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Research on development route of low carbon industrial cluster in the coastal areas of Liaoning

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ABSTRACT

Low carbon economy is the important development trend of China, which is also the important point and only way to construct Liaoning coastal economic zone as well as a booster to accelerate the development. Currently, Liaoning coastal economic zone has not only been formed in the construction of low carbon economy as the leading situation but also not yet complete a support policy system based on low carbon economy. Low carbon industrial cluster is the direction of the industrial cluster's development in the time of low carbon economy, and is also an effective way to promote green competitiveness, thus to develop low carbon industrial cluster is the key to the construction of Liaoning coastal economic zone. In the existing literature, most scholars focus on policies and methods of Liaoning low carbon economy's development but lack of a further systematic study on development route of low carbon economy of Liaoning coastal industrial cluster. This paper, based on in-depth analysis of the existing industrial structure of Liaoning coastal industrial cluster, analyses the problems of Liaoning coastal industrial cluster developing low carbon economy, and then according to the needs of the development of low carbon economy proposes the route choice of how to promote the low carbon development of Liaoning coastal industrial cluster.

KEYWORDS

Costal industrial cluster; Low carbon industry; Industrial structure; Innovation; Development route.



INTRODUCTION

Along with the development of world economy, a surge in resource consumption, the greenhouse effect is becoming more and more serious. Under this background, the low carbon economy has become the issues of common concern to the international community. The Chinese government clearly put forward the development of low carbon economy, research and promotion of low carbon energy technologies. Liaoning as a major province of energy consumption in China should go all out in the aspect of developing low carbon economy. Liaoning coastal economic zone is an important area of the revitalization of the old northeast industrial zones, its structure of industrial clusters is given priority to heavy industry with high carbon, thus, the low carbon's development path of Liaoning coastal industrial cluster is related to the adjustment of Liaoning industrial structure as well as to the sustainable development of Liaoning economy, is of great significance.

DEVELOPMENT STATUS OF LIAONING COASTAL INDUSTRIAL CLUSTER

Liaoning coastal economic zone has been initially formed the industrial cluster in the shipbuilding industry, equipment manufacturing industry, petrochemical industry, metallurgical industry, food processing industry as the leading industrial cluster. It has now formed Dalian, Jinzhou, Panjin, Huludao shipbuilding base and Dalian, Jinzhou, Yingkou, Panjin, Huludao and other ship supporting industry base. Liaoning has 6 various types of shipbuilding industrial park and more than 200 various types of shipbuilding industry enterprise, of which the above scale enterprises has reached 56^[1]. The shipbuilding industry of Liaoning coastal economic zone has been one of the world's first manufacturing phalanx both in production capacity, scale and production technical strength.

Industry groups such as processing of crude oil, ethylene, synthetic materials, organic materials and fine chemical has been initially completed. Dalian actively promoted the millions of tons of ethylene and chemical fiber raw material project, and newly built a world scale of 10 million tons production base of refining-chemical integration. Panjin has built the China's largest production base of heavy traffic PaVING PETroleum asphalt and naphthenic lube oil and also China's important production base of chemical fertilizer, polyolefin and refining, accelerated the construction of 460,000 tons ethylene expansion project. Yingkou has built the large-scale petrochemical industrial agglomeration in the Fairy Island. Jinzhou Bay has become a national refining production base and oil reserve base.

Angang steel company in Bayuquan new district and Yingkou minmetals plate company is the leader of metallurgical industry, focusing on the development of wide and heavy plate, cold (hot) rolled sheet, stainless steel sheet and strip, ship plate, etc, extending deep processing industry chain of iron and steel, and accelerating the construction of Yingkou fine steel area. Dalian, Dandong, Jinzhou and Huludao has took advantage of port, undertaking the transfer of iron and steel industry, to develop deep processing of iron and steel and also in the construction of fine steel industrial zone in Dalian Changxing island harbor industrial zone, Dengsha river harbor industrial zone, Xihai international industrial park and Dandong port economic zone. Yingkou is focusing on the construction of tens of millions of tons of iron and steel industry base.

Dalian national software industry base and software product export base has begun to take shape. Jinzhou photovoltaic industry has been included in the special industry base of National Torch Plan. Currently, plants of some projects such as Huachang photovoltaic 200MW solar cell, Boyang photovoltaic 300MW battery, 500MW component and 200MW slice in the new energy and renewable energy industry park have been partially completed. Development of 10 projects (total investment of 9.533 billion yuan) will be promoted in the new energy and renewable energy industrial park, which can realize annual output value of 42.689 billion yuan after the completion of production^[2].

On the basis of consolidation and development of high-grade magnesia brick products and unshaped refractory products, relying on the Yingkou Qinghua Group, Jinlong Group and other key enterprises, to focus on the development of magnesium chemical materials, speed up development and production of magnesium especially magnesium alloy shaped products, improve the proportion and comprehensive utilization rate of deep processing of magnesium products in order to form the pattern that can effectively control the total amount of product and magnesia refractory materials, magnesium chemical materials, magnesium alloy materials and its deep processing products can develop together. The circular agriculture, ecological agriculture and organic agriculture in the city of Dalian, Dandong, Jinzhou, Yingkou and Panjin develop rapidly that the high quality rice, fruits, vegetables and flowers are sold at home and abroad. Processing bases in these cities have begun to take shape such as high quality special agricultural production, export and processing base; sea fisheries, freshwater fisheries, seafood breeding and processing and marine biological pharmaceutical; green ecological breeding base and processing base of poultry, eggs, meat and milk.

THE MAIN PROBLEMS OF LIAONING DEVELOPING COASTAL LOW CARBON INDUSTRIAL CLUSTER

The high proportion of the second industry, the industrial structure is not balanced

As an old industrial base in China, the second industry of Liaoning in the proportion of gross national product (GNP) summary has been very high. Liaoning coastal economic zone is the main force in the Liaoning economy and its industrial structure has a great similarity with Liaoning. The regions of Liaoning coastal economic zone focused on developing the second industry especially the high energy-consumption industries such as the heavy industry and manufacturing industry whereas the development level of the third industry is still not high. In 2013, taking the 6 cities of Liaoning coastal economic zone as an example, all second industries' proportion of GDP are higher than the national level

43.9% while the third industry's proportion is lower than the national level 46.1%. Among them, Panjin second industries' proportion of GDP is as high as 67.4%, far higher than the national average level. TABLE 1 list three industries of 6 cities in Liaoning coastal economic zone accounted for the proportion of GDP in 2013.

TABLE 1 : Three industries of 6 cities in Liaoning coastal economic zone accounted for the proportion of GDP in 2013.

Regions	GDP (billion yuan)	The first industry's proportion of GDP	The second industry's proportion of GDP	The third industry's proportion of GDP
Dalian	7650.8	6.2%	50.9%	41.4%
Yingkou	1513.1	7.2%	52.7%	40.0%
Panjin	1351.1	8.5%	67.4%	24.1%
Jinzhou	1344.9	15%	48.8%	36.1%
Dandong	1107.3	13.3%	49.4%	37.2%
Huludao	775.1	13.1%	46.9%	40.0%

Data Source: (1)China statistical yearbook 2014

Liaoning statistical yearbook 2014

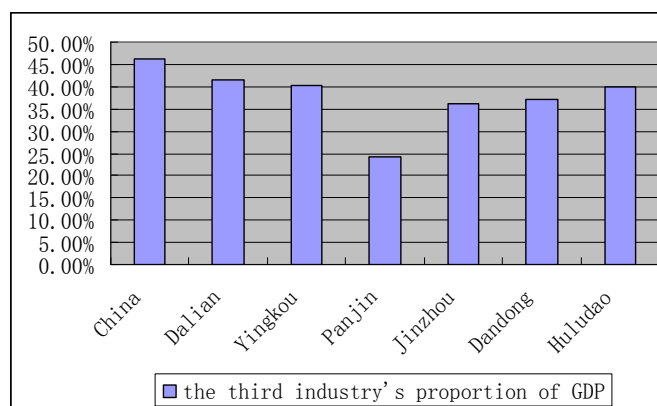


Figure 1 : The third industry of 6 cities in Liaoning coastal economic zone accounted for the proportion of GDP in 2013

According to the Figure, we find that there is a great shortage of Liaoning coastal economic zone developing the third industry. The major industry in supporting Liaoning's economic growth is still traditional industries such as natural gas, metallurgy, petrochemical, etc., while emerging industries such as household appliances, electronic communication industry grow slowly. Moreover, low technology intensive industry accounted for the larger proportion in the traditional industry. Taking manufacturing industry as an example, low technology intensive industries accounted for the proportion of manufacturing industry in more than half of all especially the proportion of Panjin and Jinzhou two cities even exceeded 85%.

Lack of enterprises' innovation in the cluster

Lacking of the ability of independent innovation of enterprises is the main cause for low-end industries in Liaoning coastal economic zone accounted for a large proportion. The following reasons lead to enterprises lacking of independent innovation ability: firstly, inadequate investment in research and development. According to statistics, with research and development expenditures accounted for the proportion of GDP as indicators for horizontal comparison, the average level of research and development investment of Liaoning coastal areas is far lower than 2.37% that in developed countries, also far away from Beijing and Shanghai (average 5.3%-6%) and other domestic area which has strong innovation ability^[3]; secondly, the shortage of innovation of science and technology talents and structural contradiction; thirdly, the weakening position of main body of the enterprises' technological innovation and the lower transformation rate of scientific research achievements; fourth, the low efficiency of technology import and lack of absorption and re innovation of foreign technology. According to statistics, during 20 years (from 1950 to 2003), Liaoning's introduction of technology investment has reached about 31.8 billion yuan, which equals to the Japanese national cost of technology introduction between 1950 and 1972. However, the effect of introduction has great difference^[3]. Japan has reached the world leading level of technology at that time while with using the same time and input the vast majority of the industry in China is behind the international advanced level of about 20 years today; lastly, the lack of environment of encouraging and supporting independent innovation. The professional services

to the technological innovation especially the independent innovation of enterprises provided by government agencies can not meet the need of.

The lower degree of agglomeration of industrial cluster, the lack of mechanism of low carbon industry cluster

At the present stage, the industrial cluster of Liaoning coastal economic zone has a clustering phenomenon rather than a group phenomenon. Specifically, although the enterprises within the cluster set in one place, it has not formed a specialized division of labor and cooperation of interrelated, interdependent industrial system, lacking of association, supporting and synergistic effect with each other. Advanced production enterprises and backward accessories coexist at the same time and the local supporting enterprises can only process some low value added processing parts, in this way, a large number of ancillary products can not be local matching, resulting in many enterprises are only spatially clustered and the degree of industry chain docking is low, unable to form a relatively complete industrial chain. For example, there is little correlation of business and technology among enterprises in Dalian software industrial cluster. There is no clear industrial division and characteristics, poor supporting ability and also serious convergence of industrial structure. Besides, the interaction mechanism of enterprises in the cluster, university and research institutes is not perfect, the scientific research ability of enterprise is weak and lack of further development.

Insufficient of government efforts to support the low carbon industry, unreasonable investment structure and direction of low carbon industry

Many enterprises in Liaoning coastal industrial cluster take the extensive management mode of production, especially in the initial stage of development some local governments in pursuit of short-term goals are eager for quick success and instant benefit and their consciousness of ecological environment protection and sustainable development is very weak leading to serious problems of high consumption of resources and environmental pollution. Although China has promulgated and implemented the "Environmental Protection Law" and other more than 20 environmental regulations and also taken corresponding economic and administrative intervention to realize the objective of environmental protection, the lack of necessary capital investment of developing green low carbon industry can not guarantee the correctness of the investment structure and direction. Environmental regulations are often disturbed by local protection and various human factors doctrine in the process of specific implementation made it unable to truly implement. Eventually, it led to the government can not take strong measure to support the development of green low carbon industry on macroscopic and to punish the enterprises in violation of environmental regulations severely, make green low carbon industry is in a natural state of development.

THE ROUTE OF STRUCTURAL OPTIMIZATION BASED ON LOW CARBON ENVIRONMENT OF LIAONING COASTAL INDUSTRIAL CLUSTER

Scientifically planning low carbon industry, actively supporting the development of green low carbon industry

Based on the current situation of the development of regional industrial cluster and from the viewpoint of industrial layout and their respective advantages, governments of all levels should learn from the experience of developed countries developing low carbon industry, scientifically and rationally plan the layout of low carbon industry, focus on the cultivation of low carbon industrial clusters such as nuclear power equipment, wind power equipment, new energy automobile and semiconductor lighting, etc. The government should formulate relevant industrial policies, plan low carbon industrial cluster pilot and gradually extended, establish low carbon agriculture, industry and service industry as the key industry areas; study on system planning of low carbon industrial cluster; make transportation and logistics planning, municipal infrastructure planning as well as the planning to expand carbon sink system that is conducive to the development of low carbon economy. In addition, Low carbon technology's research and development should be included in science and technology development planning of Liaoning coastal economic zone. Vigorously develop the green low carbon industry with high added value, low pollution, low energy consumption and reflecting the capacity of independent innovation; accelerate the formation of industrial structure and growth mode to save energy resources and protect ecological environment. Increase the support to the development and utilization of new energy and renewable energy, accelerate the research and development of advanced technology and equipment, and utilize renewable energy in multi ways. Especially under the new situation, aiming at the new mainstream of the fast development of energy saving and environmental protection industry in the industrial development of the world, and actively promote the introduction of clean energy with high efficiency and energy saving, environmental protection technology and industry, actively develop new energy, new materials and environmental protection industry such as nuclear power, wind power, fuel cells, etc., cultivate the automobile industry with energy-saving and new energy. To attract domestic and foreign technology, talent, capital and enterprises, and gradually formed aggregation effect to promote the development and growth of low carbon industry in Liaoning coastal economic zone.

Implement the strategy of leading enterprises and major projects to promote development of low carbon industry

Currently, aiming at the problem of low level of industrial agglomeration in Liaoning coastal areas, the government should cultivate or attract those leading enterprises with large scale of investment, good economic benefits and strong pulling effect to promote industrial agglomeration. With the planning and design of ecological industrial park, to attract the enterprises together which have relatively dispersed geographical position, similar production process or product and industrial symbiotic relationship by preferential policies and good environment to form an industrial community of low carbon economy. In addition, the government should also encourage a large number of small and medium enterprises to be

supported and extended processing of that industrial community and with the effect of low carbon industrial cluster to promote enterprises to focus on ecological park then promoting the development of low carbon research and development, design, logistics, service and other industries.

To build a number of productive service industries, making the traditional industrial low carbonization

The construction of the industrial cluster should be based on productive service industry as the core, making efforts to solve the problem that the level of internal structure of productive service industry is not high and to promote productive service industry to be the leading industry of modern service industry. Focusing on the construction of new service industrial cluster, to do a good job of functional zone's planning and construction of productive service industry; to promote the construction work of service project; to make a breakthrough in the development of service outsourcing industry; to actively expand the investment promotion of service industry; and improve the work of statistics and situation analysis for service industry. Moreover, the low carbon transformation of traditional industries should be insisted on to accelerate the low carbonization of the industry in each city. To build the modern industrial cluster with green industry as the direction, high technology as the guide, cluster development as the characteristic, the modern service industry and advanced manufacturing industry as the pillar and international competitiveness in order to promote industrial structure upgrade of Liaoning coastal economic zone and even the northeast of China.

To improve the relevant laws and regulations of low carbon industry, levy environmental tax and pollution tax

To speed up the formulation, implementation and improvement of the relevant laws, regulations and policy, strengthen law enforcement force; using economic instruments to levy environmental tax according to the degree of its development and utilization of natural resources or the extent of the pollution and damage to the environmental resources for all units and individuals who are developing and utilizing environmental resources. At present, the core technology of developing low carbon industry is mostly mastered by the developed countries, thus, we can not blindly develop low carbon industry at the low level and low technical level. The key is to strength the policy adjustment. The government should not only to introduce some supportive policies to support these areas with emphasis on the construction and development of new energy industrial cluster, and to develop a batch of new low carbon industrial cluster but also introduce some restrictive policies or regulations limiting repeated construction, encourage innovation to develop low carbon industrial cluster with more efficient and more environmentally friendly technology to take the lead in building a batch of advanced technology of low carbon industry cluster.

CONCLUSIONS

The development of Liaoning coastal industrial cluster should actively comply with the rise of the trend of global green economy, as soon as possible to take relevant measures to the transformation of traditional industrial structure with high carbon to low carbon industrial structure; regard advantage industry as the foundation and the large-scale backbone enterprises as the leader; speed up the aggregation of industry, technology and talent; take research and development of low carbon technology into the planning of technology development in Liaoning coastal economic zone; and improve relevant laws and regulations to realize the sustainable development of Liaoning economy.

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