Evaluation of China's maritime power construction index and policy textual analysis

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Abstract

Purpose – This research establishes an evaluation index system and calculation method for the China's maritime power construction index (CMPCI). It has conducted practical tests on the progress of China's maritime power construction since the 12th–13th Five-Year Plans. This paper conducts a phased study on the construction of China's maritime power based on the CMPCI evaluation results; it expands the relevant achievements in the research field of quantitative research in China's maritime power construction. The verification results are consistent with the actual situation.

Design/methodology/approach – Fully reflect the guiding role of national marine policies in the new development stage, guide the transformation of China's marine management model. The CMPCI is a quantitative evaluation of the overall development level of China's maritime power construction over a certain period of time. The CMPCI in this article aims to comprehensively reflect the changes in the construction of China's maritime power, strives to cover various fields it encompasses. This study focuses on objective statistical data analysis, supplemented by multisource data, to objectively and fairly measure the level of CMPCI.

Findings –

Originality/value – It fully reflects the highlights of marine science and technology, social democracy and strategic emerging industries. This research dynamically quantifies the trajectory of China's maritime power construction, synthetic reflecting the country's macroeconomic policy guiding function. Guiding the transformation of the marine resources utilization, marine economy development, marine scientific research and marine rights and interests maintenance and effectively serving the decision-making needs of the government.

Keywords Maritime power, Policy textual analysis, BP neural network

Paper type Research paper

1. Introduction

The ocean is of great significance to the survival and development of a country and a nation. Since the 21st century, the strategic position of the ocean in politics, economy, military affairs, science and technology and other fields has become increasingly prominent. As a large land and sea complex country, China has a vast land and sea territory at the same time. According to the open information of the Chinese government website (http://www.gov.cn/guoqing/index.htm), the total sea area under China's jurisdiction is about 4,730,000 km^2. In 2017,

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Chinese leaders made the strategic judgment of “great changes unseen in a century” (Xinhua, 2017). In this context, China is facing profound changes both domestically and internationally, with both opportunities and challenges. Building a maritime power with Chinese characteristics is becoming a necessary condition for realizing the great rejuvenation of the Chinese nation.

The existing literature on China’s maritime power strategy (CMPS) is extensive but can be broadly categorized into three main themes: Strategic Foundations and Objectives, Administrative and Legal Challenges and Geopolitical and Soft Power Implications. Despite the depth of these studies, there are notable gaps that warrant further research.

(1) Strategic Foundations and Objectives

This category includes works by Liu (2012), Jin *et al.* (various years) and Liu (2013) that focused on the connotation, objectives and historical context of CMPS. These studies lay the groundwork for understanding the strategy but often lack a comparative perspective and adaptation of historical lessons to modern challenges.

(2) Administrative and Legal Challenges

Studies in this category, such as those by Yu (2013), Wang and Wang (2014), Yu (2014) and Hu (2014, 2017), delve into the administrative reforms and legal aspects of the CMPS. While these works address the complexities of implementing the strategy, they often overlook the interplay between administrative reforms and geopolitical considerations as well as the interaction between international and domestic laws.

(3) Geopolitical and Soft Power Implications

This theme encompasses works by Murphy and Roberts (2018), Cooper and Shearer (2017), Wang and Liu (2019), Li *et al.* (2020), Zhao and Zhang (2019), Wu (2021), Chang (2022) and Mallory *et al.* (2022). These studies explore the military intent, geopolitical challenges, soft power aspects and even cultural dimensions of CMPS. However, they often focus on external challenges without examining how these factors feed back into China’s own strategy. Additionally, there is a lack of interdisciplinary and qualitative analyses in this category.

In summary, while the existing research provides valuable insights into various facets of the CMPS, there is a need for more integrated studies that combine elements from all three categories and place CMPS in a broader, global context. While existing research has laid a valuable theoretical foundation and provided practical guidance for China’s maritime power construction. But the quantitative research on the status quo and development trend of China’s maritime power construction is still lacking. As a result, the Chinese government and apartment in charge of marine administration are unable to accurately realize the actual situation of China’s maritime power construction. Therefore, this paper will select appropriate indicators to build the evaluation indicators system, and conduct a quantitative assessment of the China’s maritime power construction index (CMPCI) based on the back propagation (BP) neural network. So as to make up for the gaps in existing research and explore the path and methods of China’s maritime power construction.

2. Materials and methods

2.1 Evaluation system

The basic purpose of establishing the evaluation index system for the CMPCI in this paper is to effectively characterize the trajectory of China’s marine power construction. Fully reflects the guiding role of national marine policies in the new development stage, and guide the transformation of China's marine management model. The CMPCI is a quantitative evaluation of the overall development level of China's maritime power construction over a certain period. The CMPCI aims to comprehensively reflect the change trends in the construction of China's maritime power, and strives to cover various fields it encompasses. This study focuses on objective statistical data analysis, supplemented by multisource data, to measure the level of CMPCI objectively and fairly. Considering the principles of feasibility, guidance, comprehensiveness, scientificity and systematic, a research was conducted using relevant data from 2011 to 2020.

2.1.1 Evaluation index system. The construction of China's maritime power is a complicated system. To evaluate the CMPCI, it is necessary to establish a multilevel, multiobjective, multifunctional and comprehensive evaluation index system. It should cover several aspects of China's maritime power construction and reflect the operational trend of the strategy.

2.1.2 Combined weight. This paper combined the Delphi method and the analytic hierarchy process to calculate the corresponding weight values of each evaluation indicator for the evaluation index system of China's maritime power built previously. It lays the foundation for preparing to calculate the CMPCI from 2011 to 2020. The specific scope includes the following four steps (Lei and Qiu, 2016; Zhang *et al.*, 2020). First, we constructed a judgment matrix based on the initial data. Second, we used the Delphi method and statistical analysis of the results. Third, we performed hierarchical single arrangement and consistency test. Forth, we performed the hierarchical total arrangement and consistency test (Zhang *et al.*, 2022). The weight values of the evaluation index system for China's maritime power can be calculated as shown in Table 1.

2.1.3 BP neural network. In the current study, various assessment methods like data envelopment analysis (DEA), principal component analysis (PCA) and analytic hierarchy process (AHP) are widely utilized to gauge China's maritime power construction. Additionally, the BP neural network, as proposed by Rumelhart *et al.* and cited by Sun *et al.* (2018), is employed for its nonlinear mapping and fault-tolerance capabilities. This study leverages the BP neural network to evaluate the CMPCI in an accurate and objective manner.

1. Network structure

A standard BP neural network comprises three layers: the input, hidden and output layers, each containing multiple neurons. The input signals $x_1, x_2, \ldots, x_n$ represent standardized indicator data, while ω_{ij} and ω_{jk} denote the connection weights between adjacent layers. In this context, "n," "l" and "m" signify the neuron counts in the input, hidden and output layers, respectively (Zhang *et al.*, 2023).

2. Training process

The BP neural network training involves two phases: forward propagation of information and BP of error (Liu and Ran, 2020). If the output deviates from the expected value, the error is calculated and propagated backward to adjust the weights, aiming for optimal results (Zhang *et al.*, 2018).

3. Methodology

Determine expected values: Utilizing data from 2011 to 2020 for the CMPCI, the weight for each indicator is established using the combined weight method (Table 1). The expected value is then calculated via weighted summation of the standardized indicators. The equation is as follows:

Target level	Criteria level	Indicator level/Unit	Weight
Marine Resources (MR)	Marine Biological Resources (MR_1)	Production of National Marine Products (MR_{11})/t	0.020
		Added Value of Marine Biomedicine Industry (MR_{12})/10^8 yuan	0.030
	Marine Spatial Resources (MR_2)	Total Area of Wetlands (MR_{21})/10^3 hm^2	0.020
		Mariculture Area (MR_{22})/hm^2	0.010
		Number of 10,000-ton Berths for Productive Use at Seaports Above Designated Size (MR_{23})	0.020
	Marine Mineral Resources (MR_3)	Added Value of Offshore Oil and Gas Industry (MR_{31})/10^8 yuan	0.020
		Added Value of Marine Mining Industry (MR_{32})/10^8 yuan	0.020
		Added Value of Marine Salt Industry (MR_{33})/10^8 yuan	0.010
	Marine Renewable Energy (MR_4)	Added Value of Seawater Utilization Industry (MR_{41})/10^8 yuan	0.015
		Cumulative Installed Capacity of Offshore Wind Power (MR_{42})/MW	0.025
		Installed Capacity of Ocean Power Station (MR_{43})/kW	0.010
Marine Economy Development (ED)	Marine Economic Growth (ED_1)	Proportion of Gross Ocean Product to Gross Domestic Product (ED_{11})/%	0.040
		Growth Rate of the Gross Ocean Product (ED_{12})/%	0.040
	Optimization of Industry Structure (ED_2)	Proportion of Marine Tertiary Industry (ED_{21})/%	0.048
		Proportion of National Major Marine Industries (ED_{22})/%	0.072
Marine Society and Livelihood (MS)	Ocean-related employment and income (MS_1)	National ocean-related employment (MS_{11})/10^4 person	0.027
		Total Disposable Income of Urban and Rural Households by Coastal Regions (MS_{12})/yuan	0.033
	Improvement of Living Standards (MS_2)	Total Consumption Expenditure of Urban and Rural Households by Coastal Regions (MS_{21})/yuan	0.021
		Total Investment in Fixed Assets in the Whole Country by Coastal Regions (MS_{22})/10^8 yuan	0.021
		Basic Conditions of Public Health by Coastal Regions (MS_{23})/bed/person	0.018
	Growth of Education Level (MS_3)	Number of Postgraduate Students in Marine Specialties Nationwide (MS_{31})	0.032
		Number of Graduates with Diploma or Above in Marine Majors Nationwide (MS_{32})	0.028
		Number of Teaching and Administrative Staff in the Universities and Colleges Offering Marine Specialities (MS_{33})	0.020

(*continued*)

Table 1.
Evaluation index system of China's maritime power index

Target level	Criteria level	Indicator level/Unit	Weight
Marine Ecological Environment (EE)	Marine Ecological Health (EE_1)	Assessment Results of Seawater Quality (EE_{11})/km^2	0.024
		Marine Protected Areas (EE_{12})/km^2	0.018
		Biodiversity Index of Marine Ecological Monitoring Area (EE_{13})/km^2	0.018
	Environmental Governance and Restoration (EE_2)	Completion of Wastewater Treatment Projects by Coastal Regions (EE_{21})	0.024
		Total Area of Nearshore and Coastal Wetlands (EE_{22})/10^3 hm^2	0.021
		Area of Sharpleaf Mangrove (EE_{23})/hm^2	0.015
Marine Technology Innovation (TI)	Investment in Marine Science and Technology (TI_1)	Total Funding Input for Marine Research Institutions (TI_{11})/10^3 yuan	0.016
		Number of Patent Applications by Marine Research Institutions (TI_{12})/person/year	0.012
		Number of R&D Projects (TI_{13})	0.012
	Output of Marine Science and Technology (TI_2)	Number of Patents Granted by Marine Research Institutions (TI_{21})	0.014
		The Number of Marine Research Institutions (TI_{22})	0.012
		Number of Scientific Papers Issued and Scientific and Technological Works published (TI_{23})	0.014
Marine Management (MM)	Marine Rule of Law Planning (MM_1)	Number of National and Industry Standards Publication (MM_{11})	0.024
		Area of Confirmed Maritime Rights (MM_{12})/hm^2	0.024
		Number of Marine Administrative Law Enforcement Inspection (MM_{13})	0.032
	Marine Security Capability (MM_2)	Number of Marine Forecast Service (MM_{21})	0.030
		Per Capita Water Resources by Coastal Regions (MM_{22})/m^3/person	0.048
		Number of Coastal Observation Stations by Coastal Regions (MM_{23})	0.042

Source(s): Authors' own work

Table 1.

$$T_i = \sum_{j=1}^{n} W_{ij} U_{ij} \tag{1}$$

Where T_i is the expected value of the CMPCI, n is the number of indicators, W_{ij} is the weight of each indicator, U_{ij} is the standardized data.

Set neuron numbers: The input layer has 40 neurons, corresponding to the 40 indicators in the CMPCI index system ($n = 40$). The output layer contains a single neuron ($m = 1$). The neuron counts are interrelated across the three layers (Schmidhuber, 2015). Therefore, an empirical equation is available to set the number of neurons as below:

$$l = \sqrt{n + m} + a \tag{2}$$

Where a is the adjustment parameter ranging from 0 to 10.

Configure training parameters: Standardized indicator data, ranging between [0 and1], serve as the input signal. Transfer functions "Tansig" and "Log-sig" are applied to the hidden and output layers, respectively. Training, learning and loss functions are set to "Trainlm," "Learngdm" and "MSE."

Network training and evaluation: Using MATLAB's neural network toolbox, the model is trained until it meets the error threshold. The model's effectiveness is then tested by comparing the output and expected values. If both relative and absolute errors are within acceptable limits, the BP neural network model is deemed effective for the CMPCI evaluation.

2.2 Data sources

China marine economic statistical yearbook (2012–2021), bulletin of China marine ecological environment (2012–2021) and China marine disaster bulletin (2012–2021) are the main sources of data. Other data are collected from existing research literature published in journals.

The research framework diagram of this paper is illustrated in Figure 1.

3. Result

In view of availability of data, this paper regards the development of China's maritime power construction from 2011 to 2020 as the research object and conducts empirical research.

3.1 Evaluation of CMPCI

This paper considers assigning values to 40 indicators and standardizing the collected data from 2008 to 2020. According to formula (1), the expected values of the CMPCI from 2008 to 2020 are calculated by the index weight and the standardized value. Using 2008–2010s expected values as the test samples, and others are selected as training samples. Respectively, the parameter of input layer and output layer is 40 and 1. According to formula (2), the approximation range for calculating the parameter of hidden layer nodes is [7, 16]. The corresponding relationship between the error and the parameter of hidden layer in BP neural network is defined after simulation training (Table 2).

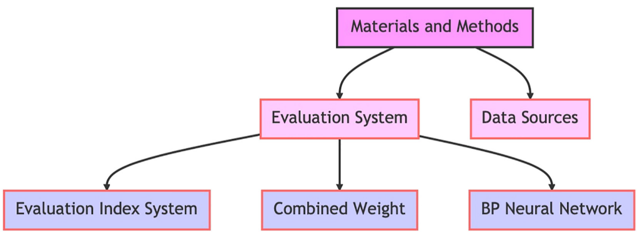

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Figure 1. The research framework diagram

Table 2. Hidden layer parameter and its error in BP neural network

Hidden layer node number	7	8	9	10	11
Root mean square error	$1.2 \times e^{-9}$	$3.4 \times e^{-7}$	$3.7 \times e^{-12}$	$2.5 \times e^{-8}$	$4.4 \times e^{-9}$
Hidden layer node number	12	13	14	15	16
Root mean square error	$6.5 \times e^{-8}$	$3.1 \times e^{-9}$	$2.0 \times e^{-12}$	$1.5 \times e^{-7}$	$6.2 \times e^{-12}$

Source(s): Authors' own work

This paper selects the minimum error value as the number of hidden layer parameter. It follows from the above that the number of hidden layers is 14 (Figure 2).

The neural network toolbox within MATLAB is utilized to configure the neuron parameters across the input, hidden and output layers, which are set to 40, 14, and 1 neurons, respectively. In the BP neural network model, we employ the "tansig," "purelin," "trainlm" and "mse" functions. The learning rate is specifically set at 0.01, while the momentum factor is defaulted to 0.9. The targeted training accuracy is set at 1e-4, with a maximum of 100,000 training epochs and an error goal for the training objective function of 0.000001. For simulation training, we input the expected value data for the CMPCI from the years 2011–2020 into the neural network. After conducting three simulation runs, we obtained the predicted values. To enhance the objectivity and reliability of our comparison between the predicted and expected values, we quantitatively assessed the gap between them, finding it to be within an acceptable range. Both the relative and absolute errors were analyzed and found to fall within acceptable limits, as illustrated in Figure 3 and detailed in Table 3.

3.2 Analysis of CMPCI

To gain a deeper understanding of China's maritime power construction, it's essential to discuss the CMPCI evaluation results in detail. The CMPCI serves as a comprehensive

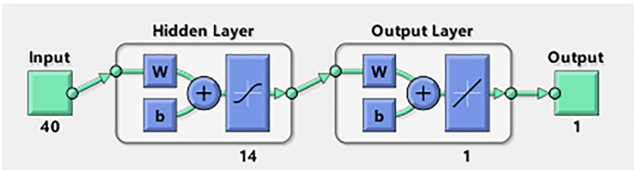

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Figure 2. The diagram of BP neural network model

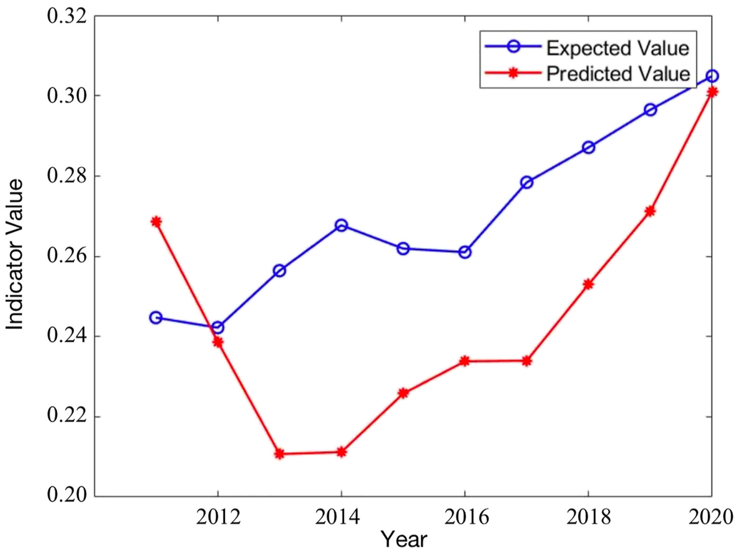

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Figure 3. The gap between predicted value and expected value

Table 3.
Evaluation value of CMPCI

Year	Excepted value	Predicted value
2011	0.2477	0.2686
2012	0.2422	0.2387
2013	0.2564	0.2107
2014	0.2677	0.2112
2015	0.2619	0.2258
2016	0.2610	0.2338
2017	0.2784	0.2340
2018	0.2871	0.2530
2019	0.2965	0.2713
2020	0.3049	0.3010

Source(s): Authors' own work

indicator that reflects various dimensions of maritime power, including resource development, economic growth, ecological protection and national marine rights. The average CMPCI value from 2011 to 2020 is 0.2448, indicating a moderate level of maritime power construction (Figure 4). However, the range of 0.2107–0.3010 across the years suggests variability and room for improvement. The 21.56% decrease from 2011 to 2013 could be attributed to various factors such as economic downturns, policy shifts or even global maritime trends. However, the subsequent increase of 42.86% from 2013 to 2020 is noteworthy and aligns well with the strategic focus placed on maritime power in the 18th National Congress of the Communist Party of China in 2012.

The upward trend post-2012 suggests that the policies and initiatives aimed at improving marine resource development, marine economy, ecological protection and safeguarding national marine rights have been effective to some extent. The 12.06% overall increase in CMPCI from 2011 to 2020, despite the periodic fluctuations, is a testament to China's growing maritime capabilities. Moreover, the CMPCI could serve as a valuable tool for policy formulation and assessment in the future. By analyzing the components that contribute to its fluctuation, policymakers can identify areas that require more focused efforts for sustainable maritime power construction.

In summary, the CMPCI evaluation results not only provide a quantitative measure of China's maritime power construction but also offer insights into the effectiveness of policies and strategies implemented over the past decade. The data suggests that China has made significant strides in becoming a maritime power, but there is still potential for further growth and development."

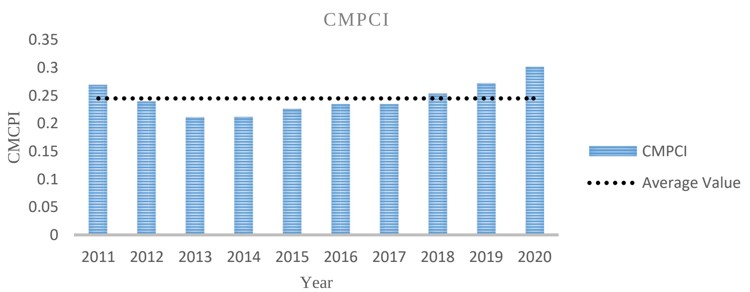

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Figure 4.
Variation trend of CMPCI in each year from 2011 to 2020

4. Discussion

This paper designs a phased study based on the calculation results of the CMPCI as shown in Table 4. According to evaluation of the CMPCI, this research is divided into four stages from 2011 to 2020. Using it as a base, analyze the implementation effects of CMPS at different stages through policy texts (Deng *et al.*, 2020).

In terms of stages, the evaluation of CMPCI (0.2751) in reinforcement period is highest than other stages. Comparing with the mean value of CMPCI from 2011 to 2020 (0.2448), where we found, the proposal period, development period and adjustment period are all lower than the mean value. It seems to be told that the construction of China maritime power acquired tremendous achievements. As a result, the rapid development of marine industry from 2011 to 2018 brought a certain amount of accumulation.

4.1 Proposal period of CMPS

This paper defines the period from 2011 to 2013 as the proposal period for China's maritime power construction. In the proposal period of CMPS, the mean value of CMPCI is 0.2393. By contrast with 2011s base period data (0.2686), it could be observed that CMPCI has decreased more than 12.24%. Meanwhile, the annual change rate of CMPCI is 7.54%. In terms of individual indicators, total area of wetlands (MR_{21}), growth rate of the gross ocean product (ED_{12}), total consumption expenditure of urban and rural households by coastal regions (MS_{21}) and completion of wastewater treatment projects by coastal regions (EE_{21}) have had an impact on the decline of CMPCI from 2011 to 2013. In terms of data change rate, MR_{21},ED_{12}, MS_{21} and EE_{21} have fallen more than 67.6%, 23.2%, 23.8% and 41.2%, respectively. From the changes in specific data, it could be seen that protecting the marine ecological environment is the most priority in China's maritime power construction.

As mentioned in the "Introduction", the report of the 18th National Congress of the Communist Party of China in 2012 proposed the construction of China's maritime power (Chen and Zheng, 2021). Specifically, China should enhance abilities to exploration marine resources, develop the marine economy, protect the marine ecological environment and resolutely safeguard national maritime rights and interests (Jia, 2018). During the proposal period, the assignment of the Chinese government is to summarize and reflect on the experiences and lessons from the development process of the country's marine industry. According to the development requests, Chinese governments clarify the focus on resources and develop the marine economy rapidly. In summary, the downward trend of CMPCI during the proposal period could be due to a series of economic and policy system adjustments accompanying the maritime power strategy. The Chinese government is striving to overcome the negative effects of the development of the marine economy, while safeguarding the country's maritime rights in order to construct a maritime power.

4.2 Development period of CMPS

This paper regards the period from 2013 to 2016 as the development period for China's maritime power construction. In the development period of CMPS, the mean value of CMPCI

Years	Stage	Mean CMPCI	Annual change rate (%)
2011–2013	Proposal period	0.2393	7.54
2013–2016	Development period	0.2204	5.61
2016–2018	Adjustment period	0.2403	3.89
2018–2020	Reinforcement period	0.2751	8.77

Source(s): Authors' own work

Table 4. Schedule of stages for the construction process of China maritime power

is 0.2204. Compared with the proposal period's data (0.2393), it could be observed that the CMPCI has continue decreased nearly 7.90%. Meanwhile, the annual change rate of CMPCI is 5.61%. As shown in Figure 3 and Table 4, the evaluation of mean CMPCI in development period is lower than it in proposal period. However, this research found that CMPCI showed an increasing trend year by year from 2013 to 2016, the increase rate is 11.73%, 0.24%, 6.91% and 3.54% respectively.

The reason for this phenomenon is that although it was explicitly proposed to construct the China's maritime power during the proposal stage, but in fact, the marine science and technology predominance was not mentioned. Meanwhile, the goals and measurement of CMPS were not clearly discussed. Therefore, there were some delays in the development period. In 2013, the Chinese government emphasized the "four aspects of transformations" directive on maritime power construction. It pointed out the direction for the implementation of the CMPS. In particular, attention should be paid to marine resources, marine ecological environment, marine technology and marine rights. In terms of marine resources, our government needs to improve the capabilities of resource exploration and development, focus on promoting the transformation of the marine economy toward a quality and efficiency-oriented approach (Wang *et al.*, 2023). Considering protection of the marine ecological environment, efforts should be made to promote the transformation of marine development modes toward circular utilization. For marine scientific research and marine technology upgrading, efforts should be made to promote the transformation of marine technology into an innovation-leading model. To safeguard the China's maritime rights and interests, efforts should be made to promote the transformation of maritime rights and interests toward a comprehensive and balanced approach. It can be found that the CMPS underwent a systematic transformation from 2013 to 2016, resulting in a downward trend in CMPCI.

4.3 Adjustment period of CMPS

This study considers the period from 2016 to 2018 as the adjustment period for China's maritime power construction. In the adjustment period of CMPS, the mean value of CMPCI is 0.2403. Compared with the development period's data (0.2204), it can be found that CMPCI has increased nearly 9.03%. Meanwhile, the annual change rate of CMPCI is 3.89%. As shown in Figure 3 and Table 4, the evaluation of mean CMPCI value in adjustment period is higher than it in development period. But in fact, the growth rate of CMPCI increase from 2016 to 2018 has slowed down. The evaluation results in 2016 and 2017 are almost the same.

From 2016 to 2017 is the beginning year of the 13th Five-Year Plan. It is a critical period for the transformation of marine economic development toward remains a quality and efficiency-oriented model. Due to long-term extensive development, marine ecological disasters occurred frequently. The frequent of red tides in the Chinese offshore was almost twice that of 2015, the efficiency of marine environmental regulation decreased obviously. Meanwhile, due to the slowdown in the growth rate of marine innovation, the upgrading level of the marine industrial structure has decreased (Wang and Cheng, 2021). In 2017, there was still a phenomenon of low quality in the added value of major marine industries. This led to a decrease in the quality of marine economic development and a significant decline in the evaluation of CMPCI.

4.4 Reinforcement period of CMPS

This paper takes the period from 2018 to 2020 as the reinforcement period for China's maritime power construction. In this period, the mean value of CMPCI is 0.2751. Compared with the adjustment period's data (0.2403), it could be observed that the CMPCI has increased nearly 14.48%. Meanwhile, the annual change rate of CMPCI is 8.77%. As shown in Figure 3 and Table 4, the evaluation of mean CMPCI value in reinforcement period is higher than it in adjustment period. From 2018 to 2020, the growth rate of CMPCI increase is accelerating to high levels. The increase rate is 8.12%, 7.23% and 10.95% respectively.

From 2018 to 2020, under the guidance of the goal about "accelerating the construction of China's maritime power" at the 19th National Congress, the country increased its emphasis on marine development and resource investment (Yu and Shen, 2022). In the same year, the State Council's organizational restructuring adjusted the functions from the former State Oceanic Administration (SOA) to the Ministry of Natural Resources (MNR), in order to achieving coordination of land and sea supervision. In 2019, the proposal of "the maritime community with a shared future" provided a new conception for marine development, leading to the steady increase in the effects of CMPS.

The empirical research in this paper covers the period from 2011 to 2020, which has gone through the proposal period, development period, adjustment period and reinforcement period of China's maritime power construction. Under the adjustment of national policies, China's accelerated construction of a maritime power gradually stepped in the right direction.

5. Conclusion

This study develops a comprehensive evaluation index system and calculation method for CMPCI. Utilizing data from China's "12th and 13th Five-Year Plans," the study validates the index system, finding a high degree of consistency with real-world developments. The CMPCI incorporates six key dimensions: marine resources, economic development, societal well-being, ecological sustainability, technological innovation and governance.

By employing a phased approach based on the CMPCI evaluation results; this paper enriches the existing body of quantitative research on China's maritime power. It offers insights into marine science and technology, social democracy and strategic emerging industries, thereby providing a dynamic quantification of China's maritime power trajectory. Importantly, the study serves as a macroeconomic policy guide, aiding in the transformation of marine resource utilization, economic development, scientific research and the safeguarding of maritime rights, thereby meeting governmental decision-making needs effectively.

As an initial foray into the quantitative analysis of China's maritime power, this study aims to lay the groundwork for future research. Three key areas warrant further exploration: refinement of the CMPCI evaluation index system, aligned with the CMPS and current realities. In-depth investigation into the predictive capabilities of the CMPCI, including the development of methodologies for forecasting China's maritime power. Integration of multisource data to provide a more comprehensive and nuanced dataset for future studies.

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