

## Construction of Green Degree Evaluation Index System for Logistics Enterprises

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### Abstract

Low carbon environmental protection has become a focus topic in all fields of society. Reducing greenhouse gas emissions, especially carbon dioxide emissions and energy consumption has become an important measure to deal with human environmental problems. Logistics is the arterial system of the national economy, connecting all parts of social production to make it an organic whole. From 2010 to 2019, the total amount of social logistics in China continued to increase. According to the data of China Federation of logistics and procurement, the express business volume in China was 63 billion in 2019, and the per capita use of express in China exceeded 45 in 2019. Although the impact of logistics enterprises on the environment is not as direct and obvious as that of industry, there are many logistics links and close links. Among them, the impact of transportation on the environment is self-evident. As the most important and basic link in logistics activities, the exhaust pollution, noise pollution and waste engine oil pollution released by means of transportation have caused damage to the environment; As the second important activity: when storing some inflammable, explosive or radioactive materials, improper storage will also cause pollution to the surrounding environment; In addition to these two links, packaging, circulation and processing will affect the environment to a certain extent. Logistics not only promotes the rapid economic development to some extent, but also needs to adapt to the low-carbon requirements of economic development, undertake the responsibility of providing consumers with low-carbon life services and bear the due social responsibility of enterprises. Under the influence of government environmental regulation, cooperation between logistics suppliers and suppliers, green preferences of stakeholders and customers, many logistics enterprises have actively promoted green behavior and green management to deal with the changes of environment and market. At this time, effectively measuring the green degree of logistics enterprises will help logistics enterprises to clarify the green development status and find the deficiencies in green management, so as to improve business processes and enhance competitiveness in time. This paper systematically combs the previous research results of green degree evaluation, and puts forward the evaluation index of green degree of logistics enterprises on the basis of relevant theories. Due to the limited time, this paper did not conduct empirical research. With the deepening of follow-up research, we will continue to explore the maturity of indicators, use reasonable methods to study and analyze indicators, and finally select the cloud model method [1] for index evaluation to further demonstrate its practical significance.

### Keywords

Low carbon environmental protection; Logistics enterprises; Green degree; Evaluate.

## 1. Literature Review

### 1.1. Green Issues of Logistics Activities

With the high-quality development of China's economy, e-commerce has sprung up rapidly. People's daily life is closely related to the level of logistics development. The increase of logistics activities and the rapid development of logistics enterprises have caused more and more serious damage to resources and environment. Many scholars at home and abroad have studied the green problem of logistics activities. Maurice (2011) believes that the traditional inventory model can not solve the increasing actual inventory needs, and the unreasonable utilization of inventory has a great impact on the environment [2]. N. Z (2019) and others believe that in order to follow the theme of protection link, stakeholders have turned to reverse logistics, and believe that reverse logistics can improve environmental problems and enhance the competitiveness of enterprises through recycling and reuse processes [3]. K. A (2016) and others believe that the widespread [7] and spread of logistics facilities and equipment will produce more noise pollution, damage air quality and traffic congestion [4]. In the aspect of packaging, Tsai chikuo (2019) studied the logistics system of reusable semi-finished product packaging in the LCD panel industry. In the green logistics mode, the shipping box is redesigned to be reusable and can accommodate multiple panels of different sizes at the same time, which can reduce the impact on the environment. The cost model involves material cost, transportation and recovery cost, and excessive use of packaging materials will cause resource waste [5]. From the traditional way of thinking, green goals and business goals seem to be incompatible. Transportation vehicles consume gasoline all the time, and the resulting exhaust pollution does great harm to humans, plants and animals. Emmanuela (2017) proposed the need for a new green business model to use green vehicles to reduce the impact of logistics and transportation on the environment [6].

Domestic scholars have also conducted relevant research on this issue. Liu Yanping believes that the use of insecticides, fungicides, refrigeration equipment refrigerants and flammable, explosive and dangerous chemicals in the storage process will pollute and damage the surrounding environment; Noise pollution during handling and commodity damage caused by improper handling will also cause resource waste and environmental pollution [7]. With the development of information technology in logistics industry, the smoothness of logistics information has become one of the factors to measure the degree of greening. Liu Hedong and Shi kuiran studied the factor of logistics information. The delay of current information will lead to the failure of logistics process and cause great economic losses. Asymmetric dissemination of information technology will indirectly lead to quality problems of goods, resulting in environmental pollution [8]. At the same time, Li Jing discussed in detail the types of packaging pollutants, which are divided into CO<sub>2</sub>, Co, NO<sub>x</sub>, dust and N<sub>2</sub>O. Different substances have different effects on the environment, causing soil pollution, water pollution and air pollution. The impact on the environment is further explored from the aspect of refining pollutants [9]. By combing and exploring the above literature, the non green behavior of enterprises not only wastes social resources and damages the environment, but also damages the economic benefits of enterprises. Therefore, how to improve their own logistics activities and management methods has become an important problem faced by logistics enterprises.

### 1.2. Meaning of Green Degree and Green Degree Evaluation

The original meaning of "green" is a description of a color, which is a common color in nature. At present, the concepts of green product, green design, green enterprise and green supply chain can be seen everywhere. It can be seen that the society pursues the quality and state of life of freshness, safety, comfort, nature and environmental protection. The concept of green degree comes from a report in 1996: "green degree: a sign of the progress of social civilization"

[10]. The report points out that green degree is a comprehensive reflection of environmental protection consciousness, from light green to medium green to dark green, reflecting different levels of environmental protection consciousness. The green degree can be measured from the attention and reflection depth of environmental protection problems. This report gives a general description of the green degree, but does not make a clear definition of the green degree. Chinese scholar Liu Fei believes that green degree includes two meanings: absolute green degree and relative green degree [11]. Absolute "green" refers to positive environmental impact. Considering that the environmental impact caused by actual situation is often negative, the concept of "green" is mainly relative to environmental regulations or some environmental standard values. "Green" is quantified and evaluated by green degree, which refers to the degree of green or friendly to the environment. Since then, many scholars have quoted this view. For example, Wu Hanlin [12] adopted this view in the measurement research of "green degree" of mechanical and electrical products, Wang Yao [13] enterprise green manufacturing application research based on ecological civilization and Wang Xiaosi [14] cold chain logistics distribution path optimization research based on green degree. With the deepening of research, Zhang Caixia [15] built a green supply chain evaluation index system in the five links of automobile product supply chain design, procurement, production, sales and recycling, and comprehensively evaluated the evaluation objects from multiple dimensions. The green degree of the above research is mainly to quantify the degree of harmony and unity of economy, society and ecology. With the gradual strengthening of environmental protection awareness of operators, various enterprises take the initiative to carry out some measures and methods to reflect the importance of environmental protection. Green degree is not only the quantification of the degree of harmony and unity of economic, social and ecological benefits produced by all activities of the evaluation object, but also the enterprise green culture and employee training for indirect benefits have become an important consideration.

## 2. Design Principles and Links of Index System

By summarizing the green issues of logistics activities, this paper leads to the discussion on the meaning of green degree and green degree evaluation, and summarizes the relevant research on enterprise green degree evaluation and logistics system green degree evaluation at home and abroad. By combing the sustainable development theory, ecological economics theory and ecological ethics theory, this paper defines the theoretical basis of constructing the green degree evaluation index system of logistics enterprises. According to the analysis of literature and theoretical basis, this paper constructs a green degree evaluation index system in line with logistics enterprises. The construction of enterprise green degree evaluation index is an important aspect of enterprise green degree evaluation. The establishment of scientific and reasonable index system is the key factor for the success of evaluation work. The design of green degree index should be based on the characteristics of enterprise green management and comprehensively consider the relevant factors affecting enterprise green development. The green degree evaluation of logistics enterprises is a complex problem involving resources, environment, economy, storage and transportation, packaging, warehousing and other aspects. Only by constructing the index system from multiple angles, levels and comprehensively can we accurately reflect the green development of logistics enterprises. In order to make the evaluation system more scientific, feasible and comprehensive, the following four principles shall be observed:

(1) The principle of combining qualitative analysis with quantitative research. Qualitative analysis starts from the purpose and principle of evaluation, considers the sufficiency, feasibility and necessity of evaluation indicators and the coordination between indicators and evaluation methods, and determines the indicators and indicator structure by system analysts

and decision-makers. Quantitative analysis reflects the impact of logistics enterprise resources, environment, economy and safety factors on green degree in the form of quantification, and makes the index system more scientific through a series of tests.

(2) Scientific principle. In order to ensure the accuracy and rationality of the green degree evaluation results of logistics enterprises, the established evaluation index system is required to be scientific. The scientific principle requires that the green degree evaluation index system of logistics enterprises should be based on scientific theory, which can fully reflect the connotation of green degree and reflect the characteristics of logistics enterprises. The meaning of the index must be simple and clear, and the expression should be scientific, reasonable and standardized.

(3) Feasibility principle. Before selecting the evaluation index, we should fully consider the difficulty and reliability of data acquisition. If the required data cannot be obtained or the obtained data is untrue and inaccurate, the operability of the whole green evaluation index system is relatively low. In the design, the indicators shall be appropriate, the concept shall be accurate and the meaning shall be clear; The content should be concise and practical, and the method should be feasible. In addition, when designing indicators, attention should be paid to combining the overall status of enterprises in a country or region and the specific implementation of green management in enterprises. It is not allowed to copy the green degree evaluation indicators of other countries or regions.

(4) Principle of comparability. The green degree evaluation index system of logistics enterprises should be used to horizontally compare the differences in the green development degree of different logistics enterprises, that is, the index system is required to be more horizontally comparable. Therefore, the common name, concept and calculation method shall be adopted as far as possible, and the uncertain factors, special conditions and environmental impact factors shall be eliminated as far as possible.

Evaluation index is a multi-attribute architecture that globally describes and describes the overall characteristics of the object system according to the purpose of evaluation. It can be roughly divided into the following links:

(1) Select the evaluation index and establish the evaluation index system. The principle of purpose. As the basis of comprehensive evaluation, the evaluation index system must reflect the purpose of comprehensive evaluation and meet the requirements of comprehensive evaluation; Systematic principle. Systematic principle means that in the establishment of comprehensive evaluation index system, the organic relationship between various indexes should be fully considered, and all aspects of the evaluated object are an inseparable organic whole; Principle of operability. The selected evaluation indicators should not only meet the purpose of comprehensive evaluation, but also be supported by data. In other words, the data of evaluation indicators should be easy to obtain, otherwise the established index system can only be put on hold and can not achieve the purpose of comprehensive evaluation, which will not help to guide the actual work. At present, this is not fully noticed in some domestic research cases of index system.

(2) Quantitative selection of evaluation indicators. Quantitative selection evaluation index, also known as mathematical selection evaluation index, refers to the method of applying mathematical method to analyze and determine the evaluation index in the alternative index set.

(3) Determine the weight of evaluation indicators. There are many factors that affect the development and change of things, and the influence degree of each factor is different, which can be divided into primary and secondary. In other words, in the comprehensive evaluation, each index in the evaluation index system has different effects on the evaluated things, and its importance is different. Therefore, weighting processing is required.

(4) Summary and synthesis of comprehensive indicators. According to the comprehensive evaluation value obtained after synthesis, the evaluated things are sorted, compared and analyzed.

### 3. Implementation Points of Green Degree Evaluation of Logistics Enterprises

By evaluating the green degree of logistics enterprises, we can urge enterprises to develop in a healthier and greener direction. In the process of implementing the green degree evaluation of green enterprises, we should pay attention to several key points.

(1) Construction of green degree evaluation index of logistics enterprises. The establishment of evaluation criteria is an important part of the green degree evaluation of logistics enterprises. The construction of indicators can be carried out on the basis of literature research, expert interview and questionnaire survey. At present, there is no unified understanding of the evaluation of the green degree of logistics enterprises. In the specific situation of logistics enterprises that design indicators, the index system is selected according to local conditions for assessment design. The evaluation standard can use the indicators of more advanced logistics enterprises in the industry as a reference.

(2) Determination method of each index weight. The index weight reflects the contribution of the evaluation index to the evaluation results. At present, the determination of index weight can be divided into subjective weighting method and objective weighting method. The subjective weighting method is mainly used by experts to judge the relative importance of each evaluation index for the purpose of evaluation according to their own experience, and then comprehensively deal with it to obtain the index weight. This method is more practical and simple to calculate, but it is highly subjective. Different experts will have different opinions; The objective weighting method determines the weight of each index directly according to the discreteness of the index attribute value series of the evaluated object. The results obtained by this method have a strong mathematical theoretical basis, but they rely too much on sufficient sample data and practical problems, which makes the participation of decision-makers poor and the calculation method too cumbersome. After determining the index weight, it can be implemented according to the green degree evaluation of logistics enterprises.

### 4. Conclusion

The negative impact of environmental deterioration on people is becoming more and more prominent, and the scarcity of resources is becoming more and more prominent. Under the influence of the green wave, consumers and partners are pursuing more green products and partners. By constructing the green degree evaluation index system of logistics enterprises, it can provide reference suggestions for logistics enterprises to implement green degree evaluation, so as to better improve the current problems of enterprises and realize sustainable development.

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