

Study on the Establishment of Foundation for Social Problem-Solving R&Ds in the Oceans and Fisheries Sector

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1. Purposes

- ▶ This study proposes policy alternatives to establish the foundation for national R&D projects which aim to address diverse social problems faced by the oceans and fisheries sector, thereby improving the quality of people's life.
 - First, this study identifies major social issues in the oceans and fisheries sector, and sets priorities weighed by the criteria of seriousness and science & technology-driven solvability.
 - Secondly, this study examines the current status of the social problem-solving R&Ds which are being undertaken in accordance with 'The 1st Basic Promotion Plan for Marine Science and Technology', and further systematically diagnoses imposed problems and limitations of the existing R&Ds.
 - Thirdly, this study proposes policy alternatives in three areas
 - legislation and regulation, governance building, and innovation for implementation process per R&D cycle, which all together

will serve as a platform to enhance the social problem-solving capability of R&Ds in the oceans and fisheries sector.

2. Methods and Features

1) Methods

Category	Purpose	Implementation method
Literature analysis	<ul style="list-style-type: none"> Analyzing the paradigm shifts of domestic and foreign science & technology policies for social problems Analyzing the major innovation methodologies 	<ul style="list-style-type: none"> Collecting and analyzing relevant research papers, national plans and policy data Extracting key elements of social problem-solving R&Ds
	<ul style="list-style-type: none"> Analyzing the current status and problems of domestic and foreign social problem-solving R&Ds 	<ul style="list-style-type: none"> Analyzing public announcement of projects, RFPs, and research papers, etc. Analyzing projects by the key elements of social problem-solving R&Ds mentioned above
	<ul style="list-style-type: none"> Analyzing the preceding studies on the concepts and types of social problems Extracting major social issues in the oceans and fisheries sector 	<ul style="list-style-type: none"> Deriving key elements to form the concepts of social problems Grouping major social issues extracted from legal/non-legal plans, diverse policy data, and research papers in the oceans and fisheries sector
In-depth interviews with experts	<ul style="list-style-type: none"> Analyzing the present status and problems of implementation of social problem-solving R&Ds per cycle (the oceans and fisheries sector and others) Collecting experts' opinions on strategies to establish the foundation for social problem-solving R&Ds in the oceans and fisheries sector 	<ul style="list-style-type: none"> Conducting in-depth interviews with 14 experts including science & technology policy researchers, R&D institution managers, corporate researchers, and officials in civic groups Reviewing the feasibility and effectiveness of improvement strategies suggested by researchers, and advancing such strategies

Category	Purpose	Implementation method
Expert surveys	<ul style="list-style-type: none"> Collecting experts' opinions on major social problems and implementation processes of social problem-solving R&Ds which are extracted via literature analysis mentioned above 	<ul style="list-style-type: none"> Setting priorities of total 46 social problems in 9 areas, judged by the criteria of seriousness, the necessity for budget setting, and science & technology-driven solvability Conducting surveys on experts' opinions and implementation processes regarding social problem-solving R&Ds in the oceans and fisheries sector
Expert consultation	<ul style="list-style-type: none"> Reviewing comprehensively analysis results of individual goals and validity of policy alternatives 	<ul style="list-style-type: none"> Consulting with researchers and officials of the national R&D policies in the oceans and fisheries sector

source: prepared by the author

2) Features

- ▶ This study has carried out in-depth analysis on science & technology policy theories, innovation methodology theories, and the evolution of domestic policies for social problems, allowing to extract the key elements of social problem-solving R&Ds. This study, therefore, contributes to form the concepts of social problem-solving R&Ds which would then be adopted in future R&D projects, thereby providing the foundation for planning R&D projects.
- ▶ As the first study on the subject of social problem-solving R&Ds in the oceans and fisheries sector in Korea, this study presents a comprehensive and multi-dimensional view of major social problems in the field.

- By applying the key elements to the existing individual R&D projects, this study provides a concrete analysis of the present status of project implementation and related issues. Further, incorporation of in-depth interviews with experts helps to provide comprehensive improvement strategies, hence enhancing applicability of the results of this study to policy making.

3. Results

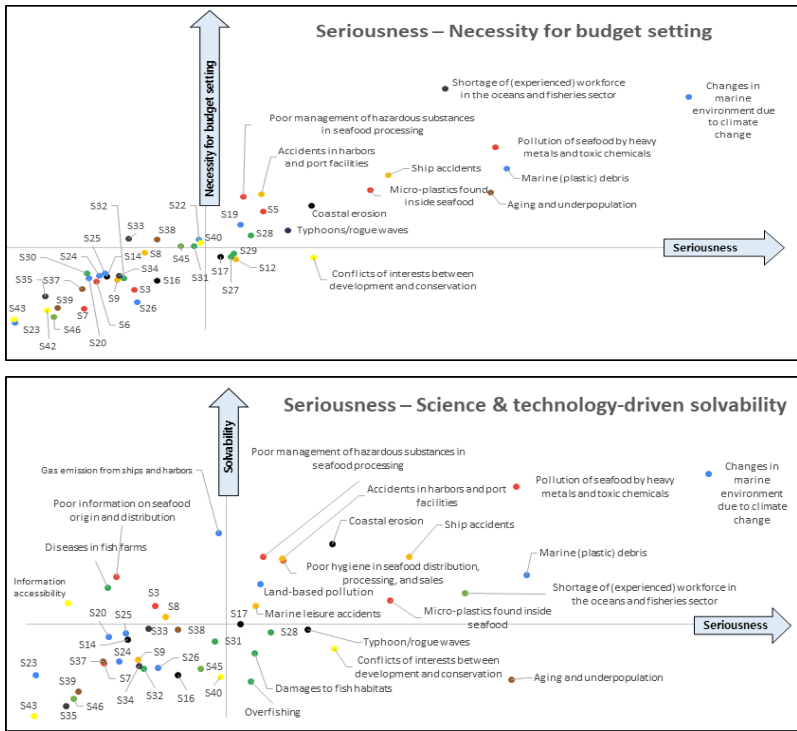
1) Summary

- This study has extracted total 46 major social problems from 9 areas in the oceans and fisheries sector, and then prioritized such problems based on seriousness, science & technology-driven solvability, and the necessity for budget setting.
 - Amongst the areas analyzed, the area of marine environment has ranked the highest priority on all three criteria mentioned above, followed by the area of health and safety.
 - Amongst the social issues analyzed, issues such as 'changes in marine environment due to climate change', 'pollution of seafood by heavy metals and toxic chemicals', 'marine (plastic) debris', and 'ship accidents' have ranked the highest priority on the criteria of seriousness and science & technology-driven solvability whereas such issues as 'aging and underpopulation' have found serious but would not be easily solvable by science & technology.

Category	Social Issues
Health (7)	1. Pollution of seafood by heavy metals and toxic chemicals 2. Micro-plastics found inside seafood 3. Seafood-borne diseases 4. Poor management of hazardous substances in seafood processing 5. Poor hygiene in seafood distribution, processing, and sales 6. Poor information on seafood origin and distribution 7. Influx of infectious diseases by cruise ships
Safety (5)	8. Fishing vessel aging 9. Job hazards of fishers 10. Ship accidents 11. Accidents in harbors and port facilities 12. Marine leisure accidents
Natural Disasters (5)	13. Coastal erosion 14. Coastal submersion 15. Typhoons and rogue waves 16. Submarine earthquakes and tsunami 17. Red tide and hypoxic water mass
Marine Environment (9)	18. Changes in marine environment due to climate change 19. Land-based pollution 20. Oils and HNS spill-based pollution 21. Marine (plastic) debris 22. Gas emission from ships and harbors 23. Power plant wastewater (hot and cold) 24. Shrinkage of salt marshes 25. Harmful marine organisms 26. International dispersion of pollutants
Fishery Resources (6)	27. Overfishing 28. Illegal fishing 29. Damages to fish habitats 30. Diseases in fish farms 31. Declines in fishery production 32. Reduction in the fishery biodiversity
Water Leisure (3)	33. Shortage of water leisure areas 34. Neglection of unused harbors and fishery ports 35. Obsolete tourism facilities, e.g., beaches
Fishing Community (4)	36. Aging and underpopulation 37. Shortage of daily life convenience infrastructure 38. Obsolete coastal transportation 39. Demands on conservation of cultural heritage and historic sources

Category	Social Issues
Social Cohesion (4)	40. Conflicts over marine activities 41. Conflicts of interests between development and conservation 42. Information accessibility 43. Multiculturalism
Labor (3)	44. Shortage of (experienced) workforce in the oceans and fisheries sector 45. Imbalance between supply and demand for seafarers 46. Human rights violation against labor minorities

Source: prepared by the author



footnote: Where each quadrant is crossed is estimated as 2.61 points, an average of weighted score

source: prepared by the author

- ▶ This study has extracted four key elements that social problem-solving R&Ds should employ to make practical contributions to problem-solving. They are ‘problem-oriented’, ‘solution-oriented’, ‘participation-based’, and ‘demand-based’ elements. With this point of view, the existing R&D projects in the oceans and fisheries sector that have been analyzed in this study have shown to meet such requirements poorly overall.
- ▶ In particular, major weaknesses are as follows: (i) lack of legal and institutional grounds for driving forward R&Ds; (ii) shortage of relevant organizations and workforce; (iii) poor implementation process of full R&D cycle – for examples, the absence of systems for identifying social issues and poor planning of R&Ds that are specialized in solving social problems; and (iv) lack of systems for utilizing R&D outcomes.

2) Policy alternatives

- ▶ This study has carried out theoretical researches on the science & technology policies that are intended to deal with social problems. In addition, this study has analyzed domestic and foreign R&D projects and policies, and reviewed the current status of implementation process of the projects in the oceans and fisheries sector. Lastly, this study has presented the policy alternatives that are largely grouped into three areas as follows: legislation and regulation, governance building, and innovation for implementation process per R&D cycle.

- First, the policy alternative concerning legislation and regulation suggests the followings: (i) amendment of the 「Marine Science and Technology Promotion Act」; (ii) employment of operational regulations on oceans and fisheries R&D projects.
- Secondly, the policy alternative regarding governance building includes the followings: (i) strengthening the policy-making function of the R&D head department in the Ministry of Oceans and Fisheries, thereby enhancing its role in social problem-solving; (ii) securing workforce dedicated to social problem-solving R&Ds in R&D management institution; (iii) organizing and operating the (tentatively named) Oceans and Fisheries Commission for Social Problem Resolution; (iv) expanding the social problem-solving function of public research institutions including government-funded research institutes.
- Lastly, the policy alternative with respect to innovation for implementation process per R&D cycle ensures the followings: (i) discovering demand-oriented social problems; (ii) developing user-centered social and technological plans; (iii) installing implementation process of user-centric participatory R&Ds such as living labs; (iv) developing systems to evaluate R&D performances while taking account of the characteristics of individual social problem-solving R&Ds; (v) utilizing and promoting R&D achievements through appropriate follow-up projects.

3) Expected contributions to policy-making

- ▶ Through in-depth evaluation, this study has diagnosed the

current social problem-solving R&Ds in the oceans and fisheries sector to be at the initial stage of development. This study has also proposed strategies to improve R&Ds, including innovative implementation process which is expected to enable R&Ds to solve social problems effectively, and clear allocation of the roles of corresponding parties.

- Further, this study has suggested science & technology-driven strategies to handle continuously accumulating and constantly newly unfolding social problems in the oceans and fisheries sector. In total, it is certain that this study will help to advance social problem-solving R&Ds to the next level, and to expand the capacity of the social problem-solving ecosystem.