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A BIBLIOMETRIC ANALYSIS OF CARBON ACCOUNTING RESEARCH BASED ON WEB OF SCIENCE

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Abstract. In recent years, research on carbon accounting has developed rapidly. To address the lack of up-to-date reviews, this study employs bibliometric methods and CiteSpace to analyze 592 carbon accounting-related publications indexed in the Web of Science Core Collection, including SCI-EXPANDED and SSCI, from 2005 to 2025. The results show that carbon accounting research has exhibited substantial growth overall and entered a phase of rapid expansion after 2023. China, the United States, and Australia are the leading contributing countries, while universities constitute the main research institutions. Research output is relatively dispersed across authors and publication outlets, while the leading outlets demonstrate distinct interdisciplinary characteristics. The main research themes include climate pressure, climate risk and policy responses, corporate governance and carbon management, as well as green innovation and performance outcomes. The evolution of research hotspots indicates that the field has gradually shifted from an early focus on ecological and policy issues to firm-level management and environmental information disclosure, and has subsequently expanded to performance outcomes and corporate social responsibility. This study reveals the structural characteristics and evolutionary trends of carbon accounting research, providing a systematic overview and useful reference for future research.

Keywords: carbon accounting, bibliometric analysis, scientific production, key authors, publication outlets, research themes, hotspot evolution.

Main provisions. This study employs bibliometric methods and CiteSpace to comprehensively analyze 592 carbon accounting-related publications in the Web of Science Core Collection from 2005 to 2025. The results indicate that this field has generally shown an upward trend. China, the United States, and Australia are the main contributing countries. Universities have become the main knowledge producers, and authors are not highly concentrated. Journal publication channels are also relatively scattered. Topic clustering shows that existing research mainly focuses on climate pressure, climate risk and policy responses, corporate governance and carbon management, as well as green innovation and performance outcomes. Keyword burst analysis indicates that this field has gradually shifted from early ecological and policy-oriented issues to disclosure, governance, and performance at the level of firm micro-behavior.

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Introduction. To mitigate the climate crisis, countries have gradually shifted from decentralized emission reduction efforts to more formal and institutionalized international cooperation, and have successively signed global climate agreements, such as the Kyoto Protocol and the Paris Agreement. Against this backdrop, carbon accounting has become a key issue in climate governance and sustainable development research.

Although an increasing number of studies have focused on carbon accounting issues in recent years, systematic reviews of the overall development of this field remain relatively limited. Existing reviews mostly focus on specific topics, specific journals, or earlier periods, and lack a comprehensive overview covering the period from 2005 to 2025 based on visual knowledge mapping.

This study aims to fill this research gap and, from the perspectives of the basic characteristics of the field and scientific mapping, poses the following research questions:

RQ1: What is the overall development of carbon accounting research?

RQ1.1: How has scientific production evolved?

RQ1.2: Which countries and institutions are the main contributors?

RQ1.3: Which authors are the most active?

RQ1.4: Which journals are the main publication outlets?

RQ2: What are the major themes and emerging trends in carbon accounting research?

RQ2.1: What are the main research themes?

RQ2.2: What are the research hotspots and evolutionary trends?

To address the above research questions, we employ bibliometric analysis methods and review 592 publications from the Web of Science Core Collection database, including SCI-EXPANDED and SSCI. Data processing is conducted using CiteSpace. This study aims to provide an updated perspective on carbon accounting research up to 2025, including its knowledge structure, development trajectory, and research characteristics, thereby offering a reference for studies on emerging economies.

Literature review. Carbon accounting research develops along several interrelated directions. First, the literature focuses on measuring carbon emissions and comparing accounting methods across different boundaries. Studies compare production- and consumption-based accounting and suggest either shifting to consumption-based approaches or combining the two [1]. This research also covers applications in forests [2], electricity markets [3], and wood products [4].

Second, carbon accounting has expanded from measurement to disclosure and reporting. Studies examine how carbon information can be incorporated into reporting systems, including drawing on the U.S. lease accounting framework [5] and the logic of balance sheets and flow statements [6]. Research also highlights inconsistencies between reported carbon information and carbon performance [7].

Several reviews have examined the development of carbon accounting research. He et al. reviewed articles published in major accounting journals from 2005 to 2018 [10]. Marlowe and Clarke traced the development of the field through 2021 [11]. Setiawan et al. conducted a bibliometric analysis for 2013-2023 using the relatively broad search string “climate change and accounting” [12].

Overall, these studies provide valuable insights into the evolution of carbon accounting research, but two major limitations remain. First, many reviews do not cover research published through 2025. Second, some studies use an overly broad search scope or an overly narrow journal scope, limiting understanding of the field’s internal research structure. These limitations motivate this study.



Materials and methods. This study employs bibliometric analysis to explore the development characteristics and knowledge structure of carbon accounting. To provide a transparent description of the literature selection process, this study uses selected elements of the PRISMA framework, namely identification, screening, eligibility, and inclusion [12]. The selection process considered database sources, search terms, document types, subject categories, language, and time range. Figure 1 summarizes the literature selection process based on these criteria.

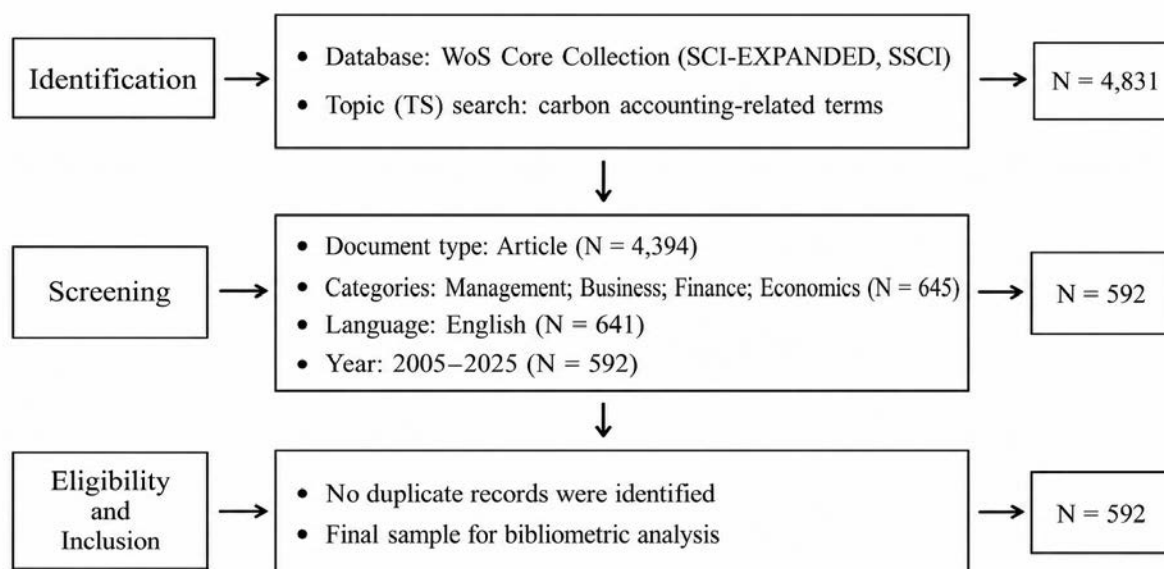


Figure 1 – Literature selection process

Following He et al. [10], a Topic Search (TS) was conducted in the Web of Science Core Collection (SCI-EXPANDED and SSCI) using “carbon accounting”, “carbon disclosure”, “carbon reporting”, “carbon report”, “carbon management”, “carbon performance”, “carbon assurance”, “carbon emission disclosure”, “greenhouse gas disclosure”, and “climate change disclosure”. The search yielded 4,831 records.

The document type was restricted to “Article,” excluding reviews, book chapters, and other non-article records. Early Access and Proceedings Paper records were retained only when also classified as articles, leaving 4,394 records. Restricting the subject categories to Management, Business, Finance, and Economics reduced the sample to 645, and limiting the language to English reduced it to 641. Restricting the period to 2005–2025 left 592 records. The records were checked for duplicates, and no duplicate records were identified. The final sample was analyzed using CiteSpace. The period begins in 2005, when the Kyoto Protocol came into effect and the European Union Emissions Trading System (EU ETS) was launched, providing an important regulatory context. It ends in 2025 to capture the most recent literature.

Results and discussion. To answer RQ1, this section examines the development of carbon accounting through publication trends, countries, institutions, authors, and journals. The CiteSpace analysis covered 2005 to 2025 using one-year time slices.

RQ1.1 Scientific production: The number of publications increased overall, with growth accelerating after 2019 and rising sharply after 2023, consistent with existing research [12]. Figure 2 shows the annual publication trends in carbon accounting from 2005 to 2025.

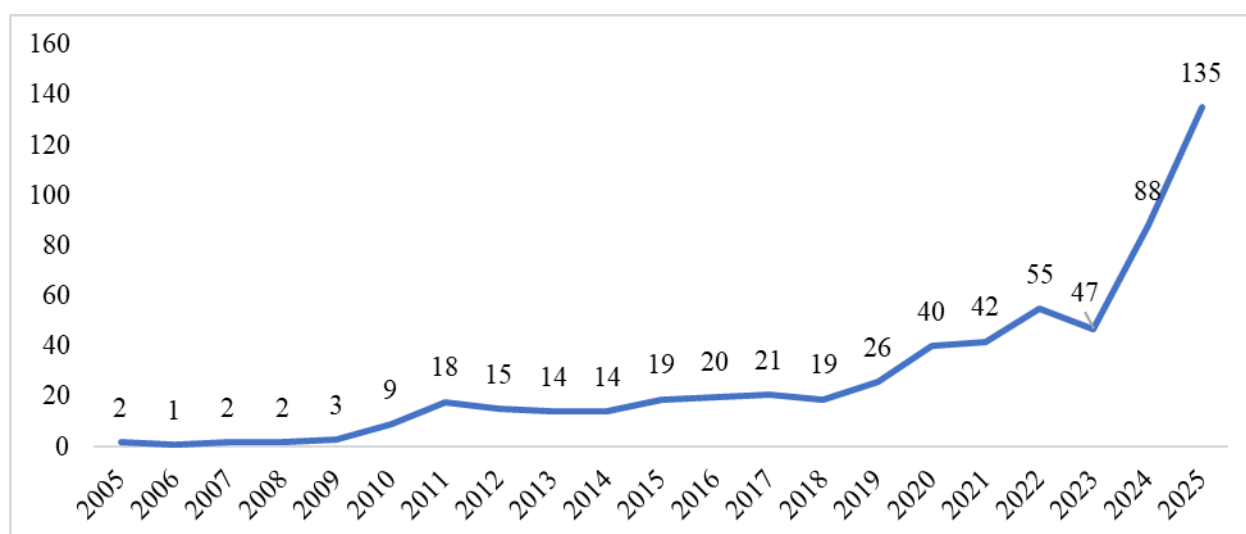


Figure 2 – Annual publication trends

Carbon accounting entered its initial stage in 2005, with the annual number of publications rarely exceeding 3. The Kyoto Protocol and the EU ETS, as important climate-related institutional arrangements, gradually made carbon emissions measurable, tradable, and manageable, thereby creating practical demand for carbon accounting and providing a preliminary institutional foundation. For instance, the Kyoto Protocol set binding greenhouse gas emission reduction targets for industrialized countries and economies in transition.

From 2011 to 2018, carbon accounting research grew steadily, with annual publications reaching around 10 to 20 papers, reflecting the expansion of accounting boundaries and information disclosure frameworks. The Greenhouse Gas Protocol (GHG Protocol) Scope 3 Standard, released in 2011, extended firms' focus from direct emissions to indirect emissions across supply and value chains. The Paris Agreement, adopted in 2015, broadened participation in global climate governance. The recommendations of the Task Force on Climate-related Financial Disclosures (TCFD), released in 2017, promoted the integration of climate issues with financial risk, information disclosure, and corporate governance research. These developments may have driven carbon accounting research from early measurement issues toward information disclosure, corporate governance, and comparability.

From 2019 to 2025, carbon accounting research expanded rapidly, especially after 2023, possibly reflecting the further development of global climate and sustainability disclosure systems. The International Sustainability Standards Board (ISSB) was established in 2021 and released IFRS S2 Climate-related Disclosures in 2023. The Corporate Sustainability Reporting Directive (CSRD) and the European Sustainability Reporting Standards (ESRS) further systematized disclosure requirements, shifting carbon disclosure from voluntary practice to more binding requirements in some institutional environments and increasing the significance of carbon accounting in business, finance, and management research. The growth after 2023 may also reflect increased research output from major contributing countries such as China, as discussed further in the national-level analysis.

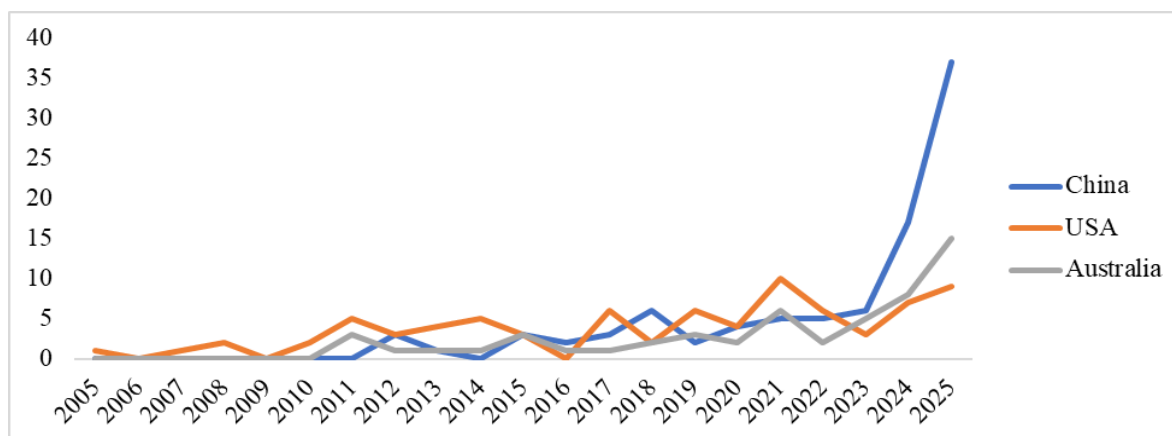
RQ1.2 Main contributing countries and institutions: at the national level, Table 1 lists countries with more than 10 publications.

**Table 1** – Top countries by publications

Country	Publications	Betweenness centrality	First year
China	94	0.33	2012
United States	79	0.33	2005
Australia	54	0.37	2011
United Kingdom	46	0.33	2010
Germany	24	0.16	2005
France	22	0.15	2014
Canada	20	0.12	2006
Italy	13	0.05	2016
New Zealand	11	0.06	2009

Knowledge production in carbon accounting is concentrated in a few economies. Except for China, most major contributors are developed economies, consistent with previous research [10]. This may reflect their earlier participation in climate governance, stronger institutional foundations, and greater research resources. In contrast, many emerging and less developed economies have weaker institutional development and fewer research resources, resulting in lower research influence.

The top three countries by publication volume are China (94), the United States (79), and Australia (54), with China as the leading contributor. Figure 3 presents the annual publication trends of these three countries.

**Figure 3** – Annual publications by country (China, USA, and Australia)

The United States was the earliest to conduct research in this field and led from 2005 to 2014, possibly due to its more mature academic system and earlier environmental information disclosure practices, including the 2009 requirement of the United States Environmental Protection Agency (EPA) that specific entities disclose greenhouse gas emission data. Although its growth later slowed, the United States maintained stable output.

China only began to publish relevant studies in 2012. This may be related to ecological civilization being elevated to a national development goal in 2012 and the initiation of carbon emissions trading pilots. Publications increased significantly after 2023, possibly influenced by the dual carbon targets proposed in 2020 and the launch of the national carbon market in 2021. Despite its late start, China later grew rapidly and became the leading country by publication volume.



Australia has a relatively small publication volume but maintains stable output, possibly reflecting the practical significance of carbon issues in its resource-based economy. Australia also emphasized climate disclosure systems relatively early, establishing the National Greenhouse and Energy Reporting (NGER) framework in 2007 and passing mandatory climate-related financial disclosure legislation in 2024. These institutional developments may have continuously supported related research.

The relatively high betweenness centrality of these three countries indicates important bridging roles in the international cooperation network.

At the institutional level, due to space limitations, Table 2 lists seven leading institutions, each with more than four publications.

Table 2 – Leading institutions by publications

Institution	Country	Publications	Betweenness centrality	First year
Macquarie University	Australia	16	0.02	2019
Western Sydney University	Australia	11	0.01	2021
University of Nottingham	United Kingdom	7	0.00	2009
University of Newcastle	Australia	6	0.01	2014
Hong Kong Polytechnic University	China	5	0.00	2023
RMIT University	Australia	5	0.01	2015
Queen Mary University of London	United Kingdom	5	0.00	2018

Macquarie University (16) and Western Sydney University (11) are the most active institutions, consistent with existing research [12]. All remaining institutions have fewer than ten publications, indicating that carbon accounting research is not highly concentrated across institutions.

Meanwhile, the generally low betweenness centrality of these institutions suggests limited institutional cooperation. Among the 20 institutions with more than four publications, universities are the main producers of carbon accounting knowledge. Australia has the largest number, with 8 universities, followed by the United States with 3 and the United Kingdom, Germany, and China with 2 each.

RQ1.3 Most active authors: This section identifies prolific authors and those with high academic influence. Table 3 includes the top nine authors with at least four publications and those with more than 50 citations.

Table 3 – Most productive and most cited authors

Productive authors	Publications	First year	Cited authors	Citations
Luo, L.	13	2012	Luo, L.	134
Tang, Q.	8	2012	Clarkson, P.M.	131
Bui, B.	8	2017	Kolk, A.	122
Schiemann, F.	5	2016	Matsumura, E.M.	93
Haque, F.	4	2017	Stanny, E.	66
Rashid, A.	4	2021	Liao, L.	65
Zaffar, A.	4	2024	Busch, T.	61
Du, D.A.	4	2024	Cho, C.H.	58
Zhang, J.	4	2025	Cormier, D.	57



Luo, L. ranks first in both publication volume and citation count, with 13 publications and 134 citations, indicating high research activity and strong academic influence.

Among the other authors, Tang, Q. and Bui, B. each have 8 publications, while Schiemann, F. has 5. The small differences in publication volume suggest that authorship is not highly concentrated. Clarkson, P. M., Kolk, A., and Matsumura, E. M. have relatively high citation counts, but except for Luo, L., there is little overlap between highly productive and highly cited authors. Because the representative works of highly cited authors were mostly published before 2015, their citation counts may partly reflect the cumulative effect of time. Their relatively low betweenness centrality also indicates limited cooperation among authors.

RQ1.4 Main publication outlets by publication volume: this section identifies the main journals publishing carbon accounting research. Figure 4 shows journals with at least six publications.

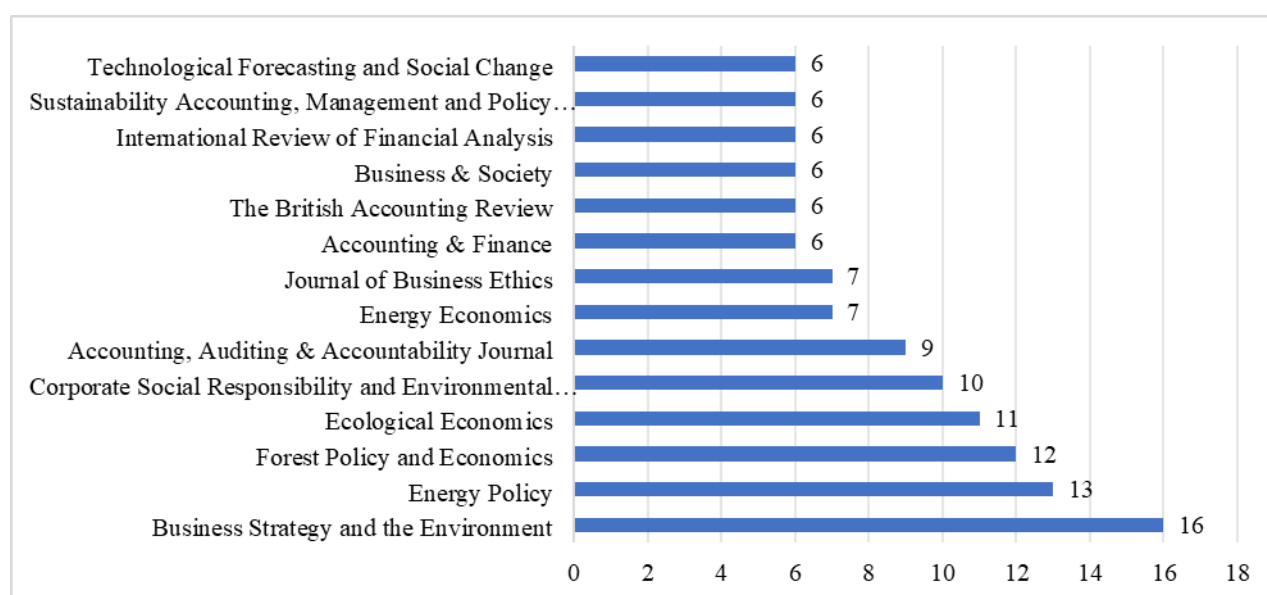


Figure 4 –Main publication outlets by publication volume

Business Strategy and the Environment (16), Energy Policy (13), and Forest Policy and Economics (12) are the top three journals and important outlets in this field. However, the small gap between these and other journals suggests that carbon accounting research is dispersed across multiple outlets and has not formed a dominant core publication channel.

Meanwhile, some journals show sustained publication activity. Business Strategy and the Environment published research on this topic over a 16-year period, with publications extending to 2025. Energy Policy and Forest Policy and Economics also published related research approximately every one to two years, indicating sustained attention. Overall, these journals have served as long-term outlets for carbon accounting research.

Although the sample was limited to Management, Business, Finance, and Economics, some major journals show clear interdisciplinary characteristics. Energy Policy is also classified under Energy & Fuels, Forest Policy and Economics under Forestry, and Technological Forecasting and Social Change under Planning & Development. Thus, carbon accounting is linked not only to business, management, economics, and finance but also to energy governance, ecological resource management, and policy development.

The scientific mapping analysis for RQ2 is presented below. CiteSpace covered 2005 to 2025 using one-year time slices.



RQ2.1 Main research themes: to identify the thematic structure of carbon accounting, the study conducted cluster analysis of the keyword co-occurrence network. Cluster labels were generated using the log-likelihood ratio (LLR) algorithm, and nodes were selected using the g-index ($k = 25$). The network had a modularity Q of 0.7343 and a weighted mean silhouette S of 0.8581, indicating clear cluster separation and high within-cluster consistency. Table 4 summarizes the three main research themes derived from the keyword clusters.

Table 4 – Main research themes and representative keyword clusters

Main research theme	Included keyword clusters
Climate pressure, climate risk, and policy responses	#3 climate change, #8 science-based targets, #10 carbon emissions, #12 climate risk, and #15 climate change risk
Corporate governance and carbon management	#4 governance, #1 gender diversity, and #9 carbon management
Green innovation and its impact on performance outcomes	#0 green innovation, #5 innovation, and #6 carbon performance
Note: The table presents only representative clusters within the three core themes; other clusters are discussed separately in the text	

First, we group #3 climate change, #8 science-based targets, #10 carbon emissions, #12 climate risk, and #15 climate change risk under the theme of climate pressure, climate risk, and policy responses. Carbon emissions exacerbate climate change and create financial risks, prompting stakeholders to set reduction targets and take action. Together, these factors form the real-world context for carbon accounting. For example, the Chinese government reduces emissions through low-carbon city pilot projects [13], while institutional investors recognize the financial significance of climate risk and participate in risk governance [14]. Jung et al. further identify carbon risk as a factor affecting debt financing costs [15]. Overall, this theme covers both climate risk identification and stakeholder responses at the policy, governance, and investment levels.

The second theme is corporate governance and carbon management, including #4 governance, #1 gender diversity, and #9 carbon management. Firms are key actors in carbon reduction and promote carbon governance through internal governance and management mechanisms. At the governance structure level, female and independent director representation and environmental committees may affect greenhouse gas disclosure [8]. At the firm strategy level, board emphasis on carbon strategy may influence carbon performance [16]. At the organizational incentive level, linking executive compensation to carbon targets may affect carbon performance and firm value [9]. Overall, this theme focuses on corporate governance structures, strategic orientations, and management practices.

The third theme is green innovation and its impact on performance outcomes, including #0 green innovation, #5 innovation, and #6 carbon performance. Existing research suggests that green innovation supports firms' low-carbon transformation through technological upgrading and process optimization, thereby improving environmental performance. Li et al. highlight the important role of green innovation in the relationship between firms' environmental information disclosure and actual environmental outcomes [17]. Other studies extend the analysis of carbon performance to financial performance, firm value, and other outcomes [18]. Overall, this theme links green innovation with carbon performance and broader economic outcomes.

In addition to the three core themes, #17 legitimacy theory is treated separately as a cross-theme theoretical foundation. It is widely used to explain firms' carbon-related behavior



and responses to institutional environments and social expectations. Many scholars regard legitimacy theory as an important explanatory framework. For example, Qian and Schaltegger showed that carbon management strategies vary across institutional contexts [19], while Luo found that institutional context affects the relationship between voluntary carbon disclosure and carbon emission performance [20]. Therefore, legitimacy theory is better understood as a theoretical foundation that extends across the three themes.

Furthermore, #7 forest, #11 leakage, #13 crop-fallow systems, #14 optimal rotation, and #16 avoided deforestation focus on forest carbon sinks, land-use change, agricultural rotation, and avoided deforestation. Although these clusters remain part of carbon accounting, they are less directly aligned with this study's business and economics focus on Management, Business, Finance, and Economics and are therefore not treated as core themes.

To assess the consistency of the thematic classification, Table 5 lists the ten most highly co-cited articles.

Table 5 –Top co-cited references

Reference	Short title	Co-cited counts
Krueger et al. (2020)	Climate risks and institutional investors	28
Bui et al. (2020)	Climate governance, carbon disclosure and performance	22
Liao et al. (2015)	Gender diversity, board independence and GHG disclosure	20
Velte et al. (2020)	Carbon performance and disclosure: A systematic review	18
Haque and Ntim (2020)	Executive compensation and carbon performance	18
Alsaifi et al. (2020)	Carbon disclosure and financial performance	17
Moussa et al. (2020)	Board environmental orientation and carbon performance	17
Depoers et al. (2016)	Voluntary disclosure of greenhouse gas emissions	15
Luo (2019)	Institutional context, carbon disclosure and emissions performance	15
Jung et al. (2018)	Carbon risk and cost of debt financing	15

Co-cited literature reflects the knowledge base of carbon accounting. Overall, the findings largely align with the themes identified above. Jung et al. [15] and Krueger et al. [14] examine climate risk in relation to investment decisions and financing costs, corresponding to the first theme. Haque and Ntim [9] and Moussa et al. [16] examine carbon performance from the perspectives of executive incentives and board environmental orientation, respectively, linking the second and third themes. In addition, several of the most highly co-cited studies directly address disclosure-related issues, highlighting the importance of carbon disclosure. For example, Bui et al. [7], Liao et al. [8], Luo [20], and Alsaifi et al. [18] examine the determinants and quality of carbon disclosure. However, disclosure did not emerge as an independent cluster in the keyword analysis.

One possible reason is that disclosure has strong cross-topic characteristics and is often embedded in research on climate risk, corporate governance, legitimacy, and carbon performance. Because keyword clustering tends to generate specific labels that distinguish clusters, disclosure may be too broad to serve as the optimal label for a single cluster.

RQ2.2 Hot topics and evolutionary trends: This section uses keyword burst analysis to identify hot topics in carbon accounting across different periods. Table 6 presents the keywords with the strongest citation bursts and their active periods. Based on their start and end years, the burst keywords are divided into three stages.



Table 6 – Keyword bursts

Keywords	Strength	Begin year	End year
carbon sequestration	3.63	2005	2016
forest	2.81	2006	2014
politics	2.57	2009	2011
carbon management	2.80	2010	2016
resource-based view	2.88	2011	2017
voluntary disclosure	2.51	2014	2019
environmental disclosure	5.40	2015	2021
Carbon Disclosure Project	2.64	2015	2019
financial performance	3.25	2021	2023
economic performance	3.13	2021	2023
social responsibility	3.27	2022	2025

In the early stage beginning in 2005, burst keywords included carbon sequestration, forest, and politics. These keywords indicate a focus on forest carbon sinks, ecological resource management, and policy discussions, reflecting a strong ecological and macro-governance orientation.

Beginning in 2010, carbon accounting research entered a middle stage centered on firm management and information disclosure. Burst keywords included carbon management, resource-based view, voluntary disclosure, environmental disclosure, and the Carbon Disclosure Project. These keywords mainly concerned corporate carbon management, disclosure determinants, and disclosure quality. Environmental disclosure had the highest burst strength (5.4), indicating strong attention to disclosure-related issues. This shift may have been related to the expansion of the scope of carbon accounting research and the maturation of disclosure standards.

Finally, since 2021, carbon accounting has further extended to performance outcomes and social responsibility. The burst keywords include financial performance, economic performance, and social responsibility, indicating a deeper focus on outcome-related issues.

Conclusion. This study uses data from the Web of Science Core Collection and employs bibliometric methods and CiteSpace to analyze the knowledge structure of carbon accounting from 2005 to 2025. The findings show an overall upward trend in publications. China, the United States, and Australia have made significant contributions, while universities are the main producers of knowledge. Productive and highly cited authors only partially overlap, and publications are relatively dispersed across journals. The main research themes are climate pressure, climate risk, and policy responses; corporate governance and carbon management; and green innovation and performance outcomes. Legitimacy theory serves as an important cross-theme explanatory framework. Research hotspots have shifted from early ecological and macro-governance issues to firm management and information disclosure, and later to performance outcomes and social responsibility.

This study provides useful references for carbon accounting research in emerging and transition economies. For Kazakhstan, as a resource-based economy, carbon accounting has clear practical significance. As a resource-based economy, Kazakhstan has strong practical needs for carbon accounting, but its institutional practices are still in their infancy. Existing research mainly focuses on policy responses. Future research can further expand to areas such as firm carbon management, information disclosure, and performance outcomes. In addition, since universities are the main producers of knowledge, we suggest strengthening cooperation



between universities in Kazakhstan and active international research institutions to enhance Kazakhstan's research visibility in this field.

This study supplements existing understanding of the development characteristics and knowledge structure of carbon accounting up to 2025. Compared with existing studies, this study does not merely focus on broad climate issues or remain confined to the narrow scope of accounting journals. However, this study still has certain limitations. First, the data source is limited to the Web of Science, which limits the sample coverage. Second, although the search terms draw on existing literature, their selection may still involve a degree of subjectivity. Future research can further expand the range of database sources and explore more objective methods for determining search terms.

Literature cited

1. Afionis S., Sakai M., Scott K., Barrett J., Gouldson A. Consumption-based carbon accounting: does it have a future? // *WIREs Climate Change*. – 2017. – Vol. 8, No. 1. – e438. – DOI: 10.1002/wcc.438.
2. Gifford L. “You can’t value what you can’t measure”: a critical look at forest carbon accounting // *Climatic Change*. – 2020. – Vol. 161, No. 2. – P. 291–306. – DOI: 10.1007/s10584-020-02653-1.
3. Tranberg B., Corradi O., Lajoie B., Gibon T., Staffell I., Andresen, G. B. Real-time carbon accounting method for the European electricity markets // *Energy Strategy Reviews*. – 2019. – Vol. 26. – e100367. – DOI: 10.1016/j.esr.2019.100367.
4. Bedogni F., Rossi E., Arfelli F., Cespi D., Passarini F. Methodological challenges in wood carbon accounting: a maritime flooring case study // *Journal of Cleaner Production*. – 2025. – Vol. 524. – e146525. – DOI: 10.1016/j.jclepro.2025.146525.
5. Easton P., Ruch G., Taylor G. Accounting is the language of sustainability: a measurement framework for carbon accounting // *Accounting and Business Research*. – 2025. – Vol. 55, No. 5. – P. 542–560. – DOI: 10.1080/00014788.2025.2516282.
6. Reichelstein S. Corporate carbon accounting: balance sheets and flow statements // *Review of Accounting Studies*. – 2024. – Vol. 29, No. 3. – P. 2125–2156. – DOI: 10.1007/s11142-024-09830-y.
7. Bui B., Houqe M. N., Zaman M. Climate governance effects on carbon disclosure and performance // *The British Accounting Review*. – 2020. – Vol. 52, No. 2. – e100880. – DOI: 10.1016/j.bar.2019.100880.
8. Liao L., Luo L., Tang Q. Gender diversity, board independence, environmental committee and greenhouse gas disclosure // *The British Accounting Review*. – 2015. – Vol. 47, No. 4. – P. 409–424. – DOI: 10.1016/j.bar.2014.01.002.
9. Haque F., Ntim C. G. Executive compensation, sustainable compensation policy, carbon performance and market value // *British Journal of Management*. – 2020. – Vol. 31, No. 3. – P. 525–546. – DOI: 10.1111/1467-8551.12395.
10. He R., Luo L., Shamsuddin A., Tang Q. Corporate carbon accounting: a literature review of carbon accounting research from the Kyoto Protocol to the Paris Agreement // *Accounting & Finance*. – 2022. – Vol. 62, No. 1. – P. 261–298. – DOI: 10.1111/acfi.12789.
11. Marlowe J., Clarke A. Carbon accounting: a systematic literature review and directions for future research // *Green Finance*. – 2022. – Vol. 4, No. 1. – P. 71–87. – DOI: 10.3934/GF.2022004.
12. Setiawan D., Santoso A., Asrihapsari A., Brahmana R. K., Jaaffar A. H. What do we know about carbon disclosure? A bibliometric analysis // *Cogent Social Sciences*. – 2025. – Vol. 11, iss. 1. – e2453899. – DOI: 10.1080/23311886.2025.2453899.
13. Huo W., Qi J., Yang T., Liu J., Liu M., Zhou Z. Effects of China's pilot low-carbon city policy on carbon emission reduction: a quasi-natural experiment based on satellite data // *Technological Forecasting and Social Change*. – 2022. – Vol. 175. – e121422. – DOI: 10.1016/j.techfore.2021.121422.
14. Krueger P., Sautner Z., Starks L. T. The importance of climate risks for institutional investors // *The Review of Financial Studies*. – 2020. – Vol. 33, No. 3. – P. 1067–1111. – DOI: 10.1093/rfs/hhz137.
15. Jung J., Herbohn K., Clarkson P. Carbon risk, carbon risk awareness and the cost of debt financing // *Journal of Business Ethics*. – 2018. – Vol. 150, No. 4. – P. 1151–1171. – DOI: 10.1007/s10551-016-3207-6.
16. Moussa T., Allam A., Elbanna S., Bani-Mustafa A. Can board environmental orientation improve U.S. firms' carbon performance? The mediating role of carbon strategy // *Business Strategy and the Environment*. – 2020. – Vol. 29, No. 1. – P. 72–86. – DOI: 10.1002/bse.2351.



17. Li D., Huang M., Ren S., Chen X., Ning L. Environmental legitimacy, green innovation, and corporate carbon disclosure: evidence from CDP China 100 // *Journal of Business Ethics*. – 2018. – Vol. 150, No. 4. – P. 1089–1104. – DOI: 10.1007/s10551-016-3187-6.
18. Alsaifi K., Elnahass M., Salama A. Carbon disclosure and financial performance: UK environmental policy // *Business Strategy and the Environment*. – 2020. – Vol. 29, No. 2. – P. 711–726. – DOI: 10.1002/bse.2426.
19. Qian W., Schaltegger S. Revisiting carbon disclosure and performance: legitimacy and management views // *The British Accounting Review*. – 2017. – Vol. 49, No. 4. – P. 365–379. – DOI: 10.1016/j.bar.2017.05.005.
20. Luo L. The influence of institutional contexts on the relationship between voluntary carbon disclosure and carbon emission performance // *Accounting & Finance*. – 2019. – Vol. 59, No. 2. – P. 1235–1264. – DOI: 10.1111/acfi.12267.

References

1. Afionis S., Sakai M., Scott K., Barrett J., Gouldson A. Consumption-based carbon accounting: does it have a future? *WIREs Climate Change*, 2017, 8(1), e438. DOI: 10.1002/wcc.438.
2. Gifford L. “You can’t value what you can’t measure”: a critical look at forest carbon accounting. *Climatic Change*, 2020, 161(2), pp. 291–306. DOI: 10.1007/s10584-020-02653-1.
3. Tranberg B., Corradi O., Lajoie B., Gibon T., Staffell I., Andresen, G. B. Real-time carbon accounting method for the European electricity markets. *Energy Strategy Reviews*, 2019, 26, e100367. DOI: 10.1016/j.esr.2019.100367.
4. Bedogni F., Rossi E., Arfelli F., Cespi D., Passarini F. Methodological challenges in wood carbon accounting: a maritime flooring case study. *Journal of Cleaner Production*, 2025, 524, e146525. DOI: 10.1016/j.jclepro.2025.146525.
5. Easton P., Ruch G., Taylor G. Accounting is the language of sustainability: a measurement framework for carbon accounting. *Accounting and Business Research*, 2025, 55(5), pp. 542–560. DOI: 10.1080/00014788.2025.2516282.
6. Reichelstein S. Corporate carbon accounting: balance sheets and flow statements. *Review of Accounting Studies*, 2024, 29(3), pp. 2125–2156. DOI: 10.1007/s11142-024-09830-y.
7. Bui B., Houqe M. N., Zaman M. Climate governance effects on carbon disclosure and performance. *The British Accounting Review*, 2020, 52(2), e100880. DOI: 10.1016/j.bar.2019.100880.
8. Liao L., Luo L., Tang, Q. Gender diversity, board independence, environmental committee and greenhouse gas disclosure. *The British Accounting Review*, 2015, 47(4), pp. 409–424. DOI: 10.1016/j.bar.2014.01.002.
9. Haque F., Ntim C.G. Executive compensation, sustainable compensation policy, carbon performance and market value. *British Journal of Management*, 2020, 31(3), pp. 525–546. DOI: 10.1111/1467-8551.12395.
10. He R., Luo L., Shamsuddin A., Tang Q. Corporate carbon accounting: a literature review of carbon accounting research from the Kyoto Protocol to the Paris Agreement. *Accounting & Finance*, 2022, 62(1), pp. 261–298. DOI: 10.1111/acfi.12789.
11. Marlowe J., Clarke A. Carbon accounting: a systematic literature review and directions for future research. *Green Finance*, 2022, 4(1), pp. 71–87. DOI: 10.3934/GF.2022004.
12. Setiawan D., Santoso A., Asrihapsari A., Brahmana R. K., Jaaffar A. H. What do we know about carbon disclosure? A bibliometric analysis. *Cogent Social Sciences*, 2025, 11(1), e2453899. DOI: 10.1080/23311886.2025.2453899.
13. Huo W., Qi J., Yang T., Liu J., Liu M., Zhou, Z. Effects of China’s pilot low-carbon city policy on carbon emission reduction: a quasi-natural experiment based on satellite data. *Technological Forecasting and Social Change*, 2022, 175, e121422. DOI: 10.1016/j.techfore.2021.121422.
14. Krueger P., Sautner Z., Starks, L. T. The importance of climate risks for institutional investors. *The Review of Financial Studies*, 2020, 33(3), pp. 1067–1111. DOI: 10.1093/rfs/hhz137.
15. Jung J., Herbohn K., Clarkson P. Carbon risk, carbon risk awareness and the cost of debt financing. *Journal of Business Ethics*, 2018, 150(4), pp. 1151–1171. DOI: 10.1007/s10551-016-3207-6.
16. Moussa T., Allam A., Elbanna S., Bani-Mustafa A. Can board environmental orientation improve U.S. firms’ carbon performance? The mediating role of carbon strategy. *Business Strategy and the Environment*, 2020, 29(1), pp. 72–86. DOI: 10.1002/bse.2351.
17. Li D., Huang M., Ren S., Chen X., Ning L. Environmental legitimacy, green innovation, and corporate carbon disclosure: evidence from CDP China 100. *Journal of Business Ethics*, 2018, 150(4), pp. 1089–1104. DOI: 10.1007/s10551-016-3187-6.



18. Alsaifi K., Elnahass M., Salama A. Carbon disclosure and financial performance: UK environmental policy. *Business Strategy and the Environment*, 2020, 29(2), pp. 711–726. DOI: 10.1002/bse.2426.
19. Qian W., Schaltegger S. Revisiting carbon disclosure and performance: legitimacy and management views. *The British Accounting Review*, 2017, 49(4), pp. 365–379. DOI: 10.1016/j.bar.2017.05.005.
20. Luo L. The influence of institutional contexts on the relationship between voluntary carbon disclosure and carbon emission performance. *Accounting & Finance*, 2019, 59(2), pp. 1235–1264. DOI: 10.1111/acfi.12267.

WEB OF SCIENCE ДЕРЕКҚОРЫ НЕГІЗІНДЕ КӨМІРТЕК ЕСЕБІ БОЙЫНША ЗЕРТТЕУЛЕРГЕ БИБЛИОМЕТРИЯЛЫҚ ТАЛДАУ

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Түйін. Соңғы жылдары көміртек есебі бойынша зерттеулер қарқынды дамып келеді. Өзекті шолу деректерінің жеткіліксіздігін толықтыру мақсатында бұл зерттеуде библиометриялық әдістер мен CiteSpace бағдарламалық құралы қолданылып, 2005–2025 жылдар аралығында Web of Science Core Collection дерекқорында, соның ішінде SCI-EXPANDED және SSCI индекстерінде жарияланған көміртек есебіне қатысты 592 жарияланым талданды. Нәтижелер көміртек есебі бойынша зерттеулердің жалпы алғанда айқын өсу үрдісін көрсеткенін және 2023 жылдан кейін жедел кеңейіп келеді. Қытай, АҚШ және Австралия осы салаға негізгі үлес қосқан елдер болып табылады, ал университеттер басты зерттеу ұйымдары ретінде көрінеді. Өнімді авторлар мен жарияланым алаңдары салыстырмалы түрде шашыраңқы, ал негізгі журналдық платформалар айқын пәнаралық сипатқа ие. Негізгі зерттеу тақырыптары климаттық қысым, климаттық тәуекелдер мен саясаттық жауап шаралары, корпоративтік басқару және көміртекті басқару, сондай-ақ жасыл инновациялар мен қызмет нәтижелеріне шоғырланған. Зерттеу бағыттарының эволюциясы бұл саланың ерте кезеңдегі экологиялық және саясаттық бағыттан фирмалық басқару мен экологиялық ақпаратты ашуға, кейіннен қызмет нәтижелері мен әлеуметтік жауапкершілік мәселелеріне қарай кеңейгенін көрсетеді. Бұл зерттеу көміртек есебі бойынша зерттеулердің құрылымдық сипаттамалары мен эволюциялық үрдістерін ашып, болашақ зерттеулер үшін жүйелі негіз ұсынады.

Түйінді сөздер: көміртек есебі, библиометриялық талдау, ғылыми өнімділік, негізгі авторлар, жарияланым алаңдары, зерттеу тақырыптары, зерттеу бағыттарының эволюциясы.

БИБЛИОМЕТРИЧЕСКИЙ АНАЛИЗ ИССЛЕДОВАНИЙ В ОБЛАСТИ УГЛЕРОДНОГО УЧЕТА НА ОСНОВЕ WEB OF SCIENCE

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Резюме. В последние годы исследования в области углеродного учета развиваются быстрыми темпами. В целях восполнения недостатка актуальных обзорных данных в данном исследовании с применением библиометрических методов и программного инструмента CiteSpace проанализированы 592 публикации, связанные с углеродным учетом, из базы Web of Science Core Collection, включая SCI-EXPANDED и SSCI, за период 2005–2025 гг. Результаты показывают, что исследования углеродного учета в целом демонстрируют значительную тенденцию роста и после 2023 г. перешли в фазу быстрого расширения. Китай, США и Австралия являются основными странами, внесшими вклад в развитие данного направления, а университеты выступают главными исследовательскими организациями. Высокопродуктивные авторы и публикационные издания относительно рассредоточены, при этом основные журналы характеризуются выраженной междисциплинарностью. Основные исследовательские темы сосредоточены на климатическом давлении, климатических рисках и мерах государственной политики, корпоративном управлении и управлении выбросами углерода, а также зеленых инновациях и результатах деятельности. Эволюция исследовательских направлений показывает, что данная область постепенно сместилась от ранней экологической направленности и ориентации на вопросы государственной политики к управлению фирмами и раскрытию экологической информации, а затем



расширилась до вопросов результативности и социальной ответственности. Данное исследование раскрывает структурные характеристики и эволюционные тенденции исследований в области углеродного учета и предоставляет систематическую основу для будущих исследований.

Ключевые слова: углеродный учет, библиометрический анализ, научная продукция, ключевые авторы, публикационные площадки, исследовательские темы, эволюция исследовательских тем.

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