Hindawi
Discrete Dynamics in Nature and Society
Volume 2022, Article ID 6313116, 9 pages
https://doi.org/10.1155/2022/6313116

Research Article

The Impact of Resource Optimization on the Economic Development of the Marine Industry

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Received 7 June 2022; Accepted 25 August 2022; Published 19 September 2022

Academic Editor: Wen-Tsao Pan

The traditional impact analysis method for the economic development of marine industries does not consider the impact weight of different marine industries, which leads to an unsatisfactory effect on sustainable development after the optimized management of resources. Therefore, a new method is designed to solve the above problems; by analyzing the scale, hierarchical system, and optimizing the spatial resource framework of the marine industry, the influence of different marine industries is comprehensively measured, and the final demand dependency of the marine industry economy is obtained. The comprehensive index system is designed to evaluate the economic development of the marine industry, and the linear weighted sum method is used to calculate the sustainable development degree of marine industry economy in different regions. The results show that the final evaluation score of the marine biological industry in Shandong Province is 64.97, which is affected by comprehensive factors. The scores of capital and environmental governance are between 84.03 and 82.87, respectively, which are the main factors to achieve sustainable development. After the optimization of this method, the demand dependence of relevant regions is reduced, and the sustainable development level is effectively improved, indicating that the sustainable state of this method is better. The resource optimization path given by the research can be further applied to the construction process of marine and industrial economic development in other provinces and cities so as to comprehensively improve the quality and effect of marine economic growth.

1. Introduction

With the increasing shortage of land resources in China, the ocean has gradually become the focus of resource development and utilization. With the promotion of the construction of the "maritime power" and the "twenty-first century Maritime Silk Road," China's marine economy has made steady progress and continued development and gradually become the blue engine of China's economic growth. China's marine economic strength cannot be underestimated [1]. The sustainable development of marine economy depends on the input quantity of marine production factors and the quality of their combination. The flow and allocation efficiency of marine production factors affect the speed and quality of marine economic development. Marine production factors include capital, labor, resources, science and technology, and policies, and their contributions to marine economic growth vary. The rational allocation of marine production factors and the efficient development and utilization of marine resources are crucial to the high-quality sustainable development of the marine economy [2].

In view of the close relationship between the marine industry and the sustainable development of the national economy, Zheng *y* and other researchers analyzed the current situation of marine tourism resources and the optimization and upgrading strategy of product development. The research results provided ideas for the rapid development of the marine economy [3, 4]. Tran m h and other scholars constructed the evaluation index system of marine resource development from four aspects: marine biological resources, marine mineral resources, marine space resources, and marine tourism resources. Through the introduction of mathematical analysis models, the research shows that there is a significant correlation between marine resource development and marine economic growth, and there are obvious regional differences in the corresponding trends of marine economic growth on marine resource development [5]. Tang w's scholars and team believe that China's marine resources have a high degree of constraint on marine economic growth, the overall utilization of marine resources is extensive, and the "tail effect" of marine resources in various regions is significantly different [6, 7].

As for the marine industry, the State Oceanic Administration defines it in the classification of marine and related industries as "the general term of various industrial activities and related activities for the development, utilization, and protection of the ocean." The marine industry refers to the development, utilization, and protection of marine resources. In terms of the performance results of the industry, it can be divided into sectors with production nature, activities with economic nature, and systems with hierarchical nature [8–12]. The classification of the marine industry has two kinds of classification: three industry classifications and a development trend classification.

Classification of three industries: the first marine industry mainly refers to marine aquaculture. The second marine industry includes the seawater salinization and desalination industry, seawater chemical industry (extraction of chemical substances), marine oil and gas and mining industry, marine electricity industry (using tidal energy, wave energy, and thermal energy for power generation), marine construction industry (ports, undersea houses, and tunnels), marine food processing industry, and drug processing industry [13, 14]. The third marine industry includes marine transportation (port and transportation), submarine storage industry, marine tourism industry (coastal island sightseeing, etc.), marine crafts decoration industry, marine information industry (marine environment information prediction and prediction consultation), marine service industry (marine environmental element monitoring, protection, disaster reduction, disaster prevention, and technical services), and so on.

Development trend classification: traditional marine industries include the marine fishing industry, marine salt industry, and other mature industries with a long history, conservative technology, and fixed scale [15–17]. The emerging marine industries include mariculture, the marine chemical industry, coastal tourism, and so on. Driven by scientific progress, they have developed to a certain scale. In the future, marine industries, including marine biopharmaceuticals and health products, marine power and seawater utilization, and marine integrated services, have been applied on a small scale. In the future, with the development of science and technology, it will reach a certain scale of industry [18–21].

Since the beginning, the State Oceanic Administration has adjusted the early statistical indicators of the marine industry and improved the classification of the marine industry. The national standard of the People's Republic of China's classification of marine and related industries has been formulated, which divides the marine industry into four categories: categories, large categories, medium categories, and small categories [22–24]. Among them, the major categories include "marine fishery industry, marine engineering and construction industry, marine transportation industry, coastal shipbuilding industry, marine oil and gas industry, marine chemical industry, marine salt industry, coastal sand mining industry, marine power and sea water utilization industry, marine information service industry, marine biopharmaceutical industry and health care product industry, coastal tourism industry, and other marine industries." In this paper, the marine industry is divided into industrial categories according to the classification of the State Oceanic Administration [25–27].

It is of great significance to effectively analyze the economic development of the marine industry through resource optimization. However, when analyzing the impact of marine industry economic development by current methods, the analysis results are not comprehensive, and the sustainable development degree of the marine industry is not good after resource optimization. In order to improve the allocation efficiency of marine production factors, realize the efficient development and utilization of marine resources and promote the high-quality development of China's marine economy. Therefore, this paper proposes a new method to obtain the final demand dependence of marine industry economy by calculating the influence of the marine industry so as to realize the effective analysis of marine industry economic development; the biggest difficulty in the research is that the influence of the marine industry is affected by many factors, and the impact evaluation is subjective. Specifically, it is as follows: firstly, the influence of different marine industries is comprehensively measured by combining the methods of resource allocation, analysis of scale, hierarchical system, optimization of marine industry spatial resource framework, and others, then a comprehensive index system is designed to evaluate the economic development of marine industries, and the sustainable development degree of marine industry economy in different regions is calculated by using the linear weighted sum method.

2. Optimal Management of Resources

2.1. Resource Allocation. In the research on the evolution of spatial structures in China, many scholars believe that institutional change has led to the evolution of marine industrial economic structures, and port resources are an important competitive factor, which can be controlled by the government through administrative power [28, 29]. Some scholars think that the change in the role of local government leads to the development and evolution of urban space; with his unique research perspective, Li Qiang uses the new institutionalism methodology to establish a new analysis framework for the economic spatial development of China's marine industry, that is, under the specific political, economic, and social institutional environment, the relevant actors interact through behavior selection to promote the internal mechanism of the economic structural development of the marine industry, as shown in Figure 1.

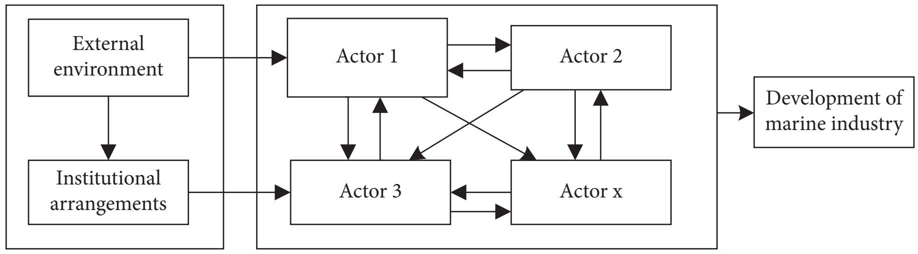

Figure 1: Port space resource structure.

2.2. Analysis Scale. Any research on spatial issues needs to be based on a certain regional scale. For the optimal allocation and control system of port resources, this study analyzes the macroscale, mesoscale, and microanalysis scale. The analysis purposes of the three scales are described as follows:

(1) Macroanalysis scale: To study the economic performance and factor scale efficiency of national port resource allocation, China's regional economic development usually takes the administrative region as the allocation and statistical boundary, but for the port, the administrative division cannot fully reflect its differences, so the study starts from the national level.

(2) Mesoscale analysis: There is no obvious difference in the governance structure and institutional environment of spatial resource allocation, while the spatial behavior related to it reflects the characteristics of spatial dependence, that is, there is a significant interaction between adjacent action units. This paper studies the decision-making and action logic of governance structures at the regional level and selects the spatial scale of adjacent ports.

(3) Microanalysis scale: This paper mainly studies the spatial pattern evolution of port resource allocation. As for the concept of the scale of a metropolitan area, scholars mainly have two ways to define it: one is based on the scope of an administrative region, and the other is based on the scope of functional radiation. However, no matter which way of definition, this regional scale is bound to be a functional nodule area with close social and economic elements and a development trend of integration [30]. In this way, it is meaningful to study its spatial structure, functional form, network connection, and spatial effect on urban governance.

2.3. Hierarchy System. Based on Williamson's hierarchy of social science research, this paper divides the spatial reconstruction effect into three research levels, namely allocation efficiency, governance structure, and institution. The three levels have a close internal logical relationship, and the corresponding relationship is presented between different levels through the mapping of organization and space. Allocation efficiency is the first level of efficiency, and its "tangible" characteristics are also the main characteristics different from the first two levels. Land resource utilization reflects the spatial relations such as geometry, topology, nodes, and networks in space, which are the basic physical characteristics of port space, social, and economic development. It presents the external derivative phenomena such as regional economic agglomeration development, spatial structure evolution, planning implementation effect, and so on; the governance structure is the second level of efficiency. Its behavior is framed in the institutional environment and determines the way of spatial allocation of resources [31]. The decision-making mechanism and results of governance structure directly affect the allocation of resources; the institutional environment (formal system) is the third level of efficiency, which is the institutional constraint on the government and market entities on port resources and related economic activities. Besides the social basis (informal system), it plays a fundamental role in spatial reconstruction. The optimized institutional environment can provide sufficient incentives to ensure the correctness of decision making, and then through the port resource allocation behavior, the institutional environment (formal system) can provide sufficient incentives to ensure the correctness of decision making. We build a superior spatial structure and realize the improvement of the port overall capacity and sustainable economic growth.

2.4. Space Resource Framework. According to the research hierarchy system, this paper constructs the analysis framework, as shown in Figure 2. The analysis starts from three levels: resource allocation, governance structure, and institutional environment. The institutional environment plays a role of constraint and incentive on the first two levels and determines the efficiency of the first level; the governance structure makes decisions on resource allocation behavior, which determines the efficiency of the second level; resource allocation directly affects land resources Source utilization determines the efficiency of the third level. In resource allocation, the self-organization mechanism and the organized mechanism simultaneously determine the development performance of port resource allocation. In addition, resource allocation and governance structures will feed back into the institutional environment in the process of layer by layer, and the institutional environment will be continuously improved, and a new round of resource allocation efficiency will be promoted.

3. Calculation of Marine Industry Influence

Sensitivity refers to the degree to which the demand of a certain marine industry changes with the increase or

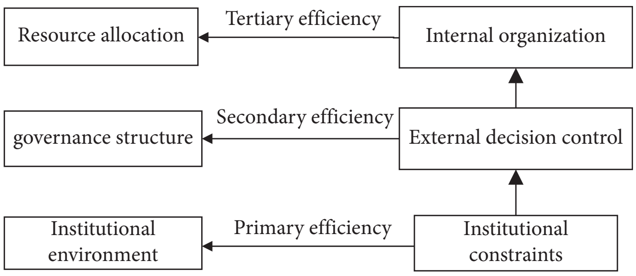

Figure 2: Configuration analysis block diagram.

decrease of the output of other industries. The sensitivity G_i of the marine industry is expressed by (1), that is, the average value of each row of the Leontief inverse matrix of the marine industry divided by the sum of the average values of each row.

$$G_i = \frac{(1/n)\sum_{j=1}^{n} r_{ij}}{1/(1/n)\sum_{i=1}^{n}\left((1/n)\sum_{j=1}^{n} r_{ij}\right)} = \frac{n\sum_{j=1}^{n} r_{ij}}{\sum_{i=1}^{n}\sum_{j=1}^{n} r_{ij}} \quad (i = 1, 2, \ldots n). \tag{1}$$

In equation (1), r_{ij} refers to the Leontief inverse matrix coefficient of the marine industry i to the marine industry j.

Impact refers to the impact of the increase or decrease of the output of a certain marine industry on the demand of other marine industries. The influence F_j of the marine industry is expressed by (2), that is, the average value of each column of the Lions Hoff inverse matrix of the marine industry divided by the sum of the average values of each column.

$$F_j = \frac{(1/n)\sum_{j=1}^{n} r_{ij}}{1/(1/n)\sum_{i=1}^{n}\left((1/n)\sum_{j=1}^{n} r_{ij}\right)} = \frac{n\sum_{j=1}^{n} r_{ij}}{\sum_{j=1}^{n}\sum_{i=1}^{n} r_{ij}} \quad (j = 1, 2, \ldots n). \tag{2}$$

From the perspective of the sensitivity coefficient of the marine industry, the values of "marine fishery," "offshore oil and gas industry," "marine salt industry," "marine shipbuilding industry," "marine biological medicine industry," and "marine engineering construction industry" are relatively low, which indicates that this marine industry is not sensitive to other marine industries and will constitute the development bottleneck of the whole marine industry. In formulating industrial countermeasures, we need to increase the guidance and support of low sensitivity to stimulate the induction of these industries. In terms of the influence coefficient of the marine industry, the values of "marine mining," "marine chemical industry," "marine biological medicine," "sea water utilization industry," "marine transportation," and "seaside tourism" are relatively large, which indicates that the marine industry has a great influence on other marine industries. When this marine industry increases its output, it will greatly stimulate the demand of the rest of the marine industry. Therefore, when formulating the industrial development strategy, these industries often become the leading industries.

It can be seen from the research on the induction coefficient that every increase in the final demand of the marine industry will have a driving effect on the industry. The calculation method of the final demand inducement coefficient is as follows:

$$\text{Production induced coefficient of final demand} = \frac{\text{Induced amount of final demand on production}}{\text{Total final demand of all industries}} \times 100\%. \tag{3}$$

Specifically, (3) can be regarded as follows:

$$T_i = \frac{\sum_{k=1}^{n} C_{ik} f_k}{\sum_{k=1}^{n} f_k} \quad (k = 1, 2, \ldots n). \tag{4}$$

Here, T_i is the induced coefficient generated by the final demand of the i th marine industry sector; $\sum_{k=1}^{n} C_{ik} f_k$ is the sum of the product of the corresponding row vector in the Leontief inverse matrix and the final demand; C_{ik} refers to the corresponding row vector in the Leontief inverse matrix; f_k is the final demand value of each marine industry; $\sum_{\text{k}=1}^{n} f_k$ is the sum of the final demand of the marine industry.

Using the same method, the production-induced coefficient of consumption, investment, and transfer out is calculated. The specific meaning of the induced coefficient of marine industry consumption is that with every increase in marine consumption, induced driving creates an effect on a certain marine industry. The specific formula is as follows:

$$\text{Production induced coefficient of consumption} = \frac{\text{The induced amount of consumption on production}}{\text{Total consumption of all industries}} \times 100\%. \tag{5}$$

The specific meaning of the induced coefficient of marine industry investment is with every increase in the marine investment of a unit, induced driving has an effect on a certain marine industry. The specific formula is as follows:

$$\text{Production induced coefficient of investment} = \frac{\text{Induced amount of investment on production}}{\text{Total investment of all industries}} \times 100\%. \tag{6}$$

The specific meaning of the induced coefficient of marine industry transfer out is the inducing and driving effect of each additional unit of marine industry transfer out on a certain marine industry. The specific formula is as follows:

$$\text{Production induction coefficient of transfer out} = \frac{\text{Induced amount of transfer out to production}}{\text{Total transfer out of all industries}} \times 100\%. \tag{7}$$

From the perspective of the marine industry production inducement coefficient, "marine fishery," "marine mining," "marine chemical industry," "marine engineering construction industry," and "marine service industry" have large final demand induction coefficients, and the marine industry is strongly induced by the final demand of this marine industry. The consumption-induced coefficient of the "marine chemical industry," "marine biological medicine industry," "marine power industry," and "marine service industry" is relatively large, and the marine industry is greatly affected by the consumption of this marine industry. The "marine mining industry" and "offshore engineering construction industry" have a large investment induction coefficient, and the marine industry is strongly driven by this marine industry investment. "Marine mining," "offshore engineering construction," "marine power industry," and "marine service industry" have large export induction coefficients, and the marine industry is greatly stimulated by the marine export volume.

The final demand dependence shows that in the marine industry, the induced amount directly and indirectly generated by the final demand of a single industry accounts for the proportion of all the induced amounts. The specific calculation method is as follows:

$$\text{Demand dependence} = \frac{\text{Induced amount of final production demand}}{\text{Total output value of the sector}} \times 100\%. \tag{8}$$

Specifically, formulas (8) can be regarded as formula (9).

$$Y_i = \frac{\sum_{k=1}^{n} C_{ik} f_k}{Q_i} \quad (i = 1, 2, \ldots n). \tag{9}$$

Here, Y_i represents the final demand dependence of the i th marine industry, and Q_i represents the total output value of the i th marine industry.

According to the final demand dependence of marine industries, the marine industries are classified. Among them, "marine fishery," "marine shipbuilding industry," "marine biological medicine industry," "marine electric power industry," "marine transportation industry," and "marine service industry" have a high degree of consumption dependence. "Offshore oil and gas industry," "marine salt industry," "marine chemical industry," "marine engineering construction industry," and "marine transportation industry" have a high degree of investment dependence (more than, they belong to investment-dependent industries). "Marine mining industry," marine engineering construction industry, marine power industry, seawater utilization industry, marine transportation industry, and marine service industry have a high degree of export dependence (more than, they are export-dependent industries). The offshore engineering construction industry has a high degree of dependence on investment and export, which belongs to both investment-dependent and export-dependent industries. The marine power industry and marine service industry processing are both consumption-dependent and export-dependent industries. In addition, the marine transportation industry is strongly dependent on consumption, investment, and export.

4. Experimental Analysis

Generally, the comprehensive evaluation method is used to measure the sustainable development level of the marine biological industry. The indicators selected in this paper are mainly quantitative, so the quantitative method is based on mathematical statistics and measures the level of sustainable development. The specific steps include normalization of indicators, the linear weighted sum method, rating standards, and so on.

(1) Index normalization: due to the obvious difference in data processing of the selected indicators, the data units and orders of magnitude are different, and the comparison of simple data is prone to bias or incompatibility. In order to ensure that these objective factors do not affect the final calculation results, the unit and order of magnitude should be unified before evaluation, and the initial data should be normalized to ensure the final evaluation. The price result is objective and scientific. The maximum and minimum values are used to process the original data to get the normalized quantitative data, and the original index value is transformed into a value between 0 and 1 after normalization.

(2) Linear weighted sum method uses a simple summation linear weighting method to judge the quality or strength of sustainable development with the score value obtained. The formula is as follows:

$$S_i = \sum_{j=1}^{n} X_{ij} \times W_{ij} \times 100\%. \tag{10}$$

Among them, S_i represents the degree of sustainable development, which is the comprehensive evaluation value of the i level, W_{ij} represents the weight of the j evaluation index of the i level, and X_{ij} represents the index value of the i and j evaluation indexes, which is multiplied by 100 to convert into the percentage system.

(3) The evaluation criteria of sustainability can be seen from the above formula that the final score of s value representing the degree of sustainable development is between 0 and 100. When $s = 100$, the highest score means the largest degree of sustainable development. The whole evaluation index system is very perfect, and the industry has embarked on the road of sustainable development; when $s = 0$, the degree of sustainable development is the smallest, which indicates that the industry is in the chaotic and disordered development stage, and the development situation is very bad; when s is between 0 and100, the closer it is to 100, the better the sustainability, and the closer it is to 0, the less sustainable development

can be achieved. In order to make the comprehensive evaluation results easy to distinguish, the evaluation level of sustainable development of the marine biological industry can be divided into four levels. The level with a comprehensive evaluation value of above 80 points is a strong sustainable level, that with a comprehensive evaluation value of 70–80 points is a sustainable level, that with an evaluation score of 60–70 points is a weak sustainable level, and that with less than 60 points is an unsustainable level (see Table 1). After the comprehensive evaluation is obtained without considering the qualitative conditions, the sustainability of development is judged according to the corresponding grades.

This paper analyzes the current situation of the marine biological industry in Shandong Province as a whole and also analyzes the sustainable development of the marine biological industry in coastal cities of Shandong Province. Table 2 is the normalized processing data of six coastal cities in Shandong Province.

According to the data in Tables 1 and 2 and the linear weighted average formula, the marine biological industry affected by the overall factors in Shandong Province is calculated. The final evaluation score is 64.97, and the evaluation standard is 50–65. It can be seen that there are still many deficiencies in the sustainable development of the marine biological industry in Shandong Province. The sustainable development is not strong, so we need to strengthen the development of the marine biological industry from all levels and factors. The overall evaluation score is not high. At the same time, we should find out the weak factors that affect the sustainable development of the marine biological industry and evaluate the factor layer. The scores are shown in Table 3.

According to the scores in Table 3, the scores of capital and environmental governance are between 84.03 and 82.87, respectively, which are both more than 80 points. They are powerful factors for sustainable development and favorable factors for supporting the sustainable development of the marine biological industry. The development of industrial economy, especially the rapid development of the marine industry in Shandong Province, also supports the sustainable development of the marine biological industry. The score of the industrial economic factor is 78.12. In the sustainable range of industrial development, if we continue to promote the development of industrial economy, we will make a greater contribution to the development of the marine biological industry in Shandong Province. The investment in ecological resources is still relatively weak, with a score of 62.27, and the score of the population factor and marine economy is a little more than 50, both of which are in the range of weak sustainability. Therefore, the industry should pay more attention to the maintenance of marine resource ecology, strengthen the control of population factors, and vigorously promote the rapid development of marine economy. At the same time, there are many weak factors, including technology and regional economy. The evaluation score of these factors is below 50, which seriously affects the sustainable development of the marine biological industry. If these factors can be improved rapidly, it will help the marine biological industry to achieve sustainable development.

Table 1: Classification of evaluation criteria for sustainable development.

Comprehensive score	Sustainable development degree
> = 80	Strong sustainability
65 – 80 (including 65)	Sustainable
50 – 65 (including 50)	Weak sustainability
<50	Unsustainable

According to the evaluation criteria of the evaluation system, the evaluation scores and the sustainable status of the six coastal cities in Shandong Province are calculated, and a table is established as shown in Table 4.

From Table 4, we can draw the following conclusions: the development of the marine biological industry in Shandong Province is not balanced. The sustainable development ability of the marine biological industry in each coastal city is not strong. Only Qingdao is in a state of sustainable development. Weihai, Weifang, and Yantai are in a weak sustainable state, and Dongying and Rizhao are in an unsustainable state. According to the analysis results of the above selected indicators, the Qingdao marine biological industry has a strong sustainable development ability, which is suitable to be the leader of this industry in Shandong Province. More support should be given to the scale of the industrial park, scientific and technological innovation, and government support to ensure its sustainable development. On this basis, it will move forward to strong and sustainable development. Weihai, Weifang, and Yantai have certain advantages in the development of the marine biological industry, and the sustainability of the industry is weak in the initial stage. Therefore, it is necessary to strengthen the industrial support and integrate relevant resources as soon as possible so as to make the development of the marine biological industry become a new economic growth point. At present, the sustainable development of the marine biological industry in Dongying and Rizhao is in an unsustainable range. The overall score is low, and the statistical data may be biased. However, generally speaking, the development of the marine biological industry in these two cities is not very obvious and should not be taken as the current key development object.

In order to further verify the economic development of the marine industry after optimization of the method in this paper, the methods of Zhang [11] and Wang et al. [17] and the economic demand dependence of the marine industry after optimization of the method in this paper are calculated, and the results are shown in Figure 3.

Figure 3 shows that different methods have dependence of different requirements. When the number of experiments is 15, the demand dependence of the method of Zhang [11] is 35%, that of the method of Wang et al. [17] is 46%, and that of the method in this paper is 9%. When the number of experiments is 30, the demand dependence of the method of Zhang [11] is 33%, that of the method of Wang et al. [17] is

Table 2: Data processing table of the marine biological industry in Shandong Province.

Factor layer	Index layer	Quantized value
Demographic factors	Natural population growth rate (‰)	0.551564311
	Population density (person/km^2)	0.728464419
	Proportion of nonagricultural population in total population (%)	0.192631579
	Proportion of employees in total population (%)	0.256478148
	Number of people with an education level above junior high school (person)	0.833611506
Capital	Total government funding (10000 yuan)	1
	Total financing amount of financial institutions (10000 yuan)	0.6431
	R&D funds (10000 yuan)	0.824666398
Technology	Internal expenditure of scientific and technological activities (10000 yuan)	0.557363369
	Several industrial patents authorized	0.163876865
	Ratio of senior professional titles to professionals (%)	0.8546
Regional economies	Per capita GDP (yuan/person)	0.367508808
	Annual per capita net income of farmers (yuan/person)	0.28744166
	GDP growth rate (%)	0.365079365
	Proportion of the secondary industry in GDP (%)	0.934724858
Marine economy	Total output of the marine industry (100 million yuan)	0.805845304
	Coastal per capita income (10000 yuan)	0.25083885
	Proportion of fishery in agriculture	0.400473934
Industrial economy	Ratio of the marine biological industry's output value to the marine industry	0.7864
	Total profit of the marine biological industry (100 million yuan)	0.9854
	Proportion of the added value of the marine biological industry in GDP	0.3546
	Annual growth rate of the added value of the marine biological industry (%)	0.87954
Ecological resources	Mariculture (10000 HA)	1
	Sea area (10000 HA) (10000 km^2)	0.081146184
	Total output of seawater aquatic products (10000 tons)	1
	New marine reserves (10000 HA)	0.290872328
Environmental governance	Total emission of industrial waste gas (100 million standard cubic meters)	0.969443116
	Total investment in environmental pollution control (10000 yuan)	1
	Direct economic loss of ecological pollution (100 million yuan)	0.3456
	Total investment in environmental protection of industrial projects (100 million yuan)	1

Data sources: 2011 China Statistical Yearbook, 2011 China Ocean Statistical Yearbook, 2011 Shandong Statistical Yearbook, 2011 Shandong Statistical Bulletin and network statistical information, and by consulting relevant data.

Table 3: Score of the evaluation factor layer.

Factor layer	Score value	Status bar
Demographic factors	51.25	Weak sustainability
Capital	84.03	Strong sustainability
Technology	48.91	Unsustainable
Region economics	48.85	Unsustainable
Ocean economics	50.49	Weak sustainability
Industry economics	78.12	Sustainable
Ecology resources	62.27	Weak sustainability
Environmental science government	82.87	Strong sustainability

Table 4: Evaluation score of marine biological industry sustainable development in coastal cities of Shandong Province.

City	Score column	Status bar
Dongying city	27	Unsustainable
Qingdao	70	Sustainable
Rizhao N city	32	Unsustainable
Weihai city	51	Weak sustainability
Weifang city	55	Weak sustainability
Yantai city	61	Weak sustainability

41%, and that of the method in this paper is 11%. The method in this paper always has a low demand dependence, which shows that the economic development of the marine industry in this paper is more independent of external influence.

In order to further analyze the development of the marine industry optimized by different methods, the degree of sustainable development after optimization of the above three methods is calculated, and the results are shown in Figure 4.

Figure 4 shows that the degree of sustainable development of the marine industry is different under different methods. When the number of experiments is 20, the degree of sustainable development of the marine industry in the method of Zhang [11] is 69%, that of Wang et al. [17] is 79%, and that of this method is 95%. When the number of experiments is 60, the degree of sustainable development of the marine industry of Zhang [11] is 76%, that of Wang et al. [17] is 78%, and that in this method is 98.7%. The method in this paper always has a high level of sustainable development,

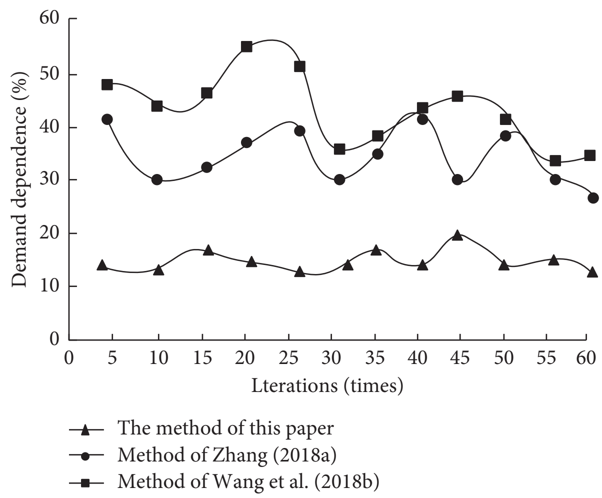

Figure 3: Requirement dependence under different methods.

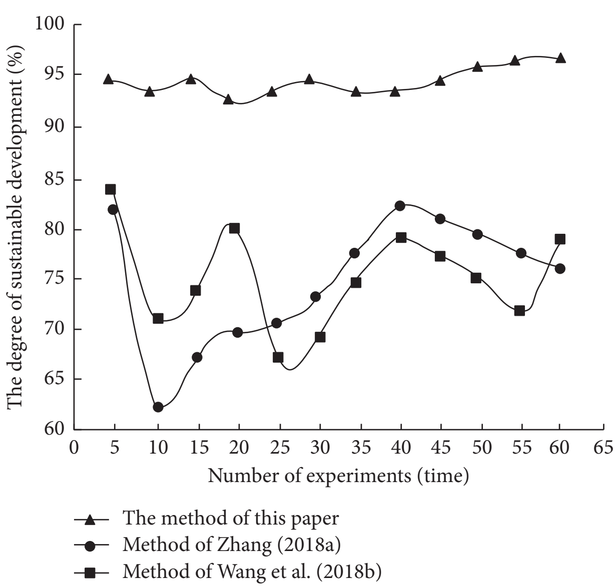

Figure 4: The degree of sustainable development under different methods.

and the score is a strong sustainable state, indicating that the sustainable state is better after the optimization of the method in this paper.

5. Conclusions

In order to analyze the impact of resource optimization and governance on the economic development of the marine industry, this paper designs a calculation method of weight quantification and evaluates the economic development of the marine industry after resource optimization through experiments; the development of the marine industry in Shandong Province is not balanced. The sustainable development ability of the marine biological industry in each coastal city of Haiti is not strong. Only Qingdao is in a state of sustainable development. Weihai, Weifang, and Yantai are in a weak sustainable state, while Dongying and Rizhao are in an unsustainable state. After the optimization of this method, the demand dependence of relevant regions is reduced, which shows that the economic development of the marine industry in this method is more independent of external influence, and when the number of experiments is 30, the demand dependence of this method is only 11%. This method always has a high level of sustainable development, and the score is a strong sustainable state, which shows that the sustainable state is better after the optimization of the method in this paper, and when the number of experiments is 60, the degree of sustainable development of the marine industry in this method can reach 98.7%. Limited by my time and energy, the research has not evaluated the economic development of the marine industry in other provinces and cities. Meanwhile, the proposed marine economic growth strategy is relatively farfetched and needs to be improved in the future.

Data Availability

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare no conflicts of interest.

Acknowledgments

The research was supported by Anhui Educational- Science Research Project in China in 2019: Research on the Cooperative Development Mechanism of Future Teachers under the Background of AIED Era (Grant No. JK19140); Anhui Quality Engineering Project in China in 2018: Intelligence Class: Management (Bilingual Subject) (Grant No. 2018zhkt153); Horizontal Cooperation Project of Bengbu University in China in 2022: Analysis of Foreign Language Learners' Behavior Based on Educational Big Data.

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