Design and Construction of Carbon Accounting Techniques in FinTech: A Scientometric Analysis

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Abstract. In the context of the "dual carbon" goals, designing and establishing carbon accounting technologies related to carbon trading, carbon accounting, carbon sequestration, and carbon pricing may significantly contribute to achieving the goals. Financial technology (fintech) is inclusive and innovative. So artificial intelligence, blockchain, cloud computing, big data analytics, and e-commerce under its fields will help provide methods and recommendations for designing and constructing carbon accounting technology. This paper discusses fintech and carbon accounting techniques, aiming to map the main countries, sources, and themes of relevant research based on 141 articles from the Web of Science (WoS) database. The scientific metrology analysis result shows that: scholars will pay more attention to fintech and carbon accounting technology topics. China contributed the most to research, followed by the United States. Publication sources reflect the interdisciplinary nature of research. The main research topics are blockchain, cloud computing, artificial intelligence, etc. Research hotspots mainly focus on carbon sequestration, blockchain, and carbon emissions. In short, there currently needs to be more studies on the design and creation of carbon accounting under financial technology. There are many factors to consider (such as practicality and feasibility), and there is more space for development.

Keywords: fintech · blockchain · carbon accounting · carbon trading

1 Introduction

Cross-border cooperation in big data, Internet technology, and e-commerce is vital in developing people-oriented technology applications [1]. From this, we can think about how to design and build carbon accounting technologies using artificial intelligence, blockchain, cloud computing, big data analytics, e-commerce platforms, fintech, regulatory tech, and more.

Scholars have studied this. For example, use blockchain to design new carbon accounting methods and corresponding carbon emission reduction incentives [2]; support regulators in designing digital emissions trading systems through an assessment framework [3]; Leverage big data to track carbon pathways to determine carbon tax collection [4] or establish carbon sequestration indices [5]; Case studies show that fintech

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with big data, artificial intelligence, and blockchain can better assess climate-related financial risks and form carbon trading mechanisms [6]. In addition, according to the evaluation of the ecological impact of green finance, it helps the construction of a carbon trading accounting system [7]. From this point of view, financial technology provides new ideas and empirical evidence for those who design and build carbon accounting technology. Although this type of research is less than that of the fintech digital economy, it also stimulates fintech innovation to achieve more inclusive and sustainable development [8].

This paper provides research on the design and construction of carbon accounting technology in financial technology, aiming to map relevant research based on 141 papers in the Web of Science (WoS) database. It can provide researchers with ideas as a reference.

2 Data and Methods

To obtain literature on fintech and carbon accounting techniques, we use the following Web of Science (WoS) advanced search query:

TS = ("Artificial intelligence" OR "AI" OR "blockchain" OR "cloud computing" OR "big data" OR "e-commerce" OR "financial technology" OR "FinTech" OR "regulatory technology") AND TS = ("carbon accounting" OR "carbon sequestration" OR "Carbon trading" OR" Carbon Pricing" OR" Emissions Trading" OR "Carbon tax").

A total of 141 articles (including SCI-EXPANDED, SSCI.) were collected on 02.02.2023. Use VOSviewer and bibliometric for mapping.

3 Research Findings

This paper presents research trends, main countries, sources, and author keywords related to the topic for data and visual analysis.

3.1 Annual Scientific Production and Related Statistics

As Fig. 1 shows, only a small number of articles were published in 2006. Volume fluctuations increased slowly between 2011 and 2016. Since 2016, the number has increased significantly year by year. The largest increase was seen in 2020–2022, and the upward trend is likely to continue. The relevant statistics of these 141 papers are listed in Table 1.

3.2 Main Countries and Sources

In Fig. 2, "AU" is the author, "AU_CO" is the author's country, "SO" is the source of publication, and the line thickness indicates the quantity. The figure shows the relationship between authors, countries, and publication sources. Authors from different countries conduct cooperative research exchanges, most of which are Chinese authors. China has contributed the most to the United States, Germany, India, United Kingdom, Canada, Korea, Spain, Australia, and France. It shows that China has paid more attention to

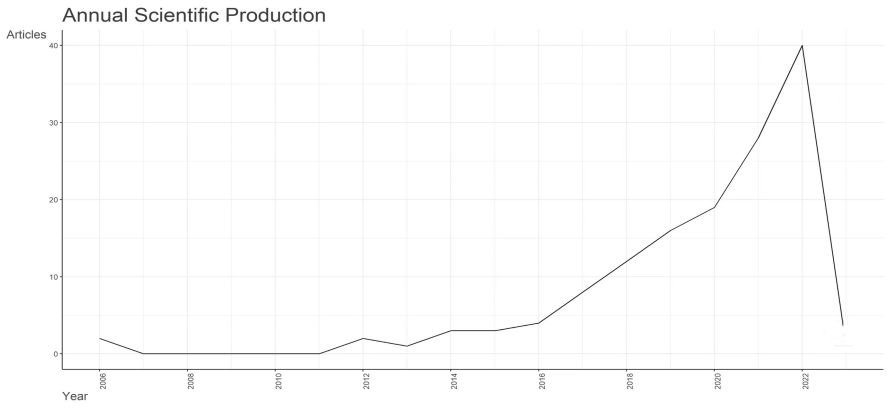

Fig. 1. The number of articles

Table 1. Related statistics

Number of Results Found	144
Total Times Cited	2332
Average Citations per Term	16.54
H-index	24

climate and carbon emissions research in financial technology. It reflects China's hope to seek solutions in frontier fields to achieve the "dual carbon" goal. Sustainability has the most significant number of publications among the publishing sources. There are relevant studies in industry, energy, computers, climate, and other aspects, reflecting the characteristics of multidisciplinarity. The countries in the chart are covered in almost all of these areas (Fig. 3).

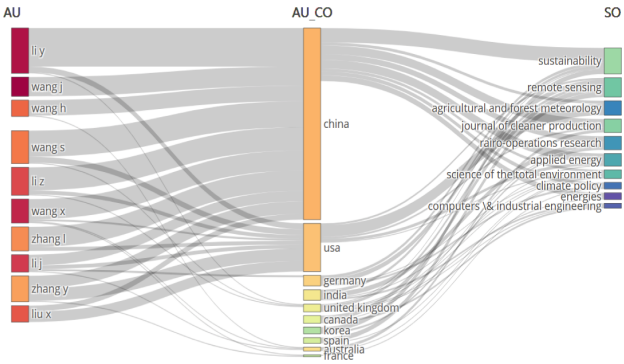

Fig. 2. Three-Fields Plot

Fig. 3. Thematic evolution map

3.3 Main Theme

Use topic analysis with Bibliometrix. Figure 2 shows the growing importance of blockchain, which not only encompasses the carbon footprint for 2006–2020 but also dominates the period 2021–2023. Furthermore, cloud computing cannot be underestimated. This is followed by carbon emissions, artificial intelligence, climate change, and machine learning.

Using network centrality measures, thematic maps distinguish the centrality (x-axis) and density (y-axis) of themes (topics or keywords here), as shown in Fig. 4. The common interpretation consists of four quadrants of themes: motor theme (at the first quadrant, indicating that there have been excellent or important developments), niche theme (at the second quadrant, indicating well-established but less critical), basic theme (at the fourth quadrant, important but undeveloped), and emerging-declining-theme (at the third quadrant, underdeveloped or just emerging or about to disappear).

Figure 4 shows that the concepts of blockchain technology, machine learning, cloud computing [9], artificial intelligence [10], etc., have been relatively more developed. In contrast, concepts such as carbon trading, carbon accounting, blockchain, big data, etc., are still important but not fully developed as part of a more systematic conceptual framework. Topics such as carbon tax policy, technological innovation, etc., can be further developed to become well-developed topics, moving away from simple niche areas. In addition, if carbon accounting is well developed, topics such as climate policy and carbon pricing are expected to be important.

3.4 Analysis of Author Keywords

To explore how research concerns and topics are interrelated, Fig. 5 shows a co-occurrence network of author keywords, and we identify three clusters. The red cluster (carbon sequestration) mainly explores how to significantly contribute to global climate change mitigation through carbon sequestration and storage [11, 12] in terms of service, storage, climate change, etc. The blue cluster (blockchain) consists of reduction, carbon market, transaction, and transparency. The literature mentions the use of blockchain technology to assist in recording carbon transaction data [13] and pricing and to make

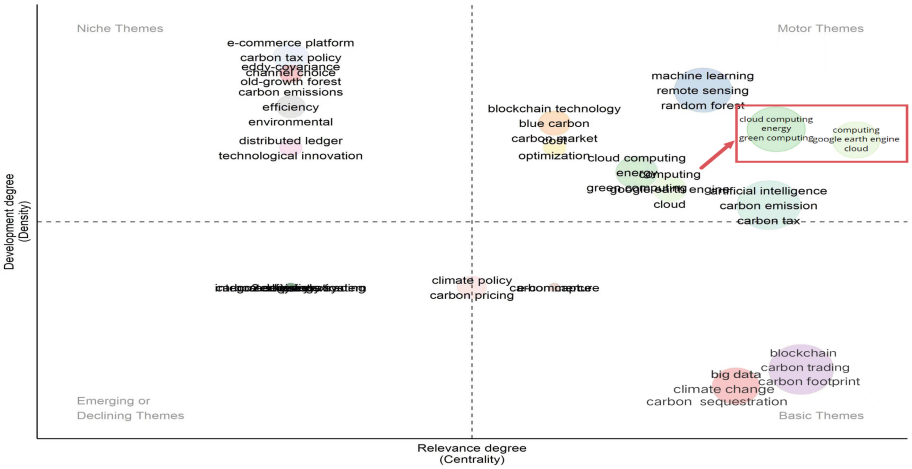

Fig. 4. Thematic map

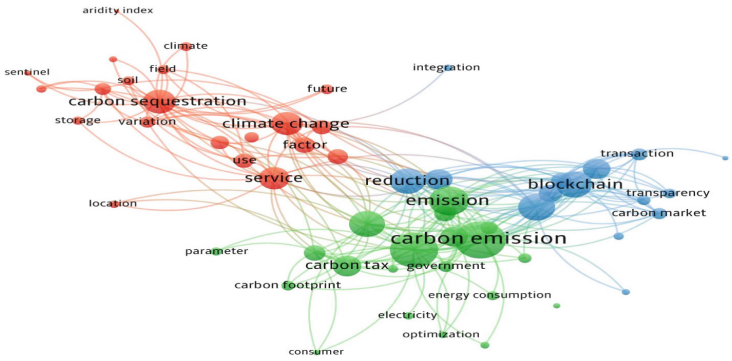

Fig. 5. A map based on author keyword co-occurrence network: clustered outcomes

case studies [14] on them. Green cluster (carbon emission) includes keywords such as carbon tax, energy consumption, carbon footprint, consumer, government, parameter, and so on. Climate change caused by carbon emissions has attracted the government's attention. Carbon footprint tracking carbon emissions and the emergence of carbon taxes can effectively control carbon emissions, which deserves the attention of researchers.

4 Conclusion

This study analyzes the literature on financial technology and carbon accounting technology. The results of the scientific econometric analysis show that: Scholars' attention to fintech and carbon accounting technology is on the rise; the research results of China and the United States are more prominent; the dispersion of the sources of major publications reflects the multidisciplinary nature; research topics on blockchain and cloud

computing received more attention during 2021–2023, but blockchain was underdeveloped in some conceptual frameworks. In addition, scholars' research hotspots include carbon sequestration, blockchain, and carbon emissions. For example, carbon sequestration significantly contributes to mitigating global climate change; blockchain can be used to create transparent and immutable carbon emission trading records; carbon use and carbon tax collection under the influence of carbon emissions.

In general, scholars will generally pay more and more attention to the research of financial technology and carbon accounting technology. Chinese scholars have explored financial technology solutions to achieve carbon peak and carbon neutrality. So China has contributed the most to the research of financial technology and carbon accounting technology. Fintech has an enormous scope of research on the design and establishment of carbon accounting technology. The practicality and feasibility of carbon accounting technology should also be considered, so in-depth research is still needed.

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