

Research Hotspots and Evolution Trends of Green Logistics in China

-- Visualized Analysis based on CiteSpace

Jialiang Wang, Lingyu Zhou

School of Management, Southwest Petroleum University, Sichuan 610500, China

Abstract

In this study, the CiteSpace literature metrology analysis tool was employed to undertake a multi-dimensional metrological analysis of the research hotspots and development trends in the domestic green logistics research domain within China National Knowledge Network from 2014 to 2024. Through the visual analysis of relevant literature, the core research themes, major research institutions, and research frontiers in the field were identified. The results indicate that the research on green logistics in China is ascending. The collaboration among authors and research institutions from different regions is inadequate, and the cooperation between research institutions requires further enhancement. Domestic green logistics research centers on logistics parks, green supply chain management, carbon emissions, and environmental protection policies. Additionally, this study also deliberates on the development direction of green logistics research in the future and puts forward research topics that demand further attention, in order to provide references for relevant researchers.

Keywords

Green Logistics; Visual Analysis; CiteSpace; Bibliometric Analysis.

1. Introduction

Green logistics is an inevitable demand when the national economy progresses to a certain stage. The notion of "Environmental Logistics" was put forward as early as the 1990s, and the latest version of the national standard of the People's Republic of China - "Logistics Terminology" (GB/T18354-2021) defines green logistics activities as follows: "By fully exploiting logistics resources and adopting advanced logistics technologies, logistics activities such as transportation, storage, loading and unloading, handling, packaging, circulation, processing, distribution and information processing are rationally planned and executed to minimize the environmental impact of logistics activities ." Currently, the concept of green logistics has not been widely disseminated and deeply practiced globally, and it still confronts multiple challenges in the development process, including but not limited to the deficiency of the institutional framework, lagging infrastructure construction, insufficient standardization level, and the shortage of relevant professional talent resources. In view of these issues, conducting in-depth research in the field of green logistics not only holds high theoretical value but also has urgent practical significance. The strength of logistics research is closely associated with the increase in the number of logistics research papers, and the quantity of logistics-related journal papers is a significant measure of the strength of logistics research [1]. To comprehensively comprehend the research status, hotspots and trends in the domain of green logistics in China, this paper conducts a visual analysis of relevant literatures in the CNKI database based on CiteSpace (v.6.3.R1) software. Through multi-dimensional analyses of the number of publications, core authors, research institutions, keyword co-occurrence and

clustering, this paper intends to reveal the dynamic evolution process of domestic green logistics research, identify the frontier topics in this field, and offer references for future research.

2. Research Object and Methods

The change of the quantity of scientific literature directly reflects the change of the quantity of scientific knowledge, so the quantity of scientific literature becomes an important measure of the quantity of scientific knowledge [2]. This paper uses China National Knowledge Network (CNKI) as the citation retrieval database and "green logistics" as the search term for topic retrieval. The publication period is 2014-2024 (2024 data selected until August 1). In order to ensure the scientific, rigorous and accuracy of the research data, The academic journals were selected as CSSCI, CSCD and core journal papers of Peking University, and the search date was January 1, 2014. On this basis, the re-processing was carried out, and news reports, book reviews and other literatures were excluded, and the obtained 302 Chinese literatures related to green logistics were taken as the basic data of the research.

Using CiteSpace (v.6.3.R1) software, the literature on green logistics in CNKI database was visualized and analyzed. Through the methods of publication trend research, core author analysis, publication institution analysis, keyword co-occurrence, cluster analysis and keyword emergence, the research status, research hotspots and development trends in the field of green logistics were systematically explored. The specific research process is as follows:

Analysis of the number of published documents: By counting the number of published documents related to green logistics, the development process of this field is studied and analyzed.

Analysis of core authors and publishing institutions: Identify and analyze core authors and major publishing institutions, and understand the main research forces and cooperative relationships in China's green logistics research.

Keyword emergence analysis: By analyzing the emergence of keywords, we find out the cutting-edge trends and emerging topics in green logistics research.

Keyword co-occurrence and cluster analysis: Through keyword co-occurrence and cluster analysis methods, the main research hotspots and topics in the field of green logistics are identified, and the correlation and structure within the research field are revealed.

3. Analysis of Current Situation

3.1. Analysis of the Volume of Publications

By analyzing the number of publications, we can grasp the research heat of the field of green logistics in China. The number of core articles related to "green logistics" included in China Knowledge Network (CNN) from 2014 to 2024 was statistically analyzed.

From the data in the figure, it can be seen that the research intensity of green logistics has experienced some fluctuations in the past ten years, but the overall trend is upward. 39 articles were published in 2014, which indicates that green logistics has received more attention and research in this year, and it is mentioned in the Medium- and Long-term Plan for the Development of the Logistics Industry (2014-2020) issued by the State Council that we should vigorously develop dumping transportation, common distribution, unified distribution, etc. The Long-term Plan for the Development of the Logistics Industry (2014-2020) issued by the State Council mentions the vigorous development of advanced logistics organization modes such as dumping, co-distribution and unified distribution, and encourages the adoption of low-energy, low-emission means of transport and energy-saving green storage facilities. As the national policy actively promotes the development of green logistics, in the following six years, the

annual average number of articles has maintained more than 24. 2021-2023, the number of related literature on green logistics has increased year by year, especially in 2023, the number of research articles in the related field has reached a new record high, reaching 43 articles. This may be related to the fact that in January 2022, the State Council issued the “14th Five-Year” Comprehensive Working Program for Energy Conservation and Emission Reduction, which indicated that: accelerating the construction of green warehousing, encouraging the construction of green logistics parks, and comprehensively promoting green courier packaging, as well as in November 2023, the State Council on the issuance of the “Action Plan for Continuous Improvement of Air Quality” notice It is clearly pointed out that: optimize the transportation structure, vigorously develop the green transportation system; China Federation of Logistics and Purchasing released the “China Green Logistics Development Report (2023)” pointed out that, with the global response to climate change and China's “dual-carbon” goals, the logistics industry, supply chain green low-carbon development potential and market space is huge. Green logistics and low-carbon development has once again attracted the attention of many scholars, and the number of articles published has gradually increased. 2024 As of August 1, the number of articles published in green logistics related literature was 28 articles.

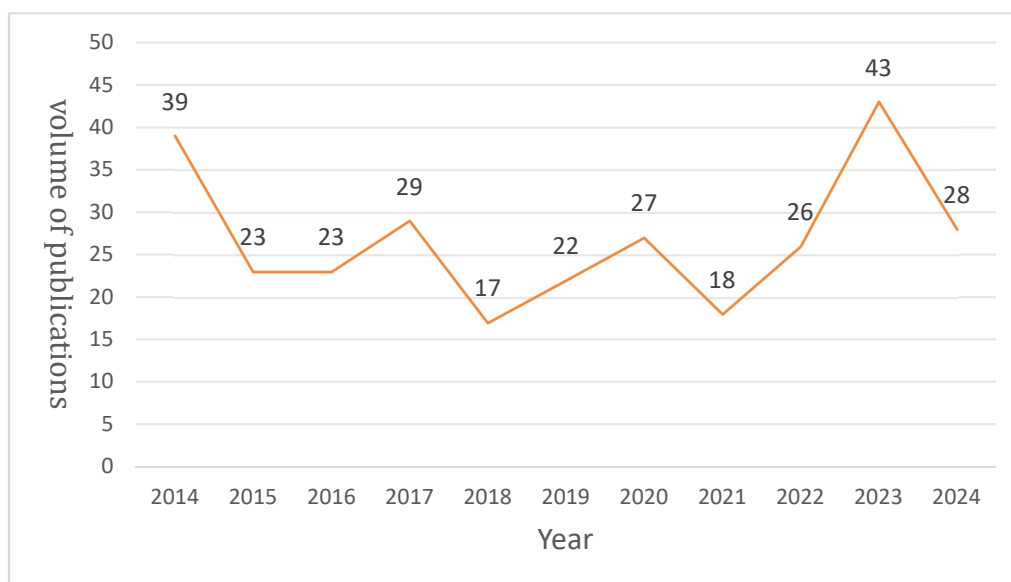


Figure 1. Distribution of the number of green logistics documents issued

3.2. Analysis of Issuing Authors and Research Institutions

Researchers are the basic elements of the flourishing scientific research field, through the literature author co-occurrence mapping can be mined out the closely linked core author group, through the core author's publication quantity can understand the research field's leader and research hotspot, and then understand the field's main research direction and development trend [3]. According to Price's famous assertion about the core author group, that is, $M = 0.749\sqrt{N_{\max}}$ ($N_{\max}$ is the number of papers issued by the most prolific authors in the field) [4], it can be seen that the standard for determining the number of papers issued by the core authors is $M = 1.27$, and according to the statistics, there are a total of 25 authors who have issued 2 or more papers, and the cumulative total of 52 papers issued only accounted for 17.57%, which is lower than Price's standard of 50%, so the field of green logistics has not yet formed a core author of real significance. has not yet formed a core group of authors in the true sense.

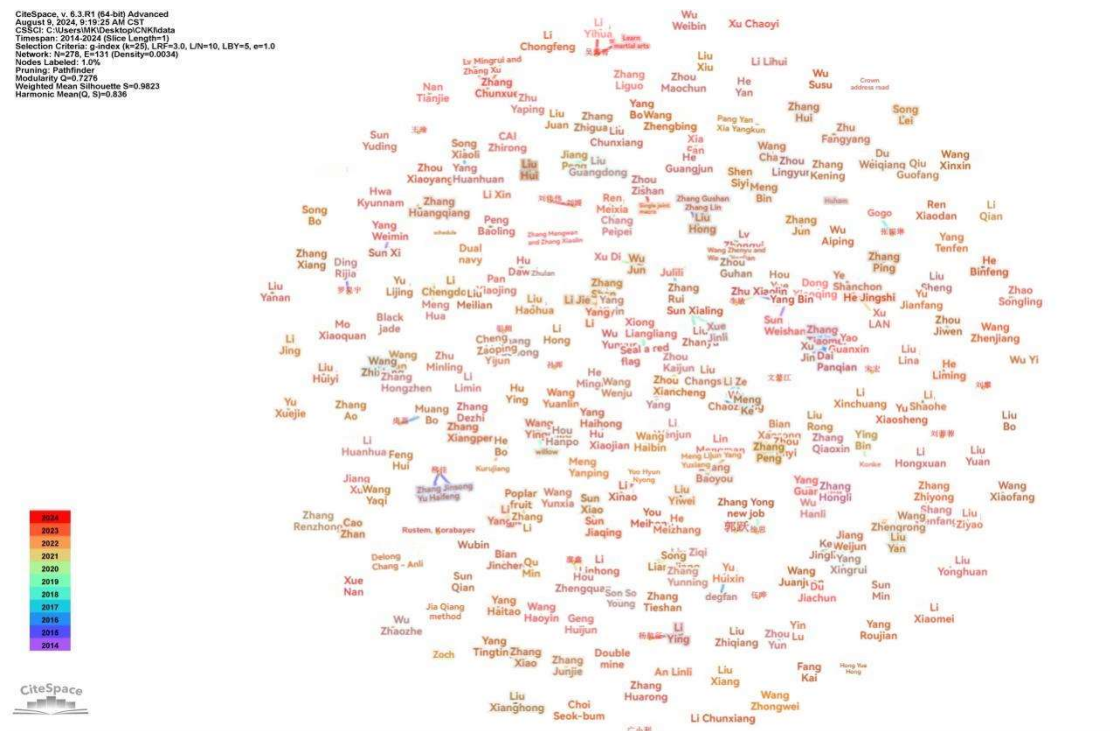


Figure 2. Co-occurrence of author network in China's green logistics research field from 2014 to 2024

Table 1. Analysis of core authors' publications

Serial number	author	Affiliated organizations	volume of literature	particular year
1	Yang Bin	Shanghai Maritime University	3	2014
2	Sun Xia Ling	China University of Mining and Technology (Beijing)	3	2018
3	Zhou Xiancheng	Hunan University of Commerce and Industry	2	2021
4	Liu Zhanyu	Henan University of Science and Technology	2	2018
5	Feng Hongqi	Changzhou University	2	2019
6	Guo Yue	Ningbo Engineering University	2	2019
7	Yang Haihong	Hefei University of Technology	2	2014
8	Hu Xiaojian	Hefei University of Technology	2	2014
9	Wang Xinxin	Anhui University of Science and Technology	2	2022
10	Sun Xi	Beijing Agricultural College	2	2014
11	He Jingshi	Dongguan Institute of Vocational Technology	2	2021
12	Zhang Xu	Yanshan University	2	2023

The authors' network co-linkage is shown in Figure 2. Overall, the mapping shows a total of 278 nodes, with a total of 131 connections between nodes, and a network density of 0.0034, which shows that there is not a close cooperative relationship between scholars of green logistics

research in China. From the same section, there are certain academic exchanges and cooperative relationships between individual authors, such as green logistics, Sun Xia-ling, who has published the most papers, and Zhang Rui of China University of Mining and Technology, Liu Zhanyu of Henan University of Technology and other scholars have a better cooperative relationship, and there are co-signers of the papers published by the authors, and author cooperative relationships mainly include “academic” and “geographic”. “The authors' cooperative relationship mainly includes two types: “academic” relationship usually involves the cooperation between supervisors and students, colleagues, or classmates; The “geo” relationship is usually a project-driven cooperation across regions and colleges^[5]. At present, the cooperation in green logistics research in China is dominated by the “academic” relationship, and the cross-regional cooperation is relatively limited. Therefore, it is necessary to further strengthen the academic exchanges between regions and schools to promote the exchange and collision of views.

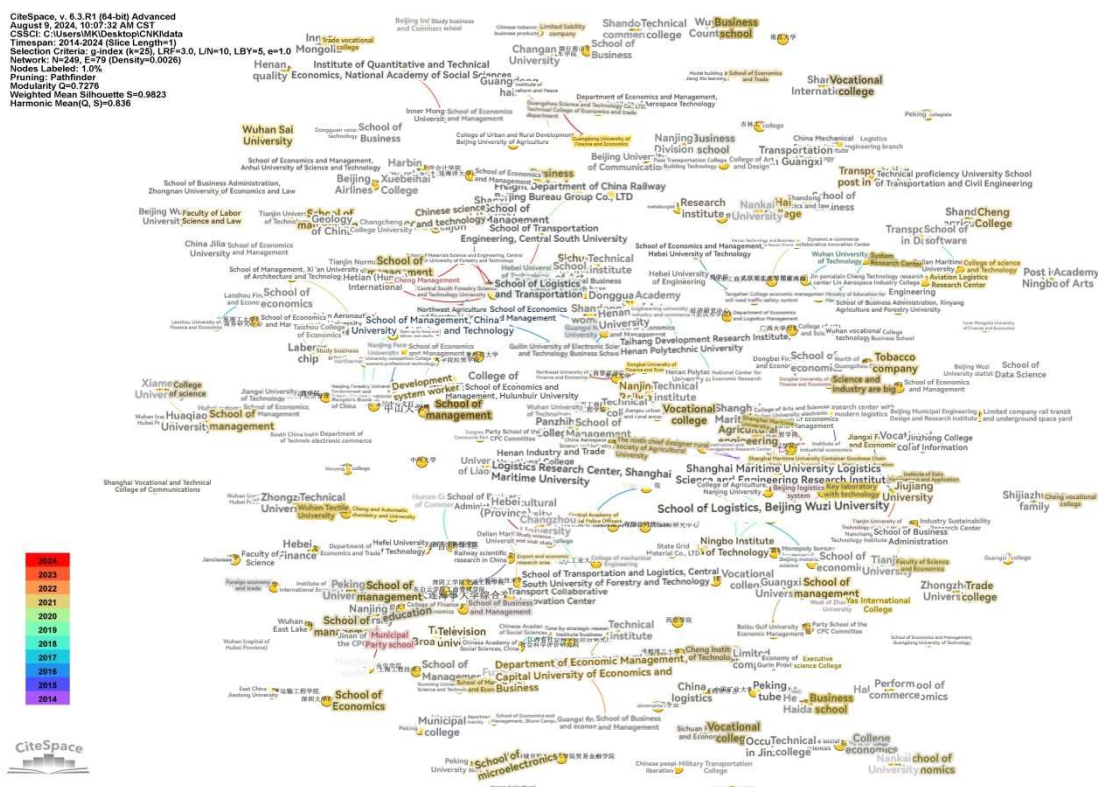


Figure 3. Cooperative network of research institutions

The cooperative network mapping of research institutions can show the cooperative research of different research institutions in the field of express packaging, as shown in Figure 3. As seen in Figure 3, there are 249 nodes, and there are 79 connections between nodes, with a network density of 0.0026, which leads to the conclusion that there is not a close cooperative relationship between green logistics research institutions. From a local point of view, there are some cooperative relationships between some institutions, such as between the School of Logistics of Beijing Materials Institute and the Department of Management and Economics of Tianjin University, the School of Management of the University of Chinese Academy of Sciences and the Research Center of E-commerce and Modern Logistics of Dalian University, and other institutions, and some academic cooperation exists between them. However, the institutions with academic cooperation only account for a very small part of the total number of research institutions, and have not formed a larger green logistics research group, so the cooperation between the research institutions has to be further strengthened.

Table 2. Analysis of the publication status of research institutions

Serial number	research organization	volume of literature	particular year
1	School of Logistics, Beijing Materials University	4	2017
2	School of Management, China University of Mining and Technology	3	2015
3	Institute of Logistics Science and Engineering, Shanghai Maritime University	3	2018
4	Shanghai Maritime University Logistics Research Center	3	2014
5	School of Transportation Engineering, Central South University	3	2020
6	Ningbo Engineering University	2	2019
7	Taihang Development Research Institute of Henan University of Science and Technology	2	2018
8	School of Transportation and Logistics, Central South University of Forestry Science and Technology	2	2014
9	School of Logistics and Transportation, Central South University of Forestry Science and Technology	2	2023
10	Hulunbeier College of Economics and Management	2	2016
11	School of Management, University of Science and Technology of China	2	2022
12	Jiangsu University	2	2019

4. Research Hotspot Analysis: Keyword Covariance/Cluster Analysis

4.1. Keyword Frequency Analysis

The top 10 high-frequency keywords in green logistics-related literature are shown in Table 1: green logistics (108 times), logistics industry (21 times), logistics enterprises (15 times), agricultural products (14 times), carbon emissions (9 times), cold chain logistics (8 times), logistics industry (7 times), and so on. Intermediary centrality is a measure of the importance of a node in the network, high centrality of the point is often located in the path connecting two different clusters, centrality is greater than 0.1, it means that the node in the map to play the role of the node interconnection of the “bridge” [6], in general, the frequency and centrality of the direction of the attention to the positive correlation, the higher the frequency and centrality of the direction of the attention of the node, the higher the frequency and centrality of the direction of the node. Generally speaking, frequency and centrality are positively correlated with the attention of the direction, the higher the frequency, the higher the attention, and the higher the centrality, the greater the importance [7]. The keywords that play the role of “bridge” are green logistics (0.94), logistics industry (0.24), agricultural products (0.17), and influencing factors (0.1).

From this, it is clear that the core of the development of domestic green logistics relies on the logistics industry, and radiates outward to the logistics of agricultural products, reverse logistics, low-carbon logistics and supply chain and other fields. In the current macro background of the development of the domestic green economy attaches great importance to the logistics industry and specific logistics enterprises, we need to analyze the various types of factors affecting the development of green logistics, and further explore its effective development mode, and accordingly put forward a series of scientific and reasonable development strategies.

Table 3. Analysis of co-occurrence of high-frequency keywords

Serial number	Keywords	Frequency	Centrality	Serial number
1	Green Logistics	108	0.94	2014
2	logistics industry	21	0.24	2014
3	logistics company	15	0.07	2015
4	agro-food	14	0.17	2014
5	carbon footprint	9	0.06	2019
6	Cold chain logistics	8	0.02	2014
7	logistics industry	7	0.04	2015
8	factor	6	0.1	2019
9	development strategy	4	0.05	2014
10	carbon neutral	4	0.04	2022

4.2. Keyword Co-linear Analysis

Research statistics on keywords are conducive to scientifically grasping the hotspots in the research field [8]. The keyword network co-occurrence graph is shown in Figure 2, which contains a total of 289 network nodes, the number of connecting lines between them is 378, presenting a high value of cooperation density, i.e., 0.0094, which is a clear indication of the existence of strong interconnectivity between keywords. In the figure, each dot represents a specific keyword, while the size of the dot directly reflects the frequency of the keyword in the research literature, i.e., the larger the dot, the higher the frequency of its corresponding keyword. These high-frequency keywords constitute the research hotspots that domestic scholars generally pay attention to and explore in depth during the period from 2014 to 2024. Among the larger nodes are green logistics, agricultural products, logistics industry, cold chain logistics, logistics enterprises, carbon emissions, etc., which can be seen that big data analytics research has mainly focused on these areas in the past few years.

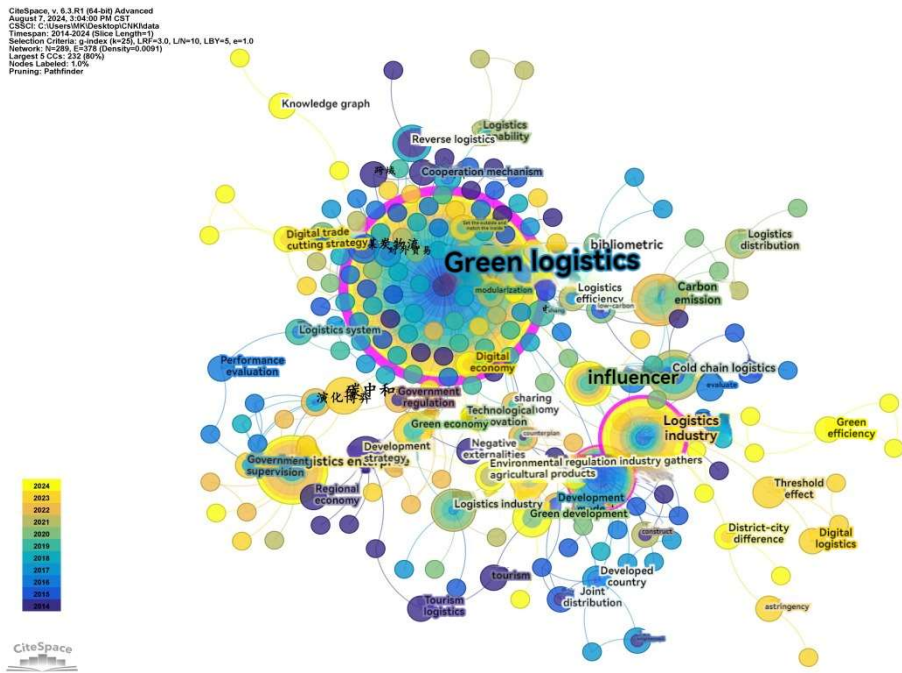


Figure 4. Network co-occurrence of keywords in China's green logistics research field from 2014 to 2024

4.3. Keyword Highlighting Analysis

In this paper, CiteSpace software was used to map the prominence of keywords in the literature on the field of green logistics from 2014 to 2024, and the top 10 keywords were selected and analyzed according to the intensity of prominence. The thick-colored line part in Table 2 represents the years in which the keywords appear to change in prominence, and the thin lines represent the years in which the frequency of keywords is relatively stable. As can be seen from the highlighting graph, the keyword with the highest highlighting intensity is “carbon emissions”, with an intensity of 3.47, followed by the keywords with higher highlighting intensity, including “carbon neutrality” (2.03) and “agricultural products” (1.86). “ (1.86). Carbon neutrality is highlighted between 2022 and 2024, indicating that this concept has received increasing attention in recent years, while agricultural products are highlighted between 2015 and 2017, reflecting the importance attached to agricultural logistics at that time. The Outline of the Twelfth Five-Year Plan explicitly proposes to “establish a perfect statistical accounting system for greenhouse gas emissions and gradually set up a carbon emissions trading market”. Through the establishment of carbon emissions trading market, aims to promote economic and social green low-carbon development, promote the construction of ecological civilization, to achieve the goal of carbon peak carbon neutral. In recent years, with the promotion of environmental protection and the concept of sustainable development, carbon emission and carbon neutrality have become an important research direction in the field of green logistics. In addition, keywords such as “logistics distribution”, “industrial agglomeration” and “logistics enterprises” have also changed significantly in recent years, indicating that the research in the field of green logistics is constantly developing and changing. change. Green supply chain management (GrSCM) is an important component of green logistics, which emphasizes the necessity of integrating environmentally friendly options in supply chain management^[9]. This includes research on defining the concept of green logistics, practical approaches and strategies, and how to improve the environmental performance and social responsibility of companies through green supply chain management ^[10].

It can be seen that the literature in the field of green logistics has a continuous and stable research from 2014 to 2024, which is involved in several aspects, such as carbon emissions, cold chain logistics, logistics enterprises and other aspects. Especially in recent years, with the enhancement of environmental awareness and the development of technology, keywords such as carbon neutrality and carbon emission represent the cutting-edge themes in the field, and the knowledge map represented by green logistics, green supply chain, green supply chain management, green products, low-carbon economy, and third-party logistics is being formed ^[11]. With the continuous development of society and technology, the research hotspots in the field of green logistics are also evolving and expanding.

Table 4. Top 10 Keywords with the Strongest Citation Bursts

Keywords	Year	conspicuous intensity	Starting year	Closing year	2014-2024
agro-food	2014	1.86	2015	2017	=====
Coal Logistics	2015	1.53	2015	2016	=====
developed country	2015	1.29	2015	2017	=====
carbon footprint	2019	3.47	2019	2022	=====
logistics industry	2015	1.78	2019	2021	=====
Cold chain logistics	2014	1.53	2019	2021	=====
logistics distribution	2020	1.64	2020	2021	=====
industrial agglomeration	2020	1.42	2020	2024	=====
logistics company	2015	2.11	2021	2022	=====
carbon neutral	2022	2.03	2022	2024	=====

4.4. Keyword Cluster Analysis

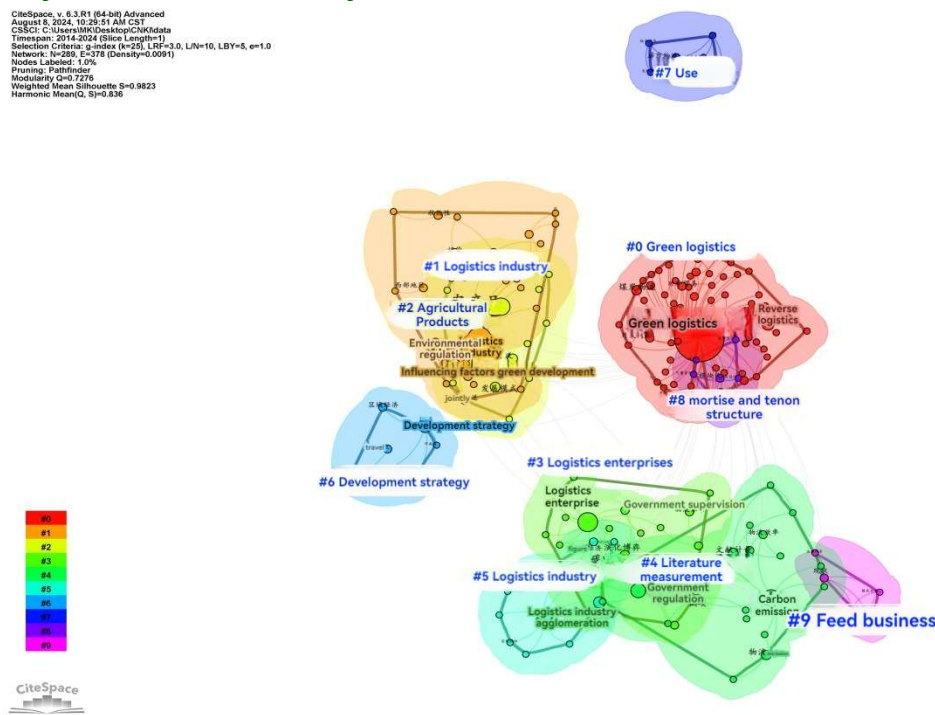


Figure 5. Cluster diagram of keywords in China's green logistics research field from 2014 to 2024

Table 5. Keyword clustering data statistics

Labels	Number of nodes	Contour Coefficient	Year	Keywords
#0	71	1	2017	Green Logistics, Coal Logistics, Collaboration Mechanism, Cross-domain, System Construction
#1	28	1	2020	Logistics industry, influencing factors, green efficiency, openness to the outside world, influencing mechanisms
#2	26	1	2016	Agricultural products, sharing economy, development models, developed countries, distribution costs
#3	21	1	2018	Logistics firms, evolutionary gaming, placement, cold chain, carbon neutrality
#4	20	1	2017	Bibliometrics, low carbon, cold chain logistics, carbon emissions
#5	11	1	2019	Logistics industry, industrial agglomeration, technological innovation, regional innovation capacity
#6	7	1	2014	Development Strategies, Regional Economy, Tourism Logistics, Sustainable Development
#7	6	1	2022	Utilization, railroad lines, urban logistics, urban transportation
#8	6	1	2019	Mortise and tenon construction, industrial design, modularity, reusable packaging
#9	5	1	2019	Feed enterprises, green packaging, e-commerce logistics, status analysis

The clarity of clustering in CiteSpace is measured by the average profile value (S value) and module value (Q value), in general, the Q value is usually in the interval of [0, 1), when Q>0.3, it

indicates that the delineated association structure is significant; when $S=0.7$, the clustering is highly concentrated and has practical research significance, and the clustering is considered to be reasonable if $S>0.5$ [5]. The keyword clustering mapping shows that $Q=0.7276>0.3$ and $S=0.9823>0.7$, which indicates that the clustering results are highly credible. Using the log-likelihood ratio (LLR) algorithm, the keywords are clustered and the number of graph nodes is obtained to be 289, the number of connecting lines is 378, the graph density is 0.0091, and 10 class clusters are formed.

In clustering green logistics, 71 subject terms are included, as shown in Table 5. The research is mainly related to the directions of green logistics, coal logistics, collaboration mechanism, cross-domain, and system construction. Among them, green logistics has the highest word frequency of 108 times. The keywords show that green logistics initially became a hotspot of research in 2017. It mainly focuses on the study of the practice and mechanism of green logistics, including the collaboration mechanism and system construction, while the emergence of coal logistics shows that how to realize the green transformation of the traditional high-pollution industry is an important topic. By analyzing the keyword clustering data in Table 5, it can be seen that the hotspots of green logistics research mainly focus on the following aspects:

- 1) Environmental protection and sustainable development: including carbon emission, carbon neutral, low carbon, etc.
- 2) Technological innovation and system optimization: including collaboration mechanism, system construction, technological innovation, etc.
- 3) Industrial application and regional differences: including cold chain logistics, agricultural logistics, urban logistics, etc.
- 4) Policies and management strategies: including development strategies, evolutionary games, impact mechanisms and so on.

These research hotspots reflect the multi-dimensional and multi-level research trend of green logistics in the past decade, covering many aspects from theory to practice. With the enhancement of environmental awareness and the continuous development of technology, the research on green logistics will continue to deepen and expand.

4.5. Keyword Timeline Chart Analysis

The keyword timeline map can visualize the time when the keywords first appeared, and combined with the time dimension division, it can help to divide the stage of development of the field and the hot topics of research at each stage [12]. Based on the CiteSpace tool to draw the keyword timeline map of domestic literature, as shown in Figure 3, where the horizontal axis indicates the time dimension, the vertical axis indicates the cluster name, and the cluster name is sorted from high to low according to the co-occurrence frequency.

By analyzing the timeline mapping of keywords in the literature in the field of green logistics research from 2014 to 2024, it can be seen that the research hotspots are mainly concentrated in the construction of green logistics system, development of the logistics industry, logistics of agricultural products, cold chain logistics of logistics enterprises and carbon-neutral strategy, bibliometrics and low-carbon technology, logistics industry agglomeration and technological innovation, development strategy and regional economy, urban logistics and transportation optimization, packaging design and modularization, and e-commerce logistics. The high-frequency keywords of Cluster 5 are logistics industry, industrial agglomeration, technological innovation, regional innovation capacity, etc., mainly focusing on the period of 2019-2024, exploring the agglomeration effect of the logistics industry and its technological innovation, and inter-regional synergistic development capacity has also become the focus of the research in this time period. The high-frequency keywords of Cluster Class Cluster 6 are development strategy, regional economy, tourism logistics, sustainable development, etc., which mainly

discuss the application of green logistics in regional economy and tourism logistics, emphasizing the sustainable development strategy.

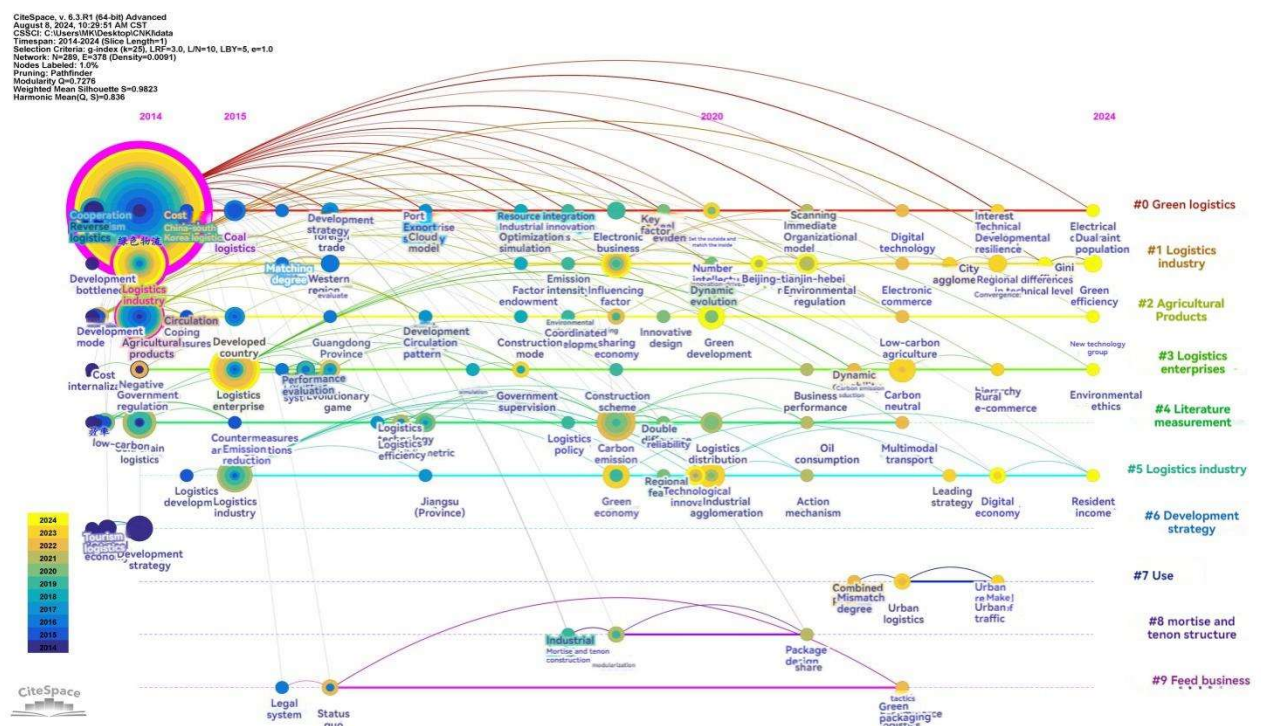


Figure 6. Time line of keywords in the research field of green logistics from 2014 to 2024

These hotspots reflect the extensive attention and rapid development of green logistics at multiple levels, including policy promotion, technological innovation, industrial application and academic research. In the future, with the further implementation of environmental protection policies and the continuous progress of technology, the research in the field of green logistics will continue to deepen and play a more important role in practical applications.

5. Conclusion and Outlook

5.1. Findings

Applying CiteSpace software, 302 core literatures in the field of green logistics in China Knowledge Network (CNN) from 2014 to 2024 were used as the research objects, and the research status, research hotspots and trends in the field of green logistics were explored through the methods of trend study, core author analysis, organization analysis, keyword co-occurrence, cluster analysis and keyword emergence, etc. The conclusions are as follows:

Trend study: Through the statistical analysis of “green logistics” related literature in China Knowledge Network during the period of 2014-2024, it can be seen that the research intensity of green logistics shows a rising trend in general, especially in recent years, with the implementation of the corresponding national policies, the research in this field has received more attention.

Analysis of Core Authors and Issuing Institutions: The analysis identifies the core authors and major issuing institutions in the field of green logistics, demonstrating the main research strengths and cooperative relationships in China. Among them, institutions such as the School of Logistics of Beijing Materials Institute and the Institute of Logistics Science and Engineering of Shanghai Maritime University have significant academic contributions in this field. However, the cooperation in China's green logistics research is mainly based on the “academic”

relationship, and the cross-regional cooperation is relatively limited, and the cooperation between the research institutions needs to be further strengthened.

Keyword co-occurrence and clustering analysis: Keyword co-occurrence and clustering analysis reveal the main research hotspots in the field of green logistics, such as green logistics, logistics enterprises, carbon emissions and other keywords appear frequently, indicating that these are the core themes of the current research. Through the keyword emergence analysis, the results show the cutting-edge trends and emerging themes in green logistics research, such as “carbon neutrality” and “low-carbon development”, etc. Regional economy and sustainable development have become the key themes in green logistics research, and the research pays special attention to the role of logistics in regional economic development. The research pays special attention to the role of logistics in regional economic development and discusses how to realize the goal of sustainable development through green logistics.

Diversification of research hotspots: The research hotspots in the field of green logistics show a diversification trend. They mainly focus on the construction of green logistics system, cold chain logistics and carbon neutral strategy of logistics enterprises, logistics of agricultural products, logistics industry agglomeration and technological innovation. These research hotspots reflect a wide range of concerns at the levels of policy promotion, technological innovation and industrial application.

5.2. Shortcomings and Prospects

Although this study systematically analyzes the research hotspots and trends in the field of green logistics in China through a variety of methods, there are still some shortcomings: 1) Limitations of data sources: this study mainly analyzes data based on the CNKI database, which may lead to insufficient coverage of relevant studies in other important databases, limiting the comprehensiveness and representativeness of the results. 2) Limitations of time span: the analysis of the time horizon mainly focuses on the period between 2014 and 2024, which may have overlooked the development dynamics of research at an earlier stage and resulted in an insufficiently in-depth understanding of the historical evolutionary process in the field of green logistics. 3) Limitations of geography: this study focuses on domestic research in the field of green logistics, and does not analyze in-depth the trends and progress of research in foreign countries. This makes the applicability and comparability of the research results in the global context limited.

There is a problem of insufficient cooperation and communication among domestic research institutions in China, and there is still a large space for cooperative research. It is recommended that academic communication be strengthened among researchers and research institutions to reduce geographical limitations. Through policy encouragement, academic conferences and other forms to strengthen the cooperative research in the field of big data analytics research, to realize the cooperation of research institutions across geographical areas. With the further implementation of environmental protection policies and the continuous progress of technology, research in the field of green logistics will continue to deepen. Future research can be carried out in the following aspects: 1) technological innovation and application: with the development of new technologies, the research direction for green logistics from the previous agricultural products, logistics enterprises, cold chain transportation, etc. can tend to shift to, for example, big data, artificial intelligence and the Internet of Things, etc., to further promote technological innovation and application in the field of green logistics, especially in the intelligent transportation system, logistics information platform and environmentally friendly packaging, etc. aspects. For example, in the specific practice of green logistics, the introduction of eco-labeling is considered to be an effective means to provide consumers with intuitive information about the environmental impact of transportation services ^[13]. 2) Policy impact and implementation effect: Future research can pay more attention to the actual impact and

implementation effect of green logistics policies, and assess the promotion of different policies on the development of green logistics through quantitative analysis and case studies. (3) International Cooperation and Comparative Research: With the development of globalization, international cooperation and comparative research on green logistics will become an important direction. By comparing the green logistics practices of different countries and regions, we will explore the optimal development path and policy suggestions.

The development of green logistics also faces a series of challenges, including the relationship between cost and profit, the uncertainty of the market mechanism, and the need for government and institutional management and constraints^[14]. Therefore, future research also needs to further explore how to balance these factors to promote the healthy development of green logistics.

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