Development Status and Prospect of Modern Fishery Parks

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Abstract Along with the thorough development of the reform and open policy, the trend of broad agriculture and broad development is increasingly intensified. In order to promote the development of fishery industry in China and increase the income of fishermen, the paper analyzes the development status of modern fishery parks at home and abroad comprehensively and summarizes relevant research status and progress on the basis of copious research literature on the construction of fishery parks at home and abroad. Research shows that the parks have the problems of insufficient construction funds, similar construction patterns, inadequate technical support and improper operation and management mechanism. In allusion to relevant problems of modern fishery parks in China, the paper has put forward some countermeasures and made a future prospect.

Key words Modern fishery parks, Development status, Prospect, Decision-making reference

The transformation from traditional fishery towards modern fishery is the basic trend of global fishery development. From the points of fishery development in China and national economy, the "12th *Five-Year Guideline*" plus the next period to come is an important period to promote the construction of modern fishery. Accelerating the construction of modern fishery parks is the major trend to further optimize the economic structure of agriculture, an inevitable demand to achieve sustainable development of fisheries, an urgent need to adapt to economic globalization, an important way to balance urban and rural development, and an effective way to increase both the production and income of modern fishermen. Based on this, the paper summarizes and analyzes the development status of modern fishery parks at home and abroad so as to provide reference for the development of fishery parks in China in the future.

1 Development and research status of modern fishery parks abroad

1.1 Overview of the development of modern fishery parks abroad With the continuous improvement of global industrialization level and the development of science and technology, traditional mode of fishery production has been overthrown gradually. The rising of new-type modern fishery industrial park makes the industrial aquaculture of fisheries possible, showing the trend of integration of modern technology and economic development.

In the 1990s, the construction of modern fishery parks had drawn great attention from countries all over the world. With the continuous improvement of global industrialization level and the development of science and technology, modernization of marine fishing techniques has been achieved gradually and the cultivation techniques have been improved rapidly. In this way, the production range of marine fishery expands constantly, and the fishing activities have been extended to open seas and oceans. New fishing grounds have been developed, and the construction of fishery parks has been promoted. In many countries, safeguard measures for the development of fishery parks and fisheries have been taken.

1.1.1 Government legislation guarantees. The government of South Korea has promulgated the Coordination Rules for Synergistic Combination of Fishing Industry to regulate and promote fishery insurance services. For non-profit insurance types like "Fishermen Insurance" and "Fishing - boat Insurance", obligatory participation is required. The *Act on Compensation of Damages to Fishing Vessels* legislated by Japan in 1952 and its subsequent revisions permit the Fishing Vessel Insurance Federation to provide liability insurance for tourist ships, which means that the business scope has extended to outside the field of fisheries. Similarly, the Parliament of France has drawn up the *Agricultural Insurance Law*, which requires carrying out compulsory insurance for agriculture and fisheries that have a bearing on national economy and the people's livelihood.

1.1.2 Government subsidies. In both Japan and South Korea, fishery insurance services are funded by the government to subsidize business operation and provide reinsurance support. For the fishermen who have an obligation in participation, their insurance premium will be subsidized by national treasury. In France, the policy of low-rate and high-subsidies is applied in agricultural insurance. Farmers only need to pay 20% - 50% of the insurance premium, and the premium subsidies provided by the government accounts for 50% - 80% of the insurance premium.

1.1.3 Tax preference. The fishing-boat insurance federations in Japan and the coordination insurance services of water associations in South Korea have access to various kinds of ax deductions and exemptions, mainly including income tax, corporation tax, utility tax and fixed assets tax etc. In this way, the management and operation costs are reduced, and the accumulation of risk reserve is promoted.

1.2 Development features of modern fishery parks abroad To a certain extent, the construction of modern fishery parks abroad is af-

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fected by the geographical conditions, fishery resources, system & mechanism as well as the role played by fishery industry in national economy in different countries. Therefore, the construction and development of modern fishery parks in different countries present great differences. This kind of differences is not only reflected in different countries, but also at different development stages of the same country. In addition, these differences have formed their own characteristics and can generally be divided into 2 modes according to the construction of modern fishery parks in various countries in the world.

1.2.1 "Ocean Farm" mode represented by South Korea. As a peninsula country, South Korea lies in the southern part of Korean peninsula at the northeast of Asian continent. Covering an area of 99 600 km^2, it is surrounded by sea on three sides in the north, south and west with long and twisting coastline of about 17 000 km long (including the coastline of islands). The sea area under jurisdiction is 444 000 km^2, which is 4.5 times of the land area of South Korea. The continental shelf under its jurisdiction is quite broad and lies at the south of the North Pacific fishing ground. Cold and warm currents interchange with each other in its sea frontier zone, creating favorable conditions for the growth and reproduction of fishes. For this reason, it is rich in fishery resources. Fishery industry has long been an important industry in South Korea. As South Korea is a peninsula country with its fishery industry featured by mariculture, the construction of modern fishery parks takes marine ranching as the carrier and is dominated by offshore fish cage culture.

The first large-scale marine ranching constructed in Sough Korea had been completed in 2007 in Tongyeong of Gyeongsang. It was built by Korea's Ministry of Oceans and Fisheries to increase marine fishery resources, improve the ecological environment of fishing ground and raise the income of coastal fishermen. Since its construction off the coast from 1998 in Sanyang-eup of Tongyeong City from Samdeok-ri to Minam-ri, the funds invested amount to 135 000 000 yuan, in which the research expenditure is 73 340 000 Yuan and facility cost is 62 050 000 yuan[1].

For the construction of marine ranching in a certain sea area, a whole set of large-scale fishing facilities and systematic management system is applied. The artificially released commercial marine species are gathered up by utilizing natural marine ecological environment to build large artificial fishing grounds of fish, shrimps and shellfish off the coast in a planned and purposeful way. Marine ranching is one of the important ways to shift from predatory development of marine resources to sustainable development of modern fishery. It can also help to increase the quantity and improve the quality of fishery resources effectively. In addition, it has also provided a beneficial reference for the construction of modern fishery parks applying mariculture. In the sea area under the jurisdiction of Tongyeong in Gyeongsang, there are more than 1 000 artificial fish reefs with over 13 000 000 aquatic breeds of sebastes schlegeli and sebastes etc. released. It's estimated that the quantity of resources in this sea area has reached over 900 tons, which is about 8 times of the resource quantity in this sea area at the early stage. The findings suggest that, with the increase of aquatic resources, the income of coastal fishermen has been increased from 180 000 yuan in 1998 to 280 000 yuan in 2012 at the growth rate of up to 55.5%.

1.2.2 "Land Farming" mode represented by Vietnam. There is a saying in Vietnam that "Grain and fish are just like mother and child". This shows the status of fish in the eyes of the Vietnamese. In recent years, aquatic products have been able to meet the basic needs of the Vietnamese. With the rapid progress of industrialization and according to the need for foreign exchange earning through product export, fishery departments have been taken more and more seriously. And fishery has become an important economic and technological department of the country. Large-scale standard farming has got more attention, and the construction of modern fishery parks has been carried out vigorously. As Japan, Europe and America have more advanced land breeding industry, highly developed science and technology and advanced materials and equipments, Vietnam has turned to these countries to introduce technologies and equipments.

The TIA RAI modern fishery park which is 300 km away from Ho Chi Minh City is mainly engaged in the artificial breeding of Rillengrundel. This fishing ground covers an area of 6.67 hm^2, in which 3.33 hm^2 is used for the breeding of Rillengrundel. The fries cultured are mostly wild fries, which are fed twice a day with artificially mixed feed developed by the fishing ground at the feeding ratio of about 5%. The fishing ground applies advanced process control technologies that may help to monitor pH, dissolved oxygen, temperature, solar radiation, wind direction, wind speed, energy consumption and other relevant indicators. In the meantime, the start and stop of valve, water pump, aerator, feeder and air compressor can be controlled to automatize the whole system. Through visiting, it can be learned that the breeding of Rillengrundel is the special local pillar industry. The average input is about 30 000 000/hm^2, and the culture cycle is 5 months. The size of cultivated Rillengrundel is about 50 fish/kg, and the maximum size may reach 25 fish/kg with the yield of 66.7kg/hm^2. Rillengrundel is of high economic benefit at the average selling price of 50 – 90 yuan/kg. Investigations in this region reveal that Rillengrundel breeding is the sunrise industry here, and is stepping toward industrialized and scale development with a broad prospect[2]. At present, the development of modern fishery parks is guiding Vietnam to transform from traditional fishery into modern fishery. The government has developed a series of preferential policies for the construction of fishery parks. Together with the large capital input and the progress in fishery science and technology, Vietnam has made great achievements in the construction of modern fishery parks.

2 Development and research status of domestic modern fishery parks

2.1 Overview of the development of domestic modern fishery parks Under the close attention of the Central Party and the

State Council as well as the correct leadership of the Party groups of the Ministry of Agriculture, the development of fisheries had achieved favorable posture of steady progress in 2012. Fishery economy has maintained a high growth rate, the total output of aquatic products has been increased steadily, aquatic product market has kept stable operation, and fishermen's income has been increased steadily and rapidly. In 2012, The gross economic output of fishery industry in the whole society was 1 732 188 000 000 yuan, increasing by 15.44% a year; the per capita net income of fishermen was 8 963 Yuan, increasing by 9.8% a year; the national output of aquatic products was 59 076 800 t, increasing by 5.43% than 2011, and the per capita availability was 43.63 kg, increasing by 4.91%. According to customs statistics, the total export-import volume of aquatic products in China is 26 981 000 000 USD at a growth rate of 4.54%, in which the export volume is 18 983 000 000 USD and the import volume is 7 998 000 000 USD, increasing by 6.69% and 0.23% respectively. The foreign trade of aquatic products continues to top the list in the export of agricultural products. Especially in recent years, the construction of modern fishery parks across the country has played a positive role in the exploration and practice of fishery modernization[3].

The major fishery provinces (cities and autonomous regions) have invested large capital in the construction of modern fishery parks. In the meanwhile, the number of parks under construction is still on the increase. According to statistics, the total number of modern fishery parks of various types is over 1 000 by the end of last year. Jiangsu Province, Shandong Province and some other major coastal provinces have taken the lead in the construction of modern fishery parks. In the Midwest and some inland provinces, the development of modern fishery parks is also undergoing rapid development with the scale and quantity on the increase gradually.

2.2 Development features of domestic modern fishery parks

With the continuous adjustment of the economic structure of agriculture and the development of rural economy in China, a batch of industrial aquaculture demonstration bases, modern fishery parks, sightseeing fishery parks and some other types of modern fishery parks have emerged in various regions. These parks have formed the new fishery industry that relies on modern science and technology, applies new production mode and modern management concept, absorbs funds extensively, conducts optimized and reasonable allocation for production factors including land, and carries out scale operation.

With the gradual improvement of infrastructure for modern fishery parks, the strengthening of talent team construction at all levels and the continuous increase of park construction funds allocated by governments at all levels, modern fishery parks have been developed and expanded gradually in recent years, playing a positive role in the exploration of modern fishery development road in China. Due to the differences in geographical conditions and the quantity of resources owned between coastal and inland provinces, their development paths for modern fishery parks are quite different from each other.

2.2.1 Innovation road of high-quality seawater cultured products. Taking Liaoning Province for example, it has introduced and implemented the *Construction Plan of Marine Ranching in Liaoning Province* (2011 – 2020) and launched the "1586" project comprehensively for the construction of modern fishery parks. The aquatic breeding area of competitive products represented by sea cucumber, prawn, scallop, jellyfish, globefish, bastard halibut, river crab and yellow-head catfish has reached 347 000 hm^2 with the yield of 2 050 000 t, increasing by 4% and 10% respectively. Sea cucumber, Donggang swimming crab, Corbicula aerua Heude and Short Necked Clam have been registered as national protected geographic indications. Panshan County has been determined as the first fishery demonstration county of "One county one industry" in the whole province. River crab brands of "Xuhai" and "Hujia" have been awarded the "Top Ten Famous Crabs in China" and "Gold Prize". Liu'erbao Town in Liaozhong County, Qiandangbao Town in Xinmin City and Huanren Town in Huanren Manchu Autonomous County have been rated as the "land of freshwater fish"; Haiyang Town in Changhai County has been rated as the "land of precious marine products"; Zhangzidao Toan has been rated as the "land of Haliotis discus hannai Ino"; Linghai Dayou Farm has been rated as the "land of stichopus japonicus" – a specialty of Liaoning Province. The construction of fishery parks has been carried out according to local conditions by making used of their advantages. On the basis of household management of production, it has also reflected the features of commercialization, marketization and intensification. This pattern not only helps to improve the fishery productivity, but also brings about benefits for numerous fishermen, which is conducive to the formation of unique regional economy and special competitive products.

2.2.2 Innovative development of freshwater aquaculture management organizations. The construction of provincial-level modern fishery industrial parks has been started in Guanyun County of Jiangsu Province from 2012. It is planned that the size of parks will reach 3 000 hm^2 by the end of 2014. The core area applies the pattern of "two zones and five centers", in which the "two zones" refer to the efficient ecological loach culture zone of 666.7 hm^2 and the common healthy and efficient freshwater fish culture zone of 133.3 hm^2. And the "five centers" refer to the management service center, technology service center, fry breeding center, product service center and leisure experience center. The operation mode of "management committees + companies + cooperatives + bases + brands" is promoted in the parks. The county has approved to establish the "Modern Fishery Park Management Committee of Guanyun County" to be responsible for the management and coordination of park construction, registration of onshore and offshore fishery development companies in Guanyun County, and the marketable operation and construction of fishery parks. In the park, 3 pollution-free loach breeding bases have been set up; 3 farmer cooperative economy organizations including Shengfeng Fishery Cooperative Association of Guanyun County and Xingda

Aquaculture Cooperative of Guanyun County have been established; and two pollution-free aquatic product brands have been declared and approved, namely "Housan Loach" and "Tengshi Loach".

The county strives to upgrade the development connotation of the park and takes the lead in executing bold innovations in the fields of industrial development, production pattern, operation organization, quality control, brand building and recreational fishery development etc., providing reference for the construction of modern fishery parks in the whole country.

3 Basic theoretical support for the construction of modern fishery parks

Rapid industrial development is bound to bring about the fervor of related basic researches. For the construction of modern fishery parks, it is found from previous data that systematic theories have not yet formed[4]. At present, the basic theories that have been approved by the academic circle for application include growth pole theory, location theory, sustainable development theory and system engineering theory etc.

3.1 Growth pole theory Growth pole theory was first proposed by Perroux – a French scholar in 1950. The theory is that it is just an ideal goal for a country to achieve balanced development, which is not possible in reality. Economic growth is usually transmitted by one or more "growth centers" to the other departments or regions gradually. Therefore, specific geographical space should be selected as the growth pole to promote economic development.

3.2 Location theory Different location theories have been developed in different periods of history. Among these theories, the location theory of Tunen is of greatest guiding significance for the construction of modern fishery parks. This theory is that land locations can be classified into types according to the cost variance caused by different distances away from the city. Currently, this theory is still of great guiding significance for the production distribution, land utilization and planning of fishery parks, especially for the layout of modern fishery parks.

3.3 Sustainable development theory In 1987, the United Nations World Commission on Environmental and Development published a report named "Our Common Future", in which the basic concept of sustainable development was put forward formally. The theory is that the needs of contemporary people should be satisfied without endangering the ability of the future generations to meet their needs. This theory is of profound significance for the construction of fishery parks in that it has stressed the importance of sustainable development of fisheries while pursuing high quantity and high quality in fishery. Irrational production concepts like "over fishing and heavy fishing" in traditional fishery should no longer be applied to guide fishery production. Instead, ecological fishery of leading science and technology, efficient fishery of intensive farming as well as the "resource – conserving" and "planting" fishery with multiple functions should be promoted under the guidance of the concept of sustainable development so as to achieve sustainable development of fisheries ultimately.

3.4 System engineering theory System engineering theory is the theory and method to achieve optimal overall effect according to reasonable planning, development, operation, management and control on the basis of the whole situation. According to this theory, modern fishery park can be regarded as a combined system of nature, economy and society that is composed of 4 subsystems: one is the natural circulation system consisting of fishery resources and external environment; second is social system consisting of social, economic and technical sections; third is the economic system dominated by the production, processing and trade of aquatic products; and the fourth is the fishery production system featured by territorial production.

4 Existing problems in the construction and development of modern fishery parks

4.1 Inadequate technical support and incomplete technology services Science and technology are the primary productive forces and constitute the basis for the sustainable and healthy development of modern fishery parks. However, as the research on fisheries is not in popular demand in the country, many top talents are not willing to be engaged in the research of the fishery industry. As a result, there is a lack of foregoers for the development of new techniques and new products. In particular, there is a serious shortage of compound talents with the knowledge of both technical business and organizational management. Besides, follow-up services has failed to keep pace with the construction of fishery parks, which results in less effective interfacing and leads to disordered development, unreasonable construction and widespread dislocation directly[5].

4.2 Similar constructing modes and lack of unique features There is a lack of innovation in the respect of park construction in various regions. They are anxious to define policies and ask for funds from the superiors in case that new national policies are promulgated and have failed to take all things into consideration and conduct reasonable planning. The construction of some parks is just a simple copy of the pattern in the other place, lacking in distinct features. They have failed to incorporate their own innovative elements, which just brings about dull and tedious pattern.

4.3 Lack of leading enterprises to stimulate the development of surrounding areas There is a lack of large leading enterprises in the parks. It is difficult for competitive industries to grow stronger and larger, which results in the situation of high social benefit and low economic benefit. Due to insufficient research on the economic pattern and ecological model of the park, ecological chain and industrial chain of enterprises are not long enough, and the virtuous circle of resource allocation has not yet formed. In this way, it is difficult for them to get strong enough to promote the income increase of fishermen in surrounding areas.

4.4 Insufficient fund for park construction with limited sources of funds At present, the construction of modern fishery

parks in China is still at the early stage. Construction fund is dominated by government investment (accounting for about 80% of the total), while personal investment and enterprise investment only account for a very small proportion. This restricts park construction and development and also goes against the establishment of market and competitive mechanisms. In addition, the fund for park construction is decentralized for a lack of perfect financing mechanism. Currently, the construction funds for modern fishery parks come mainly from financial support but not financial departments, as high fishery risk has resulted in difficulty in loan application. Therefore, this has also delayed the development of modern fishery parks[6].

5 Research prospect for modern fishery parks

5.1 Handling the relationship between government guidance and market domination properly Promote the development of modern fishery parks under the condition of market economy, and give full play to the basic role of market in the allocation of production factors. In the meantime, the government needs to strengthen the functions including planning guidance, policy support, market & product quality supervision and information services, accelerate the establishment of a financial support policy system compatible with modern fishery and park construction, and establish and improve the fishery subsidy policy and system.

5.2 Strengthening hardware and software construction At present, China has entered the stage of long-term mechanism that industry finances agriculture and cities drive the development of rural area. It is the critical period to shift from traditional fishery to modern fishery development and follow the path of fishery modernization with Chinese characteristics. Support the innovation of science, technology, systems and mechanisms and strengthen the effort in talent training for modern fishery, thus to create a favorable environment to accelerate the construction of modern fishery parks.

5.3 Laying emphasis on product quality and strengthen the protection of ecological environment The responsible persons of fishery parks should have brand awareness and conduct pollution-free registration for aquatic products so as to create featured brands of the park. Fishery sectors should supervise and inspect the stores selling aquaculture drugs, thus to prohibit the circulation and use of illicit drugs strictly.

5.4 Establishing a comprehensive evaluation index system for modern fishery parks Strive to establish a scientific evaluation index system for modern fishery parks. For this end, explore the review and assessment standards for park construction in many ways. Offer a certain amount of subsidies for park construction in order to mobilize the initiative of various departments at all levels in the construction of modern fishery parks. Besides, circulate a notice of commendation for the entities and individuals who have made remarkable achievements in the construction of modern fishery parks[7].

Since the reform and opening up, especially since the beginning of the 21st century, modern fishery parks in China have developed into the platform for the R&D and promotion of modern fishery technologies and equipments, the platform to incubate leading fishery companies as well as the base to cultivate scientific and technological talents for modern fishery research. The social influence of them is on the rise. But these are still at the initial stage for a lack of depth and breadth. The period of the "12*th Five-Year Guideline*" is a critical period for building a well-off society in an all-round way, a crucial period to promote economic transformation and upgrading, and a period of strategic opportunities for accelerating the development of modern fishery parks. In the meantime, the *Twelfth Five-Year Guideline* for the Development of National Fishery Industry has brought up new demands for modern fishery industry, including the advocacy of new economic concepts such as low-carbon economy, green economy and blue agriculture. This will leave a profound impact on the construction and development of modern fishery parks.

References

[1] South Korea's Marine Fisheries Agency. Marine fisheries industry[M]. Seoul: South Korea's Agriculture Press, 2003: 439 – 442. (in Chinese).

[2] SU YP. Investigation of marine aquaculture in Vietnam and Kingdom of Cambodia[J]. Ocean Development and Management, 2011, 28(3): 114 – 115. (in Chinese).

[3] The People's Republic of China Ministry of Agriculture, Fisheries Bureau. The twelfth five – year plan of The national fisheries development[OE/OL]. 2011 – 11 – 04. http://www.moa.gov.cn/zwllm/ghjh/201111/t20111114_2408578.htm. (in Chinese).

[4] HUANG XJ. Research review of the development status of modern agricultural park at home and abroad[J]. Guangdong Agricultural Sciences, 2010, 37(7): 289 – 293. (in Chinese).

[5] WANG YP. The direction and policy of industries structure optimization and upgrade[J]. Macroeconomic Management, 2008(7): 36 – 38. (in Chinese).

[6] LIN XQ. Discussion on the transformation of traditional fisheries to modern fishery[J]. Xiamen Science & Technology, 2003(2): 18 – 21. (in Chinese).

[7] ZHANG LZ, WANG XH, GUO ZH. A brief account of China's industrial structure optimization and quantificational methods[J]. Journal of Shandong University of Sciences & Technology(Social Science), 2007, 9(1): 62 – 65. (in Chinese).