A Study on the Improvement of VTS Simulator for Vessel Traffic Service

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Abstract—recently, it has become one of the main factors of international competitiveness to secure safety in the ports and the sea, and accordingly the efficient operation of VTS and the business related to VTS is internationally expanding so that it is urgently necessary to secure relevant localized technologies. However, VTS operator training system so that it is difficult to make improvements or reflect the requirements for education and the treatment of issues needs to depend on manufacturers. Thus, this study compares/analyzes domestic/foreign regulations related to the Standards of of training and certification of VTS personnel and the requirements of the VTS simulator requirements are analyzed to propose an improvement plan.

Keywords—IALA, Standard of training and certification of VTS personnel, VTS operator, On-the-job training, VTS simulator

I. INTRODUCTION

Recenly, in line with rapid changes of harbor traffic and the user demand for information services, VTS operation technique is changing, and innovation of VTS system is being achieved such as new technology development such as next-generation / multi-functional VTS information system. (Chung-II Gi, 2010). Also, the importance of vessel traffic service is increasing such that various countries around the world are reinforcing the marine safety security system for domestic ship and coast traffic safety/environment protection, and for security of outstanding resources and efficient education for vessel traffic service, there is much effort to introduce qualification system and evaluation system of VTS operator and systematic education system(Kang, 2005).

International Association of Lighthouse Authorities (IALA) has enacted and recommends criteria for training and qualification of VTS operators to enhance the qualifications and crisis handling capabilities of VTS operators, and in order to enhance the efficiency of education to VTS operators, the details on design and installation of educational simulators for VTS operators is established in guidelines on simulation in VTS training and is recommended to be applied (IALA, 2005).

II. STATUS OF EDUCATION USING VTS SIMULATOR

VTS simulator has the advantage of safe and effective education during a short period using the same systems as the actual control situation, and thus is being used in education and training of VTS operator

the greatest advantage of training using VTS simulator is that it allows the operators to acquire control proficiency and be trained in potential risk response abilities or observation of development of vessel traffic service through various scenarios, and to support this, the function to secure and generate various educational scenarios is one of the important for VTS simulator systems, but the scenarios are modified or generated through manufacturers which costs much time and expense, which renders it impossible to efficiently conduct education using VTS simulator.

In order to confirm the issues of education using VTS simulator and collect demands, surveys and expert interviews were conducted against operators currently working at VTS centers in korea.

The advantages and inconveniences of education using simulators in execution at publicly certified education institutions were investigated, and as the result, the greatest advantage was found to be acquisition of control abilities/proficiency through training scenario, learning how to manipulate essential VTS equipment, and experience for areas outside the controlled area (place of work) as shown in Fig. 1, and inconveniences were in the order of discrepancy in versions of VTS simulator and operation software, limited functionalities of operation program, discrepancy in screen composition between systems, and discrepancy in hardware compositions as in Fig. 2.

The current user education status according to introduction of new control system or new establishment of control center was investigated, and as the result, most were conducting both classroom and practice as in Fig. 3, and as the result of surveying the preference of education method, it was confirmed that the preference for education using simulator including education combining classroom and practice was high as in Fig. 4.

Also, the core functions or demands that should be added to the VTS simulators were surveyed, and as the result, there are many demands for improvement and expansion of education scenario and port database such as diversification of domestic/foreign ports, practical education that can reproduce past accident records, scenario composition that can be grafted to actual control circumstances by applying various control techniques, and provision of scenarios similar to by reflecting port characteristics, and many requested the system composition and function support same as the system in use at the VTS center.
III. EDUCATION IMPROVEMENT PLAN USING VTS SIMULATOR

A. Survey Development of algorithm for auto-generation of VTS training scenario

In order to improve the issues of VTS simulator through limited and standardized training scenario, the algorithm for auto-generation of custom scenario for each harbor was developed for scenarios suited to actual state of domestic harbors and to secure various educational scenarios. In case of existing VTS simulator, a scenario was generated by inputting data according to set procedures, but the proposed simulator shares information such as ship information or climate data by linking with the open-protocol-based data from VTS system and existing data, which are used to provide specialized scenario for each harbor.

If such algorithm is used, the advantages include the ability to support simulation learning that is realistic and applicable to actual jobs by utilizing data actually stored at the VTS center.

B. VTS training scenario Survey Development of algorithm for auto-generation of VTS training scenario

According to IALA recommendations, the education on V-103/1(VTS Operator) and V-103/3(On-the-Job Training) and the level of English proficiency equivalent to IELTS (International English Language Testing System) Level 5 are required, and domestically, VTS jobs are to be executed after completing VTS operator basic training and on-the-job training. As the result of surveying the operators about education completion process, as in Fig. 5, all respondents responded that they completed the VTS operator basic education, but only 17.6% responded that they completed the job-related education, confirming that the on-the-job training at the working VTS center is not being actively conducted.

Currently execution according to if the classroom training, discussion, case study, hands-on practice and on-the-job training process with site field trips currently in execution according to the circumstances of VTS centers are conducted through VTS simulators, concentrated education would be available centering on the controlled section of the work region so that the control abilities suited to port characteristics or unique control technique of the VTS center could be trained, and through education training utilizing various scenarios, work adaptation can be improved and the marine accidents due to human factors can be prevented.

C. e-Learning

Recently, the internet-based training simulator that features mathematical model and ship model that can exhibit similar operation patterns like actual ships during training and is able to overcome time/space restraints has been developed and was verified for performance through demonstrative operation (Lee & Song, 2010). As such, when VTS education is executed using simulator with e-Learning support, the time/economic inconveniences according to completing the education as VTS operators from across the country have to visit the education training institution themselves can be resolved, and there is the advantage of efficient utilization of compulsory education for enhancement of job execution abilities.

D. Relation

Through survey, it was found that a considerable number of operators wished for training utilizing ship operation simulator, and demanded a simulation system where one can practice the matters regarding job cooperation with other institutions. Support linked training between other simulators such as ship handling simulator and engine room simulator, as in Fig. 6, then integrated education for emergency control studies, nautical science, and vessel traffic service studies for VTS management would become available to maximize education synergy effect and obtain high education satisfaction for operators.

IV. CONCLUSION

In this study, the IALA recommendations and instructions for training process of VTS operator was compared and analyzed to domestic regulations, and a survey was conducted against the operator to analyze the status and issues of education using VTS simulator. Based on this, the improvement plan for the development of scenario auto-generation algorithm that enables various training for VTS operators, site job education using simulator, e-Learning and development of simulator that can be linked to other systems was proposed. Currently, a follow-up study is in progress about development of VTS simulator applying the technology for generating custom scenario for each harbor embracing the proposed method, which is expected to be efficiently utilized in resource training of VTS operators.

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REFERENCES

Fig. 1 Advantages of VTS simulator

Fig. 2 Inconveniences of VTS Simulator

Fig. 3 Education Method (Current)

Fig. 4 Education Method (Proposal)

Fig. 5 Overview for Algorithm for Auto-Generation of Custom Scenario

Fig. 6 Singapore Education Training Center using simulators