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PRESENT SITUATION AND PERSPECTIVE ON RESEARCH AND EDUCATION IN THE MARITIME SOCIETY

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ABSTRACT

The tremendous progress of science and technology and the economical conditions in shipping industry have been brought about the innovative changes on the ship operation such as computer-based navigation or mixed crew system. In this paper, author discusses the system of research and education in maritime society focusing on future ship operation technology. At first, author defines what is the maritime technical society and what activities are indispensable for the society, then proposes the imaged of future ship operation technology as a goal. There is a significant technological trend in the present and future ship operation, that is, to reinforce supporting function on shore in addition to self-contained function on board as indicated with ISM codes. This means there should be established another new professional field in the maritime education and research system concerned with ship operation such as fleet operation and maintenance, not the ship operation itself.

1. PREFACE

It is well known that the technology and management of ship operation have been rapidly changed along with the progress and innovation of science and technology and with economy growth over the world. Recently, the ship operation has standardized world-widely. The revision of STCW Treaty and the setting of ISM Code by IMO are taken for example. On the other hand, new tasks of giving technological support and of assessing are often required relating to the emergence of ship operation not complying with such criteria or standards and to the method of determining the standard.

In every society of any field, it is its culture and scientific technology that creates society and innovates on it. Education gives training to human resources in each culture. Research is aiming at the development of society through scientific technology. Figure 1 indicates an image of the activities of maritime technical society.

Education and research should be done

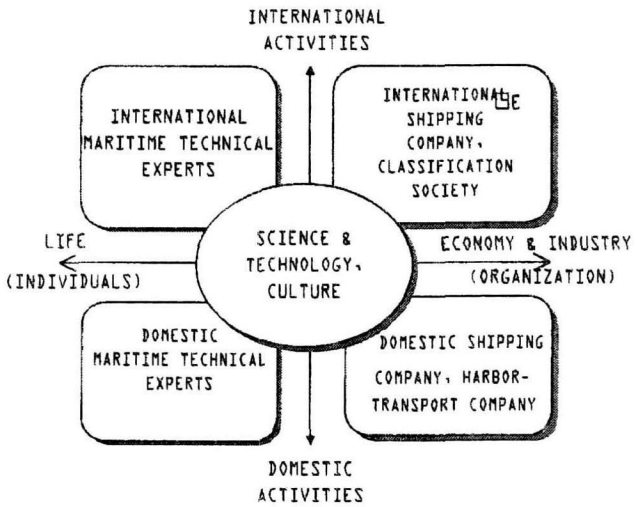

FIG.1 ACTIVITY FIELDS OF MARITIME SOCIETY

in accordance with evaluating what the next generation society would require, not just meeting the present society requires. Therefore, it is very important to set the goal as specific as possible for the development of society in the first half of the coming century, since an approach to the

goal is what education and research mean, which is the theme of this paper.

The author defines the goal of future maritime technical society as " the society where we transform ship operation technology of the global transportation system into the technology integrating both land and marine transportation from the technology of ship centered, self-completed function". There are such keywords as safety, resource saving and environmental conservation, where people working can feel satisfied at work.

To approach the goal, we have to improve the quality of human resources engaged in ship operation, present and future. We also have to build mutual support relationship beyond traditional framework and develop the new technology in maritime field. Maritime education institutes should play the central role of such development.

The goal and the way to approach it are inseparable, however, the author will first describe the goal and then discuss the way to approach.

2. IN THE FUTURE SHIP'S OPERATION TECHNOLOGY

2.1 TECHNOLOGICAL FIELDS IN MARITIME SOCIETY

Technological fields required for maritime transportation system are as follows: operation method (transportation method, maintenance of vessels), operation management (vessel management, navigational support), vessels (maneuverability, propulsion), services environment (artificial environment, natural environment). Figure 2 shows the above technological fields classified into 4 categories; system technology, factor technology, software technology, and hardware technology. In each frame of technological fields, the technologies are further divided to show an image of each field.

The field required for seamen as ship operation technology would have been the software technology and factor technology

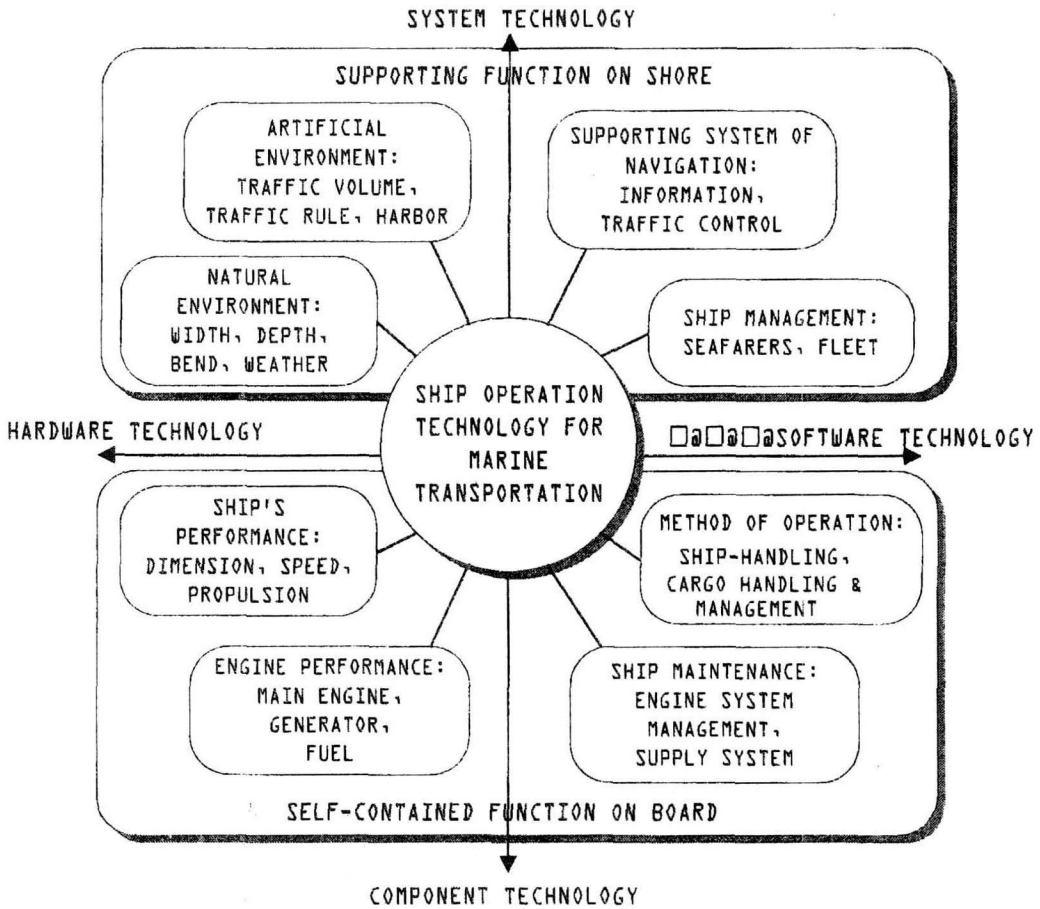

FIG.2 FIELDS OF SHIP OPERATION TECHNOLOGY

mainly consisted of operation method in the fourth quadrant. Vessels in the third quadrant are belonging to the shipbuilding and marine engineering field. Service environment in the second quadrant is the field managed by public administration as social infrastructure, such as port's facilities, maritime security and weather forecast etc.. On the other hand, operation management in the first quadrant is the field, which is managed by ship operation experts at shore of shipping companies. In this figure, the third and fourth quadrants come under the self-completed function and the first and second quadrants come under the support function. Seen from the above, maritime technical society is mainly concerned with the right half of Figure2, which is software_technology in the fourth and first quadrants.

2.2 THE ROLE OF EXPERTS FOR SHIP'S OPERATION WOULD BE SAFETY MANAGEMENT

To examine what kind of technology and standard in these fields are required for the future ship operation experts would be the first step to set the specific goal for education and research. So far, the technology required for seafarers was the operation method in the first quadrant. As the systematization of the supporting function at shore in the first quadrant in Fig. 2 was ambiguous, however, the discussion on the desired field of technology became also ambiguous. And that cause the different views on how to train human resources required for such operations.

It is our important aim to embody the specific knowledge, which is required for these fields, in the maritime safety management technology. IMO asks for reinforcement and perfection of operation management system by transferring the safety responsibility under ISM Code from the captain to corporate responsibility of shipping companies.

As ship operation system on board could be discussed on the same line with the traditional technology, author will discuss the technology necessary for operation management system at shore.

2.3 SHIP OPERATION TECHNLOGY AT SHORE FOR ESTABLISHMENT OF TQC

When the navigational function of a ship is mainly intensified at her ocean service, the managing and supporting system will be more required for shipping companies as a result. This means we need management technology, which enables us to recognize by what indicator we could detect the safety of ships at sea and by what indices we could forecast the danger. In other words, it is important to establish TQC (Total Quality Management) technology of the company's fleet. Though we can think of various kinds of TQC according to its coverage and time duration, we will finally be required to employ real time operation monitoring system based on the information technology using satellites.

After the establishment of ISM Code, the systematization of shipping management technology at shore is under the way in shipping companies and maritime research institutes. For example, the research of fleet operation system by Maritime Problems Investigation Committee in Japan (Incorporated Association) pointed out 6 operational functions as ship operations at shore including general management, ship management, treaty management, personnel management, etc. In order to perform these operations smoothly and efficiently, we need knowledge of management technology, including operations research and reliability engineering as well as basic knowledge of conventional ship operation.

3. WHAT KIND OF HUMAN RESOURCES ARE REQUIRED?

3.2 VARIETY OF TASK PERFORMING ABILITY

In maritime technical society, technical level has been classified based on the seafarers' qualification system. This is a certification of capabilities as a seaman on board according to his task. With this system, it is clear that the knowledge and experience has been a big help for the above-mentioned "ship operations at shore". But we have to examine whether the technology required on board is sufficient for operations at shore as it is. We would rather need another qualification and education system according to the role assumed in the system of operational technology integrating both sea and shore. At the same time, it is important to train human resources according to their ability to perform their tasks in the field

of technology, either at shore or at sea.

The following three types of training are necessary for human resources development.

(1) Goal-achieving type:
Human resources that is able to achieve the given goal steadily.

(2) Problem-solving type:
Human resources that is able to solve the given problems by utilizing the acquired knowledge and experience in theory and practice.

(3) Problem-setting type:
Human resources that is able to discover problems and seek to solve them on their own.

Not only in maritime technical society but also other fields, goal-achieving type human resources have been mostly sought. But in the field where technical innovations are much required, more human resources of type (2) and (3) are much more required. Industrial divisions where many of these types of human resources are employed will be able to survive in the future.

3.3 CONTENTS OF FUTURE EDUCATION

It is said that what should be taught at present education institutes are thinking ability (logical thinking and broadness of views), knowledge (basic knowledge and practical knowledge), attitude (presentation ability and positive attitude) and skills (language and computer skills).

Maritime education in history shows that importance given to these subjects has been changed along with the progress of technology. Attached importance has been changed (1) from skill (working ability) to knowledge and (2) from knowledge to thinking, and on top of that, to the sphere where attitude to study is considered important, making a spiral elevation. Figure 3 shows such changes as an image.

When universities become accessible to the young generation due to getting less in the number, education to develop basic academic ability to pursue one's own theme will be necessary instead of giving only knowledge at the undergraduate level.

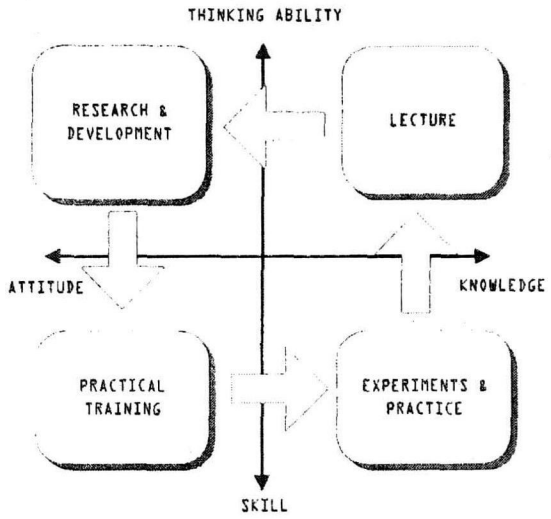

FIG.3 CIRCULATION OF EDUCATIONAL METHOD

3.3 HOW TO EDUCATE STUDENTS

Under the Japanese education system, higher education to freshman is given at universities and technical colleges. After entering private enterprises, education is given through company training system mainly based on OJT. Maritime education is given in the similar system. For seafarer education, there are many educational institutions; universities, technical colleges and seamen's school for freshmen, maritime college for mostly reeducation purpose, and the institute of sea training as a joint facility.

Three types of training of human resources described above correspond to the Japanese higher education system as: (1) goal-achieving type to undergraduate and college level, (2) problem-solving type to master course of graduate school and (3) problem-setting type to doctorate course of graduate school. We have an on-board training system by institute of sea training as a joint system. That functions as a bridge between school education and business at the basic education level. But reeducation system for seamen, which bridges between education institutes and enterprises in order to give problem-solving education, is not sufficient. Training at enterprises should be introduced under an internship program for undergraduate students in addition to sea training on training vessels.

It is essential to give refreshing education of graduate level for people now working in maritime technical society to continue their jobs and create new jobs. It is an urgent task for

maritime technical society to establish a system inside and outside of universities in which maritime experts can study while working or receiving financial support.

Figure 4 indicates the image of the educational system of maritime technical experts.

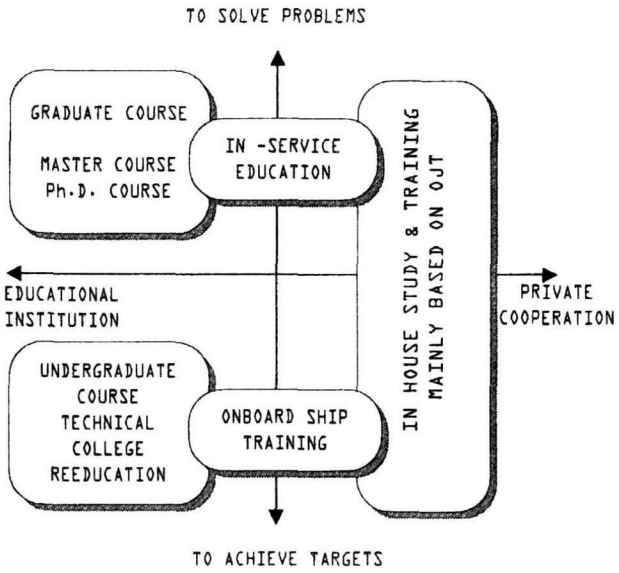

FIG.4 EDUCATIONAL SYSTEM OF MARITIME ENGINEER

3.4 THE ROLE OF INTERNATIONAL ASSOCIATION OF MARITIME UNIVERSITIES

The globalization of maritime companies is more rapidly progressing than another industries as we can see from the development of consolidated boarding and the global alliance of shipping companies. Maritime education institutes are also in the age of international cooperation and competition. One of the remarkable attempts is the foundation of this International Association of Maritime Universities, (IAMU). IAMU is trying to promote research and study with the following common goals among Maritime Universities with graduate schools in the world:

(1) What the maritime education and training for next generation should be

(2) What the future education for safety management at sea should be

(4) What the worldwide excellence of maritime education should be.

These three main issues are important and common to all maritime universities.

We believe that human resources training in the 21st century will be developed through such a global alliance of maritime universities.

4. CONCLUSION

Author has imaged the future ship operation technology, placed on education and research as an approach to that goal, and then described what maritime education should be. He believes that we have to think of the role of education and research institutes in maritime society from the viewpoint of innovation of maritime technical society. Though this discussion, we could find the starting point for the vitalization of education.

In Japan where the number of younger generation is decreasing, we cannot sustain maritime technical society that is rapidly changing merely by passing on to them the same thing we have learned. The number of people engaging in maritime affairs is decreasing. This fact is indicating that the quality improvement of these people is imperative. We must not reproduce copies of ourselves, and we have to put up an ambitious goal at which younger generation could set a high aim.

Under these considerations, Kobe University of Mercantile Marine has just started the reform of whole education and research system of the university toward 21cetuary under above considerations.