



Construction of Carbon Neutrality in E-Commerce: Scientific Metrological Analysis

Chung-Lien Pan, Wenshan Yang^(✉), Xuanyu Liang, Ziyue Yuan, and Manqiao Zhong

School of Accounting, Nanfang College-Guangzhou, Conghua, Guangzhou 510970, China
wenshan.yang@qq.com

Abstract. With the development of the era of data, global environmental pollution control and climate change are still great challenges we face today. Affected by the international situation and political environment e-commerce carbon neutrality has also received widespread attention, prompting researchers to continue to explore. We use the scientific quantitative analysis method and the Web of Science (WoS) database to select the research papers from 1900 to 2023 and make a systematic review. Based on the 149 papers retrieved, we use Bibliometrix to analyze the paper and visualize the results. The results show that the research on carbon neutrality in e-commerce is gradually deepening and is in a positive upward trend. The scope of research has gradually expanded, showing a trend of diversification. We will provide a reliable basis for researchers to grasp the development trend of the field by showing the cross-network between keywords and the development trend of relevant keywords to researchers.

Keywords: E-Commerce · Carbon Neutrality · Internet

1 Introduction

The rapid development of the information age has driven the use of digital technology and the internet and promoted a new pattern of global economic development and operation [1]. Human production and operation activities greatly increase greenhouse gas emissions, leaving many environmental hidden dangers. “Peak emissions” and “carbon neutrality” have become increasing concerns [2]. Today, 80% of the world’s carbon emissions come from urban areas, and urbanization in much of the world is still accelerating [3]. China is also under great pressure to achieve its peak carbon emissions by 2030 and achieve its carbon-neutral target by 2060 [4]. Compared with the traditional industrial age due to the progress of science and technology and the popularization of Internet technology, the impact system of carbon dioxide emission in modern society has undergone great changes [5]. Some experts point out that the Internet economy has a huge impact on China’s carbon emission efficiency (CEE) [6]. In terms of energy utilization the energy Internet has the advantages of high efficiency and convenience, which is an effective way to achieve carbon neutrality [7].

2 Data and Methods

To obtain literature on e-commerce and carbon-neutral technology, we use the following WoS advanced search query:

TS = (“Electronic Commerce” OR “Internet Technology” OR “ Internet “) AND
TS = (“carbon neutrality” OR “carbon neutral*” OR “carbon-neutral*” OR “carbon positive*” OR “carbon-positive*” OR “carbon negative*” OR “carbon-negative*” OR “carbon accounting” OR “net-zero” OR “decarboni?ation”).

A total of 149 articles (including SCI extension, SSI.) were collected on March 2, 2023. Use Bibliometrix to analyze and visualize the results.

3 Study Mapping Results

To explore the research on e-commerce and carbon neutrality to date, the following findings are presented for data and visualization analysis.

3.1 Annual Trend

Statistics show that from 1900 to 2017, there were few published articles and references, but there was a steady but slow upward trend. There was a steep and rapid increase from 2017 to 2022. And it peaked in 2022.

In addition, it shows the changes in literature and generation of sources over time, with the growth rate of energy being the most important.

3.2 Main Countries, Keywords, and Publication Sources

Figure 1 clearly shows the relationship between main countries, keywords, and publication sources. Authors from various countries actively conduct cooperation and research, among which the largest proportion is the authors from China. In addition to the Chinese authors, there are also authors from Denmark, the United Kingdom, United States Singapore, India, and other countries. This shows that countries are carbon neutral in both e-commerce and the Internet.

Energy accounts for a large part of the publication’s sources. In addition, topics such as sustainability, the Internet, environmental science, and the international environment are covered. In addition to carbon neutrality, research on climate change, smart grid, digital economy, and the Internet are also included. Almost every country shown in the chart covers these fields, which also reflects the richness of research subjects.

3.3 Main Theme

Figure 2 shows that the Internet of Things, smart grid, energy efficiency, demand response, blockchain, energy, decarbonization, and energy Internet These fields are very important for this topic and have achieved good development. However, the Internet of Things (IoT), the Internet, sustainability, carbon reduction, energy transition, and circular economy, although important, have not achieved good development.

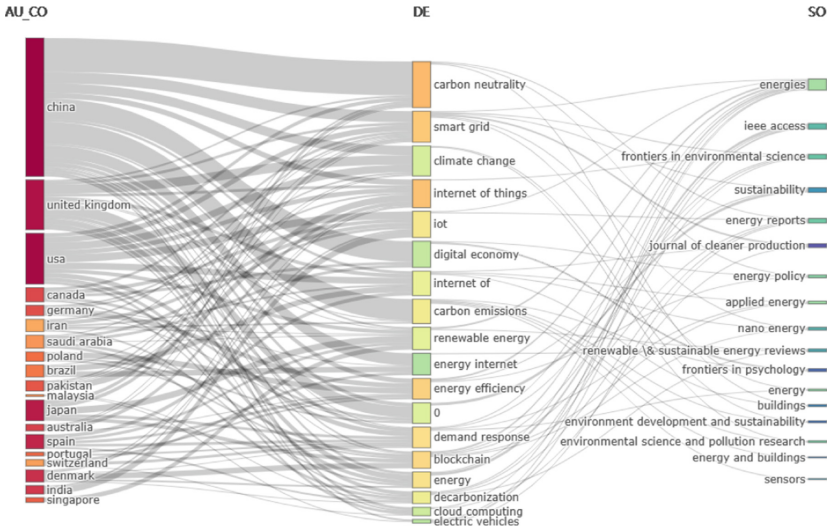


Fig. 1. Country, keywords, and source map

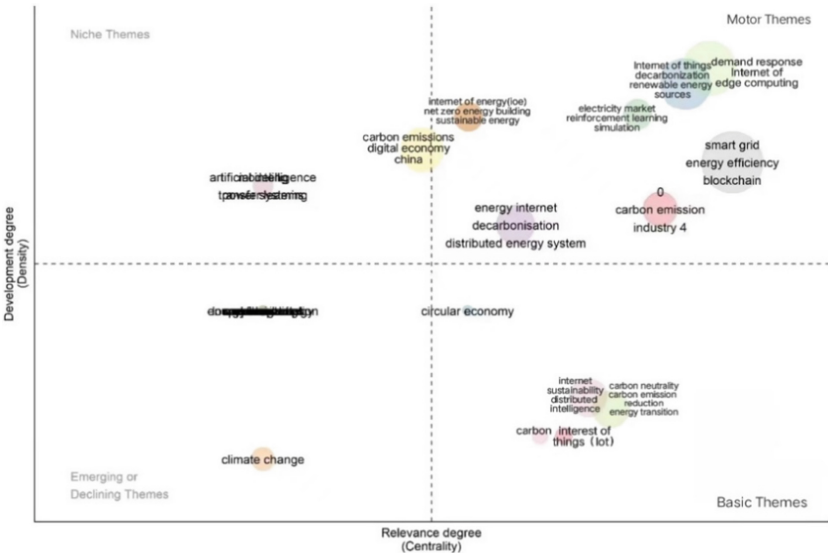


Fig. 2. Strategic coordinate chart

3.4 Factor Analysis

The method of MCA is used for multiple-factor analysis to form a conceptual structure diagram (Fig. 3) and determine its importance by the size of the clustering graph.

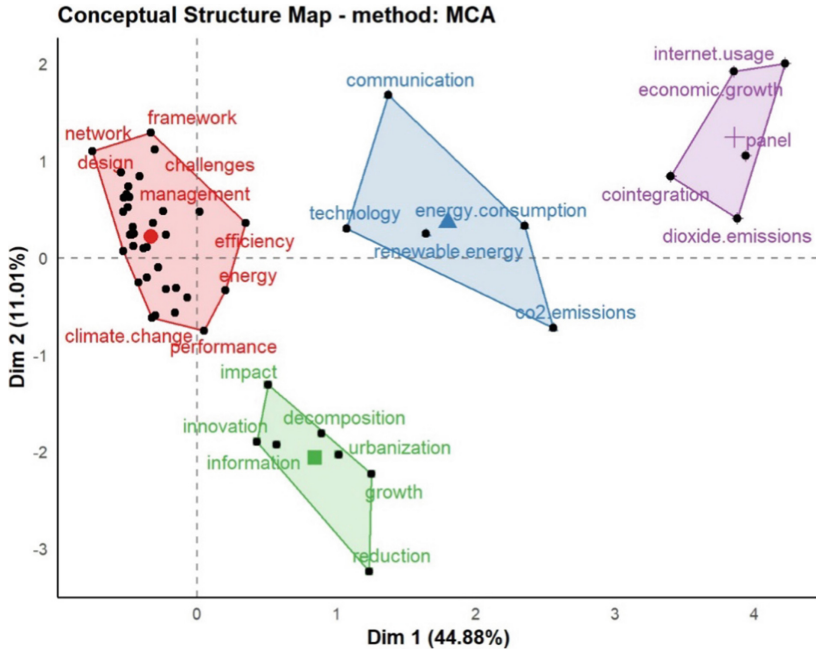


Fig. 3. Structure concept diagram

The largest cluster is the blue cluster, including communication, technology, energy consumption, renewable energy, and carbon dioxide emissions. Among them, renewable energy is the closest to the center point, which reveals that renewable energy is a very important solution to the theme of e-commerce carbon neutrality. The second is red clustering, including network, design challenges, framework, management, efficiency, energy, performance, and climate change. The third cluster is the green cluster, which includes impact, innovation, decomposition, urbanization, information, growth, and reduction. Finally, the purple cluster includes Internet usage, economic growth, + panel, cointegration, and dioxide emissions.

4 Conclusion

This paper analyzes the literature on e-commerce and carbon neutrality. Among the countries in the world, China's research achievements are more highlighted; The main sources of publications are distributed, indicating the characteristics of multi-discipline; Topics such as energy efficiency, blockchain, internet of things (IoT), sustainability, circular economy, and energy transition are relatively important and receive higher attention.

In addition, the scholars focus on smart grids, energy systems, renewable energy, and carbon emissions. For example: In the field of the Internet, IaaS is applied to reduce carbon emissions. In a word, under the current world situation and environment, experts and scholars around the world are paying more and more attention to the study of e-commerce and carbon neutrality.

Acknowledgements. The APC was funded by the Department of Education of Guangdong Province, grant number 2022ZDJS121, titled “Roadmapping for Precision-Decarbonization”.

References

1. C.-L. Pan, Z. Lin, L. Yu, X. Chen, W. Chen, «A Scientometric Analysis: Finance and Investors under the Context of Internet Development», included in 2020 International Conference on E-Commerce and Internet Technology (ECIT), Zhangjiajie, China, April 2020, Pages 261–264. doi: <https://doi.org/10.1109/ECIT50008.2020.00067>.
2. Yang Lyu, Zheng Ji, Han Liang, Tao Wang, Yanqiao Zheng, «Has Information Infrastructure Reduced Carbon Emissions?-Evidence from Panel Data Analysis of Chinese Cities». See: March 10, 2023. [online]. Loaded in: <https://www.mdpi.com/2075-5309/12/5/619>
3. Xin Yang, Guangyin Shang Xiangzheng Deng, «Estimation, decomposition and reduction potential calculation of carbon emissions from urban construction land: evidence from 30 provinces in China during 2000–2018 | SpringerLink», 2021. <https://link.springer.com/article/https://doi.org/10.1007/s10668-021-01769-3> (See January 16, 2023).
4. S. Zhong, C. Xin, H. Shen, X. Chen, «Effects of land urbanization and internet penetration on environmental sustainability: a cross-regional study of China», *Environ Sci Pollut Res*, Volume 28, Issue 47, Pages 66751–66771, December 2021, doi: <https://doi.org/10.1007/s11356-021-15226-1>.
5. F. Liu, Y. Khan, M. Marie, «Carbon neutrality challenges in Belt and Road countries: what factors can contribute to CO2 emissions mitigation?», *Environ Sci Pollut Res*, Pages 1–18, September 2022, doi: <https://doi.org/10.1007/s11356-022-22983-0>.
6. J. Wang, K. Dong, Y. Sha, C. Yan, «Envisaging the carbon emissions efficiency of digitalization: The case of the internet economy for China», *Technological Forecasting and Social Change*, Volume 184, Pages 121965, November 2022, doi: <https://doi.org/10.1016/j.techfore.2022.121965>.
7. X. Liu, J. Liu, K. Ren, X. Liu, J. Liu, «An integrated fuzzy multi-energy transaction evaluation approach for energy internet markets considering judgement credibility and variable rough precision», *Energy*, Volume 261, Pages 125327, December 2022, doi: <https://doi.org/10.1016/j.energy.2022.125327>.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter’s Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter’s Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

