scientometrics*, *52*, 291–314. https://doi.org/10.1023/A:1017919924342

Ji, C. J., Li, X. Y., Hu, Y. J., Wang, X. Y., & Tang, B. J. (2019). Research on carbon price in emissions trading scheme: a bibliometric analysis. *Natural Hazards*, *99*(3), 1381–1396. https://doi.org/10.1007/s11069-018-3433-6

Kansal, A., & Modi, R. (2012). Carbon Credits in India. In *Indian Journal of Accounting: Vol. XLII (2)* (pp. 81–84).

Kolk, A., Levy, D., & Pinkse, J. (2008). CORPORATE RESPOOSES II AA EMERGIIG CLIMATE REGIME: THE IISTITUTIOOALIZATIOO AAD COMMEESURATIOO OF CARBO DISCLOSURE. In *European Accounting Review* (Vol. 17, Issue 4). http://ssrn.com/abstract=1268404Electroniccopyavailableat:https://ssrn.com/abstract=1268404

Martínez-López, F. J., Merigó, J. M., Valenzuela-Fernández, L., & Nicolás, C. (2018). Fifty years of the : a bibliometric analysis. *European Journal of Marketing*, *52*(1/2), 439–468. https://doi.org/10.1108/EJM-11-2017-0853

Shukla, P. R., Skea, J., Reisinger, A., Slade, R., Fradera, R., Pathak, M., Al, A., Malek, K., Renée Van Diemen, B., Hasija, A., Lisboa, G., Luz, S., Malley, J., Mccollum, D., & Some, S. (2022). *Climate Change 2022 Mitigation of Climate Change Working Group III Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change Summary for Policymakers Edited by*. www.ipcc.ch

Solomon, S. (Atmospheric chemist), Intergovernmental Panel on Climate Change., & Intergovernmental Panel on Climate Change. Working Group I. (2007). *Climate change 2007 : the physical science basis : contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press.

Tang, B., Gong, P., & Shen, C. (2017). Factors of carbon price volatility in a comparative analysis of the EUA and sCER. *Annals of Operations Research*, *255*(1), 157–168. https://doi.org/10.1007/s10479-015-1864-y

Xu, X., He, P., Xu, H., & Zhang, Q. (2017). Supply chain coordination with green technology under cap-and-trade regulation. *International Journal of Production Economics*, *183*, 433–442. https://doi.org/10.1016/j.ijpe.2016.08.029

Zhu, B., Wang, P., Chevallier, J., & Wei, Y. (2015). Carbon Price Analysis Using Empirical Mode Decomposition. *Computational Economics*, *45*(2), 195–206. https://doi.org/10.1007/s10614-013-9417-4