Research on Evaluation Index System for Market-based Allocation of Marine Resources

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***Abstract*—Evaluation of the market-based allocation of marine resources is the basis for the optimal allocation of marine resources. This paper defined the connotation and mechanism of the allocation from such aspects as law, planning, assessment, audit, transaction, supervision and efficiency. Based on the scientific, dynamic, comparable, representative, independent, operable and other principles, the market allocation of the marine resources was evaluated from three aspects: the status, the process and the performance of market-based allocation of marine resources. A total of 12 primary indexes and 36 secondary indexes were designed. The research results indicated a scientific basis for discovering the problems in the market-based allocation of marine resources and making timely and necessary adjustments and improvements.**

Keywords—market-based allocation; marine resources; evaluation index system; primary market; secondary market

I. INTRODUCTION

Resource allocation refers to the relationship among the resources, and between resources and other economic factors, as well as the allocation of resources for diversified utilities, different users, and the structural arrangements made in time, space, industry, etc.[1] The General Secretary Xi Jinping pointed out in the report of the 19th National Congress of the Communist Party of China that the reform of the economic system must focus on improving the property rights system and the market-oriented allocation of factors to achieve the effective incentives for property rights, free flow of factors, flexible price response, fair and orderly competition, and the survival of the fittest enterprises. The market-based allocation of resource is the process of continuous activation, optimal allocation, and efficient trading of resources under the protection of the rule of law.

The oceans are the resource of treasure. They are the material basis, energy source, space carrier and constituent element of the construction of marine ecological civilization. Marine resources are an important source of food, energy, industrial raw materials, agricultural production materials, etc. which are closely related to people's livelihood and economic and social development, and a spatial carrier for industrialization, urbanization, and agricultural modernization [2]. The allocation of the marine resources in China is carried out after the marine function is determined. The sea areas will be allocated in certain ways to someone that can exploit the marine resources so as to maximum the overall benefits of the ocean[3]. Drawing on the experience of the market resource allocation, the market-based allocation of the marine resources refers to the behavior of allocating marine resources through a legal market competition under the macro-control of the government, in accordance with laws and regulations, through scientific and reasonable procedures, and by means of price adjustment. Compared with administrative approval, it is generated when the marine economy grows to a certain stage and level, which is conducive to optimize the allocation of marine resources, thereby effectively preventing corruption, and promoting the sustainable development of the ocean [4].

II. CONNOTATION AND MECHANISM OF MARKET-BASED ALLOCATION OF MARINE RESOURCES

The connotation and mechanism of market-based allocation of marine resources are described from the perspectives of law, planning, evaluation, review, transaction, supervision, and efficiency.

A. Law

All links, processes and methods of the market-oriented circulation of the marine resources need to be regulated by relevant laws and regulations which serve as the norms of transactions of the market participants and the basis for the management of competent authorities. The legal system for the allocation of marine resources is a general term for the various systems formed by adjusting the legal relationship of the allocation of marine resources. China's Laws on the Management of Sea Area Use, the Law on Marine Environmental Protection, and the Law on Property Rights have successively added the legal systems for the allocation of marine resources. These include the system of property rights for sea resources, the trading system for marine resources, the system for the demonstration of sea area use, the environmental impact evaluation system and the assessment system for the allocation of marine resources. On the one hand, these legal systems are constantly being improvised with the development of sea area management practices. On the other hand, these legal systems objectively control, guarantee, and stimulate the allocation of marine resources [5].

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B. Planning

The market-based allocation of marine resources cannot do without the macro-control and micro-constraints of planning. The general office of the CPC central committee and the general office of the state council clearly proposed the role of the spatial planning in guiding and restricting the allocation of natural resources in the Guide Opinions on Innovating the Way of Government' Resource Allocation.

On the basis of the functional zoning plan, all types of spatial plans drawn up by different departments will be integrated to formulate a unified spatial plan. Urban space, agricultural space and ecological space are rationally distributed. The boundaries for urban development and permanent basic farmland, and red line for ecological protection are drawn to scientifically allocate and strictly control all types of natural resources.

C. Assessment

Assessment of the sea area is an important technical support for the market-based allocation of marine resources. The various utility of the marine resources in China cause variable income, diversified rights to use the sea area, and the varied values of the right to use the same type of sea area in different regions [6]. In the market-based allocation of marine resources, both parties of the transaction need to evaluate the value of the sea area in order to reasonably determine the price of the right to use the sea area and ensure fair transactions. Whether it is the transfer of sea area use rights in the primary market or the transaction of sea area use rights in the secondary market, they are inseparable from the sea area assessment. Economic activities regarding the sea area and the right to use the sea area such as the transfer, auction, mortgage, shareholding, reclaim, and compensation of sea area need the assessment of the sea area for coming up with a fair price[7].

D. Audit

The demonstration system of the use of the sea area and the marine environmental impact evaluation system provides the necessary evaluation factors for the marine resources allocation audition system [5].

E. Transaction

The trading platform is an important carrier of the market circulation. A transparent, open, and efficient market-based trading platform for marine resources is basic for comprehensively promoting the market allocation of the marine resources. The establishment of a circulation platform for the sea area use rights can integrate information, improve the transaction rules, clearly reflect the important links of application approval, information disclosure and supervision, and help to form a fair and open market [6]. Intermediaries are one of the elements of the market, and the market-oriented allocation of marine resources should have comprehensive professional intermediaries for sea area measurement, financing guarantees, auction transactions, information services, agency brokers and legal services. These professional intermediaries can provide high-quality service to promote the market allocation of marine resources [8].

F. Supervision

A complete system of circulation of the right to use sea areas requires an effective monitoring mechanism. Supervision can regulate the power and prevent corruption. An effective supervision and management mechanism can fully guarantee the circulation market of the right to use sea areas, especially the fairness, justice and openness of the market. It can also effectively prevent the rent-seeking behavior in the process of the transfer, and maintain the long-term sound development of the sea area market. Additionally, the establishment of an effective supervision and management mechanism can also supervise and guide the current intensified ocean exploiting to ensure the sustainable use of the marine resources and the protection of the marine environment.

G. Benefit

Benefit is the fundamental starting point and one of the necessary conditions for measuring the feasibility of market allocation of the marine resources [9]. Whether the market-based allocation of the marine resources is scientific and whether it can reasonably use marine resources depend on whether the market allocation of marine resources can achieve the economic, social and ecological environmental benefits. Among them, the economic effectiveness mainly manifests in the scale of the market allocation in the primary market, the increase in the scale of the market allocation in the secondary market, and the increase in the value of the sea area reflected by the circulation of use rights. The social effects are mainly reflected in the prevention of the natural resource safety risks, the reasonable functional division of marine resources and the construction of a clean government. The ecological and environmental effects are mainly manifested in the market-based configuration, through the most effective interest-driven mechanism for the use of the right holders, in order to promote the developers of the sea area to actively and rationally use the resources and protect the marine ecological environment [10].

III. METHODS AND PRINCIPLES

A. Evaluation target for the market-based allocation of marine resources

By analyzing the status of the market-based allocation of marine resources, grasping the process of the allocation and summarizing the results the deficiencies in the allocation are discovered. The timely and necessary adjustments and improvements are carried out to provide a scientific reference for the optimal allocation of marine resources.

B. Principles for selecting indicators

- Scientific

The design of the indicator system and the selection of evaluation indicators should be scientific and follow the economic and ecological laws, which objectively reflect the characteristics and status of the market-based allocation of marine resources and can reflect its basic laws.

- Dynamic

The relationships among the integral parts can be found in the dynamic movements. The market-based allocation of marine resources has various requirements at different stages of China's social and economic development. It is a dynamic optimization process. The indicators for evaluating the process and the results should reflect the dynamic characteristics of the evaluation objectives in time and place.

- Comparable

Data availability is an important factor. In order to easily compare between different regions or levels of the country, the indicators should be as comparable and universal as possible.

- Representative

The market-based allocation of marine resources is a complex system that includes many aspects and involves multiple factors. It is impossible and unnecessary to put all the factors involved as indicators, so only the representative indicators are acceptable.

- Independent

Based on the evaluation content of all aspects, the indicators are selected as refined as possible, that is, minimizing the correlation between the indicators, and enhancing the relative independence of the individual indicators.

- Operable

The design of the indicator system should take into consideration the availability of the indicator data, the difficulty of standardizing the data, and the operability of applying the indicator system to the evaluation of the market-based allocation of marine resources to achieve the unification of complexity and simplicity.

C. Index system construction method

The analytic hierarchy process was used to divide the evaluation index system of the market-based allocation of marine resources into three levels, namely the target level, the criterion level and the index level. The first level (target level) was the evaluation of market allocation of marine resources. The second level (criterion level) consisted of the status, the process and the performance of market-based allocation of marine resources. The third level (indicator level) established a number of indicators subordinate to the three elements of the criterion layer, and constituted a complete evaluation index system for the market-based allocation of marine resources.

IV. EVALUATION INDEX SYSTEM OF MARKET ALLOCATION OF MARINE RESOURCES

The evaluation of the market-based allocation of marine resources was carried out from three aspects: the status, the process, and the performance of the allocation. A total of 12 primary indicators and 36 secondary indexes were designed, as shown in Table 1.

TABLE I. EVALUATION INDEX OF MARKET ALLOCATION OF MARINE RESOURCES

Sequence	**Target level**	**Criterion level**	**Indicator level**	
			Primary indexes	***Secondary indexes***
1	Evaluation of market allocation of marine resources	Status evaluation of market allocation of marine resources	Condition of primary market of marine resources allocation	Proportion of market-based allocation projects in the primary market of the allocation of marine resources
2				Area proportion of market-based allocation projects in the primary market of the allocation of marine resources
3				Charge proportion of market-based allocation projects in the primary market of the allocation of marine resources
4				Diversity of sea uses types of market-based allocation projects in the primary market of the allocation of marine resources
5				Diversity of market allocation mode in the primary market of the allocation of marine resources
6			Condition of secondary market of marine resources allocation	Proportion of projects in secondary market of the allocation of marine resources
7				Area proportion of projects in secondary market of the allocation of marine resources
8				Charge proportion of projects in secondary market of the allocation of marine resources
9				Diversity of sea use types of projects in secondary market of the allocation of marine resources
10				Diversity of market allocation mode in secondary market of the allocation of marine resources
11		Process evaluation for the market allocation of the marine resources	Soundness of the legal system for market allocation of marine resources	Soundness of national laws, regulations, departmental rules and regulatory documents for market-based allocation of marine resources
12			Planning regulation of market allocation of marine resources	Accounting of marine resources assets
13				Preparation and implementation of marine spatial planning
14				Construction of marine usage control system
15			Sea area appraisal of market allocation of marine resources	Formulation and implementation of technical standards and specifications for sea area appraisal
16				Construction of dynamic adjustment mechanism for sea use payment

Sequence	Target level	Criterion level	Indicator level	
			Primary indexes	***Secondary indexes***
17				Market regulation and management of sea use payment
18			Verifying system of market allocation of marine resources	Demonstration of sea area utilization and marine environmental impact assessment
19			Trading system of market allocation of marine resources	Completeness of trading mechanism
20				Trading platform development
21				Intermediary service market development
22			Regulatory system of market allocation of marine resources	Administrative supervision
23				Judicial supervision
24				Social supervision
25		Benefit evaluation for the market allocation of the marine resources	Economic benefit of market allocation of marine resources	Increment of marine resources
26				Input-output ratio
27				Industrial structure deviation
28			Social benefit of market allocation of marine resources	Citizens' awareness of legal, paid, economical and ecological use of the sea
29				Rights Protection
30				Fairness security
31			Ecological benefit of market allocation of marine resources	Health of Marine ecosystems
32				Sea water quality compliance rate
33				Ecological compensation
34			Management benefit of market allocation of marine resources	Planning control strengthening
35				Improvement of the efficiency of marine resources allocation
36				Promotion of the transformation of government functions

V. CONCLUSION

The optimal allocation of marine resources is inevitable to strengthen the management of marine resources. The management optimizing of marine resources is actually a process of transforming resources into capital and turning the potential edges into real economic advantages. Through an open, fair and transparent market mechanism, marine resources can be utilized by the most qualified users with economic and technical strengths, so as to maximize the economic and social utility of the limited marine resources. This paper, through the analysis of the connotation, elements and objectives of the market-based allocation of marine resources, clarified the evaluation objectives of the allocation. The evaluation of the market-based allocation of marine resources was conducted in three aspects: allocation status, process and performance. A total of 12 primary indexes and 36 secondary indexes were designed. The research results can provide a scientific basis for discovering the problems in the market-based allocation of marine resources and making timely and necessary adjustments and improvements.

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