Proceedings of ICEMGD 2026 Symposium: The Role of Blue Economy in Promoting Human Sustainable Development
DOI: 10.54254/2754-1169/2026.GT33724

A Knowledge Mapping Study on the Research Status of Carbon Accounting in China — Based on Citespace Analysis

Ruitong Wang

School of Economics and Management, Dalian Ocean University, Dalian, China
2378386811@qq.com

Abstract. Since the concept of "carbon accounting" was proposed in 2008, as an important tool to help achieve the "dual carbon" goals, research achievements in relevant fields in China have grown rapidly, but the research status still lacks systematic integration and sorting. This paper takes 236 literatures related to carbon accounting retrieved from CNKI from 2008 to 2025 as samples, uses Citespace 6.4.R1 software, and carries out multi-dimensional visual analysis of knowledge mapping combined with bibliometrics. The study finds that the cooperation network of research subjects in China's carbon accounting research is scattered, and university-enterprise cooperation is insufficient; research hotspots are highly concentrated, forming eight core clustering modules with clear and closely related core keywords; research hotspots adjust with the times and policies to meet development needs, but burst terms have low sustainability and insufficient research continuity. Based on this, expectations for the carbon accounting field in the future are put forward: strengthen subject collaborative research, promote scenario-based and refined research, and deepen the depth of carbon accounting research combined with the global environmental governance system.

Keywords: carbon accounting, Citespace, knowledge mapping, cluster analysis

1. Introduction

In 2008, American scholar Stewart Jones proposed the concept of "carbon accounting", arguing that carbon accounting can promote the development of green industries and the transformation of industrial energy structure by quantifying the carbon emission reduction results of enterprises. With the continuous deepening of research in carbon accounting-related fields, research achievements have emerged constantly. The research firstly focuses on the construction of carbon accounting system, secondly on the content of carbon accounting, and finally on the information disclosure of carbon accounting [1]. Research in carbon accounting-related fields mainly focuses on basic theory construction and specific case analysis, and some scholars have also conducted literature reviews and qualitative elaborations on the research progress and future development direction of carbon accounting [2]. In recent years, research achievements in China's carbon accounting field have

© 2026 The Authors. This is an open access article distributed under the terms of the Creative Commons Attribution License 4.0 (https://creativecommons.org/licenses/by/4.0/).

DOI: 10.54254/2754-1169/2026.GT33724

shown a rapid growth trend, but the development context, evolutionary laws, research overview and frontier research trends of existing research still lack systematic sorting and integration.

This study adopts Citespace, a visual analysis tool for knowledge mapping, to intuitively present the research context, evolutionary laws and core hotspots of carbon accounting. Citespace is used to conduct bibliometric analysis of domestic carbon accounting-related literatures, systematically revealing the current characteristics, evolutionary trends and existing deficiencies of China's carbon accounting research, so as to provide theoretical reference and practical support for improving the carbon accounting theory system and promoting the connection between research achievements and the "dual carbon" goals.

2. Data source and research method

2.1. Data source

China National Knowledge Infrastructure (CNKI) is taken as the retrieval database, with "carbon accounting" as the subject term, and the time range is from January 1, 2008 to December 31, 2025. To ensure the accuracy and high quality of retrieved literatures, journal sources are set as academic journals, and "Peking University Core Journals" and "Chinese Social Sciences Citation Index (CSSCI)" are selected. To ensure the accuracy and comprehensiveness of literature data, the titles, abstracts, keywords and other contents of the initially retrieved literatures are read one by one, and duplicate literatures or those inconsistent with the theme of this paper are screened out, obtaining 236 valid literatures.

2.2. Research method

This paper takes bibliometrics as the core, combines with Citespace visual analysis tool, and constructs knowledge mapping through a variety of analysis functions. The software version adopted in this study is Citespace 6.4.R1 (64-bit) Advanced-(c) 2003-2026 Chaomei Chen. The screened literatures are exported in Refworks format, named "download_01.txt" and stored in the "input" folder, and three folders "output", "data" and "project" are established at the same time. Open Citespace 6.4.R1, convert the format of literature data exported from CNKI, store the converted data in the "output" folder and copy it to the "data" folder, and import it into the Citespace project. The time range is set from January 2008 to December 2025, with a time slice of 1 year. In "Node types", diverse analyses are conducted on "Author", "Institution" and "Keyword" respectively to study the knowledge mapping of the research status of carbon accounting in China.

3. Analysis of research overview

3.1. Analysis of core author cooperation network

As shown in Figure 1 *Co-occurrence Map of Core Authors in Carbon Accounting Research in China*, the author cooperation map consists of 321 nodes and 220 connections, with a network density of Density=0.0043. Figure 1 shows that there are many nodes but they are scattered with few direct connections. Liu Meijuan from Zhejiang A&F University and Yuan Guangda from Nanjing University of Information Science and Technology have published the most papers, with 5 papers each. Among them, Professor Liu Meijuan has long been dedicated to accounting theory and resource and environmental accounting, focusing on core directions such as carbon emission right accounting, carbon sink accounting and biological asset accounting, and has continuously carried

DOI: 10.54254/2754-1169/2026.GT33724

out systematic scientific research exploration and teaching practice. Her research in the field of carbon accounting has always been based on the perspective of environmental resource protection and sustainable development, paying attention to the in-depth integration of carbon accounting theory and methods with resource and environmental management practice, forming a research feature with both theoretical depth and practical orientation [3]. Professor Yuan Guangda once worked in the audit position of Nanjing Institute of Meteorology, and has long been dedicated to environmental accounting and environmental audit, forming a research feature with both theoretical depth and practical orientation. Many academic papers he published focus on the internal correlation between environmental accounting and corporate performance, integrating theoretical research with corporate practice. His core research directions include environmental financial performance evaluation, the construction of environmental management performance evaluation paradigms and other fields, providing important references for academic research and practical application in this field [4]. Following them are Yan Huahong, Wang Defa, Zhang Yalian and Wen Guijiang, tied for the second place with 4 papers each; there are 9 authors ranking third with 3 papers each, and 23 authors with 2 papers each. This indicates that there is a lack of cooperation and communication among authors.

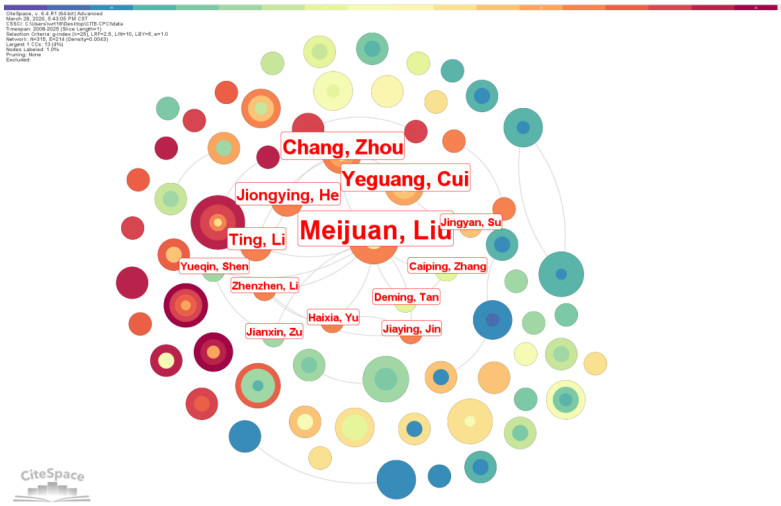


Figure 1. Co-occurrence Map of Core Authors in Carbon Accounting Research in China

3.2. Analysis of institution cooperation network

The knowledge mapping of research institutions is drawn through Citespace tool. In the presentation of the mapping, the size of each node directly reflects the contribution of the represented research institution in publishing academic papers, as shown in Figure 2. The institution network map contains N=222 nodes, forming 95 cooperative relationships, with a map density of 0.0039. According to the statistical data of papers published by research institutions in Figure 2, carbon accounting research institutions are mainly concentrated in universities of finance and economics, such as the School of Accounting, Zhongnan University of Economics and Law (7 papers), the School of Business, Nanjing University of Information Science and Technology (6 papers), and the School of Accounting, Capital University of Economics and Business (6 papers). Such universities have a strong research foundation and certain academic influence in the field of carbon accounting research.

DOI: 10.54254/2754-1169/2026.GT33724

According to the analysis of node size, connection status and centrality value of each institution, the main research institutions of carbon accounting are domestic universities, and a few universities conduct cooperative research with social institutions. On the whole, a stable cooperative bond has not yet been established between most research institutions, and the cooperation network between them is still sparse, which needs to be further strengthened. At the same time, the potential of university-enterprise cooperation is far from being fully tapped, and there is huge room for improvement. In the future, cooperation in this field should be strengthened to promote the effective integration and sharing of knowledge, technology and resources.

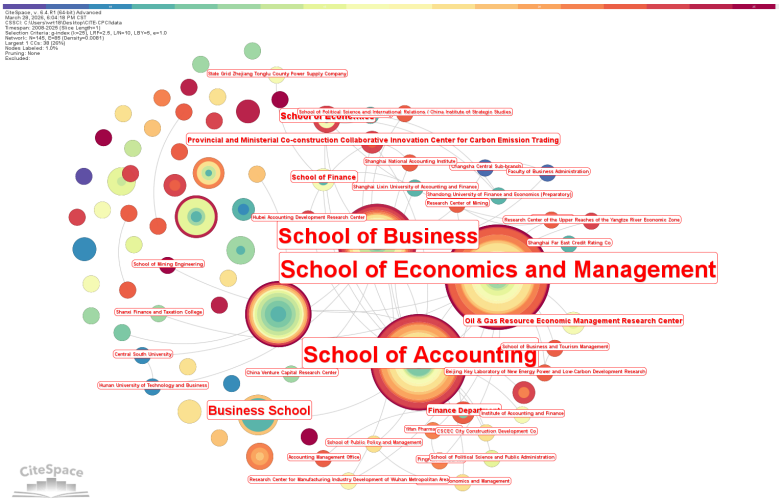


Figure 2. Co-occurrence Map of Research Institutions in Carbon Accounting Research in China

4. Analysis of research hotspots and trends

4.1. Keyword Co-occurrence analysis

Keywords are a high generalization and summary of literature research content, and the thematic hotspots of the research field can be grasped to a certain extent according to their word frequency and centrality. The top four keywords in terms of citation frequency are carbon accounting, carbon emission rights, low-carbon economy and information disclosure, which are consistent with the top four keywords in terms of betweenness centrality. They can be regarded as key nodes of the research and the central hubs connecting other keywords (see Table 1).

According to the keyword co-occurrence map and keyword centrality analysis, it is found that the research hotspots of carbon accounting in China are mainly reflected in the following four aspects:

4.1.1. Carbon accounting

Based on the sorting and analysis of 236 relevant literatures, "carbon accounting", as the core research keyword, has experienced the development from concept proposal, concept definition to theory improvement, and the integration of carbon accounting with the current background policies and scenario-based enterprises. Vertically, carbon accounting has always been the core main line of research in this field in China, and domestic relevant research generally presents the characteristics of taking "carbon accounting" as the core and continuously expanding to subdivided directions. With the deepening of research, many specific research branches have gradually differentiated around

DOI: 10.54254/2754-1169/2026.GT33724

carbon accounting, mainly including "carbon accounting recognition", "carbon accounting measurement", "carbon accounting information disclosure" and so on.

4.1.2. Carbon emission rights

"Carbon emission rights" is another important keyword in the research status of carbon accounting in China. Especially after the proposal of China's "dual carbon" goals, the research on carbon emission rights has become more diversified and divergent, carbon emission right trading plays an increasingly important role, and the carbon emission right trading market plays an increasingly prominent role in the process of low-carbon transition. The research on "carbon emission rights" in China's carbon accounting field focuses on the core issues of accounting recognition, accounting calculation and accounting measurement of carbon emissions, combined with practical enterprise problems, and generally presents a research orientation focusing on practical application and facing real problems.

4.1.3. Low-carbon economy

This keyword is mostly combined with "green development", "carbon peaking", "climate change", "climate risk", "environmental cost" and so on. Global climate and environmental problems are becoming increasingly severe. China adheres to the low-carbon development strategy, aiming to achieve sustainable economic growth while protecting the ecological environment and realizing the harmonious coexistence between man and nature. The impact of low-carbon economy on accounting includes accounting concepts, essence, objectives, technologies and policies, and carbon accounting and its derivative contents are constantly developing and changing in the environment of low-carbon economy.

4.1.4. Information disclosure

In the carbon accounting research system, carbon accounting information disclosure is an indispensable and important component. Accounting information disclosure is the link between the accounting theory system and the real environment, running through the whole process of carbon accounting research and practice. Carbon accounting information disclosure involves carbon emission reduction-related information, accounting treatment methods related to carbon emission right trading, holding and changes of carbon emission rights and other contents, which can intuitively show the carbon accounting practice and carbon management level of enterprises, and plays an important explicit supporting role in promoting the theoretical research and practical implementation of carbon accounting.

Table 1. Top 10 keywords in terms of frequency and centrality in carbon accounting research in China

Serial Number	Keyword	Occurrence Frequency	Keyword	Centrality
1	Carbon accounting	71	Carbon accounting	0.93
2	Carbon emission rights	52	Carbon emission rights	0.49
3	Low-carbon economy	26	Low-carbon economy	0.30
4	Information disclosure	17	Information disclosure	0.09
5	Accounting recognition	14	Carbon neutrality	0.08
6	Accounting measurement	12	Carbon emissions	0.06

DOI: 10.54254/2754-1169/2026.GT33724

Table 1. (continued)

7	Carbon emissions	11	Carbon audit	0.05
8	Carbon neutrality	8	Low-carbon accounting	0.05
9	Carbon assets	7	Carbon footprint	0.04
10	Accounting calculation	7	Accounting recognition	0.03

4.2. Keyword cluster analysis

Log-Likelihood Ratio (LLR) is used in Citespace to conduct cluster analysis on keywords, and a knowledge mapping of keyword clustering themes is obtained (as shown in Figure 3). This mapping can clearly show the structure of current carbon accounting research hotspots. The module value Q=0.5779>0.3 of the keyword clustering view, indicating that the clustering structure is significant; the silhouette value S=0.8794>0.7, indicating that the clustering effect is good and convincing. Eight keyword clustering modules are obtained through keyword clustering, with clustering labels as follows: #0 Carbon Accounting, #1 Net Approach, #2 Information Disclosure, #3 Carbon Assets, #4 Low-carbon Economy, #5 Carbon Neutrality, #6 Carbon Footprint, #7 Traditional Accounting. The keyword clustering map of carbon accounting research hotspots is composed of eight different color blocks.

In the cluster of "carbon emission rights" (#0), the more influential nodes include "carbon accounting", "carbon verification", "greenhouse gases", "carbon accounting view", "carbon quotas", "dual carbon", "budget management" and so on. Carbon emission rights are legal tools for the country to fulfill climate governance commitments and implement greenhouse gas emission control targets. At the same time, as tradable and transferable assets, they can realize optimal allocation of resources through market mechanisms, promote low-carbon transformation of enterprises, and are the key link connecting the "dual carbon" goals with practical emission reduction actions of enterprises. Carbon accounting, as a value accounting and management tool for carbon emission rights, with the gradual clear definition of carbon emission rights, its purchase, holding, use, sale and other behaviors need to be standardized recorded and measured through accounting calculation. Carbon accounting is an accounting calculation system specially targeting carbon emission rights and related emission reduction activities, enabling the asset value of carbon emission rights to be effectively implemented and supervised. Carbon verification is a guarantee means for the effective operation of carbon emission rights, and the core link responsible for verifying the authenticity, integrity and accuracy of greenhouse gas emission data of key emission units. Its verification results can be directly used as the core basis for carbon emission right compliance. Greenhouse gases are the core target objects of carbon emission rights, based on greenhouse gas emissions (carbon dioxide emissions), and essentially quantify and control greenhouse gas emission behaviors. All influential nodes in the "carbon emission rights" cluster form a close collaborative relationship around carbon emission rights.

In the cluster of "net approach" (#1), the more influential nodes include "carbon emission rights", "accounting treatment", "net approach", "accounting elements", "accounting policies", "manufacturing overhead", "offset" and so on. Net approach is the main method of accounting treatment for carbon emission rights. Its core logic is to offset the carbon emission rights held by enterprises with actual carbon emissions, and take the net amount after offset as the basis for accounting calculation, which is the core bridge connecting carbon emission rights with enterprise accounting treatment. Accounting treatment is the specific path for the implementation of net

DOI: 10.54254/2754-1169/2026.GT33724

approach. Combined with the definition requirements of accounting elements, the standards of carbon emission rights under net approach are clarified to ensure the standardization and comparability of relevant accounting information. Accounting policies provide institutional guidelines for the application of net approach. Enterprises need to formulate accounting policies in line with the accounting logic of net approach according to their own operating characteristics, focusing on the accounting of offset links. All nodes in the "net approach" cluster support each other: accounting policies clarify accounting basis, accounting elements define accounting objects, offset is the core operation, and finally, through standardized accounting treatment, the impact of carbon emission rights is integrated into the daily accounting system of enterprises.

In the cluster of "information disclosure" (#2), the more influential nodes include "accounting measurement", "accounting recognition", "accounting calculation", "forest carbon sinks", "initial recognition", "carbon emission reductions", "iron and steel enterprises" and so on. Information disclosure is an important part of the carbon accounting system, ensuring open and transparent information and helping global climate governance. Accounting recognition and accounting measurement are the basic premises of information disclosure. Only by clarifying the accounting attributes of carbon-related transactions and events and determining their asset values can the authenticity and accuracy of information disclosure be ensured. Accounting calculation is the core support of information disclosure. Through accurate calculation processes, relevant data such as carbon emission reductions and forest carbon sinks are integrated to form disclosable accounting information. All nodes in the "information disclosure" cluster form a closed loop around "standardized disclosure of carbon-related information": accounting calculation, recognition and measurement provide data support, forest carbon sinks and carbon emission reductions provide disclosure content, and entities such as iron and steel enterprises implement disclosure responsibilities.

In the cluster of "carbon assets" (#3), the more influential nodes include "carbon assets", "carbon liabilities", "carbon emissions", "environmental accounting", "forestry enterprises", "carbon sinks" and so on. Carbon assets are assets with economic and environmental value formed by enterprises in the process of low-carbon development. Carbon emissions are the core inducement for the formation of carbon assets and carbon liabilities. Enterprise carbon emission behaviors directly determine the holding scale of carbon assets and the occurrence of carbon liabilities, while environmental accounting is the core tool for the calculation and management of carbon assets and carbon liabilities. Through the environmental accounting system, the recognition, measurement, recording and reporting of carbon assets are standardized, and the measurement standards and performance requirements of carbon liabilities are clearly defined. Forestry enterprises are scenario-based enterprises for the subdivision of carbon assets, and are an important part of carbon assets. All nodes in the "carbon assets" cluster are closely related: carbon assets are related to carbon emissions and carbon liabilities, and environmental accounting provides a management tool to promote the formation and transformation of carbon sink-type carbon assets, jointly forming the complete system of carbon assets.

In the cluster of "low-carbon economy" (#4), the more influential nodes include "low-carbon economy", "low-carbon management", "energy conservation and carbon reduction", "management accounting", "asset categories", "carbon costs", "low-carbon strategy" and so on. Low-carbon economy is an economic development model with low energy consumption, low emissions and low pollution as the core. All nodes in the "low-carbon economy" cluster cooperate with each other: low-carbon strategy clarifies the direction, low-carbon management implements actions, management

DOI: 10.54254/2754-1169/2026.GT33724

accounting provides support, and nodes such as carbon costs and asset categories improve the management system, jointly promoting the implementation of low-carbon economy.

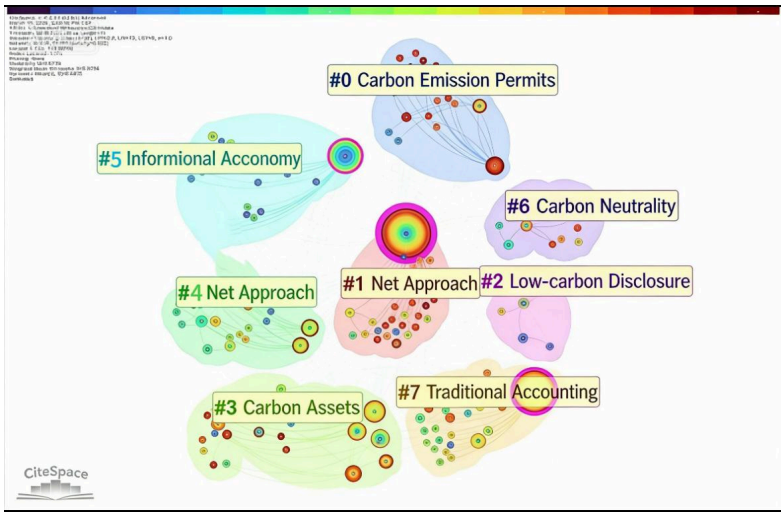


Figure 3. Keyword clustering map of carbon accounting research in China

4.3. Keyword stage analysis

From 2009 to 2012, the initial stage: clustering influences such as "carbon accounting", "carbon emission rights", "low-carbon economy" and "accounting recognition" in carbon accounting research were far-reaching, focusing on the concept definition, accounting logic and institutional framework of carbon accounting. At this stage, China's research on carbon accounting was in the exploration stage, laying a theoretical foundation for subsequent research.

From 2013 to 2019, the development stage: the content of carbon accounting research was further improved at this stage, mainly focusing on "accounting calculation", "enterprise value", "management accounting", "accounting policies", "influencing factors", "carbon measurement" and other contents. The research began to pay attention to the recognition, measurement and reporting of carbon accounting at the enterprise level.

At the same time, the emergence of specific industry application themes such as "electric power industry" and "forestry enterprises" marked that the research shifted from the general framework to scenario-based practical implementation, and the quality of information disclosure and regulatory requirements became new focuses of attention.

From 2020 to 2025, the deepening stage: national strategies such as "carbon peaking" and "carbon neutrality" have become the core driving forces, and the research has entered a new stage. Under the guidance of the "dual carbon" goals, cutting-edge themes such as "green development", "carbon asset management", "climate disclosure" and "ESG" have risen rapidly.

On the whole, research in the field of carbon accounting has always centered on the core main line of "carbon accounting", presenting an evolutionary logic from theory to practice, from calculation to management, and from enterprises to the macro level, and is highly synchronized with national climate governance policies. Future research will further extend to carbon management innovation under the carbon neutrality goal, ESG information disclosure, climate risk response and other directions.

DOI: 10.54254/2754-1169/2026.GT33724

4.4. Keyword burst analysis

Keyword burst refers to keywords that have become hotspots in a specific time zone in relevant research fields, which can well grasp the timing and content of hotspot conversion [5]. In view of this, to further study the development trend of China's carbon accounting research, Citespace 6.4.R1 is run, the software parameter settings remain unchanged after keyword co-occurrence analysis, the Burstness item is selected, the gamma value is reduced to 0.4, and 14 burst items are calculated, as shown in Figure 4. Generally speaking, the duration of each burst term is short, indicating that the relevant research on carbon accounting has weak continuity and insufficient research stamina.

From 2010 to 2011, "low-carbon economy" was the earliest strong burst term with the highest burst strength (Strength=4.46), indicating that the low-carbon development concept was the initial trigger for carbon accounting research, and the research was carried out around the macro low-carbon background. From 2018 to 2019, "information disclosure" had a burst strength of 2.08, and "accounting treatment" (2018-2020) burst simultaneously, indicating that the research focus shifted to enterprise carbon information disclosure practice and specific accounting treatment processes, and regulatory and disclosure requirements became hotspots. Since 2021, "carbon neutrality" has become the strongest burst term (Strength=3.66, lasting until 2025), directly responding to the national "dual carbon" goals and becoming the most core research hotspot at present. In the same period, "electric power industry" (2021-2023), "quota assets" and "quota liabilities" (2021-2022) burst, indicating that the research further focused on the application of high-emission industries and the definition of accounting elements of carbon quotas, serving industry practice under the carbon neutrality goal.

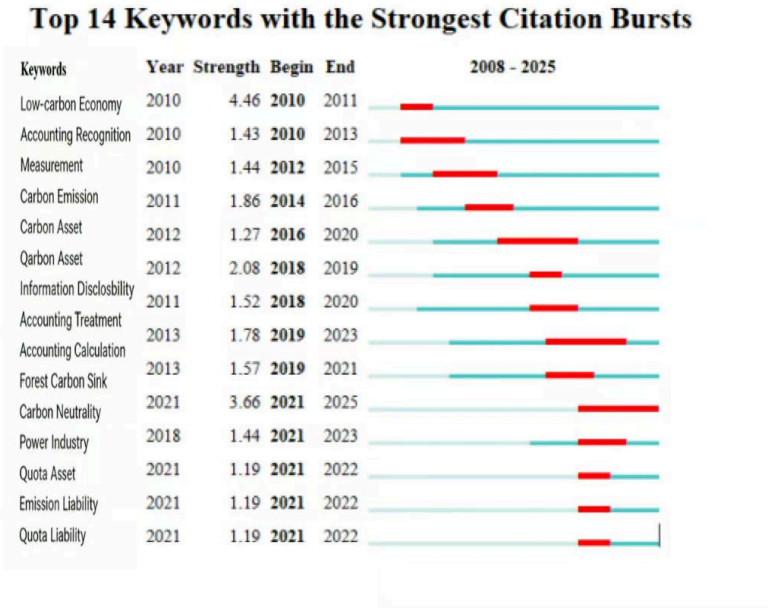


Figure 4. Keyword burst map of carbon accounting research in China

5. Conclusion and prospect

5.1. Core conclusions

Research subjects lack close cooperation and collaborative communication. A collaborative and communicative academic atmosphere has not yet been formed in China's carbon accounting field,

DOI: 10.54254/2754-1169/2026.GT33724

and there is no stable core research team. Although universities of finance and economics are the main research force, they lack university-enterprise cooperation, and the breadth of future research and development can be explored.

Research hotspots are highly concentrated, forming eight core clustering modules such as "carbon emission rights", "net approach", "information disclosure" and "carbon assets". "Carbon accounting", "carbon emission rights", "low-carbon economy" and "information disclosure" are high-frequency and high-centrality keywords, constituting the core hub of field research. 86% of keyword nodes are concentrated in the largest connected graph, reflecting that the research is carried out around core themes, and the overall research direction has strong consistency and stability.

Research hotspots adjust with the background of the times, and the sustainability of burst terms needs to be improved. Keyword burst analysis shows that the field research trend is highly synchronized with national low-carbon policies. "Low-carbon economy" in 2010 and "carbon neutrality" in 2021 have become the core strong burst terms in different stages, and industry and technical keywords such as "electric power industry", "quota assets" and "quota liabilities" burst simultaneously, reflecting that the research closely fits the needs of the national background. However, the duration of each burst term is short, indicating that key fields are studied to meet the background of the times at that time, without in-depth discussion in a certain field, with insufficient continuity and lack of in-depth excavation.

5.2. Research prospect

Environmental governance has always been a global concern. The research on carbon accounting should not only keep pace with the times, continuously promote and deepen research, but also conduct in-depth research without being superficial. Therefore, I put forward the following prospects:

The research on carbon accounting is not the research of a single person or a single subject, but a combination of multi-related field research. Scholars can cooperate with scholars in relevant environmental fields or interdisciplinary subjects to deeply discuss the calculation of carbon accounting and the recognition of relevant subjects, strengthen cross-disciplinary collaborative research, and build a diversified cooperative research system. Encourage cross-field and cross-subject cooperation between author teams, universities of finance and economics and industry-specific universities, research institutions and physical enterprises, and promote the effective implementation from theoretical research to enterprise practice.

Focus on the differentiated needs of different industries and promote the scenario-based and refined research of carbon accounting. Carry out industry-customized carbon accounting research according to the carbon emission characteristics and business model differences of different industries such as electric power, iron and steel, petrochemical and forestry, improve the carbon accounting calculation, information disclosure and carbon asset management system of each industry, and promote the implementation of carbon accounting in enterprises of different scales and types.

Pay attention to global environmental governance and make carbon accounting research truly contribute to the environment. The development of carbon accounting and the standard system of carbon emission rights are aimed at controlling the harm caused by enterprises to the environment and promoting the low-carbon transformation of enterprises. It should not only reflect the content of accounting information disclosure, but also a disclosure method that can truly affect investors' decisions, and promote enterprises to build an integrated management system integrating carbon accounting, disclosure and sustainable development management.

DOI: 10.54254/2754-1169/2026.GT33724

References

[1] Zhou Deliang, Li Huizhi. Research Hotspots and Trends of Carbon Accounting at Home and Abroad — Based on Citespace Knowledge Mapping Analysis [J]. Chinese Certified Public Accountant, 2024(03): 56-65. DOI: 10.16292/j.cnki.issn1009-6345.2024.03.020.

[2] Jiang Jieyao, Kuang Ping. Visual Analysis of Knowledge Mapping on the Research Status of Carbon Accounting in China Based on Citespace [J]. Commercial Accounting, 2025(24): 23-27.

[3] Liu Meijuan, Jin Jiaying, Yu Haixia, et al. Research on Carbon Information Disclosure of Listed Companies in Carbon Trading Pilots of Electric Power Industry [J]. Communication of Finance and Accounting, 2021(03): 92-97. DOI: 10.16144/j.cnki.issn1002-8072.2021.03.018.

[4] Yang Daijin. A Good Teacher for Accountants, A Conscience for Society [N]. Finance and Accounting News, 2006-10-16(A09).

[5] Hua Qiuhong. Research Status and Development Trend of Environmental Accounting Information Disclosure in China Under the Background of "Dual Carbon" — Based on Citespace Visual Analysis [J]. Chinese Certified Public Accountant, 2022(04): 47-53. DOI: 10.16292/j.cnki.issn1009-6345.2022.04.019.