

A Study on the Financing Model of ‘Marine Ranch+’ Industrial Cluster in Zhanjiang City

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Abstract: The construction of modern marine ranches is a necessity for strategic development. As a major marine city, Zhanjiang has natural advantages in developing marine ranches. However, due to scattered financing and difficulties in financing the marine aquaculture process, the development of Zhanjiang's marine ranch industry cluster is limited. This paper introduces the operational characteristics of Zhanjiang marine ranch from the perspectives of operational models and industry risks, analyzes the existing financing models of Zhanjiang marine ranch, and based on the system thinking of marine ranch industry chain and multi industry integration, proposes the construction of a market-oriented ‘Marine Ranch+’ industry cluster financing model. The industry chain of marine ranch should be centered on seawater aquaculture and extend the value chain upstream and downstream, In addition to the integration of the three industries within the industrial chain, it also includes the integration of ‘marine ranching+leisure fishing’, ‘marine ranching+offshore wind power’, and finally, the integration of ‘marine ranching+’ industrial cluster and financial services. The flow of funds should circulate like blood within the industry chain and inter industry systems to fully mobilize various types of capital to ensure the high-quality development of Zhanjiang's marine ranches.

1. Introduction

In years 2023, No. 1 central document mentioned ‘building modern marine ranches, developing deep-water cages, breeding factory ship and other deep-water aquaculture’. From the perspective of the national policy, the sustainable development and utilization of marine fishery resources is an important component of the strategy of building a maritime power; From the perspective of rural revitalization, marine pastures have become a new growth point for the marine economy in some coastal areas; From the perspective of food security, the construction of marine ranches has accelerated the construction of blue granaries in China, laying a solid foundation for food security [1].

The development of marine ranches in Zhanjiang City has natural advantages. Zhanjiang is a marine city with significant advantages in marine resources, a well-established industrial chain, and strong scientific research support from Zhanjiang Bay Laboratory and Guangdong Ocean University. At present, there are three national level marine ranching demonstration zones and five

provincial-level cage aquaculture industrial parks. According to the Zhanjiang Municipal Bureau of Statistics, the total aquatic production in 2022 reached 1.255 million tons, with a total output value of 27.46 billion yuan; in 2023, the production of fisheries steadily increased, and the production of aquatic products increased by 3.0%, ranking first in Guangdong Province for 20 consecutive years. Guangdong's gross Marine product has ranked first in China for 29 consecutive years [2]. However, the current development of marine ranches in Zhanjiang has not yet formed an industrial cluster, mainly due to the scattered state of existing financing, and the difficulty in financing the marine aquaculture link of the industrial chain, which limits the development of the marine ranch industry cluster. The exploration of innovative financing models should be based on a systematic thinking of industrial chain and Industrial integration, constructing a market-oriented 'Marine Ranch+' industrial cluster financing model, fully mobilizing various types of capital to ensure the high-quality development of marine ranches in Zhanjiang City [3].

2. The Operational Characteristics of Marine Ranches in Zhanjiang City

Based on the investigation of marine ranches in Zhanjiang City, the author analyzes the operation mode and main risk points of marine ranches.

(1) Operation mode

At present, Zhanjiang Marine Ranch mainly adopts an equipment based marine aquaculture model. The construction mainly involves re planning the original traditional net cages by configuring deep-sea net cages, implementing the 'bird replacement' strategy, expanding the aquaculture space, making the aquaculture water layer deeper, and improving the aquaculture yield and quality [4]. The current mainstream HDPE gravity deep water net cage for ocean ranches has a much lower cost than truss net cages, and a shorter recovery period than truss net cages. Specific examples are shown in Table 1.

Table 1: Comparative analysis of the investment cost of Hengxing Deep-Sea cage project and Haiwei No.2 HDPE truss cage project (Unit: RMB, ten thousand yuan)

Cost part	Hengxing deep-sea cage farming project		Haiwei No.2 HDPE truss cage project	
	Construction content	investment estimate	Construction content	investment estimate
infrastructure	100 meters perimeter HDPE,40gravity deepwater cages	1252 (including 10 million yuan of financial subsidy)	Intelligent net and box breeding system platform	1800 (including 6 million yuan of financial subsidy)
	8 ships	1309	Breeding boat	200
	Other equipment	50		
Land supporting facilities	Comprehensive building rent, warehouse rent	26.5	service charge	100
	brand building	8		
	Sea area royalty	334		
	goods train	18		
prime cost	Fish Fry (3.38 million tails)	135	fry	200
	Feed cost (1138 tons)	864	Feed cost	700
amount	About 40 million yuan		About 30 million yuan	
annual output	Trachinotus ovatus: 3,000 tons / year		Trachinotus ovatus: 900 ton / year	
sales income	25 (yuan/kg) *3million (kg) = 75 million yuan		25 (yuan/kg) *0.9million (kg)= 22.5 million yuan	
Cost recovery	4000 / 7500=0.53 years		3000 / 2250=1.33 years	

(2)Research on Major Risks in the Industry

Aquaculture based marine ranches all have common risks in the aquaculture industry, and marine aquaculture has some unique risks, mainly in the following aspects:

①Market risk

At present, the largest variety of marine aquaculture in Zhanjiang is the *Trachinotus ovatus*, which has a relatively complete industry chain of seedling breeding, aquaculture production, feed, disease prevention and control, and mainly focuses on economies of scale. For example, the *Trachinotus ovatus* has gone through more than 10 years from fry scale to market recognition. Cultivating high-value deep-sea aquaculture varieties is an important starting point for the development of modern marine ranches [5]. However, the current fish consumption market still needs to be cultivated, and fish suitable for deep-sea aquaculture (such as cobra and octopus) are still in the experimental breeding stage, with a breeding cycle of up to 3 years and high investment costs. Generally, farmers are less involved.

② Natural disaster risk

Fishery production is highly dependent on the environment, and marine aquaculture is generally placed in open sea areas far from the coast [6]. Abnormal changes in the natural environment or disasters can have a serious impact on its production. Due to the complex natural sea conditions and frequent typhoons in the Guangdong waters, the risk of offshore operations is high. Damaged net cages are extremely likely to cause injury, death, or large-scale escape of farmed fish. For example, due to the high water temperature in the South China Sea, red tide disasters often occur, which can have an impact on the growth of marine organisms and even lead to hypoxia and death of marine organisms [7]. In addition, Japan has started discharging nuclear wastewater in 2023, making it difficult to assess the impact on the growth and development of marine organisms [8].

③Environmental and Social Risks

In the process of using seawater for aquaculture, improper use of feed and drugs can lead to negative impacts such as damage to fishery resources and marine ecological environment, resulting in environmental risks [9]. In addition, for marine aquaculture construction projects listed in the Classification and Management List of Environmental Impact Assessment for Construction Projects (2021 Edition), an environmental impact assessment is required, and reports or tables should be provided according to different levels of sea area.

④ Compliance risk

Generally speaking, marine aquaculture shall be operated with certificates according to law, and the Aquaculture Certificate of mudflat and Sea Area Use Certificate shall be obtained, which shall be issued by agricultural and rural departments and natural resources departments respectively to ensure the legal rights and interests of aquaculture. According to the Zhanjiang Agriculture and Rural Bureau, due to the fact that the two certificates belong to different departments, it is easy to cause law enforcement confusion. Currently, Guangdong Province is studying and refining the process and requirements for obtaining relevant certificates in order to streamline relevant procedures and requirements.

⑤ Risk mitigation analysis

The risk mitigation measures that breeding enterprises can provide are mostly mortgage guarantees for ships, sea area use rights, net cage equipment, etc. These types of assets have strong professionalism and are not easy to dispose of and realize, and the risk mitigation measures are insufficient. For example, for the right to use the sea area, a mortgage contract for the right to use the sea area must be signed and registered with the government's marine administrative department. For example, truss type net cages, although they have high cost, are all customized products that are difficult to dispose of and have little significance as collateral.

3. Analysis of Existing Financing Models for Ocean Ranch in Zhanjiang City

(1) Bank loans

Taking the loan related data of a state-owned bank's marine ranch industry chain in Zhanjiang as an example. The specific data is shown in Table 2. Combined with the research of major banks in Zhanjiang, it is found that the loans of marine ranches are mainly concentrated in agricultural leading enterprises. From the perspective of the industry chain, they are mainly concentrated in upstream feed enterprises and downstream aquatic processing and trading enterprises. However, the proportion of loans from aquaculture farmers is low. From the perspective of loan types, liquidity loans are the main type, while fixed asset loans account for a small proportion. Presenting an imbalance of easy financing for leading enterprises and difficult financing for core farmers; The problem of easy short-term financing and difficult long-term financing.

Table 2: Credit balance of a state-owned bank in Zhanjiang for the Marine Ranch industry

class	Industry classification code	2022 (ten thousand yuan)
cultivation	A0411, A0541, A0549	10,331.85
process	C1361, C1362, C1363, C1369	142,810.66
forage	C1329	267,043.25
equip	C3575, C3576, C3579	3,800.45
wholesale	F5117	45,085.10
	amount to	469,071.31

(2) Government subsidy funds for enterprises

Regarding the subsidy for cage equipment [10]. According to the Notice of the General Office of the Ministry of Agriculture and Rural Affairs on the Revision of Subsidy Standards for Deep Water Anti Wind and Wave Cages (Nong ban yu [2019] No. 31), the scope of national subsidies can include the purchase of deep water cage bodies and related devices. The subsidy limit for HDPE net cages is 50%, and the subsidy limit for truss types is 30%. Regarding subsidies for industrial parks, the entities included in national or provincial-level modern agricultural industrial parks can receive corresponding financial subsidy funds from the leading entities and participating enterprises of the industrial parks.

(3) Financing for Infrastructure Construction in Fishing Port Economic Zone

According to the "National Coastal Fishing Port Construction Plan (2018-2025)" issued by the National Development and Reform Commission and the Ministry of Agriculture and Rural Affairs, it is planned to construct four fishing port economic zones in Zhanjiang City (Zhanjiang Bay Fishing Port Economic Zone, Suixi Lianjiang Fishing Port Economic Zone, Leizhou Fishing Port Economic Zone, and Xuwen Fishing Port Economic Zone). The total planned investment for Zhanjiang Bay Fishing Port is 1.2 billion yuan, and the planning map has been formed, while the other three fishing port economic zones are still under planning. Including these four large fishing port economic zones, the country has confirmed 40 fishing ports in Zhanjiang City. The construction of the fishing port economic zone includes the construction of marine infrastructure such as docks, waterways, and environmental protection, as well as the construction of land supporting projects, including aquatic trading centers, warehousing and cold chain logistics, aquatic processing centers, coastal cuisine, leisure fishing, and other supporting facilities. The construction of the fishing port economic zone is the key to the development of Zhanjiang's marine ranches. However, at present, due to the large investment amount, suitable platform companies have not been found as investment and financing entities in the fishing port economic zone, and the progress of construction is slow.

4. Problems with Existing Financing Models

Through research and data review, it is summarized that the existing financing model of Zhanjiang Marine Ranch has the following problems:

First, due to different risks, financing entities are dispersed and financing capabilities are uneven. Upstream and downstream enterprises in the marine ranching industry chain have strong financing capabilities, while there are many market entities in the middle of the marine aquaculture market, but their financing capabilities are weak. The second issue is that internal financing within the industry chain has not formed a scale, and money has not flowed within the industry chain, resulting in ineffective use and regulation of funds. The third issue is that the financing for the government led fishing port economic zone has not been in place, resulting in the failure to form a scale effect on marine ranches.

5. Building a Financing Model for the ‘Marine Ranch+’ Industrial Cluster

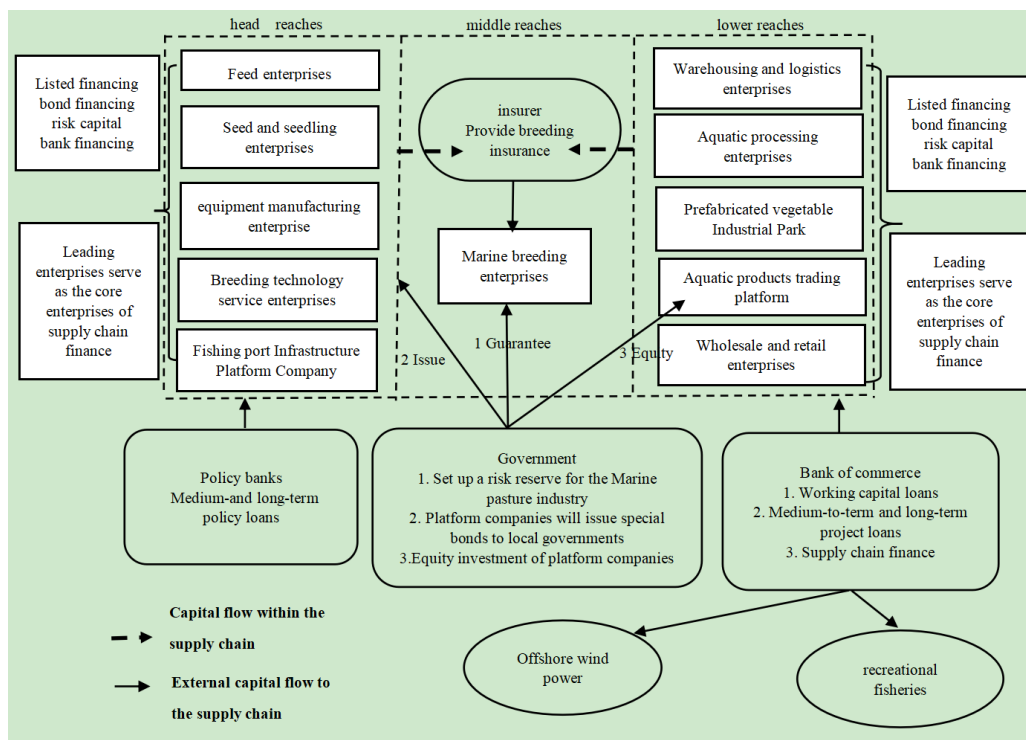


Figure 1: Innovative financing model of "Marine Ranch+" industrial cluster

At the 2023 Guangdong Marine Ranch Equipment Industry High Quality Development Seminar, Haoran Lin, an academican of the CAE Member, said: ‘The horizontal goal of Guangdong Marine Ranch construction is the integration of three industries, and the vertical goal is to build the whole industrial chain.’ Zufu Li, a professor of Sun Yat sen University, believes that today's marine ranch should be expanded to ‘Marine Ranch+’, and a sound industrial system needs to be established. Based on this, the author believes that the financing direction for marine ranches should be to introduce diversified funds into the integration of three industries and the industrial chain of marine ranches. Therefore, this paper explores the financing model of the ‘Marine Ranch+’ industrial cluster in Zhanjiang City from the perspective of industrial chain and integration of the three industries. The industrial chain of marine ranching should be centered around the marine aquaculture industry, extending the value chain upstream and downstream. In addition to the integration of the three industries within the industrial chain, it also includes the integration of

‘Marine ranching+leisure fishing’, ‘Marine ranching+offshore wind power’, and finally, the integration of ‘Marine ranching+’ industrial cluster and financial services. The logic diagram is as Figure 1.

(1) Building an innovative financing model for the ‘Marine Ranch+’ industry cluster means that each investment entity considers the marine ranch industry cluster as a whole for risk assessment and capital investment. We cannot simply see the high risks of marine aquaculture and avoid them, resulting in no funds entering that link. This will hinder the development of the entire marine ranching industry chain. Only when each link is connected can the industry cluster develop healthily and funds enter a virtuous cycle. It is recommended that the Financial Bureau of Zhanjiang City organize major commercial banks to develop a comprehensive credit plan for the ‘Marine Ranch+’ industrial cluster, and provide financial support for the high-quality development of Zhanjiang city's marine ranch.

(2)The Zhanjiang Municipal Government should take the lead in connecting financing at both ends of the industrial chain, and drive various types of funds to enter the marine ranch industry cluster. Specifically, it is to bridge the financing gap between two stages:

First, for the infrastructure construction of the upstream fishing port economic zone, the government financing Platform Company should be selected as the development and financing subject of the marine ranch project, responsible for the required land, mudflat, sea area storage and primary development, so as to accelerate the construction of the four fishing port economic zones. As a financing entity, platform companies can use local government special bond quotas as project capital, and subsequent project construction can use special bond quotas, as well as supporting financing from commercial banks [11].

The second is to build a national digital aquatic trading platform downstream and open up sales channels for aquatic products. At present, Quanlian Jicai Aquatic Products (Guangdong) Co., Ltd. is a shrimp trading platform in Zhanjiang City, and the first data product in the province to integrate public data and social data for innovative applications, "Quanlian Jinmao Tong," has completed online transactions. In addition, Xiashan Bonded Zone is preparing to build a 300000 ton cold chain logistics comprehensive project. The government should increase resource support and focus on building a digital trading platform for Zhanjiang aquatic products.

(3)Build an online ‘Marine Ranch+’ supply chain financing model. Within the marine ranching industry chain, financing or credit guarantees can be provided. Internal financing within the industrial chain is a core enterprise with strong upstream and downstream financing capabilities, which can provide a certain amount of accounts receivable or prepayment to marine aquaculture enterprises and provide financial financing. Alternatively, companies with strong upstream and downstream financing capabilities can provide guarantees for marine aquaculture enterprises, utilize commercial banks' inclusive financial policies, and provide supply chain financing to ensure that marine aquaculture enterprises obtain low-cost financing [12]. In addition, the Agriculture and Rural Bureau of Zhanjiang City can take the lead in establishing a risk reserve for the marine ranching industry, providing guarantee for marine aquaculture households and overcoming financing bottlenecks in the supply chain for marine aquaculture.

(4)Supply chain financing can be extended to the integration of the industries. For example, ‘Marine pasture + offshore wind power’ will be integrated, with the strong shareholder background of Zhanjiang offshore wind power project. Another example is the integration of ‘Marine Ranch + recreational fishery’, taking the project as a whole as the comprehensive financing subject to conduct equity financing or bond financing.

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