Monitoring and Evaluation of Marine Economic Operation in the Information Environment

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Abstract. In recent years, with the continuous progress of science and technology, the available space in the ocean has become more and more extensive. The rapid development of the marine economy has also directly driven China's economic development, and has made great contributions to the growth of China's GDP. The exploitation of natural gas, natural gas and other resources has greatly increased China's non-renewable resource reserves, and has made great contributions to China's resource problems. However, it is difficult to process the monitoring data of the marine economic operation so that good resource utilization cannot be achieved, which has become a difficult problem in China and a major social problem. The purpose of this article is to study the monitoring and evaluation of marine economic operations in an information environment. This paper combines information technology to study the problems encountered in the monitoring and evaluation of marine economic operations and analyzes the marine related industrial structure, thereby reflecting the advantages of monitoring and evaluating marine economic operations in an information environment compared to previous advantages, reducing The storage is not complete, the huge data is difficult to mine and the impact of the timeliness of the data. Fully share the marine economic monitoring operation data in various regions to facilitate the monitoring and evaluation of the marine economy, so as to maximize resource utilization and benefits. The experimental results show that information technology can solve the difficult problem of marine economic operation monitoring data collection, processing, analysis and evaluation, and realize data sharing in various regions, so as to achieve accurate evaluation of marine economic operation.

Keywords: Information Environment, Marine Economy, Operation Monitoring, Operation Evaluation

1. Introduction

The ocean is of great significance to the survival and development of human society. It has given birth to life, connected the world, and promoted development. Therefore, improving the ability of the marine economy and accelerating the pace of the development of the marine economy is great
significance to human society [1]. At present, China's economy is in a period of high-quality development. As an important support for the national economy, it is an important carrier for opening up, an important guarantee for the national economy, and a strategic space for future development. [2-3]. Therefore, promoting the high-quality operation of the marine economy is in line with the laws of China's economic development and the new trend of world economic development, and is also related to the future of modernization[4]. In recent years, the marine economy has grown rapidly, and its total volume accounts for about 10% of the total national economy, which has greatly promoted the development. However, we must also clearly see that the development of the marine economy is faced with many uncoordinated, inadequate and unsustainable problems. These problems are concentrated in the two aspects of extensive development methods, coordination and insufficient public service capabilities. These problems not only affect The development of China's economy also affects the sustainable development of the marine economy [5-6]. Therefore, the monitoring and evaluation of marine economic operation is also a hot spot that society has been paying attention to [7].

In recent years, the rapid development of information technology has greatly affected social progress, and has become an important part of promoting economic development [8]. Information technology has been applied in many industries, such as the application of information technology in the operation of marine economy. The application of information technology is of great significance to the monitoring and evaluation of marine economy and macro-control [9]. In foreign countries, informatization is widely used in many industries, and the country started late, but the development effect is remarkable. The application of information technology in marine economic operation can effectively reduce or control costs and improve operational efficiency [10]. In order to improve the effectiveness, timeliness, and diversity of information, the comprehensive ability to collect, analyze, and archive information such as marine development and industrial economic development should be continuously strengthened and accurate extraction of classified information [11-12]. Although China's marine economy has made tremendous development in recent years, there are still many problems. This article mainly relies on information technology, and provides construction experience for marine economic information construction in accordance with the principles of practicability and advancedness [13].

People do not have a unified understanding of "monitoring and evaluation", and monitoring and evaluation are usually regarded as two different types of activities. In my opinion, "monitoring and evaluation" should be an overall concept. In a sense, monitoring and evaluation is a continuous evaluation. It is two independent activity processes. It monitors every link of marine economic operation activities, and Various data are collected and then summarized. Then evaluate and analyze the data to get the problem, and finally summarize the problems and draw conclusions, and provide effective feedback for their development.

2. Method

2.1 Informatization Concept Analysis

Informatization is the product of the computer-based intelligent era, which can greatly improve efficiency and provide great technical support for human society and life. With the advent of the information age, information technology has become more and more widely used. In the development of marine economy, we can also use the big data technology and intelligent technology in information technology to provide monitoring and data records and tips for its development. It aims at the efficient operation of the marine economy, and through continuous collection and recording, objective description and real-time feedback of various activities, measures, environment, resources and other information, whether the marine economic operation is performing according to a predetermined plan Monitoring, early warning, and corrections are made on the trajectory such as the target approaching, so as to ensure that the marine economy can effectively achieve high-quality operations. According to the level of the evaluation object, monitoring and evaluation can be divided into macro. Macro-level
monitoring and evaluation focuses on the overall interests of national or regional economic interests. Through monitoring and analysis of marine economic development status data, systemic analysis and early warning are made of existing problems, potential risks, and future trends in development. The meso-level monitoring and evaluation focuses on the improvement of the quality of marine economic development and is a new form of economic benefit assessment.

2.2 Marine Economic Operation

The marine economy can be divided into three major industries. Among them, the marine primary industry is mainly composed of marine fisheries (including offshore fishing, marine aquaculture, and ocean fishing); in terms of econometric analysis methods, for the structural characteristics of the evolution of China's marine industry, the statistical methods of proportional analysis and comparative growth analysis are applied to study the structural evolution trend. The multivariate linear regression model is used to test the credibility of the functional relationship, and to distinguish between the variables that have a more significant and less significant effect on a particular variable. Take the output value of different marine industries and the total industrial output value as independent variables and dependent variables respectively, and apply the empirical model of multiple linear regression to reveal the linear relationship between them:

\[ y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_k x_k \]  

(1)

In Equation (1): Assume that there are k independent variables in the equation, and the partial regression coefficient indicates the degree of change in the dependent variable caused by the change when the other independent variables are unchanged (that is, changes in the total economic value of a certain marine industry cause the marine industry The degree of change in the total economic value).

2.3 Impact of Marine Industry Indicators on Marine Economic Benefits

Monitoring the data of marine industry indicators and economic benefits in recent years through information technology, and comparing the annual growth rate of the marine primary industry, the annual growth rate of the marine secondary industry and the marine tertiary industry, the ocean proportion of industry in GDP, annual growth rate of marine industry, marine fishing-breeding ratio, transport passenger-cargo ratio, marine light (biomedicine and chemical) -heavy industry ratio, strategic marine emerging industries, marine engineering and construction accounted for 10 indicators of the marine industry ratio, marine primary industry and tertiary industry ratio, marine secondary industry and tertiary industry ratio. Several important factors.

3. Experiment

Step1: Acquisition and recording of marine industry index data and marine industry output value data. Use big data technology to compare the annual growth rate of marine primary industry and marine secondary industry, the annual growth ratio of marine secondary industry and marine tertiary industry, the proportion of marine industry in GDP, the annual growth rate of marine industry, and marine fishing—Breeding ratio, transportation passenger-cargo ratio, light ocean (biomedicine and chemical industry) -heavy industry ratio, strategic marine emerging industries. Mining data such as industrial ratio, ratio of marine primary industry to tertiary industry, ratio of marine secondary industry to tertiary industry, and record these data in detail.

Step 2: Use SPSS's factor analysis model to calculate and classify the data. Calculate and classify data at different levels and types of different indicators. In the calculation process, by reducing the accuracy requirements, more and more real data information can be retained, thereby improving the quality of the data in disguise, but the accuracy of the data must be guaranteed. In the classification process, various marine industries are classified to ensure the scientificity of the classification.

Step3: Comparison and evaluation of data. The obtained data is compared by a computer, and the
obtained data results are represented by a chart to make the effect more prominent. Through careful analysis with data and charts, and then make assessments and provide feedback, ensure the objectivity and accuracy of the feedback.

4. Results

4.1 Data Acquisition and Calculation

Before performing the factor analysis, first perform a reliability test on the data to see if the KMO and Bartlett values meet the requirements of factor analysis. The principal components are extracted according to the criterion that the characteristic root is greater than 1, and the variance maximum orthogonal rotation method is used to obtain the common factor characteristic value and the cumulative variance contribution rate as shown in Figure 1.

![Common factor eigenvalue and cumulative variance contribution rate](image)

**Figure 1.** Common factor eigenvalue and cumulative variance contribution rate

As shown in Figure 1, these data require a large amount of manpower and material resources to collect and transmit, and take advantage of the characteristics of fast computer calculation and large amount of data. The terminal data is collected and returned to the processing module using the network protocol. The system software performs the analysis and processing, and the wireless communication network is used to transmit the data to the data server, and the enterprise can obtain the data on the server side, and process and analyze the data. The front-end of the sensor is used to identify and obtain large-scale and decentralized information. For specific tasks, multiple types, multiple angles, and multiple levels of information are used to perform online calculations and interact with other enterprises' shared resources in the network. And information transmission to ensure that the data obtained is time-sensitive. This greatly improves the accuracy of the data and the accuracy of the analysis materials. All intelligent analysis records and the comprehensiveness and depth of the data, the application of information technology has laid a solid data foundation for the monitoring and evaluation of the marine economy.

4.2 Data Evaluation

The principal components are extracted according to the standard with the characteristic root greater than 1, and the common factor load obtained after orthogonal rotation is shown in Table 1 by the method of maximum orthogonal rotation of variance.
Table 1. Common factor load matrix after orthogonal rotation

| ingredient                                         | Common factor 1 | Common factor 2 | Common factor 3 |
|----------------------------------------------------|-----------------|-----------------|-----------------|
| Annual growth rate of marine secondary industry and marine primary industry Ratio | -0.13           | -0.82           | -0.05           |
| Annual growth rate of marine tertiary industry and marine secondary industry Ratio | 0.62            | 0.62            | -0.07           |
| GOP as a percentage of GDP                         | 0.19            | 0.01            | 0.91            |
| GOP annual growth rate                             | -0.56           | -0.28           | 0.68            |
| Marine breeding-fishing ratio                      | 0.90            | 0.40            | 0.03            |
| Sea passenger-freight                              | 0.81            | 0.53            | 0.07            |
| Marine Light-Heavy Industry Ratio                  | 0.33            | 0.56            | 0.55            |
| Proportion of strategic marine emerging industries in GOP | 0.93            | 0.14            | 0.21            |
| Ratio of marine secondary industry to primary industry | 0.65            | -0.31           | 0.55            |
| Ratio of marine tertiary industry to secondary industry | 0.23            | 0.91            | -0.20           |

As shown in Table 1, with the use of information technology, the monitoring and evaluation of marine economic operations collected a large amount of raw data. To achieve intelligent analysis and control, big data analysis and mining technologies are also required. To make full use of the characteristics of big data technology, it is necessary to collect data instead of sampling the data, and fully display the business relationships and trends that can be expressed by the relevant data that can monitor and evaluate the marine economy. The development trend completely reproduces the business cause and effect caused by data changes during the operation of the marine economy. The use of information technology can not only obtain complete data but also ensure the real-time nature of the data. The subsequent analysis and calculation of massive data also solves the problems caused by the large amount of monitoring data that cannot be processed and accurately analyzed. It provides many conveniences for monitoring. The data can also make the feedback more timely and make the evaluation more scientific, laying a foundation for efficient monitoring and evaluation.

5. Conclusion

In the course of the development and operation of the marine economy, information technology has played a vital role in its monitoring and evaluation. However, due to the hugeness and complexity of the monitoring data, a large amount of data is difficult to record, some data is lost, and the calculation and evaluation of the data is complicated. As a result, the marine economic operation cannot get timely or correct feedback, which will cause great damage to the marine economy. The loss is that the enterprise can not achieve the desired gain. These issues not only arouse widespread concern in the society, government regulators are also sparing no effort to find the best solution. Only by finding a solution can the enterprise economy be maximized and the development and utilization of resources can be better monitored. With the advent of the informatization environment and the popularization of big data technology, the informatization development of the marine economy has become an inevitable trend. Under this background, this paper takes big data analysis technology and data mining technology as the key technologies to study the monitoring and evaluation of marine economic operation in an information environment, which is of great significance to the improvement of the monitoring and evaluation of the entire marine economy.
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