

Executive Summary

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.

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

<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,	- Collect and analyze domestic and foreign reports related to cost analysis including accident costs, social costs and marine accident costs

Methodology	Applying Area	Characteristics of the Methodologies and details
	railway, ship etc.) - Analyze related materials including statistics on domestic and foreign marine accidents	
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

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 United 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.