

ORIGINAL ARTICLE

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# A holistic view of maritime navigation accidents and risk indicators: examining IMO reports from 2011 to 2021

Carine Dominguez-Péry<sup>1\*</sup> , Rana Tassabehji<sup>2</sup>, Franck Corset<sup>3</sup> and Zainab Chreim<sup>1</sup>

\*Correspondence:  
carine.dominguez-pery@univ-  
grenoble-alpes.fr

<sup>1</sup>University Grenoble  
Alpes, Grenoble INP  
Institute of Engineering  
and Management, CERAG,  
38000 Grenoble, France

<sup>2</sup>School of Management, Bath  
University, Bath BA2 7AY, UK

<sup>3</sup>University Grenoble Alpes, I3M,  
38000 Grenoble, France

## Abstract

This paper investigated the risk indicators in maritime accidents and how they are considered within the reporting of maritime accidents, drawing on ten years of International Maritime Organisation (IMO) (2011–2020) accident reports. It highlighted the lack of consistent findings in studies exploring the role of vessel characteristics in maritime accidents, which often result from different methods, databases, techniques and motivations used by each respective study for gathering and analysing data. Furthermore, as human error continues to be highlighted as the top-cited cause of accidents, this study examined the qualitative content of IMO accident reports in-depth to broaden our understanding of maritime accident risk factors. Using a data-driven approach, statistical (ANOVA) and advanced text-mining techniques (using IRAMUTEQ software) were applied to extract meaning from the semi-structured and unstructured narrative descriptions that constitute most of the national administrations' investigation reports to the IMO. Building on the text analysis of the IMO accident data, we proposed the Accident Maritime Ecosystem framework, which incorporates individuals, the ship organisation (on board), the internal ship ecosystem (on board and onshore), the external ship ecosystem (external factors) and the global maritime ecosystem (policies and regulations); moreover, it identifies these entities as risk factors in maritime accidents. The findings illustrate how accident reporting is largely human-centric and that as maritime transportation is becoming increasingly complex, there is a need for policy and organisational decision-makers to incorporate a broader scope of actors when considering maritime risk factors, which can be achieved by using the AARE framework as a guideline.

**Keywords:** IMO accident reports, Maritime ecosystem, IRAMUTEQ, Risk indicators

## Introduction

The COVID-19 pandemic directly impacted the maritime transportation sector with serious ramifications for global supply chains. This was perfectly illustrated in the case of the accident involving the MV Ever Given, which played out in the full glare of the public around the world. The 220,000 dwt ton container ship, carrying billions of dollars' worth of cargo, ran aground in the Suez canal in March 2021 during high winds and poor weather (Guardian 2021a). This massive container ship blocked the world's busiest

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