Thinking on the Introduction of PPP Pattern into the Field of Marine Ecological Environment Control

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Abstract. Combining with China's actual situation of the marine ecological environment, the present situation of the serious deterioration of the marine ecological environment and the difficulties faced in the process of management are analysed, particularly under the governance of the single government body, which is unclear in the division of various functional departments and obvious in shortage of funds. Based on this, PPP pattern is introduced into the marine ecological environment governance, and on the basis of the theoretical analysis, the necessity and feasibility of PPP pattern in the control of marine ecological environment are described; finally, the PPP pattern in the field of marine ecological environment control is constructed, and the function division of the government and the private sectors under the guidance of PPP pattern is clarified in the process of marine ecological environment governance.

1. Problem statement: the present situation of marine ecological environment and the dilemma of governance

China has a maritime area of about 3 million square kilometers, accounting for about one fourth of its total territory. The ocean has been playing an extremely important role in the economic and social development of our country, which is a crucial support system to ensure national security, ease land resource shortage and expand the space of national economy and social development. [1] At present, with the transfer of national strategy to the ocean, China's marine development is constantly increasing, and then of course along comes the contradiction between marine economic development and marine ecological environment protection. According to the results of the marine environmental monitoring of the National Oceanic Administration in 2016, serious pollution had taken place in some coastal areas of China, that is, the alongshore areas which were inferior to fourth types of water quality standards in winter, spring, summer and autumn were respectively 51.2 thousand sq.km., 42.1 thousand sq.km., 37.1 thousand sq.km. and 42.8 thousand sq.km., accounting for 17%, 14%, 12% and 14% of the total alongshore area correspondingly; and 76% ecological systems, including estuaries, bays and coral reefs, under monitor were in sub-health and unhealthy conditions. [2] The pollution of the costal ecological environment has become increasingly serious, which will not only cause great adverse effect on the quality of people’s daily life, but also be an impediment to the development of China's marine economy and the construction of our beautiful country, therefore, to protect the marine ecological environment has been an urgent and imperative task to fulfill.

However, as far as concrete practice is concerned, the main difficulties China is faced with in the marine ecological environment protection are, single supplier of marine ecological environment
governance, and lack of market participation; unclear functions of various departments, and low management efficiency; high technical requirements for governance, and inadequate capital investment; etc.

1.1. Single supplier of marine ecological environment governance, lack of market participation
Under the current system of our country, the environmental protection and management work is mainly carried out by the government, while little consideration is given to mobilizing the market participation. The comprehensive management of marine ecological environment is no exception. Because of its publicity which features long time, low income and slow effect, the government has been assuming entire responsibility for the governance of marine ecological environment for a long time. Although this approach is able to carry out environmental protection with sufficient manpower, funds and material resources, the only service supplier -- the government holds several posts simultaneously by playing the policymaker and executor, even supervisor. This has surely put too much pressure on the government, at the same time, causes the circumstance that the policies cannot be effectively implemented and supervised, thus resulting in failures of implementing the marine ecological environment governance.

1.2. Unclear functions of various departments, low management efficiency
The management of water environment is a task that involves a variety of administrative regions and administrative departments, and it also leads to the fragmentation of responsibilities, lack of coordination, confusion of leading bodies and indistinct boundary of responsibilities. [3] In the field of marine ecological environment governance, the phenomenon of multi-agent governance is obvious. The relevant administrative departments involved in the management of marine ecological environment in China are mainly: Department of Marine, Ministry of Environmental Protection, Ministry of Maritime Affairs, Department of Fisheries, Ministry of Tourism, port and waterway system, maritime police, local government, etc., and they have their own responsibilities and are interacted with each other. In the practical operations of marine ecological environment protection, the administrative departments only care for their own areas without effective communication and information sharing, and some of them even go so far as to shirk responsibility, which significantly lower the efficiency of marine ecological environment governance and waste administrative resources.

1.3. High technical requirements for governance, inadequate capital investment
Marine ecological environment governance is a complex systematic project, which asks for high technical support. Compared with the developed countries, China’s specialization degree of technology, including the monitoring equipment, the utilization efficiency of facilities and renewal speed, is still too low to adapt to the technical requirements of marine ecological protection in the new era. [4] On the other hand, the lack of funds is a great bottleneck that restricts the governance of the marine ecological environment in China, and as is known for all, the implementation of any policy and system cannot be separated from the support of funds. Capital supply of marine ecological environment control in China has been mainly the government's unpaid investment so far, which means that a multi-channel and multi-agent financing system has not been built yet. Only by the special government funds will not be sufficient to pay the cost of the marine ecological environment, and it is difficult to achieve the effective management as a whole.

2. Definition, characteristics and basic structure of the PPP pattern
The full name of PPP pattern is Public-Private Partnership, which means to build the partnership between public departments and private sectors, that is, public-private cooperative system. The PPP pattern was first produced in Britain, and then became popular and developed in Portugal, Italy, Holland, Ireland and other countries. [5] At present, this pattern has been widely used in many fields,
such as infrastructure construction, public service projects, water conservancy construction, and protection of resources and ecology.

2.1. Definition of PPP pattern
Although the private sectors have been involved in public domain affairs for a long time, it is just emerged as a term in the recent 10 years. In addition to the relatively broad concept of PPP itself, the great differences between the ideology and administrative systems in different countries, as well as varied practical situations, has led to divided opinions on the definitions of PPP among countries and international organizations, institutions and experts. The main interpretations are as follows (Table 1).

Table 1. Interpretation of the PPP pattern by major institutions and scholars

| Institutions/ Experts                                      | Definition of PPP Pattern                                                                 |
|-----------------------------------------------------------|------------------------------------------------------------------------------------------|
| United Nations Institute for Training and Research        | PPP covers all the institutionalized ways of cooperation among promoters of different social systems, with the aim of solving some of the complex problems in the local or regional areas. [6] |
| European Commission                                       | PPP refers to a cooperative relationship between the public departments and the private sectors, which aims to provide public projects or services that are traditionally provided by the public departments. [7] |
| E.S. Sava’s                                               | PPP means any arrangement for the production and supply of goods and services by the public departments and the private sectors jointly. The job contracting, the franchise operation, the subsidy and so on conform to this definition. [8] |
| Ministry of Finance of the People’s Republic of China     | PPP refers to a long-term partnership in the fields of infrastructure and public services. [9] |
| National Development and Reform Commission of the People’s Republic of China | The PPP pattern is a benefit-sharing, risk-pooling and long-term cooperation relationship established by the government, in the hope of enhancing the supply capacity and efficiency of public goods and services through franchise operation, service purchase, equity cooperation, etc. [10] |

2.2. Basic structure and characteristics of PPP pattern
According to the existing researches, although a unified and comprehensive definition of the PPP pattern has not reached among various institutions and scholars, a certain consensus has been formed, that is, under the PPP pattern, the government is no longer the only supplier of public goods and services, and private sectors have also become major participants, who are directly involved in the loop-locked public service. [11] The project runs as follows (Figure 1).

Figure 1. Basic structure of PPP pattern
Under the PPP pattern, the process of providing public goods and services presents three basic features, namely, partnership, benefit sharing and risk pooling. The main characteristic of PPP pattern
is partnership. On the premise of the same goal, that is, to provide specific public projects, the pattern represents an equal cooperation mode on behalf of both the public departments and private sectors. The second one is benefit sharing, however, the mentioned benefit denotes the social achievements of public projects under the PPP pattern, rather than the profits. The private sectors will get a certain return of investment. The third one is risk sharing. Under the PPP pattern, the public departments need to bear the major risk associated with its own advantages, while the private sectors are mainly faced with business risks.

3. Feasibility of applying PPP pattern in marine ecological environment management

Currently, a majority of the researches on PPP pattern and its application in ecological protection have regarded the pattern as a new financing method, but in fact, it is also a new management mode. [12] In the management of marine ecological environment, the introduction of PPP pattern, on the one hand, transfers government's role from the only supplier to the policy-maker, the executor and the supervisor; while, the private sectors achieve the benefits and enhance their external images by participating in marine ecological environment control. At the same time, our country has also had the actual conditions to introduce the PPP pattern into the field of marine ecological environment control.

3.1. Feasibility of policy

Since the reform and opening up, as the market-oriented reform goes deeper, the role of the market in the resource allocation is increasing day by day. Focusing on the application of PPP pattern in ecological environment protection, a series of policies and regulations has been issued so far. The State Council pointed out in the Ecological Environment Protection Plan in 13th Five-Year that, it is necessary to speed up the cultivation of market bodies. The combined model of environmental governance and management development has been explored, and the return mechanism of social capital investment to ecological improvement has been perfected. [13] The Ministry of finance, the National Development and Reform Commission and the State Oceanic Administration have also issued a series of legal documents to encourage, standardize and guide the healthy development of PPP pattern in the field of environmental protection. It can be said that the current macro legal policy encourages the operation of the PPP pattern in the field of marine ecological protection.

3.2. Feasibility of economy

Fund is the key factor to ensure the success of PPP pattern in the field of marine ecological environment management. From the perspective of investment strength, it can guarantee sufficient funding sources. On the one hand, according to the existing relevant regulations, the local governments are not allowed to loan funds from the bank directly, however, when applying PPP pattern to marine ecological environment management, the private sectors have the right to provide financial support by considering the earnings power offered by the government as pledges, which equals to that the public projects are built by bank loans on the basis of government financial credit, therefore, the funds of projects is revitalized. On the other hand, the private economy has been developing vigorously in recent years and has occupies a larger and larger proportion in the gross national product of our country. The power of private enterprises to join the PPP pattern cannot be underestimated.

3.3. Feasibility of technology

The level of science and technology is an important factor that determines whether the PPP pattern can be used in the field of marine ecological environment management. The first priority is the talent reservation. With the rapid development of the economy and society and the remarkable progress of scientific and technological level, the investments in technological education and scientific research in the field of ecological environmental protection, especially in the fields of regulating rivers and watercourses, keeps increasing, and a group of professional and technical personnel are cultivated. Secondly, from the perspective of comprehensive technical strength, marine environmental protection
high-tech industry, as a sunrise industry, develops vigorously, leading to the constant improvement of
the technical level of marine monitoring technology and marine environmental protection industry,
and the enhancement of operational capability and industry experience, thus endowing China with the
hard strength to be engaged in marine ecological environment management.

3.4. Feasibility of practice
In recent years, more and more experts, scholars and all social circles have paid increasingly attention
to the marine ecological management, however, the situation remains extremely bleak. Under the call
of building a beautiful China and a maritime power, the demand and urgency of the marine ecological
management have provided an opportunity for the implementation of the PPP pattern. On the other
hand, the PPP pattern has carried out a lot of practice in the field of ecological and environmental
protection. According to the composition of PPP project library, the status showed that there were
totally 836 projects, with an investment of 841.3 billion yuan, related to ecological construction and
environmental protection by the end of July 2017, which accounts for 5.09% of the entire investment
and ranks the top 5 in the industry. [14] Therefore, from a practical point of view, a large number of
successful experience both at home and abroad have provided concrete evidence and reference to the
introduction of PPP pattern to the field of marine ecological environment governance.

4. Function division of the public departments and private sectors in the marine ecological
environment governance under the PPP pattern
The current status of the marine ecological environment in China is far from optimistic, and its
governance is also facing many difficulties. When applying PPP pattern to the marine ecological
environment management, it can be seen that the pattern is reasonable and feasible after being verified
from the aspects of macro policy, operating funds and practical practice. Based on the current situation
and existing theories, a PPP-based marine ecosystem governance model (Figure 2) is constructed, and
the functions of the public departments and the private sectors are divided in detail, hoping to yield
more than it should have through the division of labor and cooperation of work.

![Figure 2. Model of marine ecological environment management under PPP pattern](image)

4.1. Main functions of the public departments in the marine ecological environment management
under the PPP pattern
The top responsibility is the confirmation implementing subject. Before the development and
construction of PPP project for marine ecosystem, the public departments should, first of all, examine
the overall situation of sea areas that need to be governed and study the feasibility of the project;
secondly, under the premise that the project is feasible, project bidding is organized, and the properties
of the project and the advantages of the private sectors are weighed as a whole. On this basis, the
implementing subject of the PPP project can be determined.

The second one is the optimization of policy environment. On the one hand, the government should
release corresponding laws and regulations to guide the development of the marine ecological
environment in a standardized way, while encouraging and supporting the private sectors to enter the field of marine ecological environment management. On the other hand, to ensure the normal operation of marine ecological environment management projects, the public departments must also provide policy supports, including fully granting initiative, reducing taxes on project operation, enlarging government investment, and building and improving supporting facilities for PPP project. [15]

What follows are the government's guarantee and credit. Firstly, taking the credit of the public-sector finance as a guarantee, the private sectors, return of investment can be ensured, attract sufficient bank capital and private funds for the PPP project of marine ecological environment management. Additionally, the public departments should provide the project with logistical supports, so as to help the private sectors solve basic problems, such as land, water, electricity, etc., and communicate with local residents in the process of project advancement.

The next one is project supervision. When implementing PPP-based marine ecological environment governance, the government should change its own role and undertake the position of supervisor; meanwhile, the government also has to smooth out the rights and the obligations of the public departments and the private sectors and fix them in official contracts. Secondly, the public departments should supervise the private sectors, behaviors in marine ecological environment management, and prevent and guide behaviors that do not conform to the contract in time, so as to ensure effective management of marine ecosystem in the PPP pattern.

And the last one is risk pooling. In the process of contract making, the risks that the public departments and the private sectors should bear in the projects should be defined. The public departments usually have a stronger ability to resist risks, and the risks assumed by public departments are shown in two aspects, namely, non-commercial risks, including policy, law, finance and so on, and project interruption caused by the objective factors of forces beyond human control (tsunamis, earthquakes, typhoons, etc.).

4.2. Main functions of the private sectors in the management of the marine ecological environment under the PPP pattern

The first step is bidding and negotiation. Under the PPP pattern, the private sectors generally join the project by bidding and negotiating. The specific step is that, after the government publishes the relevant bidding documents, the private sectors examine the feasibility of the project and draw up the tender documents combining with their own actual conditions. Once the qualification of participation is determined, the private sectors should negotiate with the public departments on the specific contents of the corresponding contracts, thus clarifying the rights, the obligations and the benefits in contractual form.

What follows is preparatory preparations. Prior to the formal start of the PPP project of marine ecological environment management, the private sectors should make meticulous and detailed preparations for the relevant projects, handle the relevant procedures for the development and construction of the project in accordance with the requirements of the contract, and sign agreements with construction units, financial institutions and insurance companies, so that the project will be carried out smoothly.

The third one is the management and the operation of projects. During the concession period signed by both sides, the private sectors should be responsible for the management and the operation of relevant projects. Based on the specific circumstances of different sea areas, the effective ecological environmental management work should be carried out, and any cost and benefit arising out of such process shall be divided by both sides at a reasonable proportion. After the expiration of the contract, the projects are transferred to the public departments automatically.

Then, the last one is quality. During the period of project operation, the private sectors should make records of the dynamic state of marine ecological environment in the areas under governance and supervise the implementation of the project; when there are problems, the private sectors should go to
the scenes immediately and deal with the problems effectively. The PPP project is able to ensure the improvement of the marine ecological environment in the region under governance.

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