Accident Analysis and Prevention 123 (2019) 397–398

Contents lists available at ScienceDirect

Accident Analysis and Prevention

journal homepage: www.elsevier.com/locate/aap

Editorial

Risk management in port and maritime logistics

1. Introduction

Acting as a key trade facilitator, maritime transport plays a crucial role in providing relatively low-cost and efficient transportation. Maritime transport is a dominant mode as around 90% of global trade volumes are carried by sea. Historically, the role of seaborne trade has been the backbone of economic development. Ports and shipping are key components of logistics activities and contribute to the effective and efficient management of flows of materials, products, and information in supply chains.

Nevertheless, ports and shipping are considered among the key causes of uncertainty in trade and logistics flows due to the concentration of goods being transported (Lam and Su, 2015). Disastrous events such as earthquakes, floods, and cyclones have become serious challenges to the world economy due to increasing economic damages (Guha-Sapir et al., 2016). Other issues affecting connectivity and service quality of ports and shipping include safety management practices in ships and risk management in ports. Seaborne cargoes and seaports have been challenged by major accidents like the Tianjin Port fire and explosion in 2015 (Fu et al., 2016). These accidental damages are wide-ranging, spanning from operational to catastrophic in terms of occurrence level, and from man-made to natural in terms of risk nature.

In particular, major ports are key nodes in supply chains serving stakeholders of various roles, while shipping networks are the links among the supply chain parties. Any major accidents of ports and shipping networks would lead to significant business interruptions and losses causing damaging effects on a country's or region's economy (Zhang et al., 2017). The corresponding supply chain impacts could also be substantial. Therefore, it is crucial for maritime transport providers and stakeholders in the supply chains such as government authorities, manufacturers, distributors, and inland transport providers to better understand and mitigate the risks involved.

This special issue aims to collect original contributions related to risk and accident management in port, shipping, and maritime logistics. Seven papers covering various aspects of the theme are included and discussed in the following sections.

2. Maritime accidents

The special issue is started with a thorough literature review on maritime accidents conducted by Luo and Shin (2018). International journal papers covering maritime accidents occurring on seas, waterways, rivers, and ports over the past 50 years were analysed. The topic has drawn increasing attention over the decades, as reflected by the finding that the number of publications has increased, particularly in recent years. An interesting trend was observed: The focus of maritime accident research has switched from ship structure problems to environmental conditions, including human and socio-economic considerations. Maritime accident research has evolved to take into account of multiple, complex factors and situations. This paper gave a holistic overview of research developments in maritime accidents, which links nicely to other contributions as shown below.

Vessel traffic safety is a major domain in maritime risk studies. Risk analysis/safety assessment and accident data analysis are among the most prevalent aspects, as shown by Luo and Shin (2018). Two papers in this special issue involve vessel traffic accidents in port waters with accident data analysis. In Mou et al. (2018)'s study, authors proposed a framework of safety indexes to assess the risk level in busy port waterways. Based on risk criteria, the framework included safety evaluation and safety warning in the index. The study utilized 20 years of vessel traffic accidents data in the Western Shenzhen Port, China. Findings showed that the general safety level of vessel traffic in the port of Shenzhen was good, with a lowering risk level for vessel accidents since 2005, when the safety indexes were adopted in vessel traffic safety management.

The other paper is written by Chang and Park (2018). Vessels are requested to lower their sailing speed in reduced-speed zones in some ports to mitigate emissions from vessels and prevent them from hitting mammals. Also using 20 years of data, the study estimated the effects of vessel speed reduction on damages, casualties and frequency of vessel traffic accidents in the U.S. There were mixed results when authors compared active reduced-speed zones with inactive reduced-speed zones. As a whole, potential accidents with relatively minor damages were prevented through speed reduction, leaving only big impact accidents in reduced-speed zones. It was concluded that risk analysts should use damage/casualty and frequency models complementary to performing vessel traffic safety assessment.

3. Risk modelling

Maritime risk research may focus on developing models for risk analysis instead of using data-driven approaches. Achurra-Gonzalez et al. (2018) formulated a cost-based container assignment model to study the impact of liner shipping network perturbations on container cargo routing. The paper covered disruptions of a multi-port system against natural and man-made hazards and used a base case of Southeast Asia to Europe trade for investigation. According to the scenarios being tested, it was found that intra-regional shipping connectivity was more vulnerable to port disruptions. Furthermore, alternative routes and the associated costs were identified under various tests of the

https://doi.org/10.1016/j.aap.2018.04.003

Available online 11 April 2018

proposed model.

Another paper featuring risk modelling is conducted by Alyami et al. (2018). The objective of the study was to apply Failure Mode and Effects Analysis to assess the safety performance of container terminal operations. The model combined a Fuzzy Rule-Based Bayesian Network with Evidential Reasoning for anlaysing individual hazardous events. This provided a tool to incorporate subjective judgements to prioritise hazards under uncertainty. A case study of a hub container port in the Middle East was performed for demonstration. Hazardous events were ranked by considering both the local risk estimations and their influence on the overall port safety system.

The application of optimization techniques in Achurra-Gonzalez et al. (2018) and Multiple Attribute Decision-Making Analysis in Alyami et al. (2018) does not require having complex panel data sets for risk analysis. These approaches can overcome the limitation of data availability when maritime risk data are sparse or missing.

4. Maritime logistics risk management

Scholars have spent more efforts in extending maritime risk research to logistics and supply chain perspectives because it would be insufficient to study port and shipping risks as a standalone subject. Focusing on scenario analysis and disaster preparedness, Kwesi-Buor et al. (2018) conducted System Dynamics modelling to evaluate the impacts of policy interventions on industry actors' behaviour to mitigate risks and to recover from disruptions along maritime supply chains. There was a bi-directional relationship between regulation and shippers' disaster preparedness level. Findings showed that forecast accuracy was correlated positively to industry actor's attitude to risk prevention.

Vilko et al. (2018) put emphasis on maritime supply chain visibility and examined risks in the multimodal maritime supply chain between the Gulf of Finland and mainland Finland as an illustration. By conducting systematic rounds of interviews, it was found that smaller companies were usually characterised by a lower level of effective risk management. Having a higher level of supply chain visibility was desirable, however, visibility did not directly lead to controllability. The authors concluded that communication and collaboration would be essential to better understanding and managing complex maritime supply chains.

Indeed, collaboration among stakeholders is helpful in maritime logistics risk management because they operate in chains and networks. We encourage future research efforts in developing novel approaches to enhance collaboration along maritime supply chains for risk management.

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