TECHNOLOGY FOR MARITIME SAFETY MANAGEMENT

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1 . ABSTRACT

Maritime safety management means the implementation, with the consensus of the maritime society, of tangible measures to improve the safety of navigation and quality of seafarers, to raise awareness of responsibility by shipping companies, and guarantee the sea worthiness of vessels.

The success of activities to achieve these aims depends on the mentality and the willingness of people, organizations and nations involved to cooperate.

In other words, the techniques used to manage maritime safety can be defined as techniques to guarantee the logical necessity of the methodology employed to achieve navigation safety and techniques to achieve a social consensus in order to promote this methodology in the international maritime society.

In the present paper, the definitions of terms used in the framework of maritime safety management are explained. And examples of scientific approaches to management technique needed for various types of maritime safety management are introduced.

2 . NECESSITY OF RESEARCH ON MARITIME SAFETY MANAGEMENT

In recent years, the world shipping industry has experienced international cost competitiveness and shipping companies of developed maritime nations have adopted FOC (Flag of Convenience) and Mixed Crewing strategies in order to survive.

As a result, the international maritime society has formed a bipolar structure of seafarer-demand nations and seafarer-supply nations. At the same time, policies to adopt FOC and Mixed Crewing strategies by developed maritime nations have invited such unwelcome consequences for the international maritime society as a deterioration in the quality of seafarers and a lack of awareness of responsibilities by shipping companies.

The international maritime society, however, has been continuing its efforts to assure safe sea transport through global co-ordination by

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establishing international regulations such as the convention of STCW 1995, the ISM Codes and the Port State Control under the IMO, which are designed to eliminate sub-standard ships, sub-standard seafarers and sub-standard companies.

Within the current framework under the initiative of the IMO, what is universally required to the MET institutions in the world, whether they are in seafarer-demand nations or seafarer-supply nations, is to educate seafarers who will be able to guarantee the safety of navigation aboard their vessels in order to achieve safer shipping and cleaner oceans.

Meanwhile, when we look back over the changes that have taken place in the maritime world and look into the future, it is not difficult to imagine that the current seafarer-supply nations will eventually develop into seafarer-demand nations and employ them from other supply nations. The international maritime society can be likened to a relay race.

Workplaces aboard ships are successively inherited from seafarers of developed maritime nations to those of developing maritime nations just as a baton is passed from one runner to another.

This means the loss of employment opportunities for seafarers of developed maritime nations, and this gives us the motivation to consider what education curriculum we should prepare in the future for seafarers of developed maritime nations, and where and through what types of job seafarers of developed maritime

nations should contribute to the international maritime society.

What becomes clear when we consider the historical background of the international maritime society is that the objective of education provided by high-level maritime universities in developed maritime nations is no longer adequate if it only provides an education that satisfies the minimum requirements set down in STCW 1995 by the IMO.

The new mission of education that is assigned to high-level maritime universities of developed maritime nations in the 21st century can be said to encourage personnel of a quality that goes far beyond the minimum requirements set by the IMO and to encourage personnel who have an international perspective to be able to contribute to maritime safety management from the shore side.

As Figure 1 illustrates, high-quality maritime education at high-level maritime universities -where the key words are "practical techniques" to guarantee the safe navigation of vessels, "management techniques" to improve maritime safety and "ability to propose policies" to the international maritime society- must have, in one wing, practical techniques of navigation aboard individual ships and, in the other wing, techniques that are needed for maritime safety management from the shore side. I believe emphasis must be shifted to education and training that is equipped with both wings.

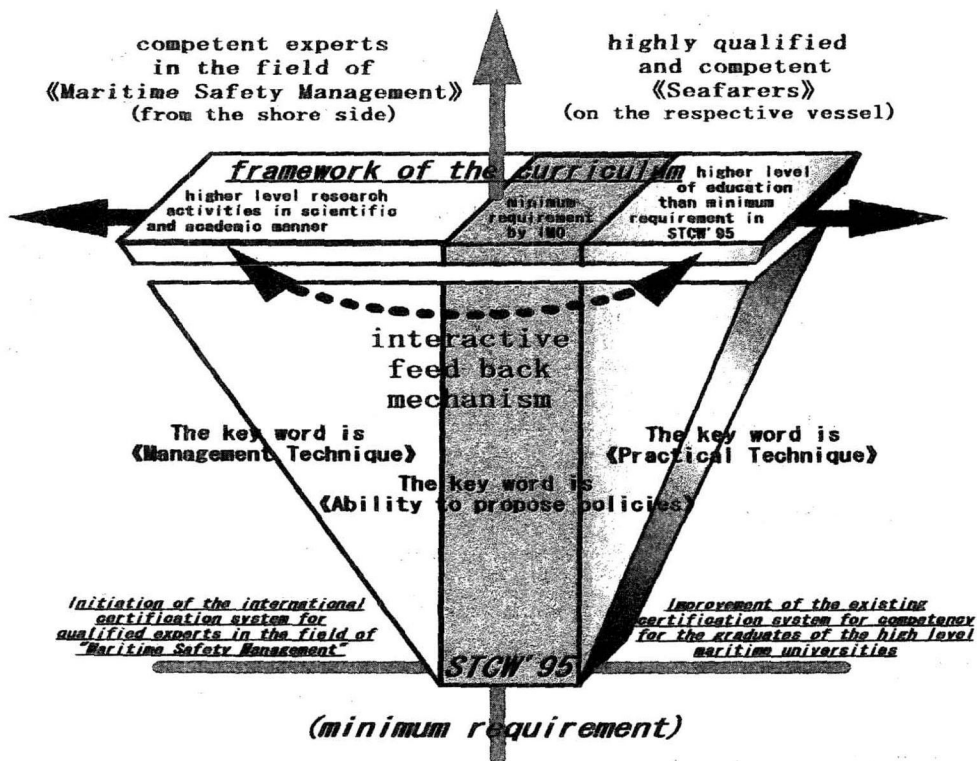Constructing this kind of new paradigm is a pressing issue for high-level maritime universi-

Fig.1 Direction and System of High Level Maritime University toward 21st Century

ties of developed maritime nations and this has an important role to play for both the universities that follow them and the international maritime society of the 21st century.

3. RESEARCH ACTIVITIES RELATING TO MARITIME SAFETY MANAGEMENT AT IAMU

The new responsibilities assigned to high-level maritime universities in the field of maritime safety management in the 21st century may be summarized as follows:

(1) To establish "management techniques" in the international maritime society through a scientific approach in order to improve the safety of navigation,

(2) To establish safety standards and a technical certification system that are common to the whole international maritime society,

(3) To create new types of occupation in the international maritime society, where seafarers of developed maritime nations manage the safety of navigation from the shore side,

(4) To build a safety management system centred on such new types of occupation within the framework of the international maritime society.

WG II and WG III of the IAMU have been set

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up to conduct research in this area from an academic perspective. Their activities are assumed to include the following work:

From the viewpoint of establishing management techniques;

(1)to define the term "maritime safety management",
(2)to define the term "scientific approach",
(3)to produce tangible research results regarding management techniques to improve maritime safety,

From the viewpoint of education;

(4)to review the existing education curricula for maritime safety management,
(5)to propose a desirable curriculum for maritime safety management,

From the viewpoint of job creation;

(6)to review occupations relating to maritime safety management that currently exist in the maritime society,
(7)to create new types of occupation relating to maritime safety management,

From the viewpoint of constructing social systems;

(8)to propose global standards for safety criteria and global standards for technical certification that are acceptable to the international maritime society,
(9)to systemize a safety management system that is acceptable to the international maritime society,

4 . DEFINITION OF TERMS: "MANAGEMENT" AND "SCIENTIFIC APPROACH"

When an organization is to carry out some activity, it is important that all of the people involved have the motivation to contribute toward the goal. The secret of success is that the relevant people are thoroughly motivated to work towards the same objective.

Similarly, the concept of the term "management" used in this context can be described as a way of achieving the goal of an activity by motivating the members of the organization or relevant people. "Management techniques" are procedures and tools used to motivate them and "management practitioners" are people who lead the activity to its goal using these techniques.

In any type of management activity -in business management, in port management, in fleet management, in quality management of human resources, or even in maritime safety management, what is common to all when achieving the goal of an activity is to build a strong desire for co-operation and contribution amongst the people, organization or nations involved.

Of course, there is a type of management, as seen in the world of business, where arbitrary decisions by the top management are imposed upon the members of the organization to achieve a goal, but this is rare and does not fit well in the international maritime society.

In the international maritime society, any relevant parties are not related in a vertical relationship, but are mutually independent. Therefore, safety management activities in the international maritime society should never be compulsory but generally be voluntary.

There must, therefore, be a tendency that, when carrying out maritime activities such as improving the navigation safety of vessels, improving the quality of crews, raising the awareness of responsibilities among companies, raising the sea worthiness of vessels, the relevant people, organizations and nations constituting the international maritime society should do so on a voluntary basis with a great willingness towards co-operation.

In this type of management process for maritime safety, it is essential to achieve a social consensus for the implementation of maritime safety policies on a voluntary basis. What is important in making more relevant people have a greater understanding is the ability to explain to them the logical necessity of the implementation of the policies.

In the process of convincing the relevant people, we are now required to have techniques that explain the logical necessity of the methodologies that are used to promote tangible measures. We are also required to have techniques to achieve a social consensus to promote the methodologies.

Therefore, the management techniques can be considered, in more precise terms, to be techniques to explain the logical necessity of

policies and the techniques to achieve a social consensus in the international maritime society, while the "scientific approach" for maritime safety management can be considered as systemizing these techniques using quantitative analysis methods.

5. SCIENTIFIC APPROACH OF MARITIME SAFETY MANAGEMENT

The international maritime society needs activities for maritime safety management in order to eliminate sea casualties and to conserve the marine environment.

Activities for maritime safety management can be categorized as follows; for example, safety management based on laws and conventions, reliability management of companies and organizations, vessel traffic management in ports and harbours or narrow waterways, quality management of seafarers and marine environment management, etc.

Here, the management techniques that are needed for the implementation of the safety management of each category are explained.

Management of International Maritime Policies

Safety management based on laws and conventions in the international maritime society is characterized by the implementation of measures based on a consensus. For example, a convention under the IMO basically comes into force only after individual nations are satisfied with it and consequently ratify it. This means

that active co-operation cannot be obtained from a nation that is not satisfied with it.

The best way to motivate the members of the international maritime society to actively co-operate for a policy objective is to publish the predicted reduction of sea casualties as a consequence of implementation of the policy and the predicted value of the outcomes which can be obtained from a quantitative assessment of cost effectiveness.

The greater the outcome, the more nations will agree with the policy. In the management of international maritime policies, techniques to predict the reduction of sea casualties and analyze cost effectiveness guarantee the logical necessity of the measures.

Management of Quality and Reliability

International maritime society has a long history of inspection systems to guarantee the safety of vessels and cargo storage and, in recent years, certification systems to guarantee the quality and the management ability of organizations have become common.

In this type of quality management or reliability management, it is necessary to establish a standard inspection procedure that is acceptable to everyone. In other words, an internationally standardized, common inspection method and common safety criteria are needed. Standardization of the abilities of those who make judgments is also important.

What level of safety and reliability is the minimum requirement, and what is a sufficient level? In the management of quality and reliability, techniques to show these criteria numerically guarantee the logical necessity of this type of management.

Management of Vessel Traffic

In areas of traffic congestion such as ports and harbours or narrow waterways, traffic separation schemes, restrictions on total traffic volume, restrictions on speeds, traffic control using signals, compulsory pilotage, widening and deepening of channels, installation of navigation aids and many other types of safety management measures are taken. Implementation of these safety management measures involves many people including mariners, pilots, port administrators and coast guards.

In the management of vessel traffic, it is most important to establish assessment models that can predict quantitatively the correlation between the measures to be taken and the improvement of safety and the reduction in the ship handling difficulties imposed on mariners, so as to achieve the mutual understanding of the relevant people. At the same time, it is important to develop techniques to describe clearly the minimum requirement level and the sufficient levels of safety and difficulty.

In the management of vessel traffic, the techniques to demonstrate numerically the correlation between measures and their effects, as well as risk acceptance criteria, guarantee the logical necessity of this type of

management.

Management of Human Techniques

Many sea casualties are said to be caused by human factors. To eliminate sea casualties, it is important to clarify in a scientific manner the causal relationships between accidents and human and technical behaviour, and it is also important to investigate how to improve human relationships and how to make technical improvements to eliminate human errors.

In the management of human techniques, solutions will assist the relevant people to understand implementation of this type of management measure.

Management of Marine Environment

Oil pollution is not the only cause of damage to the marine environment; air pollution due to exhaust gases from vessels and ecological destruction due to discharged ballasting water also cause damage. There may be other problems of which we are not yet aware.

In the management of the marine environment, the most important issue at present is to develop techniques to predict the diffusion of pollution and techniques to remove pollution. However, it is more important to develop techniques to make numerical predictions of the impact of pollution to the international maritime society and damage to the marine environment.

Publishing the values of this impact assists the

relevant people to increase their awareness and understanding of marine environment conservation. Techniques to demonstrate numerically this impact guarantee the logical necessity of this type of management.

6 . ROLE OF MARITIME SAFETY MANAGEMENT PRACTITIONER

In the absence of any established image of a "Maritime Safety Management Practitioner", an explanation may be required. Maritime safety management practitioners are technical personnel who contribute to enhancing the safety of international maritime activities towards goals.

More specifically, maritime safety management practitioners have the following features:

◆ Capable of planning and proposing policies to help enhance maritime safety;
◆ Capable of verifying the logical necessity of the policies proposed;
◆ Capable of judging activities from a fair viewpoint;
◆ Capable of coordinating conflicts between positive and negative interests in the international maritime society from a broad viewpoint;
◆ Capable of playing a role to achieve the goals of activities;

As mentioned above, a maritime safety management practitioner takes a stance as a coordinator in the international maritime society on one hand, and as a fair umpire to judge safety standards on the other. Hence,

maritime safety management practitioners are required to be controlled under an internationally unified certification system of qualifications.

Figure 2 shows the flow chart of maritime safety management services to be carried out by a maritime safety management practitioner. The procedures are summarized below.
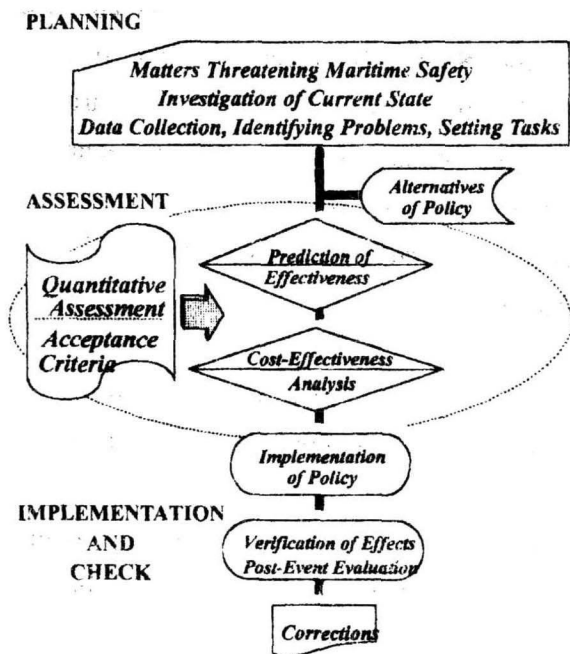

Fig.2 Flow Chart of Service

(1) Planning

The first step to be taken is the process of investigating the current state. Data are to be collected for analyses, issues that endanger or would probably endanger maritime safety are to be identified, and tasks should be established. Policies to solve problems are to be drawn up, while preparing the necessary alternatives.

(2) Assessment

The next step is a process to predict the effects. In this process, the effects of policies are quantitatively predicted and evaluated. Effectiveness and cost effectiveness are to be analyzed for each policy item. In this process of explaining the logical necessity and of achieving social consensus, it is necessary to develop a quantitative evaluation index to predict policy effects, as well as to develop management techniques for establishing acceptance criteria.

(3) Implementation

This step represents an implementation process of the highest effectiveness.

(4) Check

This is a post-event evaluation process, which verifies the effects of the policy implemented. The necessary modifications follow on the basis of the results of the post-event evaluation.

As can be seen from this flow chart of service, the assessment process is most important. The techniques to promote this procedure are conclusive factor in studies on maritime safety management.

7. CONCLUSION

The most important issue in the discussions at the IAMU is the establishment of the next generation of maritime education at high-level maritime universities of developed maritime nations, but equally important is the issue of constructing mechanisms in the international maritime society that will enable skilled

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maritime safety management practitioners, who are engaged in management of safety navigation from the shore side, to contribute to the international maritime society.

More important is to translate creative proposals into global standards and to transmit information on constructive opinions to establish the next generation of maritime education and a new paradigm of safety management in the international maritime society.

It is also more important to encourage personnel with the ability to propose global safety standards and to put those global standards into practice as policy in the international maritime society.

This paper, as an introduction to the activities of the IAMU, defines the concept of maritime safety management, explains terms such as management techniques, management practitioners and scientific approach. It also explains the management techniques needed for various types of maritime safety management.