



Research Context and Trend Analysis of China on Green Finance Using CiteSpace

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Abstract. With “green finance” as the key word, this paper uses bibliometric analysis and visual display through the citation data of CNKI (CSSCI journals) from 2000 to 2022. The purpose is to sort out the evolution trend of research hotspots in this field and explore the direction of Chinese green finance research to be deepened. According to the research, Chinese scholars have been paying close attention to the research of green finance since 2000. Since 2016, the research results have increased rapidly. After 2020, the research will be more related to the national policies and strategies such as green development, carbon emission reduction, and carbon neutrality. But the network of research partnerships between scholars and research institutions is not obvious. In recent years, research methods, research topics and research perspectives have become more diversified, but few micro empirical studies. In the future, China’s green finance research can be continuously deepened and expanded in micro mechanism, product innovation research, system design and other aspects.

Keywords: Green finance · Research frontier · CiteSpace

1 Introduction

Green finance is a kind of financial service. The goal is to support economic activities that support environmental improvement, climate change and efficient use of resources. The green credit policy introduced in 2007 gave China a rapid start in the development of green finance. In 2015, the CPC Central Committee and The State Council issued the Overall Plan for the Reform of the Ecological Civilization System, which for the first time explicitly proposed “establishing China’s green financial system” [1]. At present China with green finance as the theme of the research perspective are: the construction and development of green financial system logic, green finance and low carbon economy interaction, the development status of green finance, green finance international experience, green financial risk control, green financial product innovation, but based on knowledge graph system analysis of green financial research hot change and evolution of the trend is relatively few. Timely analysis and summary of the research status and trend of green finance in China is conducive to further research. To this end, based on the CNKI core database, this paper uses the CiteSpace literature visualization tool to produce a knowledge map of Chinese green finance research, sorts out the evolution trend of research hotspots in this field, and explores the direction of China’s green finance research to be deepened.

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2 Materials and Methods

2.1 Data Collection

The retrieved database uses the CNKI database. The themes of the literature search were “green finance”, “Green credit” and “Sustainable finance”. The source journal is set as “CSSCI”, and the search date is January 1, 2022. 1,062 pieces of valid data are obtained after screening and eliminating invalid data such as conference announcement and book recommendation.

2.2 Analytical Methods

CiteSpace Based on Java language, is developed in the context of data mining technology and information visualization. By using the connection strength analysis method in the software, the interaction strength between the connection points can be analyzed. Through the clustering analysis of hot words, the hot spots and their changes in the research field can be explored. Keyword time zone analysis can reveal the changing trend of research in this field. The CiteSpace software version adopted in this paper is 6.1.R6.

3 Results and Discussion

3.1 Trend Analysis of the Literature Volume

Figure 1 shows the time distribution chart of the literature output of green finance research literature. It can be seen from the change of the number of literature output over time that scholars have roughly gone through the following three stages of research on green finance.

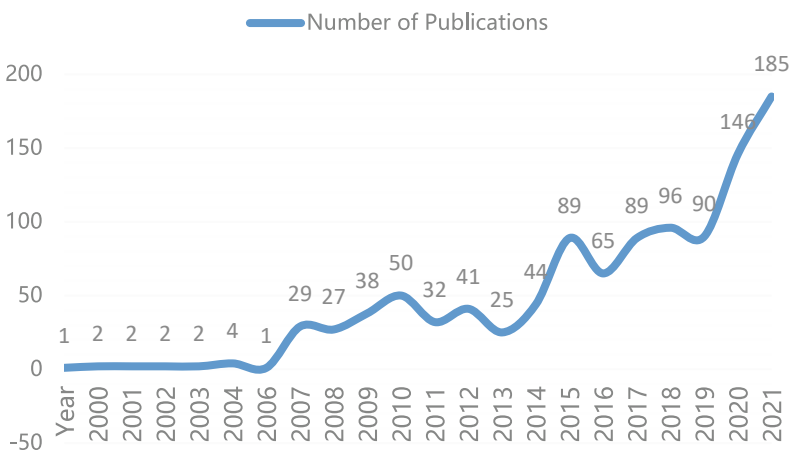


Fig. 1. Annual number of publications indexed in the CNKI and published from 2000 to 2022.

Bud stage (2000–2007): The green finance research in China began in 2000, and the literature on the theme of “green finance” first appeared in Wang Junhua’s paper. He introduced the concept of “green finance” into China to discuss the necessity of green finance development. In 2007, the former State Environmental Protection Administration, together with the People’s Bank of China and the China Banking Regulatory Commission, issued the Opinions on Implementing Environmental Protection Policies and Regulations and Preventing Credit Risks, which was a milestone in the beginning of green finance in China.

Development stage (2008–2015): During this period, the international financial crisis caused by the 2008 subprime mortgage crisis in the United States occupied the focus of attention. The research on green finance here has not been valued by a large number of scholars, mainly focusing on the design and use of green bonds and green securities, and the construction of green finance market system.

Continuous growth stage (2016 to present): In 2016, China included “green finance” on the agenda of the G20 Summit and set up a green finance research group, which received positive response and strong support from the G 20. In the same year, the People’s Bank of China led seven ministries and commissions to issue the Guiding Significance of Building a Green Financial System [2]. The “13th Five-Year Plan for Ecological and Environmental Protection” clearly proposes the construction of a green financial system covering green credit, green bonds, green insurance and other investment products. In 2020 China proposed carbon peak carbon neutral target put forward higher requirements for green finance, to achieve carbon peak and carbon neutral “30 60” goal, China must press the “amplification button” green finance: move more social capital into green low carbon areas, improve the green financial classification standard, environmental information mandatory disclosure, increase green financial policy incentives, establish transformation financial framework. Research in the field of green finance shows a continuous growing trend.

3.2 Analysis of Highly Productive Authors

Figure 2 shows the highly cited authors of green finance research derived by CiteSpace. It can be seen that the cooperation network of authors is relatively thin. There is a cooperation network among the three groups of scholars, Yu Maomao, Ma Yanyan, Dong Zhanfeng, Ge Chazhong, Wang Kangshi and Wang Fengrong. Generally speaking, researchers are relatively scattered and no obvious cooperation network is formed. At present, Chinese scholars active in the field of green finance in China include Wang Yao and Ma Jun. Among them, the scholars as the core research output, the highest cited literature the green financial contribution to China’s economic development research, earlier combed the green financial influence on China’s economic mechanism, the article thinks: green finance optimize the macro development of economic development, improve the micro economic efficiency and complementary with traditional economic policy, view was widely adopted by researchers. Scholar Wang Yao has been committed to the research of green finance for a long time. In recent years, she has produced a lot of literature combined with the “double-carbon target” Dong Zhan feng, a scholar, is an influential scholar in the field of green finance and low-carbon development. In recent years, he has rich research on low-carbon and green development, and green finance is

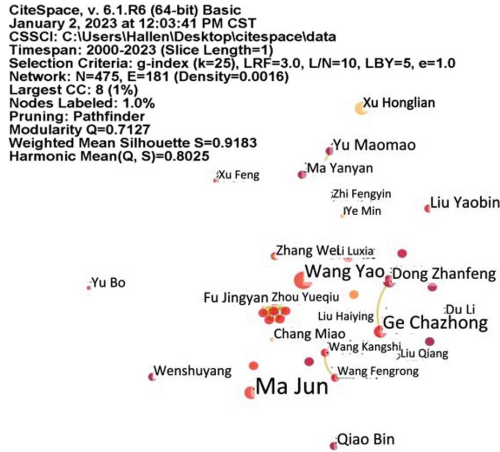


Fig. 2. High-frequency authors and cooperative network visualization results of green finance research in China



Fig. 3. Visualization results of the institution distribution of Green Finance research in China

a branch of his research. Environmental protection Ge Chazhong researcher, published in 2015 the green financial policy and products: status quo and Suggestions, elaborated the green financial policy and product system, in the same year, scholars ma paper “on the construction of China’s green financial system”, more comprehensively expounds the connotation of China’s green financial system, two literature is green financial key literature. In addition, Yu Maomao and Ma Yanyan have had a great output and influence in the field of green finance research in recent years, mainly focusing on the issues of green finance and enterprise financialization.

3.3 Analysis of Cooperative Distribution of Research Institutions

Figure 3 shows that the Chinese Academy of Social Sciences, institute of finance, ecological environment planning institute, China financial institute of green finance professional committee post for 10, the top three, it can be seen that China's in the field of green finance research institutions mainly for government departments and universities, partly from Banks of financial institutions, as can be seen from the number of research institutions, research did not present the obvious aggregation effect, but because the green finance and the national fiscal policy closely, participate in the study of relevant government departments is more. However, the analysis of the co-occurrence of institutions shows that the cooperative research of green finance is concentrated in the same research institute, and most of these research institutions are located in first-tier cities such as Beijing, Shanghai, Wuhan and Chongqing. It can be seen that green finance has received more attention and research in economically developed areas.

3.4 Analysis of the Academic Map

In our research on the search theme of green finance and green credit, the most frequent research topics include: green development, commercial banking, carbon finance, carbon neutral, low-carbon economy, green transformation, green economy, digital finance, green innovation, green industry, green investment, etc. The innovative development and role mechanism of green finance is a hot issue of green finance in recent years (Fig. 4).

At present, in the aspect of green credit research, the method of empirical analysis is often used to study its impact on the green economic growth and the green transformation of industrial structure. The research content of green bonds mainly lies in the market development trend and transnational governance of green bonds; In the research aspect of green industry, it focuses on analyzing the interaction mechanism between green industry and green finance. In the aspect of financial innovation research, it focuses on product

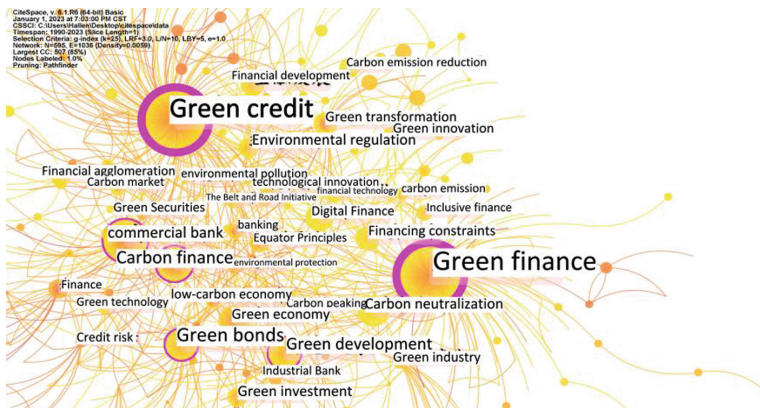


Fig. 4. High-frequency keywords and visualization results of connection network in Green finance research in China

innovation and technology innovation research. In terms of low-carbon economic transformation and research on carbon peak and carbon neutrality, it focuses on the innovative development path of green finance, green financial system under the carbon reduction target, risk awareness of green transformation, and risk governance mechanism, etc. In addition, the development of green finance will promote the adjustment of industrial structure and the low-carbon transformation of high-consumption enterprises. In the research aspect of digital finance, scholars have proved that digital finance has reduced the energy consumption per unit of GDP of the real economy through empirical research, and put forward a mechanism for digital finance to promote green development. It can be seen that China's green finance research perspective is increasingly diversified and closely related to the current carbon emission reduction target, showing a strong strategic and market orientation [3, 10] (Fig. 5).

Through the comprehensive analysis of cluster names and sub cluster names, it is found that the current green finance research mainly includes the following five aspects:

Research on the connotation of green finance. This kind of research including digital finance, carbon finance, and green credit, green bonds. This paper discusses the basic connotation of green finance under the strategic goal of realizing green development. That is, green finance is driven by the “green development transformation”, including the carbon finance, environmental finance within this concept [4, 10]. The researchers put forward that digital finance, as a new financial model bred by the integration of traditional finance and digital technology, is the advanced development of green finance. Green credit and green bonds are the most important components of green finance in China at present.

Research on the main body behavior. Such research includes commercial banks, green industries, environmental regulations and other clusters, and involves a types of stakeholders in the development process of green finance, including the government, banking institutions, enterprises, investors and consumers. The development of green finance cannot be separated from the support of the government, and the policy guidance

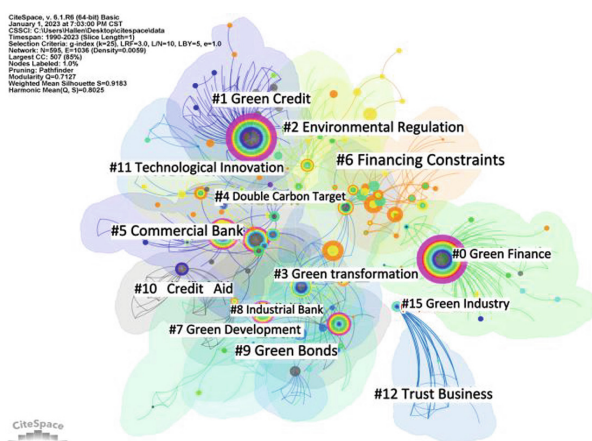


Fig. 5. Visualization results of hot word clustering in Green Finance Research in China

provides an institutional framework for the top-level design of green finance development. Banks are also financial institutions and enterprises are the most direct participants in green finance. As a new way of risk prevention and control, green finance is participating in the economic behavior of micro subjects, building a bridge between the ecological environment and economic individuals [5].

Research on product design. Such research includes the clustering of green bonds, green credit, and trust businesses. Based on the micro mechanism of green finance, this kind of research has made a lot of exploration in the innovation of related intermediary business, investment funds, bond financing, environmental pollution liability insurance, green trust and other aspects [6, 10].

Research on the development mechanisms and performance. Such research includes two-carbon goals, green transformation, scientific and technological innovation, green industry and other clusters. These clusters include the core meaning of green development, that is, green finance has the macro goal of promoting China's economic transformation and upgrading. Scholars believe that investing financial resources in green environmental protection industry helps to accelerate green technology innovation, promote green transformation and upgrading of industry, and guide the development of industrial capital from "two high" to "two low" industry [7]; Green finance is an important driving force to promote the early realization of carbon peak and "carbon neutral vision of 30 · 60".

Research on the policy system of green finance. Such research includes environmental regulation, credit support, financing constraints and other clusters. The role of green finance policy has two levels: macro and micro. At the macro level, policies are transmitted to the market by optimizing the allocation of financial resources, thus shifting the economy from black and unsustainable extensive growth to green, sustainable and intensive development. At the micro level, with the intensive introduction of green credit, green insurance, green bonds and other policies, and the rapid development of related industries and enterprises, the amount of green credit issuance and bond issuance in China have increased year by year [8, 10].

3.5 Analysis of Content Evolution

Combined with the key words in Fig. 6, the core theme of green finance research in China in different periods can be clarified.

Germination phase of the study (2000–2007): At this stage, Chinese scholars have just started their research on green finance, and the main mutation keywords are financial industry, green credit, etc. The research mainly has two aspects: the connotation definition of green finance and the conception of the future green development of the financial industry. From the perspective of financial industry or green industry, the core connotation of green finance is under the guidance of the goal of green development. That is to use financial means to help the sustainable development of the economy and society. For the construction and development of green financial system in the future, the role of financial service and environmental protection industry should be given full play [9]. Enrich financing products and innovate in green financial instruments.

Precipitation Phase of the study (2008–2015): The main keywords in this stage are credit risk, carbon finance, financial crisis, low-carbon economy, commercial banking,

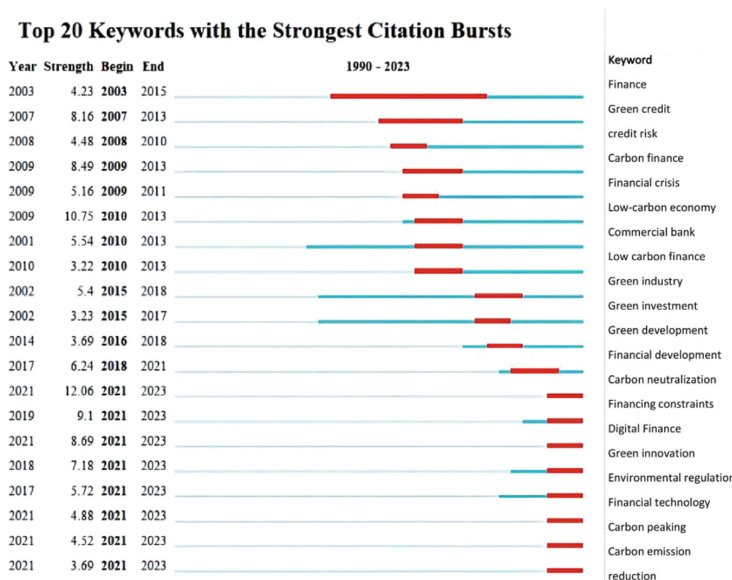


Fig. 6. Sudden occurrence analysis of key words in green finance research

low-carbon finance, green industry, green investment, green development, etc. The literature focuses on the research questions that need to be answered at this stage: What are the factors restricting the development of green finance? How to improve the green financial system? What is the effect mechanism of green finance on green industry, green investment and green development? As for the factors restricting the development of green finance, the researchers have made a series of discussions and drawn conclusions on the risks of green finance, green financial service system, green financial standards, green financial information communication, green financial products and other aspects. As for building a green financial system, China's basic idea is to learn from the relevant standards of developed countries on the premise of respecting international conventions to improve the existing legal system. At this stage, scholars draw conclusions through empirical research. They believe that green finance is the only way to promote the sustainable development of the financial industry, and actively discuss the construction of the green financial system and its development path [10]. But there is no clear conclusion on how to develop green finance comprehensively and systematically.

Development stage of the study (2016-present): At this stage, the green finance research has entered the stage of further development, and the main emerging keywords are green development, financial development, carbon neutrality, financing constraints, digital finance, green innovation, environmental regulation, fintech, carbon peak, carbon emission reduction, etc. With the proposal of the national green development strategy, the research began to deeply explore the impact of the development of green finance, and the cross research of green development concept, carbon peak, carbon neutral and green finance has become the mainstream of this stage. The research methods tend to use rigorous data measurement and scientific modeling thinking to make an in-depth analysis

of the market effect of green finance [10]. At this stage, green finance is no longer limited to ecological and environmental protection construction, but well integrates digital technology, national governance and national strategy.

4 Conclusions

To sum up, at present, green finance research in China is still in the development stage. After the concept sorting, environmental cognition and development assumption in the early stage, it begins to enter the comprehensive development stage of research. The extensive research on green finance reveals the characteristics of its development at the present stage, including the necessity of green finance development, the practical characteristics and bottlenecks at the present stage. In order to promote the development of green finance in China, further research is needed in three aspects:

From the perspective of goal dimension, the focus is on how to effectively guide more social capital to participate in investment in green industries, and curb investment with high pollution and high energy consumption, so as to achieve carbon peak and carbon neutrality. However, some important questions have not yet been answered. For example: what is the optimal state of green finance? How to measure the degree of the development of green finance in China [10, 11]? Therefore, future research should increase the attention to the green finance evaluation system and standard system, and focus on designing the overall plan to evaluate the national level of the green finance.

From the perspective of process dimension. Currently, various national studies are still scattered and conducted independently. The global sharing and development mechanism of green finance has not yet been established. In the future, China should actively advocate and participate in the establishment of a global green financial system to reduce the transaction costs of green investment and promote the interconnection of the international market. At the same time, more attention should be paid to the impact of new policies and digital technologies on green finance.

From the perspective of participants. At present, in China, there are few participants in the development process of green finance, and the depth of participation is insufficient, which leads to the low implementation rate of relevant policies and the insufficient in-depth research on participants. In the future, other financial institutions (such as brokerage companies, asset managers, trust institutions, etc.) and unincorporated participants should be reasonably included as market participants. In the future, we must also vigorously cultivate market participants and improve the financial technology level of market participants.

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