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Study on the Development of Ecological Port in China

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Abstract

In recent years, with the continuous deepening of new development concepts, building a green ecological port has become an inevitable way for my country's ports to improve their core competitiveness and achieve sustainable development. For this, firstly this article describes the relevant development background of ecological ports. Secondly, it analyzes the current situation of my country's ecological port construction and selects Shenzhen Port as a case for analysis, and summarizes the current problems of my country's ecological port construction. It once again summarizes the status quo of foreign ecological port construction and summarizes the experience and inspiration. Finally, based on the current status of my country's current ecological port construction and foreign experience enlightenment, countermeasures and suggestions for accelerating my country's ecological port construction are given. This research has reference significance for the theoretical and practical research of my country's ecological port construction.

Keywords

Ecological Port; Development Research; Countermeasures and Suggestions.

1. Introduction

Since the 21st century, with the rapid development of China's national economy, China's port production has achieved great leap forward development. According to the statistical bulletin on the development of transportation industry in 2019, by the end of 2019, China's ports have 2520 berths of 10000 tons or above, an increase of 76 over the previous year. Among them, 2076 berths of 10000 tons and above in coastal ports, an increase of 69; 444 berths of 10000 tons and above in inland ports, an increase of 7. China's port throughput reached 261 million TEU, an increase of 4.4% over the previous year. Among them, coastal ports completed 231 million TEU, an increase of 3.9%; inland ports completed 30.15 million TEU, an increase of 8.5%. China's ports completed 5.16 million TEU of container through rail transportation, an increase of 14.2%, accounting for 1.97% of China's port container throughput.

With the further expansion of the port scale, as an important infrastructure of the national economy, an important part of the comprehensive transportation system and a window of opening to the outside world, the port plays an important role in radiating and promoting the development of regional economy, and its position in China's national economy will become increasingly significant. However, with the development of port operation and construction, it is bound to have a greater impact on the port area and coastal environment. All kinds of human production activities will have an impact on the environment, and the environment will also have a reaction on human beings. With the continuous emergence of environmental problems, people have more and more profound understanding of this reaction, and pay more and more attention to the environmental impact of production activities. As an important driving force of world economic growth, port is also the main body of energy consumption and pollutant emission. In the situation of global environmental deterioration and energy

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shortage, the development concept of green ecological port is proposed. Some policies issued by China to support the construction of ecological ports are shown in Table 1.

Table 1. List of some policies of Ecological Port

Time	Policy	Issuing department	Content
November 2014	National ecological protection and construction plan (2013-2020)	National Development and Reform Commission	Promoting and improving the ecological construction of China's ports
June 2018	Action plan for further promoting green port construction (2018-2022)	Ministry of transport	Green port construction
September 2019	Outline of building a transportation power	The CPC Central Committee and the State Council	Green port and smart port construction
November 2019	Guiding opinions on building a world class port	Ministry of transport	Focus on port comprehensive service capability Green port construction

Ecological port, also known as green port, is a sustainable development port that can meet the environmental requirements and obtain good economic benefits. The key is to seek a balance between environmental impact and economic benefits, that is, the economic and social development of the port does not exceed the carrying capacity of the natural system. This acceptable balance point must be based on the correct judgment of environmental consumption and economic interests, and at the same time, it must meet the requirement that there is no irreversible environmental change. It can be seen that ecological port will be the trend of port development in the future. Therefore, taking ecological port as the breakthrough point, this paper analyzes the construction of ecological port in China and puts forward countermeasures and suggestions.

2. The current situation and problems of ecological port construction in China

This section mainly summarizes the current situation of ecological port construction in China, and selects Shenzhen port as a case to analyze the measures of ecological port construction, and finally summarizes and analyzes the existing problems of ecological port in China.

2.1 Current situation of ecological port construction in China

With the further deepening of China's environmental protection work, China's port environmental protection work has been further strengthened. China's ecological port construction is mainly concentrated in Shanghai port, Shenzhen port and other large-scale ports. At the same time, with the accelerating process of public rail transit, Huanghua port and other ports are also actively building ecological ports.

Since 2004, the Shanghai port administration has made it an important research topic on how to practice the construction of "ecological port" in Shanghai according to the objectives and measures of the Shanghai municipal government to build an ecological city. During the construction of Shanghai Yangshan Deepwater Port Phase I project, as the first batch of environmental supervision pilot projects of the State Environmental Protection Administration in China, the end control of the previous environmental protection work was changed to process control.

On the basis of energy-saving technology transformation of old terminals and high starting point construction of new terminals, Shenzhen Port actively carries out environmental protection cooperation with international advanced ports (Shenzhen Yantian international container terminal and Long Beach port of California signed memorandum on environmental protection initiative agreement), striving to create an "environment-friendly ecological port".

The environmental protection work of Qinhuangdao port has developed with the development of China's environmental protection. In the work of pollution prevention and control, we have persisted in taking science and technology as the guide, continuously introduced new technologies and means, supplemented and transformed pollution prevention and control facilities, and established a relatively systematic and perfect comprehensive pollution prevention and control system.

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Huanghua Port adheres to independent innovation, and controls the generation of dust from the source by building large-scale coal storage silos, implementing essential long-term dust suppression technology, and constructing the whole process dust prevention and control system; through the construction of ecological water circulation system, it controls the stubborn disease of coal containing sewage in the port, achieves remarkable economic, ecological and social benefits, and constructs an ecological water treatment system covering the whole port area Through scientific management, we can ensure the effective implementation of various measures, create a model of ecological construction and development of coal port, realize green, innovative and high-quality development of port, and provide replicable and operable supporting solutions for the industry.

2.2 Analysis of ecological port construction of Shenzhen Port

In recent years, Shenzhen port has actively carried out the construction of ecological port with remarkable results. The main measures adopted include the promotion of low sulfur oil, the transformation of shore power, shipping subsidy policy, the transformation of oil into electricity, structural emission reduction and so on.

2.2.1. Carry out the promotion of port low sulfur oil

Shenzhen port is the first coastal port in China to advocate the conversion of container ships to low sulfur fuel oil. In March 2015, Shenzhen first proposed to use low sulfur fuel for berthing ships in China, called on the shipping companies and Shenzhen port enterprises to voluntarily join the Shenzhen Port Green Convention, and promised to use low sulfur fuel for berthing ships. In order to effectively implement the implementation plan of the Pearl River Delta, Yangtze River Delta and Bohai Rim (Beijing Tianjin Hebei) water area ship emission control zone issued by the Ministry of transport, in August 2016, Shenzhen Municipal Commission of human settlements and environment, Shenzhen Maritime Administration and Shenzhen Municipal Commission of transport jointly issued the notice on the use of low sulfur fuel oil during berthing at Shenzhen port, which requires that from October 1, 2016, ships are required to stay in Shenzhen port During berthing at Shenzhen port, fuel oil with sulfur content ≤ 0.5% m / M must be used. At present, more than 96% of the container ships entering Shenzhen port use low sulfur oil with sulfur content less than 0.1% during berthing, and the ocean going container ships berthing in Shenzhen port have switched to low sulfur oil with sulfur content less than or equal to 0.5% m / m. According to estimates, compared with 2015, it is estimated that in 2019, ships in emission control areas will reduce about 600000 tons of sulfur dioxide and 78000 tons of particulate matter.

2.2.2. Shore power transformation

In March 2014, in the key task list of Guangdong green port action plan issued by Guangdong Province, Shenzhen port became the key application unit to promote ship shore power.

As of July 2018, 14 sets of shore power facilities covering 25 large berths have been built, ranking first in China. A total of 141 ships have been connected to shore power facilities, with a total of 8345.5 hours of electricity. Ships of 10 international shipping enterprises have been connected to shore power in Shenzhen port, with a power consumption of 3.2 million kwh. As of April 2019, Yantian Port has provided shore power service for berthing ships for more than 3200 hours, with 2.8 million tons of alternative fuel oil, equivalent to 4200 tons of carbon dioxide emission reduction. According to the assessment results of Shenzhen port authorities, the sulfur oxide emission and particulate matter emission during berthing period are reduced by 95% and 81%, respectively. The targets of reducing sulfur oxide and particulate matter by 75% and 40% respectively by the end of 2020 as mentioned in the "five year action plan of Shenzhen green and low carbon port construction (2015-2020)" are completed ahead of schedule. At the same time, the total emission reduction of various pollutants exceeded 8000 tons.

2.2.3. Carry out shipping subsidy policy

In 2015, Shenzhen took the lead in introducing the subsidy policy of "green shipping" in China [5], with an annual subsidy of 200 million yuan for green port construction. It has successively issued the

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Interim Measures for the administration of subsidy funds for ports, ship shore power facilities and marine low sulfur oil in Shenzhen, the detailed rules for the implementation of subsidy for ports, ship shore power facilities and marine low sulfur oil in Shenzhen, and other documents And voluntarily switch to low sulfur oil for financial subsidies to guide enterprises to implement energy conservation and emission reduction projects. From March 2015 to June 2019, a total of 83.2911 million yuan of marine low sulfur oil subsidies and 75.5568 million yuan of shore power subsidies were issued.

2.2.4. Oil to electric

Since 2006, the main container terminals of Shenzhen port have carried out the test and construction of the "oil to electricity" project of RTG. Each gantry crane can save 80% of fuel cost and reduce 95% of exhaust emission.

"Oil to gas" refers to the change of traditional diesel trailer to liquefied natural gas Trailer.

2.2.5. Structural emission reduction

The structural emission reduction of the port refers to strengthening the water to water transfer and sea rail combined transportation, and gradually reducing the proportion of road transportation in the port collection and distribution system [5]. At the end of 2016, Shenzhen launched the "Shenzhen combined port green port chain" project to encourage and guide cargo owners to adopt green transportation modes with large capacity, low energy consumption and light pollution, such as "water to water" and "sea rail combined transportation", so as to reduce the proportion of road transportation.

2.3 Problems in the development of ecological ports in China

Based on the achievements of China's ecological port construction, at present, the problems existing in the development process of China's ecological port are mainly reflected in the following four aspects.

2.3.1. The scale of the port exceeds the environmental capacity

China's socialist economy is in a stage of rapid development, the total economy is expanding, the original carrying capacity of the port has been insufficient, so many ports continue to expand the scale, in order to increase the carrying capacity, resulting in the production of more and more pollutants, is bound to expand the scope of pollution, causing a huge impact on the carrying capacity of the environment.

2.3.2. The port management system is not perfect

The construction of green port requires the introduction of advanced scientific management system to guide the correct way of work and ensure the implementation of the work. Only in this way can the construction process and quality of green port be improved. According to the actual situation of port construction in China, there are many problems in the process of port greening, which are mainly manifested in the imperfection of relevant policies, unreasonable management system, unscientific pollution control methods and unclear development direction of ports.

2.3.3. Environmental awareness is not strong

At present, China vigorously advocates that with the sustainable development, the awareness of environmental protection is constantly enhanced, and some achievements have been made in the construction of green ports, but there are still some deficiencies. Specifically, the execution of environmental protection work is not enough, the work efficiency needs to be improved, the management mode of some ports needs to be improved, and the environmental protection awareness of the staff needs to be further strengthened.

2.3.4. Backward port environmental protection facilities

At present, many ports have been built early and the technical equipment is aging. Many ports do not have professional environmental protection equipment and the pollution control technology is backward. In addition, due to the limitations of the layout of the old terminals, many of them can not be upgraded, and the shutdown and comprehensive transformation have the disadvantages of high cost and low income.

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3. The current situation and Enlightenment of Foreign Ecological Port Construction

3.1 Current situation of Foreign Ecological Port Construction

At present, the United States, Japan, Australia, the Netherlands and other developed countries have strengthened environmental protection in the process of port planning, design, construction and operation, successfully applied the concept of sustainable development to the development of ports, and achieved a lot in the construction of ecological ports.

The port of Rotterdam in the Netherlands has implemented the "regimond air quality action project". The "clean and environmental protection port development plan" for 2020 was formulated, and the environmental policy with "clean shipping" as one of the themes was adopted through consultation with other ports in the Netherlands. The main measures include reducing and exempting port charges for energy-saving and environment-friendly ocean going ships; stipulating that inland river ships must be connected to shore power when berthing at public berths of Rotterdam port to maintain power demand during berthing; implementing clean coal plan to realize clean utilization and accurate mixing of coal; starting carbon dioxide start-up and capture plan, etc

Australian ports attach great importance to environmental management and require environmental planning at the port planning stage. In the process of development and construction, it is necessary to carry out work in strict accordance with legal requirements, and formulate corresponding management measures and detailed rules for different environmental problems, such as marine dumping, noise pollution prevention and control. Sydney port is the second largest container port in Australia. Its "green port guide" puts forward sustainable goals and measures for port development and operation in terms of material selection, solid waste management, water resource consumption, energy application, transportation, indoor environment, emissions, water quality, land use and environmental management

The New York New Jersey Port Authority carried out ecological port construction by establishing a sound port environmental management system. Through increasing external publicity and internal staff training, we can enhance the concept of sustainable development and integrate it into all aspects of port development. In addition, through a series of measures such as the expansion of high-speed railway and the improvement of port logistics system, the construction and development of ecological port has been accelerated, forming a set of reliable sustainable development concept.

In recent years, Japan has attached great importance to ecological balance and the creation of comfortable environment, and has begun to work on the environment in line with the principles of the United Nations Environment Summit, that is, the sustainable development of the world environment as the ultimate goal, related environmental projects and environmental projects to ensure biodiversity. In Japan, the construction of ports and the construction of marine environment are carried out, including the unified planning of the marine park, coastal landscape, wild bird habitat, green space and other hydrophilic space.

On the whole, the ecological construction of ports in developed countries has entered a substantive stage. The theory of sustainable development has been applied to the construction and daily operation of terminals, and perfect port policies and management regulations have been established.

3.2 Enlightenment from foreign ecological port construction

After years of exploration and practice of green ecological port construction, the main experience of foreign green ecological port construction can be summarized as follows.

(1) In the planning stage of the port, the concept of ecological environment protection is integrated, and the environmental planning is carried out at the same time.

(2) The improvement of environmental protection legislation system ensures the enforcement of environmental protection in ports and forms a good environmental management system. Through the establishment of environmental protection supervision and management system and environmental

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protection incentive mechanism, port enterprises are encouraged to actively participate in environmental protection construction.

(3) Pay attention to the construction of ecological environment protection infrastructure, so as to promote the port pollution control, ecological restoration and construction work.

4. Countermeasures and suggestions on accelerating the development of ecological port construction in China

With the deepening of the concept of sustainable development of socialist market economy, our government pays more and more attention to the environmental protection work. It is required that in the port construction, we must fulfill the environmental protection obligation according to the national requirements for environmental protection work, and build a green modern port. Therefore, based on the development status of green ecological port in China, the following suggestions are put forward.

4.1 Strengthen top level design of Ecological Port

Taking advantage of the "new infrastructure" of transportation to promote the construction of ecological port and strengthen the top-level design of ecological port. Carry out domestic ecological port system research, formulate development strategy, and promote the planning and construction of ecological port. At the same time, relevant laws, regulations and technical specifications should be issued to support the development of ecological port.

4.2 Give full play to the regional economic characteristics of the port and promote the large-scale and intensive development of the port

We should actively develop the new development mode with port industry as the main body of urban industry, so as to realize the seamless connection between port and regional development strategy. Strengthen the cooperation with the upstream and downstream related industries of the port, actively carry out the cooperation among port enterprises, port shipping, port and port railway, and build a good logistics platform.

4.3 Establish a systematic standard system of green ecological port construction

Accelerate the planning and research of green ecological port and the corresponding environmental planning research, establish the relevant standard system of green ecological port under the system framework of national and industrial standards, so as to guide and evaluate the construction of green ecological port, promote the integration of green development concept into the whole process of port planning, construction and operation, and ensure environmental planning, environmental protection infrastructure construction and environmental management The smooth implementation of the establishment of management system.

4.4 Carrying out port planning research and strengthening technological innovation

On the basis of the existing ecological research of the port area, the corresponding work requirements and key points should be formulated in strict accordance with the different functional types and regional environment of the port. For the built and planned ports, the corresponding ecological construction requirements and strategies and the planning and element allocation principles for improving the ecological functions of the port should be formulated according to the different construction and operation periods.

For port enterprises, it is necessary to actively strengthen the combination of production, study and research. Port enterprises should carry out comprehensive research on green port construction with universities and research centers. Only in this way can port construction develop into green technology, green materials, green technology and green products. Only in this way can the core competitiveness of port enterprises be improved and the construction of green port be promoted for port enterprises Design has been greatly promoted.

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5. Conclusion

Port plays an indispensable role in social and economic development. However, extensive development can not meet the development requirements of today's society. The transformation from traditional port to green ecological port not only conforms to the requirements of the development of the times, but also is an inevitable way to enhance the core competitiveness of the port and realize the sustainable development of the port. This paper mainly analyzes the current situation and problems of China's ecological port construction, and draws lessons from the experience of foreign ecological port construction, and gives countermeasures and suggestions for China's future ecological port construction.

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