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Formal Safety Assessment for Ship Traffic in the Istanbul Straits

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Abstract

Formal Safety Assessment is a very important tool for the establishment of safety systems according to marine safety. FSA methodology has been recommended to all the maritime actors by the International Maritime Organization (IMO) as an integrated safety system. In Formal Safety Assessment two main risk methodologies are applied, which are quantitative and qualitative risk assessments. Both of these methods are used together in practice. The FSA approach is applied in five main stages. In this study, risks related to marine traffic in the Istanbul Strait in the period of 2001-2010 are analyzed. In practice, different factors are selected for risk analyses such as vessel specifications, accident locations, accident time, accident types and causes.

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Keywords: Istanbul Strait, Formal Safety Assessment, Ship Traffic, Risk Analysis

1. Introduction

The Istanbul Strait is located between the Black Sea and the Sea of Marmara. The Istanbul Strait is approximately 31 km long, with an average width of 1500 m and its narrowest point is 698 m between Yeniköy and Umurbey. The Strait has at least eight sharp turns. The Strait of Istanbul, the Bosphorus, is roughly an ‘‘S-shaped’’ channel and links the Black Sea to the Sea of Marmara (Akten, 2004). An average of 50,000 ships transit the Istanbul Strait annually. In addition to that, there is the local maritime traffic, as well as the international marine traffic in the Istanbul Strait. The local traffic includes more than 2000 daily ferry crossings, transporting more than 250,000 people between the Strait’s European and Asian shores (Or et al, 2007). The Istanbul Strait is one of the important

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waterways in the world because of its socio-economic, cultural, geopolitical and strategic importance. At the same time, it is a unique gateway for the Black Sea countries. The most important part of the world trade is realized through the Turkish Straits. With globalization, world trade has shown rapid development and this situation has also affected the shipping industry. In parallel with growing world trade, world trade fleet has grown in terms of capacity of ships, volume of transported cargo and cargo types. Developments in the shipping industry have led to an increase of marine traffic. Similar results occur for the Istanbul Strait.

Today the Istanbul Strait is one of the busiest waterways in the world. The marine traffic has been growing fast during the last few years in this area, especially due to the rapid increase of the transportation of various cargoes to Black Sea countries and the transportation of oil, chemicals and LPG/LNG from Russia and the Middle Eastern countries. The number of vessels passing through the Istanbul Strait increased from approximately 117 to 139 daily between 2001 and 2010 (Secretariat of Maritime Affairs, 2011). However, marine traffic increased an average of 16 percent annually. Therefore, marine risks are increasing, too. Marine risks have resulted in different types of accidents such as collisions, grounding, fire, drifting. According to Doğan and Burak, 450 traffic accidents have been reported by the authorities and the most frequent reason is collision (Doğan and Burak, 2007). As a result, marine risks are increasing every day in the Istanbul Strait. Ensuring marine safety depends on the establishment of systematic and integrated safety procedures. Therefore, risk levels and risk factors must be known and risks should be evaluated for the establishment of safety systems. In the shipping industry and marine area, Formal Safety Assessment (FSA) is the most important risk assessment methodology and it shows the systematic safety procedures. In this study, Formal Safety Assessment was applied to the Istanbul Strait and the obtained results were evaluated.

Nomenclature

F	Frequency of marine accident
S	Severity of marine accident
Ci	The number of ships exposed to an accident
Qi	The number of total ships passing through a marine area
pNi	Accidents that resulted in death, injuries and economic losses

2. Formal Safety Assessment

After severe maritime disasters such as the Exxon Valdez (1989) and Herald of Free marine accidents, reviewing the legal instruments according to maritime safety has become mandatory by the international community. Therefore, in 1993 the National Maritime Safety Agency of England proposed the maritime safety procedures that consist of five stages. FSA can be used as a tool to improve the measures and regulations or to make new ones on the basis of analysis of current ship design and engineering techniques, ship's operation and control, standards and regulations of safety management, together with the combination of realistic needs (Hu et al, 2007).

Formal Safety Assessment (FSA) has been developed by the International Maritime Organization (IMO) as a structured and systematic methodology, aimed at enhancing maritime safety, including protection of life, health, the marine environment and property by using risk analysis and cost-benefit assessment (Psarros et al, 2010). One of the objectives of FSA is to construct a systematic and proactive maritime safety infrastructure. For these aims, the methodology determines safety procedures individually but at the same time in an integrated way. FSA is a rational and systematic process for assessing risks and for evaluating the costs and benefits of different options for reducing those risks (Peachey, 1999). FSA can be applied as five stages. In the first stage, all the hazards and dangerous situations are determined in detail. This stage can be characterized as "Hazard Identification" (HAZID). In the HAZID Stage, all the risks are set out. In formal ship safety assessment, a hazard is defined as ''a physical situation with potential for human injury, damage to property, damage to the environment, or some combination'' (MSA, 1993). Significant risks can be chosen in this step by screening all the identified risks (Wang, 2002). Secondly, risk assessment is carried out considering data obtained in the first stage. The third stage is the determination and selection of the risk control options. In the fourth stage, cost – benefit analysis is performed. In the fifth and the final stage, recommendations for decision-makers are listed.