Empirical Analysis and Countermeasure Study on the Development Capability of Marine Industry in Jiangmen City

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ABSTRACT

Jiangmen City is located in the western Pearl River Delta Marine Economic Zone, east is adjacent to the Xijiang Golden Waterway, west is connected to the coastal economic hinterland of western Guangdong, south is bordered by the South China Sea International Waterway, and north is bordered by Guangfo. Therefore, as the hinterland of the construction of the "Guangdong-Hong Kong-Macao Greater Bay Area", it is of far-reaching significance to promote the development of the marine industry. This article uses SPSS statistical analysis software and mainly uses the main level analysis method to analyze the development status of the marine industry in Jiangmen from 2011 to 2016. The empirical analysis results show that the overall trend of the development of the marine industry in Jiangmen in the past six years is improving, but at the same time facing the irrational structure of the marine industry, the prominent problems of the marine ecological environment, and the insufficient scientific and technological innovation capabilities of the marine industry.

Keywords: Marine economy of Jiangmen city, Industrial development, Principal component analysis

1. INTRODUCTION

Jiangmen is a major marine city in Guangdong Province, with abundant marine resources such as islands, tidal flats. The maritime area within the coastline is 2886 square kilometres, of which the exclusive maritime area 30198 square kilometers (Marine Economic Zone) is, and the coast is approximately 400 kilometers, and there are 561 large and small islands [1]. The islands have rich and diverse styles and are suitable for the development of new coastal tourism. It comprises an area of approximately 140 square kilometres and has a larger development area. There are 4 fishing port, 5000 fishing vessels and 26198 hectares of aquaculture in marine waters, which are suitable for the development of sea fisheries [2]. Numerous bays and excellent seaports lay the groundwork for the development of nautical tourism, such as the flying beach on Shangchuan Island and Wangfuzhou on Xiachuan Island [3]. The marine living resources are extremely rich, and it is fertile ground for all kinds of fish and commercial molluscs. The marine industry appears to be a new driving force for economic development in Jiangmen City [4]. Therefore, it is critical to increase the development capacity of the marine industry.

2. POLICY SUPPORT

In March 2013, the Jiangmen Municipal Government announced the "Jiangmen City Marine Economic Development Plan (2011-2020)", which clearly proposed the key construction of the three blue industrial belts of Sichuan Island, Guanghai Bay, and Yinzhou Lake [5]. In April 2013, the Jiangmen Municipal Party Committee and Municipal Government issued the "Implementation Opinions on Accelerating the Construction of a Strong Marine Economic City", which increased the policy tendency for high-quality development in marine economic financing and taxation [6]. In November 2016, the Jiangmen Municipal Government announced the "Thirteenth Five-Year Plan for Jiangmen's Marine Economic Development", which is a directional plan for Jiangmen City to develop the marine economy and a strong marine city. In July 2017, the National Development and Reform Commission and the governments of Guangdong, Hong Kong and Macao signed the Framework Agreement on Deepening Guangdong-Hong Kong-Macao Cooperation and Promoting the Construction of the Greater Bay Area. Jiangmen Daguang Bay Economic Zone has become a platform for cooperation between Guangdong, Hong Kong and Macau. With the strong support of all parties, the development of marine industry in Jiangmen City is facing unprecedented opportunities.

3. JIANGMEN CITY MARINE INDUSTRY DEVELOPMENT EVALUATION INDEX SYSTEM CONSTRUCTION

3.1. Research Methods

In this paper, the principal component analysis method is used to conduct an empirical study on the development capability of Jiangmen's marine industry. We explain principal component analysis (PCA) through feature decomposition of the covariance matrix. Principal component analysis is to use "dimensionality reduction" thinking on all original variables, remove redundant and complex variables from repeated variables (closely related variables), and integrate as few new variables as possible to make these new variables independent and It may reflect the information of the original information object more. In this way, under the premise of less information loss, many complex indicators can be converted into some comprehensive indicators, called the main component. These main components constitute the subsystem of the marine industry development capability evaluation index system, and a further comprehensive analysis of this subsystem yields the status of the marine industry development capability of Jiangmen City in relevant years.

3.2. Data Sources and Indicators

The data used as the basis comes from statistics such as China Ocean Statistical Yearbook and China Ocean Statistical Yearbook. The missing values are obtained by averaging interpolation. The time span is from 2011 to 2016. It mainly includes 11 indicators, mainly Indicators include marine fishery (X1), marine mining (X2), marine chemical industry (X3), marine biomedical industry (X4), marine power (X5), seawater utilization (X6), marine shipbuilding industry (X7), marine Engineering and construction (X8), marine transportation (X9), coastal tourism (X10), marine science and education management service (X11)[7].

3.3. Data Processing and Principal Component Extraction.

First, standardize and eliminate dimension processing on the collated index data. After that, the main Components of 11 indices, the one value of the main Components and the rate of variation of the contribution of the SPSS software are calculated. According to the principle of the Grand Increase in Factor and Self-Value greater than 1, the main components are 3, which are 5.453, 2.715, and 1.836, respectively. Therefore, development capacity of the Jiangmen maritime industry is fully reflected in the first three major components. After the principal components are determined, we can obtain the index system for assessing capacity for the development of the maritime industry and the principal component load matrix (Table 1).

Table 1 Evaluation index system and principal component loading matrix of Marine industry development capability

	Ingredient		
	Y1	Y2	Y3
Marine Fisheries	-0.104	0.872	-0.464
Marine Mining	-0.056	-0.123	0.943
Marine Chemical Industry	-0.878	0.420	-0.223
Marine Biomedical Industry	0.741	0.565	-0.335
Ocean Power	-0.876	0.425	-0.221
Seawater Utilization Industry	0.961	-0.212	-0.137
Marine Shipbuilding Industry	0.340	-0.812	-0.039
Offshore engineering Construction Industry	0.788	-0.060	0.486
Marine Transportation Industry	-0.280	0.557	-0.534
Coastal Tourism	-0.129	0.936	0.035
Marine Technology Management Service Industry	0.156	-0.021	0.957

Extraction method: principal component analysis.

Rotation method: Caesar's normalized maximum variance method.

a. The rotation has converged after 5 iterations.

Table 2 Comprehensive evaluation of development capability of marine industry in Jiangmen City F

Years	Y1	Y2	Y3	F (Overall ratings)	Rank	Years
2011	-1.4010	0.1417	-1.209	-0.3068	6	2011
2012	-0.4202	-0.5339	0.8985	-0.0745	5	2012
2013	-0.0706	-0.0715	0.1845	0.0285	2	2013
2014	-0.0742	-0.0897	0.3390	0.0504	1	2014
2015	0.2223	0.2360	-0.2050	-0.0199	4	2015

3.4. Principal Component Analysis

From the principal component load matrix table (Table 1), it can be seen that the marine biological medicine industry, marine power, marine chemical industry, seawater utilization industry, and marine engineering construction industry have higher loads on the first principal component (Y1), which mainly reflects status of development capabilities of the secondary marine industry. The four indicators of coastal tourism, marine fisheries, marine shipbuilding, and marine transportation have a higher load on the second principal component and a strong correlation. They are included in the second principal component (Y2), which mainly reflects the development capability of the primary and tertiary industries in the ocean. The third major component (Y3) of marine mining, marine science and education management service industry has a higher load and has a stronger correlation, which reflects the current situation of scientific and technological innovation in the maritime industry and the service capacity of marine culture management.

4. EMPIRICAL ANALYSIS

According to the evaluation function of the development capacity of the marine industry: $F = \sum a_i Y_i$,the comprehensive summary score value from 2011 to 2016 can be calculated. The explicit expression formula is: $F = 0.545Y1 + 0.271Y2 + 0.184Y3$,from which the comprehensive evaluation table of Jiangmen's marine industry development capability can be calculated (Table 2). First, from 2011 to 2014, the development capability of Jiangmen's marine industry has steadily increased, and the number fell from 2014 to 2016. This shows that the stability of the development capability of Jiangmen's marine industry is not enough. Second, marine industries such as the marine chemical industry have risen steadily. Among them, a new stage has been entered since 2012, which is inseparable from the policies related to the development of marine industry issued by Jiangmen City

during this period. Third, the development capabilities of the marine primary and tertiary industries first declined and then rebounded, but the change was not large. This shows that the overall development of the marine primary and tertiary industries in Jiangmen City is relatively low, and the conversion rate of traditional marine industries is not high. The development of emerging marine industry is slow. Fourth, the technological innovation of the marine industry and the capacity of marine cultural management services have fluctuated, especially after 2014, which marked a significant decline. This shows that the innovation system of the maritime industry of Jiangmen City is not perfect, and the certified marine talent reserve may be insufficient.

5. CONCLUSIONS AND COUNTERMEASURES

5.1. Conclusions

Based on the above empirical analysis, we can get the following conclusions about the development of the marine industry in Jiangmen City. During the period from 2011 to 2016, under the influence of relevant government departments' marine development policy support, Jiangmen's marine industry has developed to a large extent. Overall, Jiangmen's marine production capacity has been greatly improved, but there are also some negative problems. For example, the marine industry structure needs to be transformed and upgraded, the traditional marine industry technology is backward, and the emerging marine industry and modern marine service industry are underpowered. Development efficiency of traditional marine industries such as marine fishery and marine shipbuilding is low, and their ability to drive the economy is limited. The stability of the development capability of the marine industry is not enough, which may be caused

by the lack of long-term innovation mechanisms and innovation capabilities. The development of secondary industries such as marine engineering and construction will promote the development of the marine economy in Jiangmen City, but will also bring about problems such as pollution and destruction of the marine ecological environment. Due to the lack of professional marine talents and institutions, to a certain extent, the scientific and technological innovation capabilities of the marine industry are insufficient.

5.2. Suggestions

Fundamentally speaking, we should enhance the innovation capability of marine science and technology, and drive the innovation chain and industrial chain in both directions to drive the development of the marine industry with innovation. One is to drive the transformation of the traditional marine industry through innovation. Promote the improvement of the quality and efficiency of the traditional marine industry from extensive development to lean development, change the development model of the marine fishery industry, and introduce advanced marine technology. Encourage the transformation of the traditional marine industry to a high-end direction, and actively participate in the competition and cooperation in high-end marine technology fields such as "deep water, green, and safety". The second is to drive the development of emerging marine industries through innovation. We will focus on the research of key technologies in marine basics and expand the development and utilization of marine emerging products such as marine biological products. The marine transportation industry should conform to the development trend of modern marine logistics informatization, adopt emerging logistics technologies (Internet of Things and big data, etc.) and establish a modern marine logistics system. The third is to promote the development of contemporary marine service industry through innovation. The marine tourism industry should rely on new carriers such as artificial island construction and high-end cruise ships to develop high-quality coastal tourism and other marine services to promote the development of modern marine services. The fourth is to establish a marine environment monitoring and evaluation system to monitor the polluting marine industry from the source to prevent and control marine ecological pollution. Fifth, establish a group of institutions and teams specializing in seagoing research, for example, the establishment of the Ocean College of Wuyi University and the establishment of a marine innovation talent reserve fund.

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