

A framework for improving the Marine Spatial Data System in the Republic of Korea

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ABSTRACT

The main objective of this paper is to : (1) analyze and compare the present Marine Spatial Data(MSD) system in the Republic of Korea(ROK) with those of other countries, (2) identify the legal vacuum of the Act on Marine Spatial Planning(MSP) and Management, (3) propose a solid legal framework for the MSD system.

By exploring some key significant points in the MSD system, the paper revealed a lack of a comprehensive framework for managing MSD in the current system. To effectively support the MSP, the study concludes that the Act should provide a legal basis for securing implementation. Preparing standardized guidelines is essential to combine distributed marine space information into an integrated one. In addition, amending ambiguous clauses of the implementation of MSP is crucial.

This research illustrates how the advanced framework of the MSD system can be applied to ROK in two ways: (1) by establishing an executive MSP organization to provide guidelines concerning MSD for related organizations, (2) by connecting administration such as licensing with this MSD system's scenarios. This advanced system shall increase not only the public's cyclical participation in the MSP processes utilizing open API but also public acceptability thereby improving the transparency of decision-making based on scientific data and shall decrease social conflicts on sea use.

1. Introduction

In recent years there has been a growing concern about climate change. To cope with this global challenge, 195 member countries of the Intergovernmental Panel on Climate Change(IPCC) came to the agreement on Paris Agreement. As a result, all parties agreed to take responsibility for reducing Green House Gases(GHG) emissions and achieving carbon neutrality by 2050. As a part of its efforts, the Republic of Korea(hereinafter referred to as ROK) proclaimed that the government shall reduce 40% reduction in carbon emissions compared to 2018. Furthermore, the Ministry of Trade, Industry and Energy has introduced the Korean RE-100, a policy that companies are advised to cover the use of electricity with 100% renewable energy, since 2021.

Due to the high demand for renewable energy, marine space is considered a proper place to establish vast amounts of wind farms considering the limited territory area. Recently, however, there are some problems that not only it takes much time to identify the best location, but also it's hard to deal with conflict between fishermen and developers.

As one of the decision-support systems, the integrated Marine Spatial Data(hereinafter referred to as MSD) system has been considered a scientific mechanism for marine policy in various countries(M.G, 2008). The Ministry of Oceans and Fisheries(hereinafter referred to as MOF) also has emphasized the necessity of an integrated MSD system(KIM et al, 2022). There are very few studies, however, which can explain how this system should be established. In this paper, we raise some research questions as below and propose institutional consideration of this topic.

2. Research Questions and Methods

The research question of this paper is what kinds of legal and institutional frameworks should be prepared for the integrated MSD system. To promptly support decision-makers from fragmented MSD thereby effectively convincing stakeholders based on MSP, the study shall proceed in the following way: first, We will examine the status of the MSP system in ROK; second, We will analyze related foreign cases; and third, We will conclude by delivering the insights into MSD system in ROK.

3. Status of ROKs MSP System

In order to introduce Marine Spatial Planning (hereinafter referred to as MSP) as a marine spatial management system, ROK carried out a pilot project called the establishment of a marine spatial management plan of Gyeong-gi Bay and based on these theoretical results, the Act on Marine Spatial Planning and Management was enacted in April 2018.

To thoroughly understand the Act on Marine Spatial Planning and Management, We need to analyze the relationship to other plans beforehand. From a legal hierarchical perspective, Marine Spatial Master Plans be established or amended in compliance with the purpose and basic ideology of this Act (MOF, 2021). According to Marine Spatial Master Plans, Where the head of a central administrative agency or the head of a local government intends to approve, formulate, or amend marine space use and development plans, or to designate or change any district, zone, etc in marine space, he or she shall, in advance, have a consultation with the Minister of MOF or obtain approval from it. As a result, a person who is willing to develop marine spaces needs consideration of whether one's action is suitable for 9 designated marine use zones as Fig.1 illustrated.

Under this legal system, the MSP is established by different subjects according to the marine boundary. To be specific, the minister of MOF formulates the MSP regarding other marine spaces prescribed by presidential decree, the continental shelf, and the exclusive economic zone. Excluding these marine spaces, mayors or Do-governors organize the MSP consult with the heads of the relevant administrative agencies, and undergo deliberation by the Maritime Affairs and Fisheries Development Committee.



Fig. 1. Process of MSP implementation(Left), Composition of 9 Marine Use Zones(Right)

MOF has operated an integrated marine spatial management information system to assess the characteristics of marine areas and designate marine use zones. There are some problems, however, regarding evaluating marine spatial characteristics and digitizing the conflicting index due to the dispersed MSD and the lack of specific standardized criteria to collect and utilize those (Chang et al, 2018). In addition, current guidelines allow the MSD to be excluded or redefined as similar ones to reflect the characteristics of the original one if it is impossible to collect or produce necessary MSD (MOF, 2019). It raises concern about the transparency and objectivity of the result. Furthermore, the fact that consultation on the suitability of marine space doesn't have compulsory enforcement makes it difficult on managing the implementation of MSP.

4. Related Foreign Cases

In order to overcome the above-mentioned limitations, it is necessary to compare the spatial information system of neighboring countries that have pre-emptively introduced MSP and the legal system supporting it. As the 1st marine spatial master plan emphasized the necessity of establishing an executive organization so-called control tower on MSP and improving the MSD system more integrated, this paper aims to analyze 3 countries' MSD systems and institutional frameworks that already have been managed. The research results will contribute to deriving the direction of our MSD system.

4.1 Japan

To improve the existing distributed administration system on marine policy, in 2007 Japan enacted Basic Ocean Law and Policy. Once the law have been implemented, Japan established comprehensive maritime policy headquarters and unified related administration. The advantage of this system is the smooth cooperation of related agencies on marine policy due to the organization of headquarters presided over by the prime minister and chief cabinet secretary. Among the main functions of the headquarters, the function related to MSP is to establish the marine spatial master plans for comprehensive management of the ocean. Also, the headquarters operate a marine data center to provide unified MSD. Following the instruction and mediation of the headquarters, related agencies enter the MSD and Japan Coast Guard (JCG) has been operating the Marine

Information Clearing House which is an integrated database site to provide a summary of marine information and how to get it since March 2010 based on Maritime Security Act(JODC, 2015). This site promotes the development of marine industries by providing general marine information from natural information such as water temperature to social ones such as related legal systems to the entire marine space.



Fig. 2. Example of Marine Information Clearing House.

4.2 China

China established an integrated national spatial planning system to solve the problem of complexity and overlap of the existing one(KIM et al, 2020). As part of this movement, the National People's Congress reorganized the State Council in 2018 and launched the Ministry of Natural Resources, which integrated the existing National Maritime Bureau and the Ministry of Land, Infrastructure and Resources in order to effectively manage marine space in an integrated manner. After that, the National Maritime Functional Division Expert Committee(hereinafter referred to as the NMC, National Maritime Commission) was established as a sub-organization of the Ministry of Natural Resources.

The NMC consists of the supreme leader of the provincial people's government, officials from each maritime administrative agency sector, and related experts. Under the Sea Use Management Act 2001, the Commission provides technical guidance to central and local governments for deliberation on changes to the establishment of the National Marine Functional Zone(hereinafter referred to as the MFZ) and provides general direction and consults on issues related to marine uses.

China established the National Marine Data & Information Service under the Ministry of Natural Resources so that the maritime affairs department can use marine space information when changing the establishment and implementation of MFZ. This is because the government has an obligation to monitor and supervise the current status of sea use by establishing a sea use management information system and accumulating marine space in a standardized manner in accordance with the Sea Use Management Act. For example, China has prepared standard guidelines for marine ecological surveys to collect information on marine topography and resource status. Based on this information, the government regulates specific activities that conflict with the purpose of MFZ and uses scientific data as a criterion for determining permission.

4.3 United States of America

Over the Deepwater Horizon-BP Oil Spill accident in 2010 at the Gulf of Mexico, the United States pointed out that individual maritime policies and law enforcement contain limitations in integrating marine-related problems. To establish countermeasures, the government established the National Ocean Council(hereinafter referred to as NOC) by integrating the main organizations of the existing maritime policy under the White House as shown in Figure 3.

The NOC is governed by the executive order Stewardship of the Ocean, Our Coasts, and the Great Lakes Act, and functions as a CMSP agency throughout the United States. The NOC sets up 12 basic principles on CMSP to provide basic guidelines to 9 Regional Planning Bodies(hereinafter referred to as RPB) made up of federal state Tribal Groups. These principles lay a foundation for the participation of RPB in the CMSP establishment process and provide a cooperative planning implementation system for each department based on National Ocean Policy. Through this criterion, the NOC ensures consistency between the federal and regional CMSPs and coordinates disputes over redundant use of the marine space.

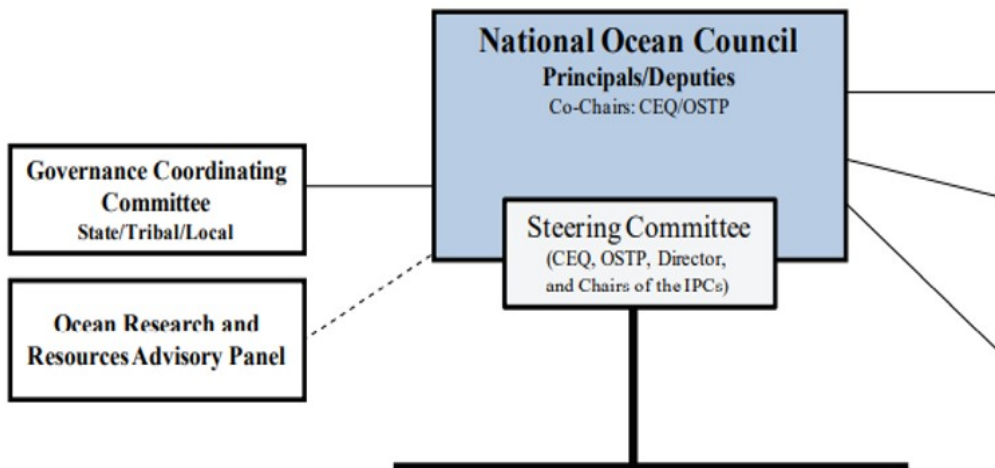


Fig. 3. Policy Coordination structure of NOC

In order to manage MSD necessary for CMSP establishment and implementation inspection, the United States prepared the Integrated Coastal Ocean Observation System Act and introduced the Integrated Ocean Observation System (hereinafter referred to as IOOS). Based on the Act, NOC is granted the authority to coordinate and supervise IOOS and delegates the practical operation of IOOS to the National Oceanic and Atmosphere Administration (hereinafter referred to as NOAA). Figure 4 shows a systematic basis for local planning agencies to provide the necessary information in a timely manner through IOOC to comply with NOC guidelines.

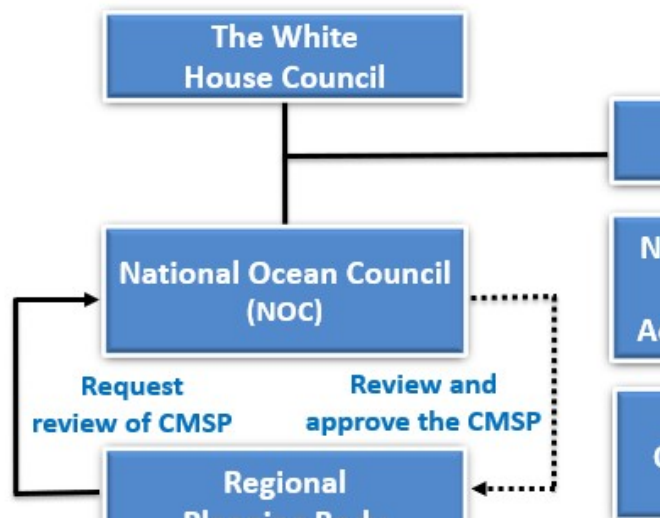


Fig. 4. CMSP system based on IOOS

5. Results

Through these steps, the paper has reviewed the empirical studies on how MSD systems might be operated in practice. Coupled with evidence that three countries have managed each MSD system in integrated measure, it is highly probable that the government shall integrate MSD from different organizations in a coherent manner. This is because these current separated data systems do not lend much support to direct decisions for policymakers.

Proceeding from what has been said above, it should be concluded that ROK should swiftly enact guidelines on collecting MSD and establish an executive organization. Furthermore connecting ordinary policy measures such as authorization or permission with this MSD system is important to secure the implementation of MSP. We can get a detailed idea of how the MSD system shall be advanced from digital cadastral spatial information service cases in terms of what Korea National Land Information Corporation (LX) already has been operating. By providing this system to citizens, administrative inconveniences decreased and land transaction costs were saved about USD 1.3 billion (LX, 2022).

If we introduce a digital twin simulator like territory ones in the MSP sector, the expected effects are not only shortening time on finding a suitable marine place to use and administration but also improving transparency of

decision-making based on scientific data. Utilizing open API in the MSP processes will enhance public acceptability and prevent social conflict through overall cyclical participation.

6. Conclusion and Future directions

Taking into account the results of the study, it is highly probable that ROK prepares the institutional framework of an executive organization for managing MSP. In this process, the main points as follows should be concerned: (1) the necessity to prepare standardization guidelines to combine distributed marine space information into an integrated one, (2) the necessity to establish a clause for securing implementation so that administration such as licensing can be conducted in connection with system scenarios.

Currently, ROKs MSP is intensively established along the coast. However, the continuous increase in demand for eco-friendly energy sources and the development of carbon capture storage installation technology implies that ROK will have no choice but to expand and establish MSP to exclusive economic zones in the future. In order to prepare for the establishment of transboundary MSP, sharing standardized MSD with coastal states such as China and Japan seems to be an important issue. Therefore, ROK needs to quickly improve the MSD system and prepare standardized guidelines to integrate MSD from different organizations. Then the system can be used as a basis for solving problems such as resource development and fishery resource protection in overlapping EEZ in the future.

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Author's Biography



Jin-kyung Kim is Master in Division of Marine Policy Korea Maritime & Ocean University, ROK, the first author of this research. Her master research focused on the improvement plan of the Act on Marine Spatial Planning and Management for Securing Effectiveness. Currently, her primary research interest is in Marine Spatial Planning, marine environment, and Law of the Sea, etc. She has been performing continuous projects on MSP in Marine Spatial Environmental Policy Research lab at the Korea Institute of Ocean Science & Technology(KIOST). She received the "Best Presenter" award in KOSOMES on the Yellow Sea Large Marine Ecosystem(YSLME) Project.



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