

A Research on the Mechanism of Collaborative Development of Marine Industry in the Northern of Jiangsu Province

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Abstract: The Ocean has abundant resources, which can provide broader development space for human social and economic development. With the proposal of China's marine power strategy, China's marine economy has rapidly developed and grown. Taking Yancheng and Lianyungang as examples, this article analyzes the current development status of the marine industry in the northern Jiangsu region, and based on this, proposes coordinated development strategies and suggestions between cities in the process of developing the marine economy. This article suggests: 1. Based on their respective resource endowments, cooperate with each other to jointly develop and utilize marine resources; 2. Reasonably plan and utilize land resources in coastal cities to avoid spatial conflicts between industry and tourism; 3. Adapt to the changing trends of market demand and actively develop new markets; 4. Faced with marine environmental pollution and ecological damage, regions should unite and cooperate to effectively respond through technological innovation.

Keywords: Marine Economy; Collaborative Development; Space Conflict; Aging Population; Environmental Protection

1. Introduction

The marine economy is a new type of economy derived from human society's continuous expansion and expansion of the production field from inland areas to the vast ocean. Compared to inland areas, the ocean has richer resources. As a new form of economy, the marine economy has broader development prospects and market space, and is another important engine to promote national economic development, increase social employment, and enhance national

income.

In recent years, with the proposal of the strategy of becoming a maritime power, China's marine economy has rapidly developed and grown, and coastal provinces and cities have increasingly attached importance to the construction of the marine economy. Guangdong Province has clearly proposed to "rebuild a new Guangdong" based on the development strategy of marine economy. In the 14th Five Year Plan, Shandong Province proposed to build a globally influential marine technology innovation highland. Jiangsu Province has proposed an action plan to build a strong maritime province. With the rapid and vigorous development of the marine economy in various coastal provinces and cities in China, the demand for scientific theories of marine industry clusters will also become increasingly strong. On this basis, research on the development strategy of marine economy and its land sea integration from the perspective of industrial clusters will continue to increase, and the demand for scientific industrial planning of marine economy in social and economic development practices will inevitably continue to increase. In this context, it is of great significance to scientifically analyze the development strategy of land sea integration of marine industry clusters, study the strategies and paths for regional coordinated development and reasonable division of labor, and ensure that all regions can share the dividends brought by the development of marine industry clusters, in order to achieve common prosperity and sustainable development of the national economy.

2. Research Review

Simmonds Peter Lund first analyzed the value and application prospects of marine resources

in human production practices, pointing out that the ocean is rich in various substances, including not only various fish that can be directly consumed by humans, but also a large amount of raw materials that can be deeply processed by human industry to supply the market with profits, such as mother of pearl, shells, sea salt, algae, and coral amber.[1] Don Groves analyzed and predicted the feasibility and market prospects of developing marine industry by combining the current state of scientific and technological development.[2] The study suggests that the status and value of marine resources in modern industrial production will become more important with economic and social development.

Since the 1960s, research on the status and value of marine resources in the economy and society has become increasingly widespread abroad. Yasushi Miyamoto & Kazunari Nakamura et al first proposed the concept of the marine industry.[3] Since the 21st century, with the rapid development of the global marine economy, the academic community has paid increasing attention to the marine economy and industry. Diana I.S.P. Resinde & Marta Ferreira and other scholars studied the usage trends of marine ingredients in a series of anti-aging formulas in the Portuguese market. In 2011, only 6% of 190 anti-aging cosmetics came from the ocean, but there was a significant increase in 2018. Among the 103 anti-aging products newly studied, 33% of the products used these ingredients. Due to the diversity, ease of cultivation, and growth regulation of algae, especially red algae, they are the most commonly used marine component in these anti-aging formulas. [4] The author's research believes that the marine industry, characterized by the development and utilization of marine resources, is an important "engine" for promoting social and economic development at present. Hanna Dijkstra & Pieter van Beukering and other scholars analyzed the business models of 96 startups engaged in marine plastic products, and found that regardless of the business model chosen, all companies will face entrepreneurial challenges. The challenges mainly come from competition among companies with poor sustainability and slow government response. The author believes that the government should actively encourage blue entrepreneurship, popularize identified

risk barriers for practitioners, and provide predictive information support. [5]

In recent years, some Chinese scholars have also begun to pay attention to and study marine economic issues. Huang Yingming conducted an in-depth analysis on several aspects of the development process of marine industry in the coastal areas of South China, including the linkage of marine and land industries, spatial connection between marine and land, mutual flow of marine and land elements, and co governance of marine and land ecological environment. The study showed that the spatial distribution of marine industry in the coastal areas of South China is uneven, and the development of emerging marine industries lags behind. At the same time, the spatial distribution of marine industry and land industry in coastal areas is relatively consistent, with strong linkage between the two. The degree of agglomeration of marine industry decreases from the coastline to inland areas, and the degree of agglomeration of marine industry around ports is relatively high. [6] Lu Yayun used a stochastic frontier model to calculate the input-output efficiency of marine science and technology innovation in 11 coastal provinces and cities in China from 2011 to 2016, and introduced time delay effects to analyze the driving factors of innovation efficiency. The results show that capital investment plays a more important role than personnel investment in marine science and technology innovation. The efficiency of marine science and technology innovation is in the stage of diminishing returns to scale, and there are significant inter provincial differences in the efficiency of marine science and technology innovation; The quality of marine technology personnel has a one-year lag effect on innovation efficiency; The intensity of investment in marine scientific research funds, the level of marine industry structure, and the level of foreign investment utilization are positively correlated with the efficiency of marine scientific and technological innovation, while the quality of marine scientific researchers is negatively correlated with the efficiency of marine scientific and technological innovation; The intensity of marine scientific research investment and the level of marine industry structure are the main factors affecting high efficiency and low efficiency, respectively. [7]

Zheng Xinyi analyzed the current development status and shortcomings of the marine industry cluster in Jiangsu Province. The study showed that the marine industry in the province has developed rapidly, and as of 2016, the output value of the marine industry accounted for about 9% of the regional GDP. However, there are also some shortcomings in the marine industry throughout the province, including similarity in industrial structure, potential threats to the marine ecological environment, and unclear advantages of service industry clusters. The author suggests that Jiangsu Province should cultivate and strengthen marine industry clusters in accordance with the requirements of leveraging advantages, key breakthroughs, and driving development. Strengthen the industrial cluster level of marine fisheries, achieve the transformation from traditional fisheries to modern fisheries, focus on developing ecological fisheries, efficient fisheries, and branded fisheries, and form a large-scale and systematic industry. Accelerate the development of marine secondary and tertiary industry clusters, cultivate the development of coastal tourism industry, and vigorously develop core industries such as marine salt industry and petrochemical industry. Create a high-tech marine industry, optimize the marine transportation industry, and achieve sustainable development of the marine industry.[8] Ding Chengwei believes that in the process of developing marine industry clusters, we should always adhere to high-quality development, enhance industrial technology extension ability from three dimensions of promoting quality change, efficiency change, and power change, build competitive advantages in the industrial chain, and continuously strengthen the ability to formulate international patent standards, establish multi-level strategic maritime enterprise clusters, build a multi factor industrial technology support platform system, promote cross docking of supply and demand in marine industry clusters, improve the mechanism for attracting high-end talents, strengthen the role of financial services in driving, and optimize the operation mechanism of industrial policies. [9]

3. Current Situation of Marine Economic Development in the northern of Jiangsu

Province

3.1 Current Situation of Marine Economic Development in Yancheng City

According to data from the Jiangsu Provincial Bureau of Statistics, the northern Jiangsu region includes Xuzhou, Lianyungang, Huai'an, Yancheng, and Suqian. Due to the fact that Xuzhou, Huai'an, and Suqian are not coastal cities, this article will focus on analyzing the marine economic development status of Yancheng and Lianyungang.

Yancheng City has a sea area of 18900 square kilometers, a coastline of 582 kilometers, and a coastal mudflat area of 4550 square kilometers. In 2022, the total marine production value of Yancheng City was approximately 140 billion yuan, accounting for approximately 15.48% of the total marine production value in the province.

In terms of developing marine fisheries, Yancheng City has built a total area of 671000 acres of seawater aquaculture. In 2022, Yancheng City successfully applied for the National Marine Ranch Demonstration Zone - Taowan Marine Ranch, with a planned total investment of about 1.2 billion yuan for the ranch, and completed the first phase investment of 420 million yuan. Taowan Marine Ranch combines marine aquaculture and sightseeing leisure functions. It can achieve deep and distant sea fish farming through modern technologies and equipment such as water quality monitoring and automatic feeding, as well as provide support for comprehensive supply and sightseeing leisure through helicopter lift platforms. At the same time, artificial fish reefs have been arranged and constructed around the ranch, providing a good environment for the reproduction and growth of various seaweed and marine microorganisms, which plays an important role in purifying seawater and protecting the marine environment. In addition, Yancheng City has been trying to develop mudflat saline alkali land agriculture by using the vast mudflat resources. Up to now, Yancheng has developed nearly 5 million mu of mudflat saline alkali land, planting and producing a variety of agricultural products with salt tolerance such as rice, rape and quinoa. For example, in 2022, Tiaozini reclamation area will reclaim 500 mu of mudflat and successfully plant quinoa,

achieving a single season yield of 120 jin per mu and an average income of 2400 yuan per mu. The yield of salt tolerant new rice per mu has reached 400 kilograms, and the yield of rapeseed per mu has reached 280 kilograms.

In terms of developing marine new energy projects, as of 2022, Yancheng City has built 23 offshore wind farms with an installed capacity of 5.54 million kilowatts. The city achieved a wind power generation of 22.2 billion kilowatt hours, accounting for 49.5% of the total electricity consumption in the city. In the production and manufacturing of wind power equipment, the overall production capacity has reached 2300 sets/year, the blade production capacity has reached 6900 pieces/year, and the production capacity of towers, conduits, and internal components has reached 540000 tons/year. Meanwhile, in September 2022, the first phase of the CNOOC Yancheng "Green Energy Port" project with a total investment of 13 billion yuan was put into operation, and the main construction of a single tank capacity of 270000 cubic meters of LNG storage tanks was basically completed. According to the planning goals, the total installed capacity of natural gas in the completed Yancheng Green Energy Port will reach 2.5 million cubic meters, and it can process 6 million tons of liquefied natural gas annually.

In terms of developing the marine equipment manufacturing industry, Yancheng City has completed the construction of a national marine engineering special equipment industry base. The national marine engineering special equipment industry base in Dongtai City, under the jurisdiction of the city, has gathered over 50 marine engineering enterprises, mainly producing equipment for lifesaving, signal, fire protection, seawater purification, and environmental protection. In 2022, the production and sales of marine life saving supplies in Dongtai City accounted for 75% of the domestic market share, with sales exceeding 1 billion yuan.

With the strategic goal of continuously promoting the development and construction of the marine economy, Yancheng City has also provided strong construction and support in supporting industries and scientific and technological services. As of now, Yancheng City has successively completed the construction of Yancheng Marine Vocational

School, Yancheng Normal University Wetland College, and Yancheng Institute of Technology Marine Biology and Engineering College.

3.2 Current Status of Marine Economic Development in Lianyungang City

Lianyungang has a sea area of 6677 square kilometers, a shallow mudflat area of about 1.6 million mu, and a coastline of 211.6 kilometers. In addition, the waters under the jurisdiction of Lianyungang City have 20 out of 26 islands in the province. In 2022, the total marine production value of Lianyungang City was approximately 104.3 billion yuan, accounting for approximately 11.53% of the city's GDP. In terms of marine economic structure, Lianyungang City presents a "three two one" characteristic, that is, the proportion of the total output value of the marine tertiary industry to the total marine production value is significantly higher than that of the marine secondary industry, and the latter is also significantly higher than that of the marine primary industry. From a specific industry analysis, the maritime transportation industry, coastal tourism industry, and marine fisheries constitute the three pillar industries of the city. In the development of marine agriculture, Lianyungang City has been deploying the construction of marine pastures since 2002, actively building a "marine granary". As of now, two national level marine ranching demonstration zones have been established in the city, including the national level marine ranching demonstration zone in the eastern part of Qinshan Island and the national level marine ranching demonstration zone in the Haizhou Bay area. The national marine ranch demonstration zone in the eastern waters of Qinshan Island covers an area of approximately 5379.39 acres. Within the demonstration area, more than 70000 artificial fish reefs have been constructed, and one breeding, releasing, and domestication base has been established. As of 2023, the total output value of marine fisheries in Lianyungang City is approximately 41.3 billion yuan.

In the field of development and construction of new marine energy projects, Lianyungang City is actively building two major projects, namely, Huadian Ganyu LNG and Tianwan mudflat photovoltaic, with a total planned investment

of 6.4 billion yuan and 10.2 billion yuan respectively. After the completion of the project, the Tianwan mudflat photovoltaic project alone can achieve 2.2 billion kilowatt hours of photovoltaic power generation, which can reduce 1.771 million tons of carbon emissions.

In promoting transportation, Lianyungang actively constructs and innovates an integrated international sea land logistics system. Lianyungang will jointly build a linkage channel with Guangzhou Port to the south, build a 7000 km long commodity supply chain to the west with the help of the "the Belt and Road" policy and facilities, and establish cooperation channels with Shanghai Port, Yantian Port and other seaports.

In terms of service guarantee and support, Lianyungang City has established extensive contacts and cooperation with professional research institutions such as Ocean University of China, Jiangsu Ocean University, Nantong University, and Yancheng Institute of Technology, actively exploring and practicing the integrated development path of industry, academia, and research in the field of maritime affairs. For example, Lianyungang City has reached a cooperation agreement with Jiangsu Ocean University, which will provide outstanding scientific researchers to serve as the Vice President of Science and Technology in related fields, and provide technical experiments and testing services for maritime enterprises in the city.

Overall, there is a significant gap in the development of marine economy between Yancheng and Lianyungang. Firstly, in terms of marine economic volume, Yancheng City is significantly higher than Lianyungang City. Secondly, in terms of equipment manufacturing and the development of marine fisheries, Yancheng City has taken a more rapid action, able to quickly identify development shortcomings and accurately grasp the driving force for promoting the development of the marine economy by combining its own resource endowment and characteristics. Furthermore, there are significant differences between urban land planning and spatial utilization. From the perspective of spatial distribution, Yancheng City mainly arranges production units for the development of the marine primary industry and some factories and enterprises with

relatively low pollution in the coastal and nearshore areas, reserving great development space for the development of marine fisheries and tourism industry. Lianyungang City places petrochemical production and processing enterprises in coastal and nearshore areas, and even places petrochemical production and processing enterprises near tourist attractions. In this way, it will inevitably affect the future development and growth of Lianyungang's marine tourism industry.

4. Suggestions

4.1 Strengthen Regional Cooperation, Jointly Develop and Utilize Marine Resources

From the analysis of the distribution of natural resources, Yancheng City has relatively wider and richer marine natural resources, while Lianyungang has abundant island resources. From the analysis of transportation resources, Lianyungang is the starting point of the Eurasian Continental Bridge, which connects China and even the Eurasian continent from east to west in terms of inland transportation, and has relative advantages. From a geographical perspective, Yancheng is closer to the central area of the Yangtze River Delta urban agglomeration than Lianyungang, with its southern region bordering Taizhou City and Nantong City respectively. Similarly, the two cities each have their own advantages in different fields. If we can complement each other's advantages and cooperate with each other in the development and utilization of marine economic resources, we will inevitably achieve faster development of regional marine economy. For example, in many fields such as offshore wind farms, marine ranches, marine tourism, and marine environmental protection and ecological improvement, the two cities can engage in close cooperation.

4.2 Reasonably Plan Urban Land and Leverage the Advantages of Coastal Resources

The development of manufacturing industry cannot come at the expense of tourism industry. Reasonably develop and utilize the land resources of coastal cities, and strive to maintain the original ecosystem and natural landscape of coastal land and beaches. Industrial production and manufacturing

enterprises should be located as far inland as possible from beaches to avoid potential spatial conflicts between industry and tourism. Land resources in coastal and coastal areas should be fully supplied to the primary and tertiary industries of the ocean, supporting the development of salt tolerant agricultural products, seafood storage, marine scientific research, coastal tourism, and port transportation industries, as well as simple processing enterprises with low pollution and small land occupation. One important aspect of the integrated development of land and sea is to utilize the abundant land resources in the inland region and develop offshore industries that can process and produce marine resources. It cannot be simply understood that placing enterprises in coastal areas is equivalent to developing the marine economy.

4.3 Adapt to Future Market Demands and Actively Develop New Markets

At present, there is an aging trend in Chinese society, and this trend will further intensify over time. If we look at the changing trend of market demand, the scale and proportion of demand for goods and services by the elderly population will continue to grow in the future market demand. Under this historical development trend, various needs related to healthcare, health, housing, leisure, entertainment, social activities, and other aspects of the elderly population will rapidly increase. However, facing this trend of changing demand, coastal cities rarely involve or reflect it in the formulation of marine economic development plans. Therefore, we believe that in promoting the development of the marine economy, the cities of northern Jiangsu should fully consider the changing trends in market demand and current market gaps, comply with the trend of aging development in Chinese society, and actively develop and plan suitable medical services, health and leisure, entertainment and housing, social networks and other products or services with marine characteristics for the elderly population.

4.4 Actively Respond to the Pressure of Marine Environmental Pollution, and focus on Innovating Marine Environmental Protection Technology

Faced with the deterioration and destruction of

the marine environment, coastal cities should quickly and actively take action, jointly discuss countermeasures, and negotiate solutions to sudden pollution and ecological problems. Regardless of the type of pollution, there are theoretically corresponding solutions and methods. Even if current technology or scientific methods cannot solve it, it does not mean that the problem will never be solved. The unresolved pollution problem is constrained by two key factors, namely science and technology and cost. In essence, it ultimately boils down to the issue of technological shortcomings. The most urgent problem to be solved in the face of possible pollution in the marine environment is to break through conventional environmental protection measures and technological methods, and find more reliable and effective alternative technologies and methods. The saying goes that in the process of economic development, regardless of the competitive situation between coastal areas, in the face of marine pollution and ecological damage, we should unite and cooperate with each other to discuss solutions.

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