

Green Logistics Research Review Report

Tianyi Li

School of Management, Shanghai University, Shanghai 200444, China

Abstract: With the rapid development of the social economy, the modern logistics industry is, on the one hand, an important part of supporting the development of the national economy and enhancing the national economic competitiveness. On the other hand, logistics activities are also one of the main factors leading to the deterioration of the ecological environment and the waste of social resources, the development of green logistics has become the key to the transformation of the logistics industry. The article uses CiteSpace software to conduct a quantitative analysis of the literature on the theme of "green logistics", aiming to sort out the knowledge structure and research hot spots in the field of green logistics, summarize the research process of green logistics at home and abroad; secondly, classify the research and development directions of logistics Explore.

Keywords: Green logistics; CiteSpace; Environment; Enterprise development.

1. Introduction

The concept of green logistics is to achieve the purification of the logistics environment while suppressing the harm caused by logistics to the environment during the logistics process so that logistics resources can be fully utilized. To reduce environmental pollution, reduce resource consumption, and make full use of resources, we use advanced logistics technology to plan and implement activities such as transportation, storage, packaging, loading and unloading, and circulation processing. From the perspective of enterprise processes, the green logistics system mainly consists of green supply logistics, green production logistics, green distribution logistics, waste logistics, and reverse logistics. The ultimate goal of green logistics is sustainable development. The scope of activities of green logistics covers the entire product life cycle. The theoretical basis of green logistics includes sustainable development, ecological economics, and circular economy theory. The main actors of green logistics include the public, the government, and all members of the supply chain.

2. Research Trend Analysis

2.1. Posting trends and development stages

In the early 1990s, with the deterioration of environmental problems and the spread of environmentalist ideas, green logistics gradually received great attention from foreign government departments and academic circles. First, foreign governments have passed legislation to reduce the impact of traditional logistics environments. Countries such as the United States, Canada, the United Kingdom, Germany and Japan have formulated strict laws and regulations to limit vehicle exhaust emissions and waste pollution; secondly, developed countries actively support the development of reverse logistics and propose political and economic propositions to reduce resource waste and environmental pollution through the development of circular economy. Therefore, the number of WOS-related documents published has been increasing year by year, reaching 844 articles in 2022.

2.2. Literature keyword analysis

Within a certain period of time, the scientific issues or

topics discussed by a large number of papers that are intrinsically related are called research hot spots. Keywords serve as a high-level summary of the topic of a paper, and their frequency of occurrence can reveal the hot spots of research in a certain field. Through CiteSpace, keywords with a frequency of 10 or more were selected to draw a keyword co-occurrence map. In addition to "green logistics", the keywords with the highest frequency were "low carbon economy", which appeared 48 times in total, and "countermeasures" and "agricultural products". The frequency of "management strategies", "circular economy", "logistics enterprises", "logistics management", "logistics industry", "management" and "problems" decreases from high to low. A keyword clustering map was further generated through keywords. The top 9 keyword clusters were "low carbon economy", "problems", "logistics industry", "management", "circular economy", "government", "coordinated development" and "measures", and "development strategy", which represent the research direction in the field of green logistics in my country. Based on the above clustered keywords and related literature analysis, it can be seen that issues, strategies and measures to develop green logistics are the most popular research topics in this field. Experts in various fields mainly put forward their opinions from the three perspectives of government, enterprises and consumers. The government actively publicizes the urgency, necessity and advantages of developing green logistics concepts to the society, formulates and improves relevant policies and regulations as soon as possible, and provides a good policy and economic environment for the development of green logistics; actively explores and establishes logistics information systems and Standardization system, promote greening through standardization, vigorously improve the level of green logistics infrastructure, green logistics transportation channels, and continuously strengthen the construction of green logistics parks and theoretical research and talent training on green logistics. On the corporate side, we should strengthen green logistics management, carry out technological innovations in procurement, circulation processing, packaging, warehousing, transportation, distribution and other processes, establish reverse logistics management plans, reduce pollution and waste, and strive to make the entire process of logistics activities green. On the consumer side, green needs and green consumption are

actively advocated, and consumers' wishes are used to force companies to implement green logistics management and the government to promote green logistics.

In CiteSpace, the keyword prominence of the green logistics literature theme was detected, and keywords with a significant increase in growth rate since 1999 were obtained, thereby identifying the research frontiers in each period. The prominent words from 1999 to 2010 were logistics activities, modern logistics, green transportation, environment, green consumption, and circular economy. During this period, people focused on exploring the conceptual connotation, theoretical basis, system composition, management measures, etc. of green logistics. At the end of the 20th century, the rapid development of the modern economy brought about massive consumption of resources and increased environmental degradation. At the same time, modern logistics is the "third source of profit", and many companies want to use logistics as a new opportunity for economic growth. However, with the development of global economic integration, some traditional tariff and non-tariff barriers have gradually faded, and environmental issues have become a green trade barrier. If our country's logistics enterprises want to make a difference, the development of modern green logistics has become an inevitable choice. From 2010 to 2016, low-carbon economy and agricultural products became the focus of research in the field of green logistics. Low-carbon economy refers to an economic development form that, under the guidance of the concept of sustainable development, reduces the consumption of high-carbon energy such as coal and oil as much as possible, reduces greenhouse gas emissions, and achieves a win-win situation for economic and social development and ecological and environmental protection. Since logistics is a large consumer of energy and carbon emissions, it has become one of the industries in urgent need of reform in the low-carbon economy. Its low-carbon and green transformation and upgrading measures have become a frontier topic. The highlighted words from 2017 to 2022 are smart logistics, express packaging, express delivery industry, logistics industry, cold chain logistics, and logistics packaging. Science and technology, as the primary productive force, continue to promote technological innovation in various fields. The logistics industry also uses integrated intelligent technology to improve the efficiency of all aspects of logistics activities. At the same time, with the popularization of e-commerce consumption patterns, the express delivery industry has developed rapidly. While bringing convenience to people, the waste caused by express packaging has also triggered widespread discussions in law, trade, policy, society, enterprises, and consumers. Improvement suggestions were put forward and discussed in order to promote the development of green logistics packaging. After 2019, the potential development prospects of cold chain logistics have been explored, which has put forward higher requirements for the distribution efficiency of green logistics. Its development status, logistics system construction, and distribution path optimization have become cutting-edge topics at this stage.

3. Research Status

Research on evaluation indicators: By issuing questionnaires to purchasing staff and department managers, a classic supplier evaluation system was proposed, and these indicators were analyzed and sorted. This evaluation system includes a total of 23 indicators, of which product quality, on-time delivery and historical performance are the top three

most important factors. The publication of research results has aroused the interest of scholars around the world in researching supplier evaluation indicators, laid the research foundation in this field, and promoted the progress of research in this field^[1]. (Dickson, 1966) The green supplier evaluation standard for the textile industry based on a hierarchical structure includes eight main indicators such as environmental management, pollution management and green production, as well as 20 secondary indicators such as ISO14001 and ODC^[2]. (Gurel, 2015)

Research on evaluation methods: The first is the study of qualitative methods. The intuitive judgment method is a theoretical method for decision-makers to directly evaluate suppliers based on the information they already have or the relevant data obtained from surveys, while closely combining their own experience. The bidding method is that suppliers bid according to the specific requirements of the bidding company. The company organizes experts to conduct an assessment, and then selects the most suitable supplier for cooperation based on the assessment results. Generally, companies can find suitable suppliers within a wider scope through public bidding. The negotiation selection method refers to a method in which the company communicates directly with candidate suppliers based on its own needs. This method is suitable for when the procurement time is tight, the specifications of the ordered products are special or the technology is relatively complex. After communication and coordination between the company and the supplier, both parties can have a more comprehensive understanding of each other's situation in a short period of time and promote better cooperation. The delta method means that experts use an anonymous method to put forward their own suggestions for candidate suppliers without communication, and then the decision-makers summarize them, and then after multiple rounds of repeated consultations, they finally draw evaluation and selection conclusions. . Benchmarking is a method used by Xerox to improve product quality and characteristics. This method uses a successful company as a benchmark, and then compares the performance of candidate suppliers with that benchmark to obtain a suitable supplier. This method can select high-level suppliers, but due to different specific situations, the selected suppliers may not be suitable for your actual needs. The second is the study of quantitative methods. Cost methods mainly consider the price factors of products, usually including cost ratio method, cost comparison method, total cost method and activity-based cost method. Data envelopment analysis is based on the concept of relative effectiveness and was developed in order to meet new decision-making requirements; researchers have also tried to use data envelopment analysis methods to select suppliers, while actively exploring the use of data envelopment and mathematical programming. A combined portfolio model is used to evaluate and select suppliers. Mathematical programming can solve resource optimization problems. It can be divided into linear programming and nonlinear programming according to whether it is linear or not; it can also be divided according to the number of targets. The method of approaching the ideal solution is to find the alternative that is closest to the ideal solution but farthest from the negative ideal solution, which is the optimal solution. The traditional TOPSIS method has strong applicability and the calculation process is relatively simple, but some information may be lost during use, affecting the accuracy of the results. Principal component analysis (PCA) removes the correlation

between indicators. During the analysis process, several principal components will be obtained, and their information proportions will decrease. While ensuring that the original basic information remains unchanged, a linear combination of several variables is used to describe the original information. After principal component analysis, the structure can be simplified and the focus of the problem can be analyzed to achieve the purpose of dimensionality reduction. As a data analysis tool, rough sets can process incomplete data information, achieve attribute reduction of information, and achieve the purpose of eliminating redundant information.

Cooper ^[3] (1997) used a linear weighting method to evaluate suppliers in the article. The linear weighting method was used earlier and is widely used. It expresses the total score of the evaluated supplier by using the sum of the products of each indicator score and the corresponding weight. In 1991, Weber proposed the use of the AHP method to evaluate suppliers. Through SWOT analysis, Dorota Klimecka-Tatar, Manuela Ingaldi, et al. ^[4] (2021) clarified the relevant strategies for the development of green vehicles, especially the use of green vehicles in the fleets of various logistics companies. Khan S A R^[5] (2019) examines the association between green logistics operations, and social, environmental, and economic indicators of SAARC (South Asian Association for Regional Cooperation) countries. Jinru L^[6] (2022) finds green financing and green logistics have a significant and positive effect on sustainable production and the circular economy.

4. Literature Review and Summary

The shortcomings of existing research methods: Although the methods of researching green logistics have been developed to a certain extent in China, it is still difficult to study the entire green logistics process. Green technology

application: 3D printing, blockchain and other technologies have not been well applied in green logistics. Future research directions: Future research can broaden data information collection channels, innovate analysis methods, find alternative variables and representative variables, and study green logistics from a more detailed decision-making unit perspective. Green technology application: Track cutting-edge technologies and explore their possible impact on green logistics.

References

- [1] DICKSON G W An Analysis Of Vendor Selection Systems And Decisions [J]. *Journal of Purchasing*,1966,2(1): 28-41.
- [2] GUREL O,ACARAZ,ONDENI, et al.Deterinants of the Green Supplier Selection [J]. *ProcediaSocial and Behavioral Sciences*,2015,181: 131-139.
- [3] COOPER S D.A Total System for Measuring Delivery Performance [J]. *Journal of Purchasing and Materials Management*,1977,13(3):22-26.
- [4] Klimecka-Tatar, Dorota, Ingaldi, Manuela and Obrecht, Matevž. "Sustainable Development in Logistics – A Strategy for Management in Terms of Green Transport" *Management Systems in Production Engineering*, vol.29, no.2, 2021, pp.91-96
- [5] Khan S A R , Jian C , Zhang Y ,et al.Environmental, Social and Economic Growth Indicators Spur Logistics Performance: From the Perspective of South Asian Association for Regional Cooperation Countries[J].*Journal of Cleaner Production*, 2019, 214(MAR.20):1011-1023.
- [6] Jinru L , Changbiao Z , Ahmad B ,et al.How do green financing and green logistics affect the circular economy in the pandemic situation: key mediating role of sustainable production[J]. 2022.