

High Potential for the Development of Offshore Wind Power based on the Construction Technology of Heavy Cargo Vessels

The Shutdown of Kori-1 is to Herald the Era of Renewable Energy

Kori-1, South Korea's first and oldest nuclear reactor built in Gijang county on the northeastern outskirts of Busan, stopped operations after 2 years when the decision to decommission the reactor had been made. Nuclear energy is responsible for supplying approximately 30% of national demand of electricity. However, many experts forecast that more nuclear reactors will face shutdown following a growing global momentum of the development of renewable energy. President Moon Jae-in said “Our government will move away from an energy policy dependent on nuclear power and toward an era of denuclearization” while attending on June 19 an event to announce the permanent decommissioning of Kori No. 1 nuclear reactor. He also added that South Korea will reduce the number of nuclear power plants, and expand the development of LNG and renewable energy. Meanwhile France, known as a major nuclear power, plans to close as many as 17 nuclear reactors by 2025, concentrating on the development of renewable energy

Driven by Europe and China, Offshore Wind Power will Grow

Bearing a positive image as ‘green energy’, offshore wind power is growing fast with its market size expanding at an annual rate of 20%. In addition, offshore wind power is assessed as having a high industrial value, as it creates 90,000 jobs every year. Europe, which is the leader of offshore wind power industry, has the largest offshore wind power market, investing 21 trillion KRW in 2016 alone. Looking at the cumulative installed capacity of offshore wind power, 4 out of top 5 countries except for China are all located in Europe. According to the statistics published by WWEA, the UK (5,156MW) ranked the first in cumulative installed capacity of offshore wind power as of 2016, followed by Germany (4,108MW), China (1,627MW), Denmark (1.271MW) and the Netherlands (1,118MW).

China has risen up to the third leading country in offshore wind power with cumulative installed capacity of 1,627MW. As China ranks the first in onshore wind power, no other countries have more knowhow and infrastructure than China. During last year, Europe invested a total of 25.6 billion dollars (30 trillion 80 billion KRW) and 4.1 billion of them came from China. As shown above, many advanced countries, especially driven by Europe and China, are sparing no efforts to investing in offshore wind power to maximize the profit. However, most Asian countries and developing countries are reducing their investment in offshore wind power.

<Cumulative Installed Capacity of Offshore Wind Power by Countries>

|  |  |  |  |
| --- | --- | --- | --- |
| Rank | Country | 2016 end | 2015 end |
| 1 | UK | 5,156 | 5,100 |
| 2 | Germany | 4,108 | 3,295 |
| 3 | China | 1,627 | 1,035 |
| 4 | Denmark | 1,271 | 1,271 |
| 5 | The Netherlands | 1,118 | 427 |
| 6 | Belgium | 712 | 712 |
| 7 | Sweden | 202 | 202 |
| 8 | Japan | 60 | 53 |
| 9 | South Korea | 35 | 5 |
| 10 | Finland | 32 | 32 |
| 11 | USA | 30 | 0.02 |

Footnote: Re-arrange the data provided by the WWEA

Source: http://news20.busan.com/controller/newsController.jsp?newsId=20170413000321(2017.4.19.)

South Korea should make efforts to actively develop offshore wind power based on the construction technology of heavy cargo carriers

The South Korean government recently announced that it has finalized its 2030 target to reduce the country's greenhouse gas emissions by 37 percent to 536 million tons from the business-as-usual (BAU) level of 850 million tons. In addition, South Korea should establish a 10 GW offshore wind farm in accordance with the National Basic Plan for New and Renewable Energies. Therefore, the government is reviewing measures to increase the incentives of offshore wind power through Renewable Portfolio Standard (RPS) to expand the use of renewable energy. Against this backdrop, Korea’s development of offshore wind power sector is like a ship sailing before the wind. Surrounded by sea on three sides, Korea has a geographical advantage of developing offshore wind farms. Furthermore, Korea owns the shipbuilding technology of heavy cargo carriers. Since this technology is similar to offshore wind power in terms with design, construction and installation process, Korea is fully prepared for the adoption of offshore wind power.

The UK used to boast its leading position in shipbuilding technology in the world. After descending from its top position, the UK had steadily invested to the offshore wind market. Ten years on, the UK has been able to regain the top position in offshore wind power, which was lost in the shipbuilding industry. South Korea should take a through look at the UK’s case, and need to apply it to our situation.

Besides the shipbuilding technology, the operation and maintenance (O&M) sector should be developed together which is included in the service industry. According to the National Subsea Research Institute (NSRI), O&M accounts for 40% of the development cost of offshore wind power. Therefore, it is necessary to conduct continued discussion and research among academic, research and industrial sectors, such as nurturing relevant experts, preparing measures for localization and exploring additional wind farms.

**Contact Information**

Name: Lee, Sun-ryang

E-mail: [srlee@kmi.re.kr](mailto:srlee@kmi.re.kr)

A Consideration on the 4th Industrial Revolution and Maritime Cyber Risk Management

The Influence the 4th Industrial Revolution has on the Maritime Arena

|  |
| --- |
| 1) Kim Jin-ha, 2016, The era of the 4th Industrial Revolution: Seeking for strategic response in preparation for the changes of future society, KISTEP INI, 15th issue, pp. 45  2) [http://terms.naver.com/entry.nhn?docId=3548884&cid=42346&categoryId=42346 (Search](http://terms.naver.com/entry.nhn?docId=3548884&cid=42346&categoryId=42346%20(Search) date: July 1, 2017)  3) <http://efficiensea2.org/beta-release-of-the-maritime-cloud-and-balticweb> (Search date: July 1, 2017) |

The term ‘the 4th Industrial Revolution’ is now far from novel. An Industrial Revolution refers to a paradigm shift in social and economic structures resulting from technological innovation. Arnold Toynbee, the first historian to coin the phase, defines that the transformational change inherent in the term IR is a continuous process which occurs over time rather than a dramatically occurring event which takes place at one time.1) The 4th Industrial Revolution refers to the development of a new industry based on ICT (Information and Communication Technology) 2), covering IOT (Internet of Things), AI (Artificial Intelligence) and Big Data. More specifically, big data is the technology to collect, analyze and process large volumes of data. While Artificial Intelligence refers to technology with which machines reproduce a similar thought process exerted by humans, IoT enables information exchange between humans and things by connecting all information based on the Internet. The maritime arena is no exception to the influence of the 4th Industrial Revolution.

A prime example is e-Navigation, a strategy developed by the International Maritime Organization (IMO). E-Navigation is the harmonization of marine navigation system utilized for the purpose of collecting, analyzing, sharing and exchanging marine information between ships and ashore for maritime safety and security, while contributing to the protection of the marine environment. Starting from 2019, the IMO will implement e-Navigation systems globally, an ICT-based ship operation system aimed at ensuring maritime safety and environmental protection. The IMO’s decision has facilitated the technological development of the maritime ICT sector, resulting in the establishment of the Maritime Cloud, an information transfer system.3) The Maritime Cloud serves as a venue to exchange all the information necessary for both ships and on land. Therefore, this technology has allowed the exchange of large amounts of information on ships to a similar level on land.

In addition, it is not in the distant future where autonomous ships or unmanned ships are operated in reality. Rolls-Royce presented its vision of the future in March 2014 where they foresaw unmanned cargo vessels taking to the seas in a decade4). Furthermore, projects dealing with unmanned ships such as MUNIN from the EU and DNV-GL’s ReVolt is either completed or currently underway. In particular, the EU’s MUNIN research project has indicated that autonomous ships could be realized in three phases (Remote Ships, Automated Ships, and finally, Autonomous Ships) 5). Remote ships are ships which are controlled via a remote control mechanism e.g. by a shore based human operator. Automated ships use land-based advanced systems to undertake operational decisions without intervention of a human operator. Lastly, autonomous ships establish an on board system that enables ships to independently operate from origin to destination based on pre-computed information.

At the Maritime Safety Committee's (MSC) 98th session in mid-June, the IMO agreed that the operation of unmanned ships is not in the distant future, raising the necessity of reviewing the relevant regulations for safe operation and management.6) Therefore, the IMO committee has made the decision to implement a ‘regulatory scoping exercise for the use of Maritime Autonomous Surface Ships’ with regards to the operation of unmanned ships to be further discussed in the next meeting. Such a decision could be clear evidence that the operation of unmanned ships is expected sooner rather than later. As evident from these decisions, it is expected that autonomous ships will be introduced in a number of phases. In addition, it is necessary to establish an ICT based control system for the safe and secure operation of remote ships and automated ships. When an autonomous ship equipped with an independent system is finally realized, a shipping monitoring system based on ICT should also be established.

The 4th Industrial Revolution based on ICT and Maritime Cyber Risk Management

|  |
| --- |
| 4) <http://www.bbc.com/news/technology-26438661> (Search date: July 1, 2017)  5) <http://www.unmanned-ship.org/munin/about/the-autonomus-ship> ( Search date: July 1, 2017)  6) IMO, 2017, Draft report of the maritime safety committee on its ninety-eighth session, pp.25-27  7) <http://terms.naver.com/entry.nhn?docId=302167&cid=50374&categoryId=50374> (Search date: July 1, 2017)  8) Lee Hye-eun, 2017, Cyber Risk and Cyber Insurance,: Current status and future tasks, KIRI Report, pp. 30  9) <http://fortune.com/2015/01/23/cyber-attack-insurance-lloyds/> (Search date: July 1, 2017)  10) <https://www.reuters.com/article/us-cyber-attack-maersk-idUSKBN19I1NO> (Search date: July 1, 2017)  11) <http://www.kidd.co.kr/news/192589> (Search date: July 1, 2017) |

The advancement of ICT has raised the importance of cyber security. Cyber security is the protection of computer systems, information networks and information from potential threats occurring in cyber space.7) Cyber space is a virtual place in which information can be shared through information networks. If an ICT-based virtual space is established, this place would be subject to potential threat beyond geographical limits. A cyber-attack not only results in information loss, privacy intervention, but may also cause managerial and financial losses and in extreme cases businesses to shutdown.8) The CEO of Lloyd’s estimated that the direct loss arising from cyber attacks reached approximately 400 billion dollars in 2015. Furthermore, this loss could rise to up to 2.1 trillion dollars by 2019.9) The advancement of maritime ICT increases the possibility of the ocean being the target of cyber attacks. For instance, the ‘Petya’ ransomware has crippled computers, halting operations at the world's largest container shipper, A.P. Moller-Maersk.10)

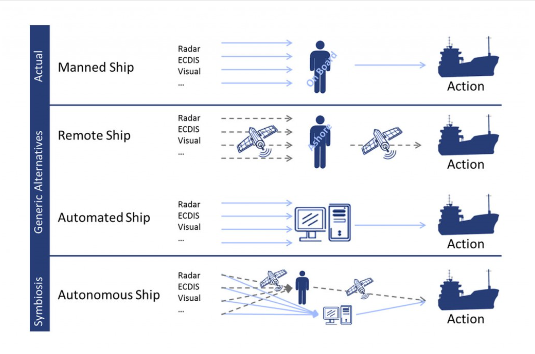
Recognizing the importance of maritime cyber security, the IMO has approved Interim Guidelines on Maritime Cyber Risk Management to let ship owners, captains and ship operators acknowledge their importance. The Maritime Safety Committee, at its ninety-eighth session, will include Guidelines providing high-level recommendations on functional requirements of ISM code.

The foundation of policy and institutions for maritime cyber risk management is necessary in the maritime and port industry in preparation for the 4th Industrial Revolution

Gearing up for e-Navigation initiated by the IMO, Korea is implementing an e-Navigation project customized specifically to Korea under the target year of 2020. In particular, the Korean government plans to establish the LTE-Maritime network which is an integrated communication network. In doing so, it will offer services to ships and fishing boats within a 100km radius of the coast making the same level and quality of information available as found on land. In addition, technological developments are underway regarding the operation of unmanned ships by advancing high reliability operation technology for unmanned ships and infrastructure projects.11) The introduction of e-Navigation and an increasing demand of domestic maritime information clearly indicates that maritime cyber security has the potential to become no other than our very own issue.

However, Korea has not yet prepared policy and institutional foundations for maritime cyber risk management. Furthermore, several shipping companies are using maritime cyber risk management manuals utilized in foreign nations as their manual for subsidiaries. The Korean government should establish relevant systems regarding maritime cyber risk management, seeking for policy measures for a systematic and comprehensive response against maritime cyber attacks.

The Autonomous Ship, as it is understood in the MUNIN project, is a symbiosis of the Remote Ship and the Automatic Ship

※ Source: MUNIN([http://www.unmanned-ship.org/munin/about/ the-autonomus-ship/](http://www.unmanned-ship.org/munin/about/%20the-autonomus-ship/)), As of July 1, 2017

|  |
| --- |
| **Contact Information**  Name: Hwang, Soo Jin  E-mail: ardentH@kmi.re.kr |

Banning HFO in the Arctic

Why Should HFO be Banned in the Arctic?

Heavy Fuel Oil (HFO), residues from the crude oil refining process, is the most widely used fuel in the marine industry. While it is cheap and abundant, it is highly polluting when burned and difficult to clean up if spilled. In the Arctic environment, an HFO spill will be almost impossible to clean up due to the region’s remoteness and harsh environmental conditions. In particular, the viscosity and the density of the fuel will not easily disperse or breakdown in the frigid Arctic waters, causing long-term damage to the Arctic environment and ecosystem. HFO also emits black carbon when burned, which is known to be the second largest man-made global warming agent after carbon dioxide. Black carbon that is emitted in the Arctic has a surface warming effect nearly five times greater than those emitted at midlatitudes.

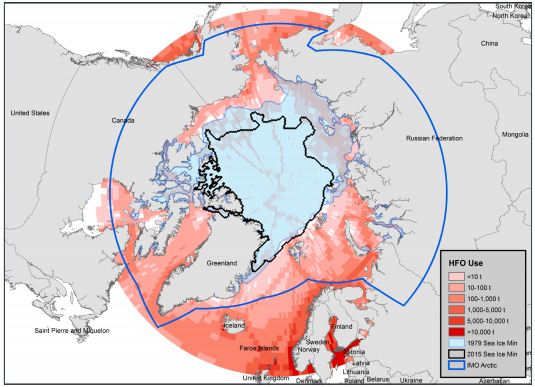
The IMO has banned HFO use or carriage in the waters around Antarctic and Svalbard since 2011. However, the same rule does not yet apply to the Arctic, and the Polar Code, which came into effect this year, only recommends against its use in the Arctic. However, with rescinding ice and increasing economic activities in the Arctic, shipping traffic is growing in the region, as well as the risks associated with increased use and carriage of HFO.

Current Use and Carriage of HFO in the Arctic

According to an ICCT report1) on Heavy fuel oil use in Arctic shipping, in 2015, of HFO was the most consumed marine fuel in the Arctic2). A total of 4,372,90 ton of fuel was consumed ships in the Arctic, of which HFO accounted for 57%, distillate 43%, and almost no LNG. Among vessel types, general cargo vessels consumed the most HFO (66,000 t), followed by oil tankers (43,000 t), and cruise ships (25,000 t). HFO was also the most carried fuel, in tonnes, and transported, in tonne-nautical miles (t-nm) in the Arctic. While about 42% of ships in the Arctic operated on HFO, they accounted for 76% of fuel carried and 56% of fuel transported. More than 75% of HFO was carried and transported by bulk carriers, container ships, oil tankers, general cargo vessels, and fishing vessels.

|  |
| --- |
| 1) ICCT, “Prevalence of Heavy Fuel Oil and Black Carbon in Arctic Shipping, 2015 to 2025”, 2017  2) Among the three different types of “Arctic” used in the ICCT report, the Arctic as defined by IMO is used. |

<HFO use in the Arctic, 2015>



Source: ICCT, 2017

Movement Towards an HFO-Free Arctic

The momentum is building towards restricting HFO in the Arctic. The prospect of an increase in Arctic shipping traffic and probability of an oil spill has propelled environmental groups to demand a mandatory ban or phase-down in HFO use and carriage by ships in the Arctic. The movement is being joined by some of the important players in the shipping industry such as the Danish Shipowners’Association and the Norwegian Shipowners’Association. Hurtingruten, an Arctic expedition cruise operator, advocated for a stronger regulation on HFO too, by signing the Arctic Commitment initiative against HFO for Arctic shipping. Countries in general also support the move, and the European Parliament has been trying to impose a mandatory ban on HFO in the Arctic since it was banned in the Antarctic in 2011.

Such effort culminated in the submission of the proposal on “Measures to Reduce Risks of Use and Carriage of Heavy Fuel Oil as Fuel by Ships in Arctic Waters” at the recent Marine Environmental Protection Committee (MEPC) meeting of the International Maritime Organization (IMO) in July this year. The proposal was supported by countries such as Canada, Finland, Germany, Iceland, Netherlands, Norway and the United States, even Russia, thus becoming a formal agenda for the next MEPC meeting in 2018. In addition, the Arctic Council working group on the Protection of the Arctic Marine Environment introduced projects on HFO in its work plan for 2017-2019.

Challenges Ahead

Trying to implement an effective ban on HFO in the Arctic won’t be an easy task compared to the Antarctic. First there is the question of costs. It is generally known that the cost savings gained from HFO use by ships outweigh the negative costs associated with human health and the environment. However, most ships are built to operate on HFO and switching to a cleaner fuel will be expensive for both shipowners and the Arctic communities. For example, it has been estimated that switching from HFO to a cleaner alternative such as distillate would have increased fuel costs for an individual ship in the Arctic fleet by 55%. Therefore, even if the price of LNG falls below that of HFO in the future, it is likely for the short term that most ships will still consider it economical to run on HFO. Furthermore, the implementation of the 0.5% Sulphur cap from 2020, and other similar trends towards promoting greener and cleaner fuel use will likely encourage ships to switch away from dirty fuel in the longer term. However, most ships that currently operate on HFO is expected to use desulfurized residual fuel or residual fuel blends that comply with the standard rather than switching to more expensive cleaner fuel or installing scrubbers.

Then, there is the question of political will. Countries are more reticent to impose an effective ban on HFO use in the Arctic than the Antarctic, because the political cost associated with it is higher. Russia’s involvement in the effort will be particularly important, as the country owns the longest Arctic coastline, and the Northern Sea Route is more likely to see a significant increase in shipping traffic in the future. But more importantly, Russian vessels accounted for 56% of the Arctic fleet that consumed HFO in 2015. Positively, Russia has acknowledged the need to move away from HFO use, and the country is trying to build more cleaner vessels and icebreakers. However, faced with a difficult economic situation, and ongoing Western sanctions, the real challenge will be whether the transition to cleaner marine fuel can occur soon enough before a major oil spill strikes.

**Contact Information**

Name: Kim, Jee Hye

E-Mail: jhkim85@kmi.re.kr

A Study on the Development of Estimation Methodology for Psychological Cost in Marine Accidents

1. Purpose

The primary purpose of this study is to estimate the psychological cost of marine accidents using reasonable methodologies, and then to include it to the damage cost of marine accidents, ultimately contributing to more accurate calculation of the total cost of marine accidents.

|  |  |  |
| --- | --- | --- |
| <Table> Characteristics of the Methodologies | | |
| **Methodology** | **Applying Area** | **Characteristics of the Methodologies and details** |
| Literature review | - Analyze research reports and literature (articles) related to the estimation of domestic and foreign accident costs (road, railway, ship etc.)  - Analyze related materials including statistics on domestic and foreign marine accidents | - Collect and analyze domestic and foreign reports related to cost analysis including accident costs, social costs and marine accident costs |
| Survey | - Estimate the psychological cost of marine accidents  - Design the survey/Make questionnaire/Conduct the survey/Analyze the result | - Conduct Contingent Valuation Method(CVM) survey for estimating the psychological cost of marine accidents |
| Consultation and interview with domestic experts | - Detailed investigation on the cost estimation of road accidents  - Detailed investigation related to the accident cost of fishing vessel, coastal ship and oceangoing vessel | - Consult with experts on road transport as well as insurance experts on fishing vessel, coastal ship and oceangoing vessel on selecting accident cost items and estimating accident costs |
| Consultation with foreign experts | - Current status research on the estimation of traffic accidents in foreign countries such as US, EU, Japan and China | - After the consultation with foreign experts, summarize the current status of estimating traffic accident costs in overseas |

Excluding the psychological cost from the damage cost of marine accidents could result to an error of excluding the psychological pain of the victim and those close to him or her, and only calculate human and physical damage costs. To prevent this problem, it is absolutely necessary to apply a scientific method to calculate the psychological cost of marine accidents.

Another purpose of this study is to contribute to the development of policy measures for reducing marine accidents through calculating the psychological cost.

We expect that the inclusion of psychological cost to the total cost of marine accidents would significantly contribute to the outer expansion of marine safety policy. In other words, it would broaden those subject to marine safety policy and expand PR activities.

2. Methodologies and Features

1) Methodologies

2) Features

This study carried out Contingent Valuation Method (CVM) survey to estimate the psychological cost of marine accidents for the seafarers working on fishing vessels, coastal ships, and oceangoing vessels.

The CVM survey has already been used to estimate the psychological cost of road accidents in Korea. Also, this method is used to estimate the traffic accident costs in various countries including the US, Europe and Japan.

3. Results

1) Summary

(1) The current status of cost estimation for traffic accidents in Korea

The Road Traffic Authority estimated that the cost of road accident stood at KRW 24.44 trillion (as of 2013) in the total traffic accident in Korea. According to the estimation by Korea Transport Institute, the cost of road accidents in Korea were calculated KRW 38.6512 trillion (as of 2011), while that of railway, maritime and air traffic accidents stood at KRW 54 billion, KRW 152.6 billion and KRW 171.2 billion respectively. The road traffic accidents account for the largest share of the total accident costs and the cost for human casualty takes up the highest proportion of cost items for traffic accidents.

Considering this, it is necessary for the government to come up with a comprehensive measure and intensive care for reducing casualties and preventing the road traffic accidents, which take the highest social cost of traffic accidents. In addition, public interest and cooperation are required for traffic safety.

(2) The current status of cost estimation for traffic accidents in overseas

Looking at the estimation of traffic accident costs, the Unites States ranked the highest (economic cost) accounting for 1.6% (USD 242 billion) of the GDP. Also, the US is estimating the social cost by taking the cost of changing quality of life due to traffic accident into consideration.

The United Kingdom is differentiating itself from other countries in that the country includes the cost for preventing the accidents into the concept of accident costs. In Japan, the transport accident cost reached to JPY 6.3 trillion which accounted for 1.3% of the GDP as of 2009. Unlike other countries, Japan considered not only the monetary loss, but also non-monetary loss such as pain, grief, suffering and joy of life. In the same year, China’s transport accident cost stood at CNY 926 million in direct economic loss.

While Korea classifies accident cost items into large categories, advanced countries including the US and the UK classifies the items in detail and estimates the cost.

(3) The Result of Estimating the Psychological Cost of Marine Accidents (KRW unit)

According to the result of estimating the psychological cost of marine accidents, the accident leading to death was KRW 230,363,000, major accident resulting physical impairment at KRW 104,523,000, major accident without physical impairment at KRW 70,994,000 and minor accident at KRW 21,295,000. Next, the study compared this physiological cost of marine accidents with the average WTP (Willingness to Pay) estimate for road accident costs calculated by the Korea Transport Institute. The comparison result showed that the estimated psychological cost in marine accidents leading to death was higher than that of road accidents in 2007 and lower than the psychological cost of death accidents in 2013. The estimated cost for major accidents with physical impairment showed a similar pattern. On the other hand, in case of major accidents with no physical impairment as well as minor accidents, the psychological cost of marine accidents was 2.5 times higher than that of road accidents.

One reason that the psychological cost of marine accidents related to death and physical impairment was lower than that of road accidents is the difference of the subject groups for survey. The subject for road accidents includes those with various jobs and income groups. However, the estimation of psychological cost of marine accidents was carried out to almost the same job groups mainly in fishing and shipping areas. Therefore, the estimated result was partly biased due to the limited group of subjects.

(4) How to use the psychological cost of marine accidents

The psychological cost of marine accidents can largely be applied in two ways: policy measures and statistical measures. For policy measures, the psychological cost can be utilized for the Cost Benefit analysis for marine transport safety facilities, and as a side index for Marine Safety Culture Index. It also can be used as a policy promotion material to spread the marine safety culture. Meanwhile, the psychological cost can be used directly to the marine accident statistics or estimating the annual cost of marine accidents. This study used the psychological cost to estimate the 2014 marine accident cost.

(5) The Marine Accident Cost in 2014

The marine accident cost as of 2014 stood at about KRW 490.2 billion of which the cost of physical and human damage took up the most with KRW 427.3 billion (87.2%), followed by the psychological cost of KRW 58.9 billion (12.0%) and then the administration cost of KRW 4 billion (0.8%).

The estimation of marine accident cost in 2014 had some changes in terms of the individual items. The change was the result of different estimation method such as changing standard of the marine accident statistics and the calculation in KRW currency unit. However, the total cost of marine accidents was not largely impacted. This is because the physical and human damage costs, which account for most of the marine accident cost, were based on insurance data. Also, the total cost has partly related to the number of marine accidents, but the impact itself is not absolute. Since the administration and psychological costs were hugely affected by the number of death, missing and injured, the cost increase was significant.

2) Policy contribution

As calculating the marine accident cost in an objective and scientific way, the study can be utilized as a basic policy material for reducing marine accidents. It could ultimately contribute to the reduction of social cost related to marine accidents.

(1) Reduce marine accidents

Until now, Korean Maritime Safety Tribunal has not been able to release proper statistics on the impact of reduction in marine accidents, due to the lack of data on which the reduction in marine accidents has the social and economic impacts. When the social cost of marine accidents is calculated, the impact of reducing marine accidents can be suggested in numerical terms, which will show clearer impact of reducing marine accidents.

(2) Increase the safety of ship operation

If the social cost of marine accidents is presented, ship operators would strengthen efforts to reduce marine accidents, contributing to the safety of shipping operation.

(3) Secure smooth marine transport networks

As the ship operator and those in charge of safe operation makes increasing efforts to improve safety and reduce marine accidents, it would help secure smooth marine transport networks.

(4) The result of the study can be used directly to estimate the social cost of marine accidents, and used in the Cost and Benefit analysis in investment projects for reducing marine accidents.

3) Expected benefits

Since this study is a fundamental research, it would not only have policy implications, but also make various contributions in academic perspective.

(1) Contribute to the development of estimation methodology for social cost of marine accidents

Besides the estimation method of physical and human damage costs, it will contribute to the estimation methodology for social cost of marine accidents

(2) Contribute to active academic research utilizing marine accident costs

If the estimation methodology for psychological cost of marine accidents is developed, it is expected to sharpen the estimation of marine accidents and diversify the usage of the estimated costs.

● Research project on monitoring non-tariff barriers of fishery products

● A study on measures to facilitate the cooperative relations among Northeast Asian ports

● Act as deputy for evaluating certification system of excellent logistics companies in 2017

● The establishment of comprehensive development plan of Pohang Port

● A study on policy measures for promoting the rights of fisherwomen

● The 2nd study on the revision of the basic plan for maritime fishery development (Proposed in 2013) Korea-ASEAN cooperation project (A study on the joint development of fisheries and aquaculture in ASEAN and the establishment of cooperation system

● Korea-China-Japan transportation logistics cooperation measures (7th round)

● A study on building processing clusters for seafood export by sea areas

● An analysis on promising areas for fisheries farming investment

● Research on measures to vitalize the investment of Korean offshore aquaculture industry

● The establishment of a comprehensive plan to support and prevent disasters in fishing operations and its current status survey

● A validity study on Pyungtaek Port type 2 logistics complex development

● A case study on maritime boundary delimitation for negotiating countries

● The feasibility study and the establishment of plans for building sea fishing complex town

● A study on securing logistics base in Far Eastern Russia for activating northern logistics business

● A study on the preservation of marine biological resources in Polar Regions and sustainable fishery

● Review of proposal for development project of marina port at Waemok, Dangjin

● Necessity of local tax reduction to expand the international vessels registered in Korea

● Development and commercialization of traditional fisheries products suited for each seas

● 2017 future aquaculture investment forum operation

● 2017 consigned study on port demand forecast center operation

● A study on rationalization of fisheries port designation and its dismissal

● Study on the systematic management plan of the total cost of the port construction sector

● A review on possible functional conversion of aging terminals at Mokpo port (Samhak terminal)

● Basic planning of North Korean port logistics system in the Unified Korean peninsula era

● Strategies for fisheries subsidies negotiation prepared for the 11th WTO ministerial meeting

● Establishment of evaluation criteria for folding container pilot project (I)

● The development of next generation fishing vessels customized to Korea and its demonstration

● 2017 International logistics investment analysis center

● A survey on fisheries product production and distribution industry

● Master plan development for Algerian fisheries production increase

● Methods for climate change impact and vulnerability assessment of the fisheries industry

● Annual report on Dokdo and implementation plan development

● A study on establishment of the 2nd national port security plan

● A study on basic planning of fisheries distribution development

● A study on the sales trend of seafood following the implementation of the Anti-graft Act and preparing measure to minimize the impact

● A study for the establishment of sustainable development strategy in Garorim Bay area

● Study on export promotion of biodegradable fishing gears and feasibility Study on ODA Project

● Capacity building to manage Sri Lanka's marine debris (Yeosu project, R&D, 2nd year)

● Consigned study on aquaculture development based on warm water form power plant and implementation measures

● A review on demand prediction and economic validity of Thilawa, Myanmar

● A study on Northern logistics market model development and measures for its facilitation

● A study on port risk evaluation system advancement

● A study on future fusion and demand based shipping port logistics technology development

● A study on comprehensive management of Geokryol Biyol-do

● A study on the establishment of basic plan for maritime and fisheries development strategy in Gimje city

● Establishment of mid-to-long term development plan for marine tourism policy at Yeongdeok

● New fisheries policy tasks for future fisheries industry development

● Feasibility study for the construction of the third phase coal pier in Donghae port

Major Activities Conducted in September 2017

1. 2017 Chinese Region Logistics Seminar

○ Time: Sep 14 (Thu) 14:00~17:40

○ Place: Harbin Engineering University of China

○ Contents: Development prospect of logistics industry in Heilongjiang Province in connection with One Belt One Road Strategy

○ Host: KMI, Harbin Engineering University

○ Participants: About 80 guests of relevant officials from Korean and Chinese institutes and companies including President Yang Chang-ho of KMI and President of Harbin Engineering University

2. 2017 NEMT (Network of Experts on Maritime and Territory in the Asia-Pacific Region) Workshop

○ Time: Sep 15 (Fri) 09:00~17:40

○ Place: Le Meridien Hotel Kuala Lumpur, Malaysia

○ Contents: Organization of a research group to find peaceful solutions of maritime and territorial issues

○ Host: KMI

○ Participants: About 40 world-leading experts on maritime disputes and territorial issues

3. National Forum Gangwon Seminar on Maritime and Fisheries

○ Time: Sep 27 (Wed), 13:30~18:00

○ Place: Research Institute for Gangwon, Grand Hall

○ Contents: National agendas and regional development strategies etc. of maritime and fisheries

○ Host: Research Institute for Gangwon, Korea Research Institute for Human Settlements (KRIHS), KMI

○ Participants: About 100 guests including Lee Yang-soo, a member of the National Assembly, governor Choi Moon Soon of Gangwon Province, President Yang Chang-ho of KMI, President Kim Dong-ju of KRIHS and President Yook Dong-han of Research Institute of Gangwon

4. 2017 KMI-CIMA Ocean Policy Seminar

○ Time: Sep 27 (Wed) 08:30~14:00

○ Place: Beijing New Century Hotel, China

○ Contents: New ocean policy and cooperation measures of Korea and China

○ Host: KMI, CIMA

○ Participants: About 20 guests including experts from KMI, CIMA, Shandong Academy of Social Sciences and The Waterborne. Transportation Institute of MOC etc.

Major Activities Planned in October 2017

1. Discussion at the National Assembly for the Vitalization of Marine Education

○ Time/Place: Oct 11 (Wed), 15:00~17:00 / The National Assembly Building, 2 meeting room

○ Contents: Mandating marine education as public education for future-oriented and sustainable marine education

○ Host: Ocean Culture Forum of the National Assembly

○ Organizer: KMI

○ Participants: About 120 guests including members of the National Assembly Kim Han-jung and Oh Young-hoon, President Yang Chang-ho of KMI etc.

2. 2017 KMI-KSIL General Meeting of International Law Scholars

○ Time/Place: Oct 21 (Sat), 09:00~18:00 / Korea University CJ Law Hall

○ Contents: Conclusion and Application of Agreements: National implementation and future prospects

○ Co-host: KMI, KSIL

○ Participants: About 100 attendees including KMI researchers, members and lawyers of KSIL

3. The 2nd Korea Latin America Fisheries Forum(KOLAFF)

○ Time/Place: Oct 25 (Wed), 10:30~17:00 / Guayaguil, Ecuador

○ Contents: Potential Fisheries Cooperation between Korea and Latin America

○ Host: KMI

○ Participants: About 200 participants such as relevant officials in academic, research and industry circle on fisheries in South Korea and Latin America

4. 2017 Yeosu Academy of the Law of the Sea

○ Time/Place: Oct 22 (Sun)~Nov 4 (Sat) / Yeosu Exhibition Hall, Seminar room

○ Contents: Leading group of developing countries in maritime sector: national development of ocean policy and support for their capacity to address current issues

○ Host: MOF

○ Organizer: 2012 Yeosu Korea Foundation

○ Operator: KMI

○ Participants: About 50 guests including maritime related public officials, researchers, professors and graduate students from developing countries

|  |  |
| --- | --- |
|  | **Publisher**  Yang, Chang Ho - President, Korea Maritime Institute  **Editor-in-Chief**  Kim, Woo Ho - Director General, Planning & Coordination Division  **Editorial Board**  Kim, Jong Deog - Director General, Industry Intelligence & Strategy Research Division  Mok, Jin Yong - Director General, Marine Policy Research Division  Cho, Jung Hee - Director General, Fisheries Policy Research Division  Kim, Beom Jung - Director General, Maritime Industry & Safety Research Division  Lee, Sung Woo - Director General, Port & Logistics Research Division  **Secretary**  Lee, Sun Woo - Planning & Coordination Division  Lee, Yun Jung - Planning & Coordination Division  **Contact Information**  Address: 26, Haeyang-ro 301beon-gil, Yeongdo-gu, Busan, 49111, Korea  Tel: +82-51-797-4800  Fax: +82-51-797-4810  E-mail: [neoport@kmi.re.kr](mailto:neoport@kmi.re.kr), rheesw[@kmi.re.kr](mailto:a@kmi.re.kr) |