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Analysis on the Low-carbon Transformation Path of China's Logistics Industry under the Background of Carbon Neutralization

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Abstract

Under the background of “carbon neutrality”, green and low-carbon have gradually become a broad consensus of the whole society. As an important part of social and economic development, the logistics industry consumes a large amount of energy and urgently needs low-carbon transformation.This paper analyzes the problems encountered in the low-carbon transformation development of our country's logistics industry and puts forward the necessary solutions, which will not only promote the development of the low-carbontransformation of our country's logistics industry, but also promote the realization of the goal of "carbon neutrality" as soon as possible. Based on the economic and social development of our country under the "double carbon" policy, facing the dilemma of low-carbon transformation of logistics industry in China, this paper puts forward the general and concrete ideas of low-carbon transformation of logistics industry in our country, and puts forward the specific path and method under the guidance of the thought of low-carbontransformation, hoping to provide some references for the low-carbon transformation of logistics industry in China.

Keywords

Carbon Neutrality; Logistics Industry; Low-carbon Transformation; Path Analysis.

1. Introduction

At present, the excessive emission of carbon dioxide has caused many environmental problems, seriously affecting people's living environment. If it is allowed to develop, it will have incalculable consequences. The realization of carbon neutralization will greatly improve the ecological environment of the earth and reduce the environmental problems caused by human activities. In September 2020, since the country put forward the strategic goal of “carbon peak, carbon neutralization”, all parties reached an agreement on how to deal with carbon emissions. With the implementation of "double carbon" strategy,logistics enterprises face severe challenges. Under the background of low-carbon economy, the cost of freight transportation is rising constantly, and the profitability of logistics industry is limited due to the intensified market competition. Therefore, how to realize green development under the premise of guaranteeing the interests of enterprises is an important problem facing the logistics industry at present.

ISSN: 2710-0723

2. The Dilemma Faced by the Low-carbon Transformation of China's Logistics Industry

2.1. Incomplete Low-carbon Policy System

2.1.1. Uneven Policy System Within the Industry

China's "double-carbon" work is at the initial stage, and systems such as mandatory disclosure of carbon emission information and carbon emission accounting and authentication are also in the embryonic stage. At present, the policy targets are more focused on large enterprises in the industry, such as SF Express, JD Logistics, Suning Distribution and even Haier Logistics. They are large in scale and have strong financial strength to realize low-carbon transformation. In addition to the tilt of policies, they can better carry out overall planning. However, for a large number of small and medium-sized enterprises in the industry, there is no perfect policy system, and there is no clear route in the low-carbon transformation target, key point and implementation path. In the long run, the small and medium-sized enterprises in the industry are the key force to comprehensively realize the green and low-carbon transformation. There are a large number of small and medium-sized enterprises in the logistics industry, which are an important part of the logistics industry. However, due to the lack of their own capital and the insufficient inclination of the relevant policy system,It's hard to make a green, low-carbon transition. It is the key to realize the green and low-carbon transformation of logistics industry to provide effective policy support and restrictive carbon emission indicators for logistics enterprises of different scales.

2.1.2. There are Differences in Policies of Different Regions

Since 2022, in order to smoothly promote the "double carbon" work, policies such as incentives and financial subsidies for low-carbon emission reduction have been successively introduced. But because of China's vast territory and complex terrain, different regions and regions have different levels of economy and technology and different industrial structures. In terms of economic development level, the higher the economic development level, the better the development of logistics industry, with more low-carbon equipment, stronger capital force, higher informatization degree, faster realization of low-carbon transformation, and the more difficult it is for the regions with weaker economic development level to realize. In terms of industrial structure, the manufacturing industry is the main industry in the Yangtze River Delta and even the southeast coastal area, the light industry is mainly in the central region,the heavy industry is mainly in the northeast region, and the mining industry is the main industry in the western region. These different industrial structures also lead to different development of logistics industry in each region, and also lead to different energy consumption structure. In addition, the resource category and resource reserve of each region are different, resulting in different carbon emission of each region.This has also led to the inability to implement the "double-carbon" policy throughout the country.resulting in regional policy differences, It also leads to different progress of low-carbon transformation of logistics industry in different regions. At present, there are not many provinces that have really implemented policies such as incentives and financial subsidies for carbon emission reduction, and the provinces in northwest China have not established a complete relevant policy system, which will also affect the progress of low-carbon transformation of logistics industry in each region.

2.2. Immature Logistics Low-carbon Transformation Technology

The low-carbon transformation of logistics industry cannot be driven by technological innovation. Only when more mature technologies are applied to the whole process of logistics can the goal of reducing carbon emission be achieved.However, at present, the technical aspects of logistics enterprises are not mature, and the following problems exist, which are mainly reflected in the following aspects:

ISSN: 2710-0723

2.2.1. The Digital Technology Level is Backward

At present, the digital infrastructure construction of the logistics industry lags behind and the technical level is not compatible with the times.The level of intelligence and automation is low, and the application rate of emerging digital technologies of blockchain, Internet of Things and artificial intelligence is low.

2.2.2. Low Utilization of New Energy Equipment

At present, the main means of transportation in logistics transportation are traditional fuel vehicles, because new energy vehicles are still not captured in the technical fields such as endurance range and performance, and the utilization rate of new energy vehicles driven by renewable energy or cleaner energy conversion technology is low.

2.2.3. Large Contamination of Logistics Packaging and Fillers

At present, the packaging materials and fillers in the logistics industry are still dominated by non-recyclable packaging materials such as adhesive tape paper and foam, and the use and subsequent treatment of such packaging materials greatly increase the carbon emission.

2.2.4. Laggard Logistics Distribution Technology

On the one hand, at present, the logistics distribution in China is mainly based on the traditional distribution method of manually driving traditional energy vehicles, which not only increases the consumption of traditional fossil energy, increases the carbon emission, but also consumes a large amount of human resources. On the other hand, the overall informatization level of the logistics distribution link is still low and there is no clear and perfect planning for the distribution route, resulting in the repeated transportation of distribution vehicles and insufficient loading in the current logistics distribution link.This also increases the cost and carbon emissions of logistics enterprises.

2.3. Insufficient Low-carbon Concept in Logistics Industry

Our country's green logistics is in the initial stage, in the development process of the green logistics, there are still some problems that need to be solved urgently: the theoretical research on the green logistics in the industry is not enough, and the lack of practice makes the policy and standard of the green logistics difficult to implement; The management has made the short-term benefit and the long-term development objective vague, and cannot make an effective decision on the choice between the profit cost and the low-carbon objective, and has not put the green development on a certain level;Lack of conventional low-carbon concept of employees makes them pay less attention to in production practice, and even if there are standards, they will not be strictly implemented; The lack of general concept makes it impossible to effectively implement the low-carbon logistics route from top to bottom in the whole logistics process.

2.4. Lack of Low-carbon Logistics Professionals

In order to realize carbon neutrality, low-carbon logistics has become the inevitable trend of modern logistics industry, and the cultivation of low-carbon logistics talents is the inevitable requirement of low-carbon economy development. However, due to the late start and extensive development of the logistics industry in China, the elite talents in China are not willing to devote themselves to the development of the logistics industry, forming the situation that the shortage of logistics professionals reaches hundreds of thousands per year. In the case of lack of logistics talents in general, inthe field of low-carbon logistics talents, since the concept is relatively novel, and compared with the traditional logistics industry, relevant personnel are required to master more knowledge on low-carbon aspects. Therefore, it is impossible to effectively cultivate qualified low-carbon logistics talents by staying in traditional logistics education, so that there are few talents in this field. Most companies do not have talents with such awareness. Low-

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carbon logistics talents are the necessary conditions for the logistics industry to realize low-carbon transformation under the carbon-neutral background. The shortage of talents leads to the fact that most logistics companies are not able to make low-carbon transformation.

3. Carbon-neutral and Low-carbon Transformation of Logistics Industry in China

3.1. General Idea of Low Carbon Transformation

In order to fully understand the low-carbon transformation thinking of logistics industry, the overall thinking of carbon neutrality and emission reduction in China is first elaborated. According to China's greenhouse gas inventory data, China's total greenhouse gas emissions in 2022 will be 13.9 billion tons of carbon dioxide equivalent, accounting for 27% of the total global emissions. To achieve the goal of "carbon neutrality" at an early date, the most important thing is to reduce the carbon emission of the whole society and increase the negative emission and carbon sink capacity. In order to have a more in-depth understanding of the idea of carbon emission, this paper introduces the emission KAYA formula, and the emission KAYA driving factors are decomposed into:

$$Cco_2 = \frac{Cco_2}{E} \times \frac{E}{G_{GDP}} \times \frac{G_{GDP}}{P} \times P$$

In the formula: Cco_2 is the total carbon emission, E is the total energy consumption, G_{GDP} is the economic total,P is the population, $\frac{Cc_2}{E}$ is the Energy carbon emission intensity, $\frac{E}{G_{GDP}}$is the energy intensity, $\frac{G_{GDP}}{P}$is the GDP per capita.

It can be seen from KAYA decomposition that the decrease of energy carbon emission intensity and energy intensity can drive the decrease of total carbon emission, and the energy carbon emission intensity is mainly affected by the cleanness of energy production and the greening of energy consumption .Research shows that if the proportion of clean energy reaches 70%, even if the total energy consumption is doubled, the energy carbon emission intensity can still be reduced by about 60%. From 1978 to 2018, China's energy intensity decline contributed about 80% to the carbon emission control, while the energy carbon emission intensity decline contributed only 13%. There is great potential for emission reduction in the future.

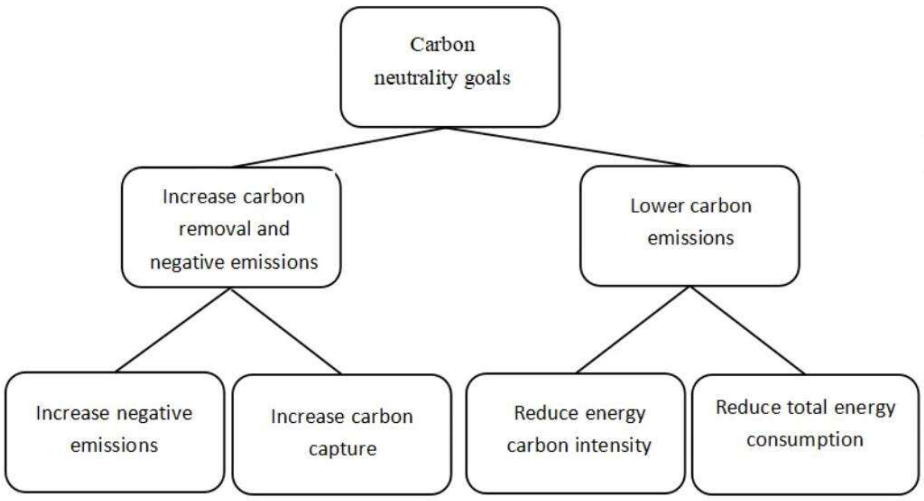

Figure 1. Framework of China's overall idea of carbon neutrality

ISSN: 2710-0723

Therefore, China's overall approach to achieving the carbon-neutral goal is to "increase and decrease". Decrease is the core and increase is the bottom.The “one increase” is to increase carbon removal and negative emission.Through carbon collection, utilization and storage, the discharged carbon dioxide is commonly stored to realize zero emission. The biomass carbon is used for universal storage, and the forest carbon sink is increased to increase solid capacity, and direct air gas is used for universal absorption of carbon dioxide to provide negative emission. “One reduction” is to reduce emissions by reducing total fossil energy consumption and energy carbon intensity.The specific idea framework is shown in Figure 1.

3.2. The Specific Thinking of the Low-carbon Transformation of China's Logistics Industry

Combined with the overall thinking of low-carbon transformation in China, the key to realize the low-carbon transformation of logistics industry is to construct the economic system of green and low-carbon circular development. Considering the development characteristics and development stages of the logistics industry in China, the low-carbon transformation of the logistics industry in China faces many difficulties, this paper puts forward the concrete thinking of the low-carbon transformation of the logistics industry.

The thinking of low-carbon transformation of China's logistics industryincludes "two substitutions, one improvement, one improvement, one renewal andone cultivation".

“Two substitution” refers to clean substitution and electric energy substitution, in which “clean substitution” refers to replacing fossil energy with clean energy such as solar energy, wind energy and water energy through low-carbon transformation on the energy supply side, so as to gradually reduce coal consumption in the process of logistics and transportation. the combustion and use of fossil energy such as carbon; “Electricity substitution” refers to replacing coal with electricity, oil with electricity, gas with electricity and primary biomass energy with electricity through the low-carbon transformation of energy consumption side, so as to get rid of the dependence on fossil energy in the process of logistics and transportation.

"One improvement" means to build a perfect and balanced low-carbon support policy, carry out overall planning and coordination, break regional barriers, and promote the low-carbon transformation of China's logistics industry;

“One improvement” refers to the development of digital technology by improving the level of digital technology so as to reduce carbon emission and energy consumption;

"One renewal" means to provide ideological support for the low-carbon transformation of China's logistics industry by updating the concept of green logistics and guiding the practice with the updated concept;

"One cultivation" means to lay a solid foundation for low-carbon transformation of logistics industry by cultivating high-level low-carbon logistics talents. In the process of low-carbon transformation of logistics industry, carbon reduction and efficiency enhancement is always the primary objective and prerequisite. The key to carbon reduction and efficiency improvement lies in adhering to the new development concept as the guide,scientifically planning as a whole, establishing first and then breaking,promoting in order, and handling the relationship between emission reduction and development, long-term and short-term, market and government.

4. Path Analysis of Low-carbon Transformation of Logistics Industry in China

Under the guidance of general thinking and specific thinking of low-carbon transformation, the specific path of low-carbon transformation of logistics industry in China is proposed below.

ISSN: 2710-0723

4.1. Building a Perfect and Balanced Low-Carbon Policy System

4.1.1. Improve the Low-carbon Transition Policy System within the Industry

The government plays a very important role in the low-carbon transformation development of the logistics industry. However, it is difficult to realize the green and low-carbon transformation of the logistics industry because of the unbalanced policies of the current low-carbon transformation of the logistics industry. This requires the government to define the key direction, coordinate as a whole, give full play to the advantages of the leading enterprises in the logistics industry according to the actual situation, give reasonable policy guidance and necessary reward and punishment system on this basis, give full play to the leading role of the leading enterprises in the industry, carry out logistics transportation, warehousing, packaging and other activities in the form of green low-carbon intelligent environmental protection, and take the lead in realizing the green and low-carbon transformation of the logistics industry. At the same time, it recognized the important role of small and medium-sized logistics enterprises in the green and low-carbon transformation of the logistics industry, formulated a perfect policy system, encouraged the small and medium-sized logistics enterprises to carry out green core technology innovation through low-carbon emission reduction incentives, fund support and other policies, formulated the incentive mechanism for the R&D achievements of the relevant core technologies of green logistics to improve the enthusiasm of the small and medium-sized enterprises in the low-carbon transformation of the industry, and gave full play to their backbone in the low-carbon transformation of the logistics industry, and finally realized the green and low-carbo transformation of the logistics industry.

4.1.2. Make Overall Planning and Coordination and Break Down Regional Barriers

The difference of economic development level in each region also leads to the difference in the development of logistics industry in each region. This requires the government to formulate appropriate policies according to the actual conditions of each region. For more developed coastal areas, such as FuJian, Zhejiang, Guangdong, Jiangsu, Shanghai and other provinces and cities have more perfect logistics systems, and local logistics enterprises also develop better. The government should implement the measures of introducing the green and low-carbon transformation concept mainly, supplemented by financial support, establish necessary reward and punishment policies, formulate the standards for waste emission of transport vehicles, assess the local logistics enterprises, give corresponding capital rewards and preferential tax policies to the enterprises that are excellent in the assessment, and collect additional taxes and fees for the enterprises that fail to pass the assessment. However, for some regions with poor economic development, such as Yunnan, Xinjiang, Tibet, Inner Mongolia and other provinces, they lack complete logistics infrastructure andexcellent transportation facilities, and the logistics industry is relatively undeveloped. The local government should strengthen fund support to guide local logistics enterprises to purchase low-carbon equipment to realize green and low-carbon development. At the same time, strengthen overall planning and coordination, give play to the capital advantages of the southeast coastal areas to support the development of low-carbon transformation of logistics enterprises in the northwest region, bring into play the advantages of rich resource reserves in the northwest region and combine the technical advantages of the southeast region, realize the complementary advantages, break the regional barriers, establish the cooperation and sharing mechanism among the national logistics enterprises, strengthen the low-carbon technology cooperation, and promote the green and low-carbon transformation development of the logistics industry in China excellent transportation facilities, and the logistics industry is relativelyundeveloped. The local government should strengthen fund support to guide local logistics enterprises to purchase low-carbon equipment to realize green and low-carbon development. At the same time, strengthen overall planning and coordination, give play to the capital advantages of the

ISSN: 2710-0723

southeast coastal areas to support the development of low-carbon transformation of logistics enterprises in the northwest region, bring into play the advantages of rich resource reserves in the northwest region and combine the technical advantages of the southeast region, realize the complementary advantages, break the regional barriers,establish the cooperation and sharing mechanism among the national logistics enterprises, strengthen the low-carbon technology cooperation, and promote the green and low-carbon transformation development of the logistics industry in China.

4.2. Strengthen Low-carbon Transformation Technology Transformation and Innovation

4.2.1. Strengthening the Technological Innovation and Improving the Digital Level

Logistics enterprises should improve their independent innovation capacity,increase capital investment, apply the achievements of scientific and technological innovation to the low-carbon transformation of the logistics industry, make full use of artificial intelligence, Internet of Things, cloud computing, intelligent storage, 5G and other new digital technologies, integrate them into the transportation, storage, loading and unloading, handling, packaging, circulation processing, distribution, goods packaging,information handling and other links of logistics, improve the distribution infrastructure and popularize intelligent express terminals.Effectively reduce carbon emissions and energy consumption by optimizing transportation routes.

4.2.2. Tackling Technical Problems of New Energy Vehicles

China is a vast country, medium and long distance transportation is an important link in logistics transportation. At present, traditional fuel is still the main energy source for logistics transportation, mainly because of the convenient storage and use of traditional energy. However, the limitations of clean energy in medium and long-distance logistics transportation, for example, the endurance and charging facilities of electric trains and hydrogen-fuel electric vehicles need to be further improved. Therefore, logistics enterprises should break through the technical bottleneck, develop new energy vehicles, gradually change the energy use structure, and reduce the dependence on traditional fossil energy. Meanwhile, they should be equipped with photovoltaic power generation facilities and add charging piles to ensure timely charging during logistics and transportation, supplement energy, and reduce carbon emission while completing the transportation task.

4.2.3. Strengthen the Technical Innovation and R&D in the Field of Logistics Distribution

Improve logistics packaging. In order to protect the goods from being damaged in the transportation process, enterprises often use a large amount of foam, adhesive tape and other packaging materials and fillers, which are often non-recyclable, which leads to a large amount of waste of resources. The incineration of these packaging materials and fillers leads to the increase of carbon emission. Therefore, logistics enterprises should actively promote the development of low-carbon packaging technology, develop reusable packaging materials and logistics boxes with more advanced technologies, and research and develop degradable green fillers.the packaging material and the filling material are subjected to harmless treatment and recycling, thereby achieving the purpose of reducing the carbon emission.

Optimize distribution routing with Internet+ technology. Under the background of “carbon neutrality”, logistics enterprises need to optimize path selection if they want to realize low-carbon green distribution, that is, select an optimal logistics distribution route in the distribution process, so that the distribution activities can be completed with guaranteed quality and quantity in a short time, so as to reduce the carbon emission in the distribution process. In the new era, optimizing path selection needs to make full use of the convenience brought by “Internet+”, apply cloud computing, cloud storage, big data and artificial intelligence

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technology to the link of logistics enterprises to choose the distribution path, use big data and algorithms to calculate the superior situation, optimize the distribution process, reasonably plan the arrival time of goods, reduce the waiting time of logistics vehicles, improve the efficiency of the distribution link, and thus reduce the carbon emission.

Develop unmanned distribution technology. Unmanned distribution is a transportation mode that is not restricted by terrain, traffic and personnel. With the development of automation technology and radio remote control technology, unmanned machines, such as unmanned aerial vehicles and unmanned vehicles, have been gradually applied to logistics distribution. The application of unmanned distribution technology can safely, quickly and accurately deliver goods to the destination under the condition of unmanned driving, which not only improves the distribution efficiency, but also reduces the carbon emission caused by the combustion of traditional fossil energy in the distribution process. Improve the intelligent level of UAV through technical innovation, realize autonomous flight and obstacle avoidance of unmanned machinery, and improve safety and reliability. Therefore, for logistics enterprises, accelerating the exploration and development of unmanned distribution business in the whole process such as unmanned warehouse, unmanned sorting, distribution robot and so on, so as to reduce carbon emission is the only way for low-carbon transformation.

4.3. Enhance Relevant Concepts of Green Logistics

The popularization of the concept of green logistics in the logistics industry is the work that needs to be promoted. At present, we can take measures as follows: make relevant brochures and organize employees to read them; And collect the feedback of employees on low-carbon operation in actual operation on schedule, so as to realize benign interaction. However, the popularization of the concept should not only promote the new concept, but the rigid specification can more efficiently promote the practice of the low-carbon concept, which is in urgent need of construction.

Strengthen standardization management and establish standardization consciousness. Green logistics is a system engineering and needs to have a perfect standardized system. Each link of logistics activities shall be standardized, enterprises shall be guided to reduce energy and resource consumption and environmental pollution caused by non-standard operation, and meanwhile, facilities and equipment in each link of logistics shall be promoted for matching, sharing and recycling . Meanwhile, the statistics of green logistics index shall be conducted. Strengthen the statistics of green logistics data, understand the development status of China's green logistics, and realize the standardization of green logistics in a scientific and quantitative way. On the basis of drawing lessons from the practical experience of the development of green logistics in developed countries, through the experiment of green logistics of enterprises, and adding the relevant indexes of green logistics into the logistics information statistics system, the related evaluation work of enterprises is promoted and the development of green logistics in China is promoted.

Popularize the idea of carbon asset management in logistics industry.Through the establishment of national carbon emission right trading system, the concept of carbon emission emission in the whole industry has been qualitatively updated. Under the background of increasing carbon emission in the logistics field, it is an important way to promote the green development of the logistics industry and promote the emission reduction of the whole supply chain by promoting the accounting and trading of greenhouse gas emission and realizing the carbon asset management of the logistics industry.

ISSN: 2710-0723

4.4. Introduce and Train High-level Low-carbon Logistics Talents

4.4.1. Implementing the Reform of Logistics Specialty in Colleges and Universities to Cultivate Compound Excellent Talents

According to the needs of logistics enterprises and large-scale enterprises in China for relevant positions such as logistics procurement, and according to the current development trend of low-carbon logistics in China, optimize the training scheme of logistics management specialty, perfect the curriculum and strengthen the practical training. Join the courses of environmental economics, carbon verification, carbon reporting, carbon audit, carbon finance, carbon asset management, etc. Let students understand low-carbon knowledge in class. Add the relevant cases of low-carbon logistics management to the current classroom teaching, and add the relevant parts of low-carbon logistics management to practice, so that students can apply the knowledge in the textbook to the practice, so as to help them better grasp the knowledge of low-carbon logistics management. In the allocation of teachers, relevant professional skills such as carbon emission accounting, reporting and auditing are introduced, and basic theoretical courses such as environmental economics are taught. Through the reform of logistics specialty education, students will be provided with comprehensive knowledge of logistics specialty and low-carbon economy, so as to cultivate the complex excellent talents required by the market.

4.4.2. Strengthen the Training of Logistics Practitioners on Green and Low-carbon Knowledge and Improve the Skill Level

Improve the carbon emission accounting and reporting capability of logistics process. Under the background that our government and international industry organizations pay more and more attention to the carbon emission reduction policy in the field of transportation, many logistics enterprises and logistics departments of large enterprises are facing increasing pressure from management or the public, and logistics management talents with corresponding accounting and reporting capabilities are required. The logistics process is composed of purchase, transportation, storage, packaging, loading and unloading,circulation and processing, distribution, etc., and the working mode and carbon emission accounting method of each business link are also different.

Therefore, the professional low-carbon logistics management personnel in the new era need to be proficient in the carbon emission calculation and reporting methods at all stages of logistics.

Strengthen the carbon audit capacity of logistics industry. In low-carbon logistics, not only the enterprise's own carbon emission accounting and reporting, but also the corresponding logistics carbon audit. To be qualified for this position, it is necessary to have both domestic and foreign carbon emission verification and report writing capabilities, as well as the ability to verify the carbon emission reduction of enterprises.

Cultivate the consciousness of financial assetization of logistics carbon emission reduction. In the era of carbon assets and carbon finance, enterprises can not only use carbon certificates for financing, but also change and innovate the logistics process through various carbon emission reduction measures to obtain carbon credits. The extra carbon credits can be sold in the carbon trading market to obtain financing. At the same time, super-emission enterprises will also buy carbon credits in the carbon trading market, which requires professional low-carbon logistics management personnel to have certain knowledge of carbon finance and carbon assets to protect their rights and interests in carbon trading.

Introduction of high-level low-carbon logistics talents.In the process of higher education reform, due to the lag of reform achievements and the guidance of experts with certain experience, we need to introduce a group of experienced high-level low-carbon logistics talents to promote the educational reform and put into the practice of low-carbon reform in the existing enterprises. Through a series of favorable policies for high-level talents, attract talents and promote the development of low-carbon logistics in China.

ISSN: 2710-0723

5. Conclusion

Under the carbon-neutral background, the low-carbon transformation of logistics industry in China is at the initial stage. The low-carbon transformation of logistics industry is not only an inevitable requirement of environmental protection, but also lays a solid foundation for the sustainable development of economy. However, this paper analyzes the dilemma of low-carbon logistics transformation through macro, medium and micro multi-perspective, and finds that there are several problems in logistics industry, such as imperfect low-carbon policy system, immature low-carbon logistics transformation technology, insufficient low-carbon concept in logistics industry and lack of low-carbon logistics professionals. Aiming at these problems, this paper puts forward the thinking of low-carbon transformation of logistics industry in China, which mainly includes "two substitutions (clean substitution and electric energy substitution), one perfection, one improvement, one renewal and one cultivation". To sum up, in the context of carbon neutrality, the low-carbon transformation of logistics industry is of great significance. Therefore, it is necessary to take measures to push the logistics industry to low-carbon transformation and build a lower-carbon green logistics system.

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