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Original article

Improving and Assessing the Impact of e-Navigation applications*

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Abstract

The scope of this paper is implementation issues of the e-Navigation concept of the International Maritime Organization (IMO). IMO has adopted the e-Navigation strategic implementation plan (SIP) in 2014. This plan, i.a., bases on estimating the effect of e-Navigation applications on reducing navigational accidents, including collisions and groundings of ships falling under the International Convention for the Safety of Life at Sea (SOLAS) by approximately 65 per cent. However, IMO Member States are responsible for safety of navigation and efficient vessel traffic at international but also on national levels. Regarding the introduction of new concepts and innovative systems into vessel traffic there is a need to comprehensively assess potential effects not only for SOLAS ships but also for non-SOLAS ships. This paper aims at a more comprehensive and theoretically sounded estimation of e-Navigation potentials by investigating and applying IMO's methodology for quantification of those effects also to the implementation of e-Navigation solutions to ships not falling under the SOLAS convention (non-SOLAS ships). The authors carried out a case study using the SMART-Navigation concept of Korea as model case for impact assessment. For the mentioned purpose, this paper identifies main tool kits of IMO e-Navigation, proposes and applies a set of formulas to comprehensively assess and quantify effects of new functions or services based on IMO's methodological approaches. From gained results authors suggest investigations not only taking into account expert opinions but also simulation trials to identify factors and coefficients for thorough calculations. From the results the authors conclude and recommend to extend the impact assessment of e-Navigation also to vessel traffic involving non-SOLAS ships as a general and global recommendation to coastal states. Further, results are provided as a potential model case for IMO Member States' reference for their state-specific individual situation and conditions.

Keywords: "e-Navigation, Non-SOLAS ships, Impact Assessment"

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I. Introduction

IMO, at the 85th meeting of its Maritime Safety Committee (MSC, 2008), adopted the e-Navigation development and implementation strategy and defined the e-Navigation concept, among others, "to enhance berth to berth navigation and related services, for safety and security at sea and protection of the marine environment." With the e-Navigation Strategy Implementation Plan (SIP) IMO has provided its vision of the concept in relation to on board, onshore and communication elements. The SIP is mainly to implement five prioritized e-Navigation solutions by taking into account IMO's formal safety assessment methodology.

The SIP evaluates effects of e-Navigation as to reduce navigational accidents, including collisions and groundings, for SOLAS ships by 65%. However, the situation of maritime safety is different from country to country, and SOLAS ships are always interfaced with non-SOLAS ships in the real maritime practices. This might mean that the practices to introduce e-Navigation would be different from countries in terms of their priorities, levels and effects to apply it in their water areas. Therefore, it is important for a country to analyze its own specific data of vessel accidents and assess the effects of e-navigation in terms of accident types, including the other accidents as well as navigational accidents, and ship types, including non-SOLAS ships as well as SOLAS ships. This supports member states to maximize benefits of implementing e-Navigation for its water areas by establishing an effective and efficient National SIP.

National authorities investigate and monitor their individual situations in respect to their national waters and shipping fleets. In this paper, the authors introduce the development of an enhanced method for the comprehensive assessment of implementing e-Navigation applications. The method specifically focuses on the quantification of the impact of e-Navigation solutions in terms of a reduction of the number of accidents that potentially can be avoided by e-Navigation applications. The method will be introduced and discussed by means of the Korean SMART-Navigation project, which includes e-navigation services for both non-SOLAS and SOLAS ships, in order to provide a model case for comprehensively assessing the implementation of e-Navigation taking especially into account the specific individual situation and conditions of the coastal states. In the frame of this project specific solutions are presented as so called e-Navigation tool kit applications. Finally, outcome of research performed and coordinated by World Maritime University in cooperation with other partners into the identification of training needs and user requirements to support the quick and smooth introduction of innovative e-Navigation solutions into real practice will be presented.

II. IMO's initiative on e-Navigation

2.1. Concept of e-Navigation, brief history and state of progress

E-navigation was initiated by a joint proposal, including Japan, the Marshall Islands, the Netherlands, Norway, Singapore, the UK and the USA, to the MSC of IMO at its eight-first session in 2006 (MSC 81/23/10). Following this proposal, the NAV Sub-Committee developed a "Strategy for the development and implementation of e-navigation (NAV 54/25 Annex 12)" and "Time frame for implementation of the proposed e-navigation strategy (NAV 54/25 Annex 13)",