

Global discourse on the ‘Blue Economy’ and the need of a paradigm shift for Korea’s ocean development in Africa

What is the blue economy?

The blue economy, a recently developed concept by the international community, is an inclusive term to comprise the range of socio-economic policies that affects to the ocean sustainability. Although this is not a novel concept, the international community argues that a tinge of “blue” can be a paradigm shift to catalyze ocean-based development projects. It is similar to the frame of “sustainable development,” but putting more emphasis on ocean-oriented industries. It covers traditional ocean activities such as fisheries, marine-based tourism, green maritime transport, while it also includes emerging sectors such as offshore renewable energy, seabed mining, marine biotechnology etc. According to the OECD, the ocean economy’s direct contribution to the world economy is 1.5 trillion dollars as of 2010, which is about 3% of the world GDP1), when measured very conservatively. Also, ocean-based industries contributed to more than 31 million full time equivalent jobs.2)

African package for climate resilient ocean economies

In the African context, the blue economy has more significance in ensuring food security and its livelihoods. 38 of the 54 African countries are coastal states, and more than 90 per cent of Africa’s trade is conducted by sea.3) The impact of climate change is particularly vulnerable to coastal communities in Africa, and the fish catches will be possibly drop by half before 2050, if current practices are continued.4) Therefore, the World Bank, the FAO, and the African Development Bank initiated a set of programs to develop the ocean as a source of jobs and competitiveness under the frame of the blue

economy. The current blue economy portfolio in Africa is 330 million dollars, and a further 450 million to be approved in 2018 and 2019. The package is composed of 5 regional flagship programs, and most of them starts with a priority on fisheries, aquaculture, climate change and the tourism sector.

The need of Korea’s engagement to blue economy projects

This platform provides a great opportunity to expand our capacity in global development. Korea has been conducting a number of development projects in the ocean and fisheries sector in Africa. However, due to the fragmented governance structure in Korea’s ODA, the importance of ocean development is comparatively neglected and its full extent is still controversial. In addition, our ocean ODA in Africa is weighted to material support. In this sense, this emerging development paradigm can be a driving force to scale up the ocean cooperation and act as a shift to the existing paradigm. Particularly, Korea, based on the platform of the blue economy, can share our own experiences in developing ocean policies such as value-added seafood processing, resource management, MCS (monitoring, control and surveillance) measures etc. In parallel with the bilateral instruments, we need to leverage this platform not only to expand the scope of our development capacity, but also to overcome domestic budget constraints.

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| 1) OECD(2016), *The Ocean Economy in 2030*, OECD Publishing, Paris.  2) PPT materials in “The Future of the Ocean Economy: exploring the prospects for emerging ocean industries to 2030,” April 27, 2016, Seoul.  3) UNECA(2016), *Africa’s Blue Economy: A Policy Handbook*, ECA Printing and Publishing Unit, Addis Ababa  4) http://www.worldbank.org/en/news/feature/2017/06/07/new-hope-for-sustainable-fishing-and-a-blue-economy-for-west-africa |

Shipping Liners, Starting the Competition to Cut Carbon Emissions

Global shipping companies starting to cut carbon footprint in accordance with IMO regulation

International transportation by ships are emitting as much carbon as that by aircrafts. That is why members of the International Maritime Organization (IMO) have agreed to reduce greenhouse gas (GHG) emissions from ships by 50% compared to 2008 levels by 2050. Global shipping companies have already started a competition for reducing carbon emissions from approximately 50 thousand ships including tankers, cargo ships, containerships and ferries by developing a new technology etc.

Carbon emissions from international shipping currently contribute an estimated 2% of global carbon footprints. The international body unveiled this strategy since the Paris Agreement left control of carbon emissions emitted from maritime transport to IMO. IMO also established a detailed strategy to implement the reduction of GHG emissions by 2030. Although environmental organizations welcome the reduction strategy, they pointed out that it falls far short of the pledges of EU and island countries who promised to cut GHG emissions by 70%.

According to a report published right before the International Transport Forum (ITF), the shipping industry is capable of reducing as much as 95% of GHG emissions by 2035 when deploying already developed technology. From the perspective of low technology solutions, world’s leading shipping liners such as Maersk can immediately reduce 30% of fuels by moving steam engine a little bit slower. Furthermore, the leaner and narrower the hull of a ship is, the fewer fuels it consumes.

Banishing conventional ships and rising eco-friendly ships

According to Sustainable Shipping Initiative, conventional ships powered by oil will disappear, while eco-friendly ships are going to fill the vacuum. Furthermore, hardliners of the shipping industry including cruise liners and commercial shipping companies strongly argue that the shipping industry should grow through various innovation ranging from biofuels to LNG.

For instance, LNG has positioned itself as an epitome of innovation. There are already hundreds of LNG fueled ships operating across the world. In 2022, MSC Cruises is going to operate a LNG-powered mega cruise ship that is able to carry 7,000 passengers. Viking Grace, the world’s first LNG powered cruise ship, has another special feature; This LNG-fuelled ferry is the first passenger ship in the world equipped with a rotor sail for wind-assisted propulsion, operating routes between Finland and Sweden. These vessels install a pair of vertical, rotating cylinders at the center of passenger ships. As they would spin, the rotors would generate vertical force, pushing the ship forward. This principal is called the ‘Magnus effect’. The Viking Line says the extra power will reduce the ship’s CO2 emissions by 1,000 tons per year.

Putting together better designs and better fuel will create entirely new kinds of ships in future. The Aquarius Ecoship, a cargo ship devised by a Japanese company called Eco Marine Power, is driven by a phalanx of rigid sails and solar panels. The same system could power oil tankers, cruise ships and much else. Even with large batteries to store the solar and wind energy, back-up would be needed. But it could cut emissions by 40 percent.

A Japanese shipping line NYK boasts that its design for a 350m-long container ship, the Super Eco Ship 2030, would use LNG to make hydrogen to run fuel cells. Backed up by solar panels covering the entire ship and 4,000 square meters of sails to catch the wind, the combination could cut emissions by 70%. Wallenius Wilhelmsen, a Scandinavian shipping line, offers the E/S Orcelle, a lightweight cargo ship designed to

<Eco-friendly ships>

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1) Source for images of Viking Grace and Rotor sail: <https://gcaptain.com/viking-grace-becomes-first-passenger-ship-to-use-rotor-sail/(Sear>ch date: 2018.5.14)

2) The Aquarius Ecoship of Japanese Eco Marine Power: Source: http://www.ecomarinepower.com/en/aquarius-eco-ship

3) NYK Super Eco Ship 2030: Source: https://www.elomatic.com/en/industrial-sectors/marine/marine-references/marine-concepts-references/nyk-super-eco-ship-2030.html

4) Wallenius Wilhelmsen E/S Orcelle: Source: https://www.marineinsight.com/green-shipping/top-5-zero-emission-ship-concepts/attachment/es-orcelle-2/

transport up to 10,000 cars (electric, we trust) on eight decks. It would be powered by electricity, half coming directly from wind, solar and wave energy, and the other half from converting some of that energy into hydrogen to power fuel cells. The company says the ship could be afloat by 2025.

IMO’s global climate agenda will become a norm

Following IMO’s environmental regulations taking into effect, South Korea also has concentrated to eco-friendly ships. Hyundai Global Service signed a MOU with Dorian LPG of the US, undertaking a project for upgrading dual-fuel engines powered by LPG. Targeting to expand the project for upgrading eco-friendly ships, this strategy aims to provide the design, installation and all the way to A/S of eco-friendly devices.

Today’s ships are in many respects almost indistinguishable from those of a century ago. But the IMO decision to finally get with the global climate agenda has fired the starting gun on what is set to be a race to create a new standard for low-carbon shipping that should be the norm just a few decades from now.

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A Direction of the Oil Tanker Market Following the Resumption of US Sanctions on Iran

Renewed economic sanctions on Iran following the US withdrawal from the JCPOA

President Donald Trump of the United States announced that the country is withdrawing from the Iran Nuclear Deal, based on the decision that Iran has continued nuclear-related activities. As a result, the US will re-imposed economic sanctions after a 6-month grace period targeting sectors including energy resources, petrochemical products, finance and shipping. Following the decision on the resumption of U.S. economic sanctions on Iran, companies doing business with Iran have phase out deals and businesses for the 6-month grace period. Doing otherwise, companies doing business in dollars or operating offices within the US will be banned from accessing the US banking and financial systems.

Iran’s oil production already fell resulting from the US economic sanctions prior to the agreement of Iranian Nuclear Deal. Many analysts expect that the resumption of sanctions will bring down the production on average from 200,000 b/d to as high as 1 million b/d.1)

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| 1) https://www.hellenicshippingnews.com/tanker-owners-shouldnt-panic-over-iran-affair-claims-shipbroker/ |

US sanctions on Iran to have limited effect on the crude tanker market unless other European and Asian counties take sides with the US

Various institutions including a London based shipbroker Gibson analyzed the impact of resumed economic sanctions against Iran on the tanker market based on experience and tangible data. The result shows that the decision will not have a significant impact to the tanker market. Since Europe and Asia have not fully participated to the sanctions, the impact resulting from economic sanctions will not be prominent. Furthermore, China has made it clear that it will continue to import Iranian crude oil as long as the Nuclear Deal remains. European countries also seem not to agree with economic sanctions imposed by the US.

As long as Europe is in JCOPA and European insurance companies keep providing insurance coverage for Iranian crude trade, the impact on Iran’s oil exports will be modest. Turkey, France, Italy, Spain and Greece are the key consumers of Iranian crude oil in Europe, accounting for about a third of total Iranian exports. While Turkey is expected to continue to import Iranian crude, integrated oil companies (IOCs) and refiners in Europe with footprints in the US will feel the heat of US sanctions. Still, as the volume of Iranian crude imports by IOCs is very small, the overall impact will be modest. Even if European countries align with the US, scrapping JCOPA, the impact on Iranian exports will still be lower than the previous sanctions as China, which imports massive amount of crude oil, will continue to import Iranian crude.

Limited operation of Iranian oil tankers will have a positive impact to the global VLCC market

The more Iranian exports decline, the bigger the reduction in crude tanker demand. However, other producers are likely to compensate for any lost Iranian barrels. Furthermore, one must consider that a significant proportion of Iranian exports are carried on Iranian tankers. If exports increase from elsewhere, for example Saudi Arabia to compensate for lower Iranian volumes, then these volumes will not be carried on Iranian vessels – so international tanker owners will benefit. Whilst sanctions may be marginally beneficial for VLCCs, the benefit for the Suezmax sector is less clear. If Saudi Arabia makes up the lion’s share of lower Iranian exports to the West, then the Suezmax market might surrender some market share to the VLCCs.

Additionally, any decline in Iranian crude exports would lead to the return of about 17 of National Iranian Tanker Co (NITC) vessels to floating storage, reducing tonnage supply in the market. As NITC only operates 8 Suezmaxes, there is unlikely to be much impact on fleet supply”.2)

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| 2 https://www.hellenicshippingnews.com/us-sanctions-on-iran-to-have-limited-effect-on-crude-trade-and-tanker-demand/ |

The Purpose of M&A between shipping liners is shifting from raising sales to expanding business areas

Change is underway in M&A among shipping companies

Change is underway in M&A among shipping companies. The purpose of conventional M&A carried out so far would be to gain economies of scale with increasing its sheer size. Recent days, shipping companies are seeking consolidation for economies of scope by expanding business areas.

Economies of scale is a term that refers to the reduction of per-unit costs through an increase in production volume. Since fixed costs are costs that do not change when output changes, larger the production volume is, lower its cost will be. When a company manufactures a product, or offers a service, it creates a certain cost, which includes fixed cost generated regardless of production volume. An increase in production reflects a downward trend on average fixed cost, consequently reflecting a downward slope on the curve. The larger the size of transportation services carried out by a shipping company, the lower an average cost will be which is able to improve the company’s financial result.

The theory of an economy of scope states the average total cost of a company's production decreases when there is an increasing variety of goods produced. Economies of scope give a cost advantage to a company when it produces a complementary range of products. For instance, meat processing companies are able to reduce costs by cutting down fixed costs when they manufacture cowhide belts along with meat packing and sales of meat products.

Shipping companies’ increasing entrance into logistics business

The initial public offering (IPO) of CEVA Logistics (CEVA), a European logistics firm, was launched on May at Swiss Stock Exchange. The reason that this news has received so much attention is that CMA CGM, which owns the third-largest refrigerated containers in the world, announces it has reached an agreement to acquire an equity stake of nearly 25% of CEVA.

There has been global container shipping companies, representatively Maersk Line and NYK, which have strived to expand business areas into logistics beyond shipping. On the other hand, some companies have concentrated their efforts solely to core container shipping business. As CMA-CGM, widely known as a global leader in core container shipping, has announced to acquire stakes of CEVA Logistics, this comes as a kind of surprise to the market.

It is too early to make any conclusion on what shipping companies’ equity investment (such as CMA-CGM) into a logistics company will bring about in the future. However, such investment is a strategic move so that CMA-CGM is expanding business areas, diversifying its businesses.

Shanghai-headquartered COSCO Shipping also has purchased two logistics firms, including land-based transportation company in 2017. Experts forecast that an increasing number of global shipping companies, which have solely focused on shipping, is likely to enter into logistic business.

Shipping companies’ expansion of business areas is a matter of course

Until now, M&A has been an obvious trend for companies to secure economies of scale. From now on, it is a matter of course that shipping companies are seeking for business expansion, moving beyond size expansion.

Indeed, the M&A market has been brisk between major shipping companies and logistics firms. Large European shipping companies such as Maersk Line, MSC etc. are continuously purchasing mid-to-large forwarders in European region. In 2017 Maersk has teamed up with the Chinese e-commerce giant Alibaba, expanding its business areas into e-commerce logistics business.

The shipping industry is witnessing a change in its M&A trend from growing its size to expanding business areas. Shipping companies are explaining that seeking for the economies of scope such as logistics business etc. is the only option to reduce costs amid long-term market recession and able to survive from fierce competition. All eyes are on major global shipping firms concerning how far the expansion of logistics companies will reach.

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Russia to restrict shipment across Arctic only to Russian vessels

Restrict shipment across the Arctic only to Russian vessels

The Russian government has finalized plans to nationalize shipment of natural resources along the Northern Sea Route across the Arctic. This policy, concluded in May by the Putin administration, will be applied to new shipping contracts signed as of January of 2019.

Accordingly, the Yamal LNG project already under operation has been exempted from the ban on foreign ships traversing the Arctic because the contract was signed prior to the new restriction. However, with the “Arctic LNG-2” project, a follow-up of the Yamal LNG project, to be launched by 2022, the new measure is likely to be applied to icebreaking LNG tankers sailing along the Northern Sea Route.

In December 2017 the Russian government announced this proposed restriction and in May 2018 granted the final approval to its implementation. The restriction is applied to all vessels shipping gas, oil, and coal produced in Russia and traversing the route across the Arctic. Under the measure, only Russian vessels may travel all sea lanes from the first loading to the final unloading port.

Tighten protectionism in the shipping industry

According to the decision made in May 2018, the Russian government plans to allow shipment of natural resources only by Russian vessels and introduce a bill specifying that ships passing through the route must be built in Russia. This demonstrates Russia’s plans to strongly enforce protectionism for its national shipping industry. In this context, Russia plans to pass a relevant bill into law by January 2019.

The Zvezda shipyard in the Far East of Russia is the most promising candidate for a shipbuilding complex. The shipyard has served as a ship repair base with its expertise in nuclear submarine repairs. However, under the new protectionist measure, the Far Eastern shipyard is currently expanding its shipbuilding equipment and facilities. The complex is also pushing ahead with efforts to strengthen a partnership with South Korea’s shipbuilders such as Daewoo Shipbuilding & Marine Engineering. The purpose is to acquire diverse shipbuilding technologies such as LNG tanker-building technologies.

Russia’s shipping and shipbuilding industries have been in the doldrums due to economic sanctions imposed by Western countries. According to an analysis by experts, Russia has devised the new shipment measure as a strategy to foster its shipping and shipbuilding companies, including Sovcomflot, a state-own maritime shipping company.

Problems expected to arise out of shipment nationalization

The matter of the greatest concern over Russia’s shipment nationalization is to raise finance for building new tankers. Russia has risks for investors, such as uncertainty over its relationship with the West and ambiguous and complicated law. Thus, experts say that only Russian financial institutions can provide shipping finance against the risk of only Russian-registered vessels being allowed to ship along the Northern Sea Route.

An official from an EU financial institution commented, “Seizing Russian-registered vessels by financial institutions is an extremely rare case which is unprecedented for either Japanese or American financial institutions.” And “Even Chinese financial institutions which have established a favorable relationship with the Russian government would not actually execute the seizure of foreign vessels.” He added.

In addition, Russian financial institutions have a shortage of finance and a relatively higher interest rate, posing a challenge because a huge amount of money is required to build icebreaking LNG tankers capable of sailing across the Arctic Ocean. In this respect, given that finance should be provided for building a large fleet of tankers, not for building one or two vessels, it is impracticable to grant the right for such financing only to Russian financial institutions.

In response, shipping companies worldwide find a way to avoid the restriction measure from the fact that the rules announced by the Russian government do not include regulations on ship management firms. One practical option is to establish a ship management firm in Russia. Accordingly, foreign shipping companies plan to establish ship management firms as subsidiaries in Russia and register the nationality of their vessels sailing across the Arctic as Russian. This way, they plan to open the way for providing finance for projects in Russia.

Meanwhile, the Russian government’s restriction measures includes a provision of “exceptions when the Russian government acknowledges its necessity”. Although all depends on the decision of the Russian government, many global shipping companies plan to continuously calling for the application of the exceptional provision and alleviating the level of restriction.

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Legislation of ‘Act on the Marine Spatial Planning and Management’ and Future Tasks

Need of a paradigm change in marine spaces

Having regarded as the last frontier on earth, the ocean is considered as a rich repository of natural resources as well as an important source of food. Recently, there have been increasing attempts of utilizing the potential of the ocean for resource. Mainly, there are three reasons that the ocean has become a major ground for economic activities.

First, rapid development of scientific technology has raised the potential for exploration and development into deep-seas, open oceans and even arctic areas. Second, while rising population and economic development has increased the demand for resources, the amount of resources on land is decreasing. Third, the ocean plays a significant role in responding to climate change. With the rising importance of the ocean, the demand for utilizing them is also significantly rising. At the same time, conflicts are deteriorating. Following the rising demand for developing marine spaces and deteriorating conflicts, marine spaces have come under complex and strong pressure never seen before. This also leads to damaging marine ecosystems and falling service values.

Conventional methods of ocean management can no longer enrich human lives in a sustainable manner. Therefore, it is necessary to establish Marine Spatial Planning which encompasses all sea areas.

Legislation of Marine Spatial Planning Act

There is a growing consensus that marine spaces require comprehensive management as public good. The Coast Management Act, currently in force, has served as a basis law for effective preservation, use and development of coasts for the last two decades, playing its due parts. However, this law alone has failed to encompass all sea areas including Exclusive Economic Zones (EEZ), having limitations in terms of scientific evaluation and developing implementation measures.

That is why the Korean government has legislated the ‘Act on the Marine Spatial Planning and Management’ (hereinafter Marine Spatial Planning Act) last April in order to systematically manage marine spaces. The legislation of the Marine Spatial Planning Act provides a legal foundation to expand the management scope into wide marine spaces where the Republic of Korea is able to exercise its jurisdiction and manage marine spaces considering the demand of marine resources. The legislation has offered a major breakthrough to marine spatial planning, shifting from ‘use after occupancy’ into ‘planning first, development later’ by considering spatial characteristics and value of ecosystem.

Future tasks following the legislation of the Marine Spatial Planning Act

The purpose and method of introducing marine spatial planning vary individual countries depending on management conditions. However, general process usually follows the order of conducting pilot projects for accumulating experience, establishing plans in earnest, institutionalizing and implementation stage. The Ministry of Oceans and Fisheries pushed ahead a pilot project to develop a marine spatial planning system befitting to the Korean environment. The purpose of pilot project is to enhance executive ability by understanding scientific and political conditions before the adoption of relevant systems, coming up with feasible response measures. Carried out over two years, the pilot project includes the development of a model and methods during the first year. And during the second year, the government prepared a comprehensive zoning system focusing on marine activities, and implemented it. The pilot project has allowed identifying elements necessary to organize a planning model and its operation, hence able to draw implementation tasks for adopting and operating relevant policy.

First, marine spatial information is essential for sustainable use and development of marine spaces. Marine spatial management should be accompanied by tools for behavioral management. The spatial management is effective only when the use and establishment of the information are taken into account as the basis of behavioral management. Organizations including Korea Hydrographic and Oceanographic Agency, National Institute of Fisheries Science and Korea Marine Environment Management Corporation collect and manage marine spatial information. Until now, much of the marine spatial information has been produced and established. However, spatial information on human activities taking place at the ocean is insufficient compared to marine environmental or marine physical information. In addition, there are a lack of cases in which marine spaces are utilized for diagnosis, evaluation and forecasting. Therefore, it is important to establish marine spatial information as a way to serve the purpose of marine spatial planning. Instead of simply providing locational information of activities, the system should be able to offer the degree and level of activities. Together with applying agreed data standards, marine spatial information separately managed by institutions or sectors should be provided.

Second, effective implementation of zoning system focusing on marine activities is essential. Identifying the use and managing by zoning certain areas is crucial; it recognizes important spaces of the ocean, while monitoring any activities degrading or having an impact to the functions of these spaces. Globally, marine spatial planning carried out by individual countries includes the following areas; marine preservation, fishery and aquaculture, maritime transport, oil and gas exploration, colleting aggregate, developing ocean energy, marine leisure and tourism, marine landscape and cultural asset, and submarine cable and equipment. Korea has adopted marine spatial planning for coordinating the conflicts of activities and promoting sustainable use of the ocean. Therefore, it is necessary to come up with a zoning system that encompasses various marine activities. The Marine Spatial Planning Act includes 9 types of ocean zoning; Fishery Activity Protection Zone, Aggregate and Mineral Resource Development Zone, Energy Development Zone, Marine Tourism Zone, Environment and Ecosystem Management Zone, Research and Education Preservation Zone, Port and Navigation Zone, Military Activity Zone, and Safety Management Zone. One of the most important elements of ocean zoning, which is a key to marine spatial planning, is to develop evaluation process and methods for designation. At the same time, relevant officials should also consider management standards after designation as well as specific measures for its management

Third, following the legislation of the ‘Marine Spatial Planning Act’, it is necessary to restructure relevant systems considering changing conditions of coastal and marine management. While concentrating the management on land- and sea- areas adjacent to coastal lines, the top priority task is to revise the ‘Coastal management Act’ by including new management issues, such as waterfront spaces, landscape and restoration etc. The Marine Spatial Planning Act has been established by taking over a planning system of the ‘Coastal Management Act’. Therefore, it is important not to create any vacuum in the works of coastal management system. At the same time, it is essential to create consensus and promote awareness on the policy from relevant officials of regional and local governments.

Fourth, it is necessary to establish a dedicated organization for marine spatial planning, laying the foundation for participation and cooperation. Together with the legislation of the law, it is necessary to establish (tentatively named) the Institute for Marine Spatial Planning Assessment. While comprehensively managing dedicated organizations for marine spatial planning as well as marine spatial information, this institute aims to evaluate spatial features and review the feasibility of development plans for using marine spaces carried out by other departments. At the initial stage, the government should take a leading role, inducing a successful landing of marine spatial planning. In the mid-to-long term, strengthening the capacity of local governments is important as a main agent of planning and implementation. Success of marine spatial planning system ultimately hinges on how to coordinate various interests relevant to marine use, drawing agreement among stakeholders. Therefore, participation of stakeholders should be guaranteed in the process of marine spatial planning, especially at the beginning stage. Although the cause for comprehensive management of marine spaces is important, it should be implemented after going through sufficient time for hearing the voices of the field and region.

Targeting all marine spaces, the Marine Spatial Planning Act encompasses contents relevant to various marine activities. Therefore, it is natural to face a little confusion at the initial stage of implementation. In the process of legislation, however, this act has gained a public consensus as an important law for the future of the ocean as well as a key to joining the ranks of advanced countries in maritime sector. Therefore, the Korean government should put its best efforts to make the Act to settle early through public promotion and raising awareness.

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Measures for the Development of Marine Science and Technology based Service Industry

1. Purpose

○ This study clarifies the concept of marine science and technology based service industry and examines the current status of the industry. In doing so, it aims to identify the role of the government for the industrial development.

- Identify the characteristics of marine science and technology based service industry as well as the development status by each type of major service industry

- Examine the barriers for the development and innovation of Korea’s marine science and technology based service industry, and draw the role and tasks of the government for addressing these factors

2. Methodologies and Features

1) Methodologies

○ The review of domestic and foreign literature is at the center of the research work to study the concept of marine science and technology based service industry and the current status of each industrial type.

- Related papers at home and abroad, academic writings including journal papers and separate volumes, various government policy materials containing related laws and plans, reports published by international organizations such as EU and OECD, research papers published by domestic and foreign research institutes as well as public organizations, background materials of domestic and foreign companies and materials of corporate associations, and internet search materials etc.

○ Researchers visit and investigate major companies of marine science and technology based service industry by type

- Conduct in-depth interview with key representatives of the companies who are well aware of their works and management rules, including CEOs

○ Survey was carried out to several marine science and technology service companies

- Investigate the routes a company was established, products and providing services, the current status and prospects of major domestic and foreign markets, cooperating or competing companies and hindrance to innovation

2) Features

○ The subject of this study is science and technology based service industry which is not restricted to existing sectors such as shipping, port, fisheries and shipbuilding but penetrates the overall ocean industry. This is the first policy research in Korea which intends to summarize all the way from basic concept to policy direction under the subject of science and technology based service industry in the ocean industry.

- Until now, the policy research in ocean industry has largely been carried out individually for traditional industries such as shipping, port, fisheries, etc.

- From the perspective of utilizing the knowledge on marine science and technology, the study is related to policy research of knowledge-intensive service industry which has been mainly conducted in other industries.

3. Results

1) Summary

○ The marine science and technology based service industry has developed on the back of rising economic activities related to ocean. Globally, the industry is estimated to be recently developing faster than other ocean-related industries.

- The industry is rising based on the historical trend of world economy; the spread of knowledge economy and great unbundling of production.

- The marine science and technology based service industry is driving the development of the overall ocean industry through mutual synergetic effect with other ocean industries.

○ (Definition) The marine science and technology based service industry is intensively using science and technology related knowledge, producing relevant services necessary to ocean-related economic activities (for the purpose of providing external users).

- Its concept is consistent with knowledge-intensive business services (KIBS) or knowledge intensive service activities used in EU, OECD, etc.

- The marine science and technology based service industry only includes the services being provided to external users therefore, excludes the knowledge-intensive service internally procured.

○ This study classifies marine science and technology based service industry into four categories; plan·design· research and development, marine science survey· research, ICT service, ocean works·technology support.

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| Service type | Detailed services |
| Plan·Design·R&D | Planning, feasibility study, basic design, acting R&D |
| Marine science survey·  Research | Marine survey, observation, exploration, monitoring, measurement, marine science research |
| ICT service | Software, system development |
| Ocean works·  Technology support | Technology consulting, inspection, auditing, authorization, purchase procurement, safety management, test driving, installment, operation, maintenance, dissolution |

- Companies under the type of planning·design·R&D are able to conduct basic design in some areas, such as shipbuilding and ocean facilities. Overall, however, it is important for them to build a capacity for basic design and FEED, entering into the global supply chain for future growth.

- Companies under the type of ocean science·research are generally limited to domestic market with a large proportion taken up by public demand. Therefore, individual companies need to enhance specialty and differentiation through specializing in marine science and technology.

- The type of ICT services is expected to undergo innovation and market expansion owing to new technologies, such as virtual and augmented reality, internet of things, big data, etc. as well as the convergence of ocean industry. However, companies providing ICT service should respond to environmental changes as large telecommunications companies are advancing into the marine industry.

- Companies under the type of ocean works·technology support have various kinds of industrial sectors with each of them facing different conditions. Ship management service and waste treatment service, etc. are restricted to domestic market in their works. However, some sectors such as laying submarine cables are actively entering into overseas markets including the Middle East, etc.

○ The study confirmed that the science and technology based service industry including the ocean sector has high potential for growth. And policy efforts are actively underway both at home and abroad.

- The ocean industry is expected to grow faster than GDP growth of Korea. Also, OECD estimates that the added-value of the ocean industry will double by 2030 from the level of 2010 in the global market.

- Having recognized the importance of knowledge service industry since the 2000s, the Korean government including the Ministry of Trade, Industry and Energy (MOTIE) has started to prepared relevant laws and institutions, such as the Contents Industry Promotion Act and the Industrial Convergence Promotion Act for industrial promotion and support.

- Advanced countries in ocean sector such as the UK and Canada are establishing a systemic strategy on marine science and industry, while promoting the cooperation between private and public sector for the development of marine science and technology based service industry. In particular, much emphasis is focused on pioneering foreign markets.

○ It is necessary to nurture service industry specializing in marine science and technology. Under the current legal, institutional and policy structure, however, it is more appropriate to guide a direction rather than to provide a comprehensive and specific remedy.

- Therefore, three policy directions are suggested; 1) improving the policy of marine science and technology, 2) strengthening the role of marine science and technology based service industry in ocean industry policy and 3) systemizing and expanding corporate supporting programs.

- Since specific policy tasks should be drawn from follow-up research, the study intends to suggest the overall direction for 15 tasks which are derived from this study

2) Policy contribution

○ Provide the meaning and importance as Korea’s first policy research regarding the marine science and technology based service industry

○ Build a solid foundation for follow-up studies and establish national policy related to marine science and technology based service industry as the importance of the industry is likely to increase in the national economy

3) Expected benefits

○ Establish and implement a systematic policy on marine science and technology as well as the ocean industry considering marine science and technology based service industry

○ Address barriers preventing innovation and development of marine science and technology based service companies through the government’s policy on the industry

○ Effectively support timely entrance to overseas markets and global supply chain depending on the type of marine science and technology based service industry

● Consignment project on the development of port hinterland complex

● A study on the measures to accelerate the cooperation between ports in Northeast Asia

● A study on the development of response strategies for WTO negotiation on fisheries subsidy

● A Study on the establishment of maritime and fisheries development plan in Jeollabuk-do

● International cooperation and institutional framework for the promotion of Arctic policy in 2018

● Survey on operation status of port hinterland complex and study on measures to improve its competitiveness

● A study on the introduction of total pollution loads management in Ulsan coastal and Gwangyang Bay special management waters of 2018

● A study on the implementation of total pollution loads management in Masan Bay special management waters of 2018

● A study on Improvement measures on pricing system of charging exclusive use on public waters

● Risk communication projects of 2018

● The development of next generation fishing vessels customized to Korea and its demonstration (2nd year of 2018)

● The operation of international logistics investment analysis center in 2018

● Maintenance and management of sharing system for global logistics information in 2018

● A Survey of national transportation of 2018

● The second status survey on uninhabited islands (1st year)

● Korea-China-Japan transportation and logistics cooperation measures (8th)

● A feasibility study for regular reflection of the Basic Plan of Public Waters Reclamation

● A study on measures for attracting and expanding cruise tourists

● A master plan for establishing the National Maritime Museum (tentative) and its feasibility study

● A study on designation, preservation and management of protected marine life in 2018

● A study on response measures following the expansion of evaluating fishing environments

● Evaluation on the pilot project of World Fishery University and consulting

● A Study on responses for IMO member state audit

● A Survey on the management status of fisheries resource protection zone and selecting management standards and evaluation methods

● A study on countermeasures of bilateral/multilateral FTA and WTO systems for allowing maritime and logistics companies to enter into the Eurasian market

● A study on the strategies of connected development between Korea’s major industries and ports

● A policy study for rearranging legal systems for the management pollutants emitted from ships and response to climate change

● A study on the establishment of basic plan for new ports and reestablishing its functions

● Changes and responses of regular shipping liners (Korean shipping companies’ strategies for the 4th Industrial Revolution and countermeasures)

● Analysis on the changes of living spaces in fishing communities of islands

● A study on the establishment of Shipping Industry Vision 2030

● A plan for implementing the study on comprehensive plan for the development of island areas in Taean

● A study on the establishment of maritime and fisheries development plan for Gyeongsangnam-do

● A study on strengthening the international cooperation to facilitate the advancement to Arctic routes

● The establishment of a basic plan for the development of fishing communities and ports in Chungcheongnam-do (1st round in 2016, 2nd round in 2017)

● A study on the permanent continuance of Jeju Special Economic Zone for the International Ship Registration

● Technological development of glass only mobile-rack for transportation to improve loading efficiency and unloading convenience (The 4th year)

● The Publication of white paper on the salvage of Sewol ferry and compensation (2nd)

● A study for strengthening the cooperation in port areas with Asia-pacific developing countries and support companies to enter the market

● Development of fishing nets for aquaculture grounds utilizing UHMWPE

● The internationalization and KS standardization of the process and information model for real-time management and safety for bulk cargo (agricultural and fishery products) (3rd year)

● Basic plan for utilization of port and surrounding coastal space

● A study on the introduction of Cargo preference etc. and the development of a model of Contract of Affreightment (COA) for containers

● Development of environment-friendly copper-alloy fishing nets and facilities for cage aquaculture

● Plan for pilot projects of foldable containers and the development of its assessment (draft)

● Check-off programs for fishery products of 2018

● R&D on marine environment and ecosystem management around Saemangeum (2018, 5th year)

● Development of ecosystem-based marine spatial analysis and utilization technology (2018, 5th year)

● A study on the establishment of a policy platform for e-Navigation

● A study on exploration and practical application of marine healing resources for revitalization of the marine industry (2018, 2nd year)

● A feasibility study for regular reflection of the Basic Plan of Public Waters Reclamation

● A study on the establishment of marine spatial planning system in 2018

● The establishment of a global network of ocean territory experts

● Analysis on international trends relevant to marine territory

● 2017 Evaluation study on implementing environmental management plans by sea areas and the 3rd study on the establishment of management plans by sea areas

● A study on the emission status of air pollutants at major ports and a feasibility study for designating Emission Control Area (ECA)

● The 3rd study for a basic plan for the management of marine debris

● A study on the revenue insurance of disaster insurance for seafood produced by aquaculture

● A study for the development of user guideline for uninhabited islands

● A study on the development of specific policy for mutual development of shippers and carriers (Certificate system of excellent shippers and carriers)

● A consignment project on port redevelopment

● A study on the permanent continuance of Jeju Special Economic Zone for the International Ship Registration

Major Activities Planned in June

1. KMI – LOSII (Law of the Sea Institute of Iceland) International Academic Conference

○ Time: June 28 (Thu) ~ 30 (Sat)

○ Place: Reykjavik, Iceland

○ Contents: 44 experts holding presentations on the subject of “New Knowledge and Changing Circumstances in the Law of the Sea”

○ Hosted and organized by: Korea Maritime Institute (KMI)

○ Participants: About 150 people including Vice president Jeong Myung-saeng, Director General Kim Jong-deog and Head Hyun Dae-song of Dokdo and the Law of the Sea Research Center etc.

2. The 1st International Logistics Forum for Korean Expats

○ Time: June 1 (Fri), 9:00 ~ 18:00

○ Place: Gubei Wan Hotel, Shanghai

○ Contents: Inviting Korean freight forwarders operating overseas to Shanghai and co-hosting “the 1st International Logistics Forum for Korean Expats”

○ Hosted and organized by: Korea Maritime Institute (KMI)

○ Participants: 150 people including those from 20 Korean Freight Forwarders in overseas (excluding Korea and China) and members of Shanghai Korea International Freight Forwarders Association, Director Kim Eun-soo (presenter) and Head Kim Hyung-geun of China Research Center of KMI etc.

3. The 4th Maritime Silk Road Port International Cooperation Forum

○ Time: June 12 (Tue) ~ 14 (Thu)

※ The forum is held from June 13 to 14

○ Place: Ningbo

○ Contents: Expanding cooperation and exchange among coastal ports, shipping companies and logistics firms under the One Road, One Belt Strategy

○ Participants: About 80 people including officials from BPA and IPA, Head Kim Hyung-geun of China Research Center and Associate research fellow Lee Eon-kyung of KMI etc.

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