

Low Carbon Environmental-friendliness Innovation and International Trade Industrial Structure Upgrading Optimization

Yucong You

School of Economy and Trade, Guangzhou College of Business and Technology, Guangzhou 510000, China;

stoneyc@163.com

Abstract

This paper focuses on the analysis of the low-carbon technology innovation promotion model, the relationship between industrial restructuring and international trade. The low-carbon industry innovation model was analyzed from four aspects: the low-carbon technology innovation promotion model, low-carbon policy promotion model, low-carbon enterprise linkage model, and low-carbon consumption-driven model. From the aspects of product structure and trade structure, the changes in industrial structure and international trade structure were analyzed. Combining low-carbon industry, service trade, and big data mining, the relationship between low-carbon environmental innovation and the optimization of international trade industrial structure has been accordingly analyzed, together with a set of effective performance evaluation of low-carbon and environmentally-friendly industrial innovation being proposed, with relevant conclusions and recommendations.

Keywords

Low Carbon, Environmental-friendliness, International Trade, Innovation Drive.

1. Introduction

Nowadays, with a view to maintaining global economic growth and meet the needs of industrial development, cultivating and developing low-carbon environmental protection industries has become a resonance and inevitable choice for all economies in the world to achieve industrial structure adjustment and upgrade. Therefore, quite a large number of countries and regions have chosen to develop low-carbon environmental protection innovations as strategic emerging industries to promote the optimization and upgrading of the international trade industry structure. From the perspective of the development trend of globalization, the low-carbon and environmentally friendly innovation industry will develop as a strategic emerging industry toward the direction of low-carbon environmental protection, technology integration, high-end industries, regional agglomeration, and international development. The prospects for the optimization and upgrading of the international trade industry structure are expected.

At present, due to the development bottlenecks of industrial policies, capital investment, and technological transformation, the low-carbon, environmentally-friendly and innovative industries have made the relevant theoretical systems appear scattered and lacking systemicity and are unable to meet the needs of innovative practices in low-carbon industries. To this end, a systematic low-carbon industry innovation theory is established to study the relationship and mechanism of low-carbon environmental protection innovation and international trade industrial structure optimization and upgrading, and to provide a scientific and effective performance evaluation of low-carbon environmental protection industry innovation, which is rich and low development. The carbon industry economic theory, international trade theory, and an important and urgent research topic to guide the innovation practice of low-carbon environmental protection industries have very important theoretical significance and practical reference value.

This study focuses on the analysis of the low-carbon technology innovation promotion model, the relationship between industrial restructuring and international trade. The low-carbon industry

innovation model was analyzed from four aspects: the low-carbon technology innovation promotion model, low-carbon policy promotion model, low-carbon enterprise linkage model, and low-carbon consumption-driven model. From the aspects of product structure and trade structure, the changes in industrial structure and international trade structure were analyzed. Combining low-carbon industry, service trade, and big data mining, the relationship between low-carbon environmental innovation and the optimization and upgrading of international trade industrial structure was analyzed, and a set of scientific and effective performance evaluation of low-carbon and environmentally-friendly industrial innovation was proposed, together with relevant conclusions and recommendations.

2. Literature Review

2.1 Literature

Green industry innovation can drive continuous optimization and upgrading of the entire industrial structure, achieve material recycling, minimize resource consumption, take into account both resource-saving and environment-friendly win-win targets, and ultimately achieve sustainable development of social economy and ecological environment. Therefore, ecological economic theory, industrial metabolism theory, industrial innovation theory, sustainable development theory and circular economy theory have become the basic theoretical guidance of this article. The theoretical system and practical research in these five aspects have been relatively mature. Now we summarize the relevant research status at home and abroad as follows.

In the late 1950s and early 1960s, the famous American economist Bourdin first proposed the concept of "ecological economics" in his article "A Science-Economy Economics." In 1980, the UN Environment Program held a conference on the theme of "Population, Resources, Environment and Development". The meeting fully affirmed that the above-mentioned four relationships are closely related, mutually restrictive, and mutually reinforcing, and pointed out that when developing new development strategies, all countries should earnestly attach importance to and correctly handle this. At the same time, after observing and analyzing various changes in the human living environment, UNEP has determined that "environmental economy" or eco-economy is the first theme of the annual "Environmental Status Report". This marks the emergence of ecological economics as an independent emerging cross-science with both theory and application. Runger (1993) contrasts the agricultural policies and ecological environmental policies of developed countries and clusters in the United States, the European Union, and developing countries, and conducts a comparative analysis. Two conclusions are drawn. First, regional economic growth will directly increase environmental resources. pressure. The second is to insist on market opening, because if the implementation of trade protection policies will lead to long-term accumulation of results, resulting in worse destruction of environmental resources. Iris (1994) first systematically elaborated the theory of industrial metabolism, and the research results of his research "eco-economics" system still occupies a dominant position. Hamel and Prahalad (1998) combined the theory of innovation economics with the theory of industrial transformation and argued that "innovating the future industry or changing the existing industrial structure is the highest level of corporate strategy. Industrial innovation should be the continuous evolution of the industrial structure. And the mutation process." The research literature on the relationship between trade and environment, different scholars have different views, domestic and foreign scholars have long debated, some scholars believe that trade is conducive to the protection of the environment (Stevens, 1993; Taylor, 2001; David, 2002; Matthew , 2003;). Another group of scholars believe that the liberalization of world trade is not conducive to the protection of the global environment, that is, that trade will hinder the environment (Ekins, 1994; Behin, 1995; William, 2002; Stefan, 2004). Scholars in recent years have studied innovative industries and Influenced by the development of global trade, You (2016) studies the development of global vertical industries such as producer services, retail, and finance, and the driving force of industrial development. You Yucong (2016; 2017), from the perspective of reforms in the "supply-side reform of the agricultural supply side" and the "supply side of foreign trade," conducted an in-depth empirical study on how to provide side effects, resolve structural contradictions, and achieve

sustainable development of agriculture and foreign trade. Path, research pointed out that innovation drive is the source of agricultural development.

2.2 Review.

The above documents indicate that scholars have conducted extensive and extensive research on low-carbon ecological environment, innovative economy, international trade and environment. However, currently, low-carbon and environmentally-friendly innovation industries are faced with many development bottlenecks such as industrial policies, capital investment, and technological transformation. Therefore, the related theoretical system is fragmented and lacks systemicity, and it cannot meet the needs of innovation practice in low-carbon industries. To this end, a systematic low-carbon industry innovation theory is established to study the relationship and mechanism of low-carbon environmental protection innovation and international trade industrial structure optimization and upgrading, and to provide a scientific and effective performance evaluation of low-carbon environmental protection industry innovation, which is rich and low development. The carbon industry economic theory, international trade theory, and an important and urgent research topic to guide the innovation practice of low-carbon environmental protection industries have very important theoretical significance and practical reference value.

3. Low-carbon Industry Innovation Model

The optimization mode of a country's economic development will inevitably go through a process of gradually changing from extensive to intensive. At the same time, it actively promotes the transformation of traditional industries into low-carbon industries and realizes the harmonious development of human society and the natural environment. Realizing the development driven by low-carbon economy innovation serves as a necessary and vital prerequisite for the implementation of the strategy for sustainable development of foreign trade. Only by actively implementing the concept of "economy-saving and environment-friendly" socio-economic synergy can low-carbon industries be vigorously developed, and can an economic entity strive to cultivate innovative models for low-carbon industries. Only by realizing the innovation and transformation of low-carbon industries can an economic entity optimize and upgrade the international trade industrial structure.

3.1 Low-carbon Industry Innovation Model

This study analyzes the low-carbon industry innovation model from four aspects: low-carbon technology innovation promotion model, low-carbon policy promotion model, low-carbon enterprise linkage model, and low-carbon consumption-driven model. Most low-carbon industry innovations are led by macro-government, and macro-governments have introduced corresponding incentive policies, macro-strategy planning, taxation policies, and macro-economic system reforms to stimulate the overall development of low-carbon industries. Under this development model, low-carbon companies acting as a practitioner of low-carbon industry innovation, in a highly competitive market, in accordance with the sustainable development strategy; it actively invests in low-carbon technology innovation and R&D, and comprehensively uses social and natural resources to form its own competitive advantage and organic low-carbon industry chain. However, in order to promote the sustainable development of low-carbon industries, the broad low-carbon market is relied and functions as a support, and the low-carbon consumption of the public should be sufficient to drive the innovation and development of low-carbon industries. This framework flow is shown in *Fig. 1*.

3.2 Low Carbon Technology Innovation Promotion Model

With the excessive depletion of natural resources and the deterioration of the ecological environment, environmental issues have gradually caused people to reflect deeply. As a result, the public's ecological awareness has been gradually strengthened, environmental protection requirements have been gradually improved, and the government's environmental control and legal measures have also become more stringent and perfect. The environmental pressures of the public and the government are forcing foreign trade companies to internalize ecological costs. Some foreign trade companies may therefore lose their cost advantage and gradually lose their competitive advantage. Under this

kind of economic development environment, low-carbon technology innovation is the main source of power for companies to obtain sustainable competitive disadvantages, and due to the cumulative nature of technological innovation, it can promote the formation of a virtuous cycle of low-carbon technological innovation and continue to accumulate, thus making the foreign trade industry structural optimization and upgrading , promoting the development of low-carbon foreign trade industry innovation.

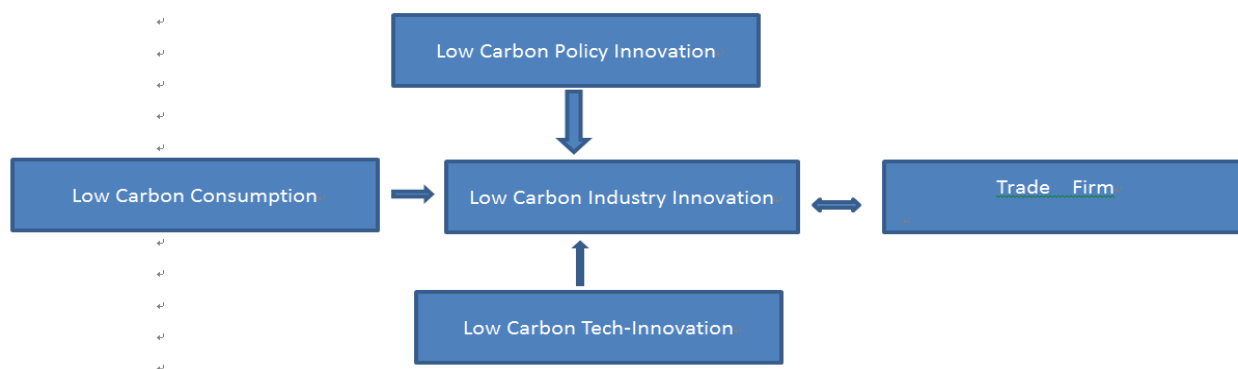


Fig. 1. Low-carbon industry innovation model framework

3.3 Analysis of Low Carbon Technology Innovation Driving Mode

The traditional mode of technological innovation of foreign trade enterprises is to adopt a “leap-forward-development” model; the introduction of a consumption-absorption-expansion will lead to many ecological and environmental problems. In the process of this kind of leap-learning and digestion, traditional foreign trade companies still take “extensive” production as the leading factor, focusing on breakthroughs in production technology and achieving scale and efficiency. Under the common drive of economies of scale and cheap labor costs, the major goals of foreign trade companies undoubtedly become the expansion of world market share. Moreover, in the design of statistics and assessment performance, the traditional model mainly relies on traditional statistical methods and traditional performance assessment. These are all "non-low-carbon" economic indicators; using these "non-low-carbon" evaluation methods to evaluate technological innovation will gradually transform natural ecological resources such as forests, freshwater, soil, minerals, and species into artificial capital, such as bridges, buildings, roads, and machinery, causing a significant decline in the stock of natural capital. As a result, technological innovation has relied on the original “intake-digest-absorption-expansion” model, which has failed to achieve high efficiency in industrial innovation and technology.

In the post-crisis era, the rapid growth of new and sustainable economies can no longer rely solely on technology import. Otherwise, the marginal role of technology in economic growth will be reduced. In particular, barriers to intellectual property rights, barriers to talent flow, and barriers to low-carbon trade are other factors. This makes the situation of technological innovation more embarrassing. Only by strengthening basic research and independent innovation can we implement the strategy of sustainable development of foreign trade, and thus provide a driving force for the rapid growth of foreign trade. Due to the relatively long research and development cycle and productization, the lag time of technology industrialization, and the technical complexity, systematicness, and overall process, as well as the large scale of R&D investment, this R&D project is usually supported by the government. In developed countries, there are a large number of research institutes focusing on basic research to carry out basic technological innovation and original technological innovation and development. This point is worthy of reference by many developing countries to carry out independent innovation research and vigorously develop autonomous technology innovation promotion models.

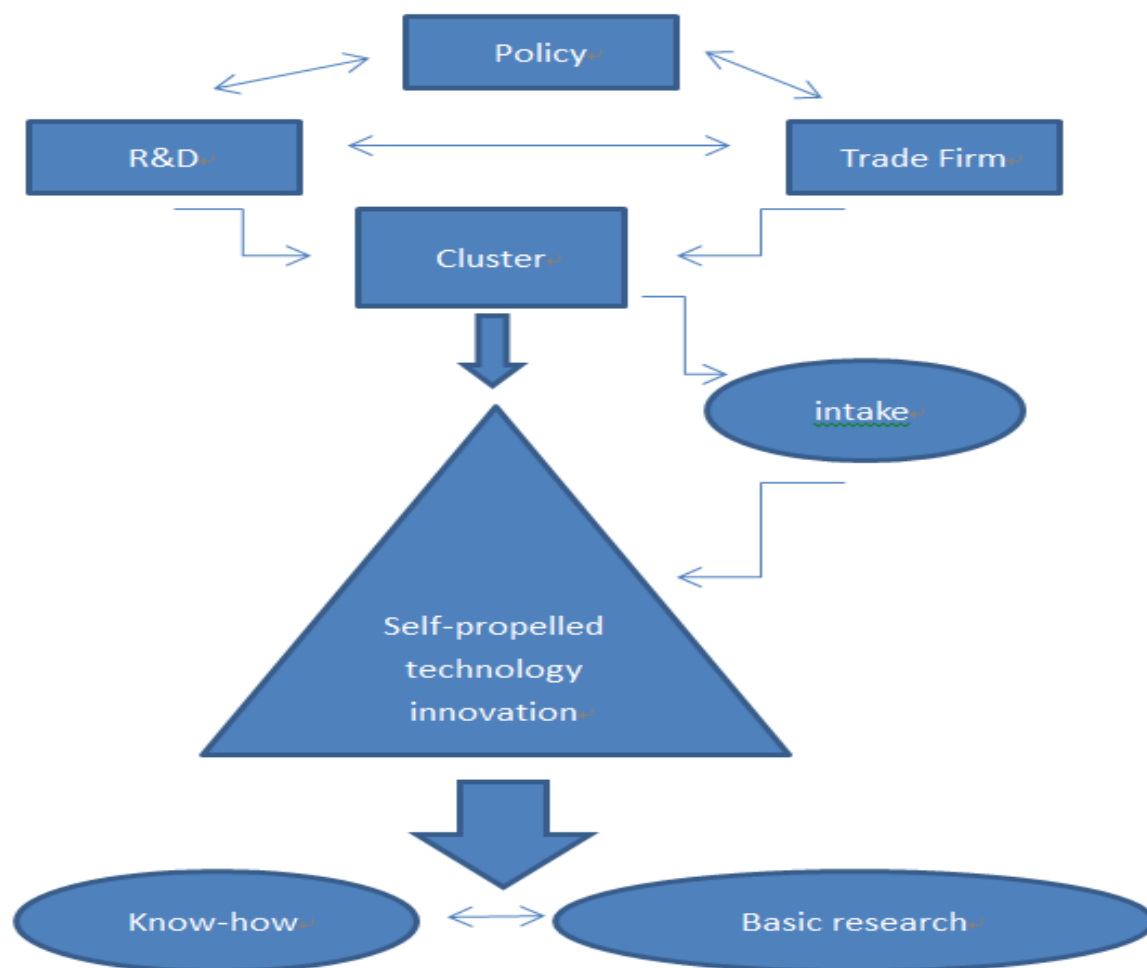


Figure 2. Self-propelled technology innovation promotion model

Self-propelled technology innovation promotion model is shown in *Figure 2*. Under this model, foreign trade enterprise units can take the responsibility of the main body of technological innovation through active joint scientific research institutions, transform the results of their collaborative research into real productivity, and guide them according to macroeconomic policies. The geographical position of foreign trade enterprises and their industrial links form a cluster of foreign trade enterprises in certain regions, such as foreign trade enterprises economic development zones, strategic alliances of foreign trade companies, and eco-industrial parks, etc., in order to improve the efficiency of information transmission between foreign trade industries and reduce the risk of technological innovation. In this way, it can not only reduce the dependence on foreign advanced technology, break the technological bottleneck, and gain the advantages of innovation capability, but also make the driving effect of technological innovation on foreign trade economy more effective and prominent.

4. Industrial Structure Optimization and International Trade Growth

The economic development of a country or region is always accompanied by an increase in the total economic output and the optimization of the industrial structure. Adjusting the industrial structure can not only improve the efficiency of the allocation of economic resources, but also can greatly promote technological progress, thus stimulating economic growth. International trade is also an important part of a national or regional economy, and there is a very close link between the import and export trade structure of a country or region together with the adjustment of the industrial structure of the country or region. In theory, the industrial structure of a country/ region

fundamentally determines its own trade structure, and changes in the trade structure, and in turn, it is more likely to lead to corresponding changes in the industrial structure. Due to there existing certain differences and heterogeneities in the various factors that determine the changes in industrial structure and trade structure, the industrial structure and trade structure are not exactly the same, but rather heterogeneous; both of them depend on the industrial technology level of a country or region, the level of economic development of the country, and the price level of the product. In addition, the industrial structure of a country or region is closely related to the domestic market demand, and the trade structure is closely related to the external international market demand. In the short term, due to the short-term invariability of technology and the lagging in time, the changes in the industrial structure may be out of touch with the changes in the trade structure. However, in the long term, because of technological changes, changes in the industrial structure will lead to trade structures. This change functions as an inevitable link and result. In the current open foreign trade economic system, a country or region can adjust its own trade structure through industrial restructuring. Conversely, the upgrading of the trade structure can also play an active role in optimizing the country's industrial structure. Noticeably, it can be seen that whether the development of foreign trade can promote the optimization and upgrading of the country's industrial structure actually becomes an important measure of the extent to which international trade contributes to economic growth. International trade can promote domestic industrial restructuring by introducing competition mechanisms and using the global market. Adjustment of industrial structure is a process that requires a certain amount of time and economic costs. It is often accompanied, in a simultaneous manner, by the transfer of factors of production resources among various departments and fields, which can eventually lead to the emergence of "precipitation costs" and also the generation of labor transfer costs. Therefore, if a country or region can adapt to the trend of international division of labor, technological development, and changes in international market demand, and advance with the times, it will be able to quickly realize effective adjustments in its own domestic industrial structure and foreign trade structure. Ultimately, domestic production efficiency and foreign international competitiveness can both be bettered and eventually, the industry will also gain more trade benefits in foreign trade.

4.1 Mechanism of Industrial Structure Adjustment and International Trade Structure Change

During the new era in which the current international trade competition continues to escalate, the promotion of industrial restructuring has become an important part of transforming the mode of economic development. Judging from the trajectory of industrial restructuring in major economies and developed countries, global international trade boasts a distinct feature: from labor-intensive to resource-intensive, then from resource-intensive to technology-intensive, and finally realized Innovation intensive. In this process of transformation, continuous upgrading of technology and innovation driven also led to the continuous upgrading and optimization of the industry.

The industrial structure of a country or region determines its own product structure, and the product structure is a concrete microscopic representation of the industrial structure. Therefore, studying the changes in the product structure of a country can intuitively reflect the changes in a country's industrial structure and international trade.

With a view to facilitating the analysis of the changes in the industrial structure and structure of international trade, the data in the goods trade database of the International Trade Center (ITC) has been selected and thus coded, combed, and subdivided respectively. After removing the missing data, the import and export trade products are grouped into three categories: resource-intensive-based (RIB), technology-intensive-based (TIB) and labor-intensive-based (LIB), as shown in *Table 1*:

In general, the trade structure mainly influences the industrial structure through the mechanism of international comparative interest. The prices of product prices and production resource factors will become heterogeneous with differences in labor productivity, production factor endowments, and technological level. When some countries or regions use the intensive use of low-cost and naturally abundant production resource elements for production, their production costs are relatively low, and they may obtain more comparative benefits in international trade. Based on the differences in

production resource factors, this specific kind of international trade will exert a relatively significant and far-reaching impact on the country's own industrial structure. With the continuous adjustment of the industrial structure, the trade structure has also changed.

In international trade, those economies that have comparative advantages in the factors of production resources can guide the country's industrial structure in favor of selecting labor-intensive industries, and this relatively low-cost specialization will make it more advantageous, which in turn is conducive to the country's adjustment of the structure of the industry.

Table 1 Trade Product Categories

Trade Product Categories	Trade Product Types
Resource-intensive-based(RIB)	Animals and food; beverage tobacco; non-edible raw materials, oils and waxes, animal and vegetable oils, etc.
Labor-intensive-based(LIB)	Finished goods and miscellaneous manufactured goods, etc.
Technology-intensive-based(TIB)	Chemicals, machinery and transportation equipment, etc.

Source: Organized by the ITC trade database

4.2 Characteristics of Industrial Restructuring and International Trade Development

In general, the following are the main characteristics of industrial restructuring and international trade development:

First, the overall optimization trend of a country's merchandise export structure is that the proportion of exports of primary products, agro-industrial products, and energy resource-related products has continuously declined, while the proportion of non-energy-based manufactured products has steadily increased. This proves that, under the guidance of macroeconomic policies and the impact of the mid-level market, a country's export companies have significantly increased their export product technologies and their added value by increasing their efforts in product quality supervision, brand cultivation, and technology development. The export product structure, eventually, will be further optimized.

Second, the import and export commodity structure of a country usually has diversified characteristics and has a certain degree of competitiveness in the international market. However, due to the close "homogenization" characteristics of industries and trade in many developing countries and regions, especially the majority of those engaged in the trade or processing trade of intermediate goods, making their own trade structure unreasonable, the productivity level is low, and some are in resources and labor. The industries that have the characteristics of "homogenization" are highly competitive in the industry.

Third, countries that have a relatively complete industrial structure and can adjust industrial structure in a timely manner have greater room for manoeuvre when dealing with international trade frictions. Because if the scope of choice of a country's merchandise exports structure market is too narrow, it will rely heavily on its major trading partners. This over-reliance will easily lead to trade frictions, which will not only increase market risk, but also trigger international foreign trade volatility.

5. Design of Evaluation Indicators for Low Carbon Industry Innovation

5.1 Dimensions

The industrial innovation ability is mainly reflected in the innovation performance of the industry, and the innovation performance is measured by both the innovation input and the innovation output. As a special type of industry, the low-carbon industry can also evaluate its innovation from two dimensions: innovation input and innovation output. By sorting out the previous research results, it

can be found that there are few researches on low-carbon industry innovation evaluation by domestic and foreign scholars, and many are based on different research methods and evaluation areas to establish the evaluation index system of low-carbon industry development level. As the low-carbon industry is a new industry, the construction of its innovation evaluation index system mostly stays at the level of theoretical research. Despite the fact that there has been a very comprehensive and systematic index system research results in the research results, the actual operability is not strong and the data is lacking. Sources, or indicators are mostly subjective ratings, lack of objectivity. There are great differences in the starting time, development basis, and evaluation principles of low-carbon industries in various countries. In particular, there is a considerable distance between developed countries and developing countries in the development level and development background of low-carbon industries.

Due to the relatively new index system of low carbon industry innovation, the research foundation is relatively weak, and the availability of statistical data is limited. After comprehensive consideration, and according to the design criteria of low carbon industry innovation evaluation index system, scientific and normative principles, system integration principles, highlighting essential principles, and differences treating the principle, the principle of comprehensive analysis, and the principle of practicality and feasibility, and drawing on previous scholars' research and design indicators system for the development status of low-carbon industries, the paper presents a set of evaluation indicators system for innovative performance of low-carbon industries, mainly including two aspects of innovation: namely , investment and innovation output, four-dimensional comprehensive utilization, pollution control, basic support, and financial support, summarizing the input-output method, network analysis method, gray multi-level evaluation method, and threshold value method for performance evaluation models of low-carbon industry innovations. A comparative analysis of the merits and weaknesses of each evaluation model was carried out. It was decided to use the smooth moving method to obtain quantitative values for quantitative indicators, and to use grey multi-level methods to assign indicators to qualitative indicators, and then combine qualitative and quantitative indicators to perform matrix operations. Therefore, for the quantitative indicators, the smooth moving method in statistics is used to find the smooth moving data for every n years, that is, to use the threshold method to score indicators. For qualitative indicators, the relevant low-carbon industry research experts are consulted through questionnaires. We use gray multi-level evaluation method to score the indicators. The qualitative and quantitative indicators are unified by the weights obtained by the method and matrix operations are performed.

5.2 Determination of evaluation index weight R

This paper uses the analytic hierarchy process AHP to determine the weights. By using the “Expert Advisory Method” to construct a pairwise comparison judgment matrix, the square root method or the sum-product method is used to find the eigenvectors and eigenvalues of the matrix. The components of the eigenvector corresponding to the judgment matrix with satisfactory consistency are the index pairs. The upper level of weight R. By formula (1) calculation, we can derive the t-th index of the m-th layer and the weight of the upper-level target.

$$R=(R_1, R_2, \dots, R_{m-1}, R_m); \sum_{t=1}^m R_t = 1, 0 < R_m < 1 \quad (1)$$

5.3 Determination of Evaluation Sample Matrix Φ

Assume that n evaluation experts are required to evaluate the investment value of the venture company. Let the evaluation expert number be h, h=1,2,,...,n. First of all, through the expert's use of brainstorming or Delphi's method to formulate standards for each evaluation level, then each expert is requested to independently evaluate each index of the industry based on the actual investigation and knowledge of the industry. To conduct evaluations, scores are assigned to S_{ijh} according to the grade criteria, and a rating scale for evaluation experts is filled in. Based on this, the evaluation sample matrix for the venture company is obtained.

$$\Phi = \begin{pmatrix} S_{111} & \dots & S_{11n} \\ S_{121} & \dots & S_{12n} \\ \dots & \dots & \dots \\ S_{151} & \dots & S_{15n} \\ S_{161} & \dots & S_{16n} \end{pmatrix} V_{ij} \quad (2)$$

6. Conclusion and Implication

Based on the above analysis and discussion, some conclusions can be drawn as follows.

With the continuous deepening of economic globalization and the continuous development of high and new technologies, the flow of production factors and the effective allocation of resources have made international industrial restructuring more dependent on international trade. The continuous adjustment of the industrial structure has brought about new trends in international trade. This is mainly reflected in the low-carbon environmental protection industry, service trade, and technological innovation and trade. This new trend leads the new trend of contemporary international trade.

6.1 Low-carbon and Environmentally-friendly Renewable Energy Industry

The development of a low-carbon and environmentally friendly renewable energy industry has gradually become the consensus for the upgrading of international trade structure. Low-carbon and environmentally friendly renewable energy such as nuclear energy, solar energy, wind energy, and bioenergy will gradually replace traditional energy sources such as oil and natural gas. The future of low-carbon and environmentally friendly renewable energy the proportion of global energy trade will continue to rise. Practice shows that the upgrading of the international trade structure in turn has an important impact on the development of a low-carbon and environmentally friendly renewable energy industry, and can, to a large extent, determine the level of development of a low-carbon environmentally friendly renewable energy industry, while the low-carbon and environmentally friendly renewable energy industry To some extent, development determines the structure of international trade. As far as the bio-energy industry is concerned, its development has not only fundamentally changed the agricultural ecosystem, but has also changed the trade structure of agricultural products. In the field of low-carbon, energy-saving and environmental protection industries, in order to further accelerate the development of international trade, it is a new trend to vigorously develop energy conservation and environmental protection industries with low pollution and low energy consumption when adjusting the international trade industrial structure, and the proportion of low-carbon products in export products will also be constantly increasing. Low-carbon environmental protection industries are closely related to international trade. On the one hand, a good ecological environment can provide a steady flow of resources for the sustainable development of international trade. On the other hand, a multilateral trading system that has formulated a low-carbon environmental policy can effectively allocate resources and maintain the sustainable development of the environment.

6.2 Big data Mining Industry and Cross-border E-commerce

The rapid development of big data mining industry has enabled the software industry to develop rapidly in international trade and have obtained excess profits. Moreover, the trade pattern will be more diversified. It will enter the new technology revolution stage beyond the traditional stage through the introduction of advanced technology. Not only that, the upgrading of big data mining products will be faster, the life cycle will be further shortened, and the emergence and wide application of various new information products will also cause drastic changes in the industrial structure. Big data mining multinational companies will be closer to the huge consumer demand and market demand, and will also set up more research and development and design. Some multinational corporations will take into account factors such as circumventing market risks, increasing factor costs, and enjoying the reindustrialization policies of developed countries, and will return some foreign

capital to developed countries. They will export to foreign companies, imports of key raw materials, labor-intensive products, traditional marketing methods, etc. Have an impact. With the development of digital manufacturing and e-commerce, the information industry marketing model will gradually evolve from "batch-less, large-volume" to "lot-to-lot, small-volume" and the new format of Internet + international trade cross-border E-commerce will also usher in explosive growth and bring great challenges to the traditional export channels.

6.3 Service Trade

With the continuous adjustment of the trade industry structure, the service industry will become the fastest and most effective industry in the new era to promote the development of the international economy. The status of the service industry in international trade has also become increasingly prominent and important. The general trend of global economic development must be that the service industry has become the fundamental driving force for the sustainable development of the world economy. Affected by the "sub-loan crisis", the international trade pattern has undergone a major transformation, showing a trend of weak economic recovery and insufficient momentum for economic development. With the continuous intensification of international economic exchanges, the international service trade with low-carbon environmental protection and innovation has risen. The constant adjustment of trade structure has enabled service trade not only to increase its share in the global economy, but also to exceed the trade in goods and the performance of international trade in services. The characteristics of low-carbon and environmental protection innovation: Low-energy, low-pollution, low-input, high-efficiency, high-value-added "three low and two high" advantages, the focus of global economic competition is also shifting from goods trade to service trade. Under this circumstance, service trade will become the main force of international trade in the new era. Developing international trade in services and achieving liberalization will become an important issue in international economic and trade cooperation.

Acknowledgements

This work was financially supported by the Guangdong Province Philosophy and Social Sciences "13th Five-Year Plan" 2016 annual academic projects (Guangdong foreign trade "supply side reform" driven development path analysis, project number GD16XYJ30) and Guangzhou philosophy and social science development "13th five" plan 2017 Research on Resource Allocation and Innovation Driving Path of Guangzhou Foreign Trade Enterprises under the View of Structural Reform of Supply Side, Project No. 2017GZGJ20).

References

- [1] Nicholas Stern, *The Economics of Climate Change: The Stern Review*, Cambridge: Cambridge University Press, 2007, pp. 24- 25.
- [2] Detlef Sprinz and Tapani Vaahtoranta, *The Interest -Based Explanation of International Environmental Policy*, Internatoinal Organization, Vol. 48, No 1, 1994, pp. 77- 105.
- [3] Michele B. Baettig and Thomas Bernauer, "National Institutions and Global Public Goods: Are Democracies More Cooperative in Climate Change Policy?" *International Organization*, Vol. 63, No. 2, 2009. pp 281 — 308.
- [4] Robert Falkner, "American Hegemony and the Global Environment," *International Studies Review*, Vol. 7, No. 4, 2005, pp. 585 — 599. Scott Barrett, *Why Cooperate? The Incentive to Supply Global Public Goods*, Oxford: Oxford University Press, 2007.
- [5] Jana von Stein, "The International Law and Politics of Climate Change: Ratification of the United Nations Framework Convention and the Kyoto Protocol," *Journal of Conflict Resolution*, Vol. 52
- [6] Charles F. Parker, Christer Karlsson, Mattias Hierpe and Bjorn-Ola Linner, "Fragmented climate change leadership: making sense of the ambiguous outcome of COP-15", *Environmental Politics*, Vol. 21, No. 2, March 2012, pp 268-286.7

- [7] Christer Karlsson, Charles Parker, Mattias Hierpe and Bjorn-Ola Linner, “Looking for Leaders: Perceptions of Climate Change Leadership among Climate Change Negotiation Participants”, *Global Environmental Politics*, Vol.11, No.1, February 2011, pp 89-107.
- [8] Gergor Schwerhoff, “The economics of leadership in climate change mitigation”, *Climate Policy*, Vol 16, No 2, 2015, pp 196–214.
- [9] Mark Purdon, “Advancing Comparative Climate Change Politics: Theory and Method”, *Global Environmental Politics*, Volume 15, No.3, August 2015, pp 1-26.
- [10] You Yucong, An Empirical Study on the Mechanism of Institutional Innovation Driving Foreign Trade Competitiveness, *Advances in Humanities and Social Science Research* 2017, pp 11-21.