Journal of
Marine Science and Engineering

MDPI

Editorial

Sustainable Operations in Maritime Industry

Yuquan Du [1], Gang Chen [2] and Shuaian Wang [3,*]

[1] La Trobe Business School, La Trobe University, Melbourne 3086, Australia; bill.du@latrobe.edu.au
[2] World Maritime University, Fiskehamnsgatan 1, 211 18 Malmö, Sweden; gc@wmu.se
[3] Department of Logistics and Maritime Studies, Faculty of Business, The Hong Kong Polytechnic University, Hong Kong
* Correspondence: wangshuaian@gmail.com

Maritime transportation serves as the backbone of international trade and the global economy. However, the ships that fulfill this maritime transportation also pose a significant environmental threat. The international nature of shipping makes maritime transportation one of the least regulated industries, with pollutants from ships, especially air emissions, becoming a growing global concern.

The International Maritime Organization (IMO), the United Nations body that is responsible for international shipping, has enacted a number of regulations to promote sustainability in the shipping sector. A few notable ones include the Energy Efficiency Design Index (EEDI), emission control areas (ECAs), carbon dioxide emissions data collection system, and carbon intensity index (CII). Additionally, intergovernmental regimes such as the European Union and governments such as those from Singapore and China have enforced stringent maritime pollution regulations within their territorial waters.

This Special Issue "Sustainable Operations in Maritime Industry" has 10 papers, which can be divided into three categories: the enforcement of sustainability regulations, the operations management that balances environmental and economical sustainability, and the research directions for sustainable maritime operations.

The enforcement of sustainability regulations in the maritime industry is no easy task, as ships trade globally. Port state control, wherein port authorities enforce these regulations on visiting foreign-flagged ships, is an effective approach to ensuring the compliance of these ships with international laws and regulations. Aiming to improve the efficiency of port state control, Hou et al. [1] designed an unsupervised machine learning model—a K means clustering model—to inform port state authorities of the conditions of visiting ships, enabling targeted inspections of substandard ships. Yang et al. [2] proposed several supervised machine learning models—a traditional linear regression model, a linear regression model with a pairwise comparison loss function, and a support vector machine model with a pairwise comparison loss function—to recommend ships for the port states to inspect.

With the sustainability regulations that are in place, the shipping industry's primary goal remains profitability. Therefore, several studies have explored the operations management strategies that balance environmental and economical sustainability. Wu et al. [3] examined the operations of ships with dual-fuel engines that can burn either low-sulfur fuel oil or liquified natural gas. They formulated a mixed-integer nonlinear optimization model, aimed at minimizing the total costs, including the cost of the carbon emissions. Li et al. [4] and Wu et al. [5] minimized the fuel consumption of ships, thus reducing all types of air emissions. Li et al. [4] focused on an optimization of the sailing speed considering uncertain weather conditions, and Wu et al. [5] worked on the optimal adoption of fuel-saving technology. Hasanspahić et al. [6] conducted a case study on ballast water discharge at the Port of Ploče, Croatia and found that general cargo ships and bulk carriers are the main contributors to this. Huang et al. [7] and Yu et al. [8] examined the port competitiveness and efficiency, respectively. Huang et al. [7] emphasized the combined impact of the technology,

Citation: Du, Y.; Chen, G.; Wang, S. Sustainable Operations in Maritime Industry. *J. Mar. Sci. Eng.* **2023**, *11*, 922. https://doi.org/10.3390/jmse11050922

Received: 21 April 2023
Accepted: 24 April 2023
Published: 26 April 2023

organization, and environment conditions of hinterland cities on the port competitiveness. Yu et al. [8] applied a data envelopment analysis method and concluded that the Yangtze River Delta port group's efficiency has not yet reached the efficient frontier.

Rigorous, evidence-based research is essential for informing sustainable maritime operations. Wang and Du [9] pointed out that researchers using optimization methods to improve these sustainable maritime operations should target the standardized problems and transparent algorithms. Yang et al. [10] emphasized the importance of incorporating shipping domain knowledge when using computer vision to address these maritime problems.

To conclude, sustainable operations in the maritime industry are vital to both the maritime industry and the global community. A number of efforts have been devoted to the field, yet more are to be seen in the near future.

Author Contributions: Conceptualization, G.C., Y.D., S.W.; writing—original draft preparation, S.W.; writing—review and editing, G.C., Y.D. All authors have read and agreed to the published version of the manuscript.

Acknowledgments: The authors wish to thank all contributors to this Special Issue and the JMSE editorial staff for their efficient work.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Hou, Z.; Yan, R.; Wang, S. On the K-Means Clustering Model for Performance Enhancement of Port State Control. *J. Mar. Sci. Eng.* **2022**, *10*, 1608. [CrossRef]
2. Yang, Y.; Yan, R.; Wang, H. Pairwise-Comparison Based Semi-SPO Method for Ship Inspection Planning in Maritime Transportation. *J. Mar. Sci. Eng.* **2022**, *10*, 1696. [CrossRef]
3. Wu, Y.; Huang, Y.; Wang, H.; Zhen, L. Joint Planning of Fleet Deployment, Ship Refueling, and Speed Optimization for Dual-Fuel Ships Considering Methane Slip. *J. Mar. Sci. Eng.* **2022**, *10*, 1690. [CrossRef]
4. Li, X.; Sun, B.; Jin, J.; Ding, J. Speed Optimization of Container Ship Considering Route Segmentation and Weather Data Loading: Turning Point-Time Segmentation Method. *J. Mar. Sci. Eng.* **2022**, *10*, 1835. [CrossRef]
5. Wu, Y.; Huang, Y.; Wang, H.; Zhen, L.; Shao, W. Green Technology Adoption and Fleet Deployment for New and Aged Ships Considering Maritime Decarbonization. *J. Mar. Sci. Eng.* **2023**, *11*, 36. [CrossRef]
6. Hasanspahić, N.; Pećarević, M.; Hrdalo, N.; Čampara, L. Analysis of Ballast Water Discharged in Port—A Case Study of the Port of Ploče (Croatia). *J. Mar. Sci. Eng.* **2022**, *10*, 1700. [CrossRef]
7. Huang, Z.; Yang, Y.; Zhang, F. Configuration Analysis of Factors Influencing Port Competitiveness of Hinterland Cities under TOE Framework: Evidence from China. *J. Mar. Sci. Eng.* **2022**, *10*, 1558. [CrossRef]
8. Yu, S.; Gong, L.; Qi, M. Efficiency Analysis of the Coastal Port Group in the Yangtze River Delta. *J. Mar. Sci. Eng.* **2022**, *10*, 1575. [CrossRef]
9. Wang, S.; Du, Y. Pathway of Mathematical Optimization Research: From Specialized Problems and Opaque Algorithms to Standardized Problems and Transparent Algorithms. *J. Mar. Sci. Eng.* **2022**, *10*, 1434. [CrossRef]
10. Yang, Y.; Yan, R.; Wang, S. Integrating Shipping Domain Knowledge into Computer Vision Models for Maritime Transportation. *J. Mar. Sci. Eng.* **2022**, *10*, 1885. [CrossRef]