**INTRODUCTION**

The impact of vessel size on the cost structure of a generalized logistics chain is a key consideration in maritime transport. While increasing vessel size reduces transport costs per unit through economies of scale, it could also result in challenges such as higher handling costs, infrastructure constraints, and logistical inefficiencies. Therefore, balancing these factors is crucial to optimizing the overall cost structure in containerized shipping.

Existing literature highlights both the benefits and challenges of vessel size expansion. Jansson and Shneerson (1982) emphasize the importance of queuing theory in analyzing port congestion and cost functions, which directly affect the cost structure of larger vessels. Cullinane and Khanna (2000) examine economies of scale in container shipping but note the difficulty of extrapolating cost benefits for ships beyond 8,000 TEU. Similarly, Sys et al. (2008) determine that economies of scale are achievable up to approximately 12,500 TEU, though factors like circulation frequency and port calls influence the optimal vessel size. Paz, Orive, and Cancelas (2015) highlight that further vessel size growth is constrained by physical port characteristics, emphasizing the need for integrated port and maritime models. Additionally, Moon and Woo (2014) show that reducing port dwell times improves ship efficiency, reinforcing the importance of port operations in cost structures. These studies underscore the complex relationship between vessel size, port infrastructure, and logistics efficiency.

In this context, our study aims to investigate the nuanced relationship between vessel size and generalized logistics chain cost, answering the sub-research question: What is the impact of vessel size on the cost structure of vessel cost and logistics chain cost?

**Conclusion**

This study proves that larger vessels reduce logistics costs through economies of scale, with the 23,964 TEU vessel achieving the lowest cost. However, diminishing cost savings beyond a certain size highlight the need to balance efficiency with infrastructure constraints. The findings provide valuable insights for shipping companies and policymakers in optimizing strategies. Future research should explore the long-term economic and environmental impacts, the role of automation in cost reduction, and hinterland transport efficiency. As global trade evolves, continuous assessment of vessel size and logistics integration remains essential for sustainable and cost-effective maritime transport.