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The Economics of Maritime Transportation: Shipping Costs, Port Efficiency, and Regional Economic Connectivity in Indonesia

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ABSTRACT

Maritime transportation plays an important role in supporting trade, logistics efficiency, and regional economic integration, particularly in archipelagic countries such as Indonesia. However, differences in shipping costs, port efficiency, and maritime connectivity may create challenges for goods distribution and market accessibility. This study aims to examine the economic dimensions of maritime transportation by analyzing these three factors and their implications for regional economic development in Indonesia. A qualitative approach using a literature review method was employed. Secondary data were collected from peer-reviewed journal articles, academic books, and relevant research publications. The results indicate that shipping costs influence logistics expenditure and business competitiveness, while port efficiency is associated with cargo-handling performance, transportation costs, and trade activities. Maritime connectivity also contributes to market accessibility and regional distribution integration. These dimensions are interconnected, indicating that improvements in maritime transportation require coordinated efforts to enhance port operations, manage shipping costs, and strengthen connections between major and regional ports. This study concludes that an integrated maritime transportation policy can support logistics efficiency and regional economic integration in Indonesia. Further empirical research is needed to examine these relationships using port performance indicators, domestic freight rates, and regional economic data.

Keywords: *Maritime Connectivity, Maritime Transportation Economics, Regional Economic Development, Shipping Costs, Port Efficiency.*

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1. | INTRODUCTION

Maritime transportation is a fundamental component of the global economic system because it facilitates international trade, connects regional markets, and supports the movement of goods across geographically dispersed locations. Its economic significance extends beyond the physical transportation of commodities to include shipping costs, market accessibility, trade competitiveness, and economic growth. Stopford (2009) explains that maritime economics involves the interaction between shipping markets, transport demand, vessel supply, and operating costs. In international trade, transportation costs can function as a substantial trade barrier, influencing firms' ability to access foreign markets (Clark et al., 2004). Recent research further demonstrates that increases in maritime transport costs can affect international trade patterns and create greater vulnerability for regions with limited transportation alternatives (Ferrari et al., 2023). Furthermore, maritime transport costs are affected by geographical distance, shipment characteristics, port performance, and shipping network structures (Wilmsmeier & Martínez-Zarzoso, 2010). These relationships establish maritime transportation as an important subject of economic analysis rather than merely an operational component of logistics management.

Port efficiency represents another important dimension of maritime transportation economics. Ports serve as interfaces between maritime shipping and inland distribution systems, and their operational performance influences cargo-handling costs, vessel waiting times, and the overall cost of transporting goods. Tongzon (2001) demonstrates the relevance of efficiency measurement in comparing port performance, while research by Blonigen and Wilson (2008) identifies a relationship between port efficiency and trade flows. More specifically, Clark et al. (2004) found that improving port efficiency from the 25th to the 75th percentile was associated with a 12% reduction in maritime transport costs in their international sample. More recent research also emphasizes that port performance results from the interaction of multiple operational factors rather than from infrastructure capacity alone. In the Indonesian context, Sunitiyoso et al. (Tovar & Wall, 2022) highlight the interconnected nature of port performance factors, particularly in relation to the movement of goods and the challenge of maintaining efficient maritime distribution across geographically dispersed regions. A literature review by Zhang et al. (Amin et al., 2024) further examines port efficiency from different analytical perspectives. These findings indicate that port performance should be assessed not only through cargo throughput but also through its implications for transportation expenditure and economic efficiency.

Maritime connectivity also plays a significant role in determining transportation costs and access to markets. Wilmsmeier and Hoffmann (2008) examined the relationship between shipping connectivity, port infrastructure, and freight rates in the Caribbean, demonstrating the relevance of maritime network characteristics to freight costs. Similarly, Fugazza and Hoffmann (2017) found that liner shipping connectivity is associated with trade performance, with additional transshipment requirements

linked to lower bilateral export values. More recent evidence indicates that maritime connectivity can also influence regional economic growth by strengthening the connection between ports, local economies, and wider logistics networks (Li et al., 2023). Research on shipping connectivity further shows that network structures can provide important information about port competition, market development, and accessibility to international trade (Yap et al., 2023). In the context of regional development, port infrastructure and logistics performance have also been examined in relation to economic growth through the contribution of seaborne trade (Munim & Schramm, 2018). Notteboom and Rodrigue (2005) explain that port regionalization reflects the growing integration of port operations with inland transportation and wider economic networks. Collectively, these studies provide a basis for examining maritime connectivity as an economic factor affecting market accessibility and the distribution of trade opportunities.

These issues are particularly relevant to Indonesia, where maritime transportation connects islands, distributes commodities, and supports economic activities across regions. Verhaeghe et al. (2021) examine the optimization of Indonesia's maritime transportation network, highlighting the importance of improving network efficiency. This issue is particularly important because Indonesia's inter-island movement of goods depends heavily on maritime transportation, while differences in regional conditions can create challenges in achieving efficient and relatively balanced distribution. Sunitiyoso et al. (Tovar & Wall, 2022) similarly demonstrate that port performance in Indonesia is influenced by interacting operational and infrastructural factors, particularly in efforts to support the movement of goods between production centers and more distant regions. In addition, research on Indonesia's maritime logistics sector emphasizes the role of digital transformation in improving port connectivity and logistics capabilities, particularly in addressing inefficiencies and competitiveness challenges (Mangeswuri & Budiyanti, 2024). Differences in shipping frequency, cargo demand, port infrastructure, and return-cargo availability may therefore contribute to variations in transportation costs across Indonesian regions. Consequently, the economic benefits of maritime transportation may vary according to infrastructure quality, shipping network structures, and regional market accessibility.

Although previous studies have examined port efficiency, shipping costs, maritime connectivity, and economic growth, these dimensions are often investigated through different analytical perspectives. Recent studies continue to emphasize the importance of examining ports as critical components of international trade and global supply chains, particularly because disruptions at strategically important ports can affect wider economic networks (Verschuur et al., 2022). At the same time, research on maritime transport costs demonstrates that increases in shipping costs can influence trade patterns and expose regions with limited infrastructure to greater economic vulnerability (Ferrari et al., 2023). Patampang and Mokodompit (2025), for example, discuss maritime transportation in the context of global supply chain efficiency, sustainability, and competitiveness. Building on this literature, the present study focuses more

explicitly on the economics of maritime transportation by synthesizing the relationships among shipping costs, port efficiency, and regional economic connectivity in Indonesia. Using a literature review approach, this study aims to examine how these dimensions relate to logistics expenditure, market accessibility, trade competitiveness, and regional economic development. The findings are expected to contribute an integrated understanding of the economic implications of maritime transport performance and identify issues for future empirical research.

2. | LITERATURE REVIEW

Maritime transportation economics examines how shipping costs, port performance, and maritime networks influence the movement of goods and access to markets. Shipping costs represent a key component of this field because they affect logistics expenditure, trade competitiveness, and the ability of businesses to reach domestic and international markets. These costs are shaped by the interaction between shipping demand, vessel supply, and operating conditions (Stopford, 2011). Furthermore, port inefficiency can increase maritime transport costs and constrain trade, while geographical and trade-related factors contribute to variations in freight expenses (Clark et al., 2004; Wilmsmeier & Martínez-Zarzoso, 2010). Therefore, shipping costs should be understood as the outcome of interacting operational, infrastructural, and market conditions rather than as an isolated expense.

Port efficiency constitutes a second dimension of maritime transportation economics. It concerns how effectively ports utilize infrastructure, labor, and equipment to facilitate vessel services and cargo handling. Using data envelopment analysis, Tongzon (2001) assessed selected Australian and international ports, illustrating the importance of evaluating operational performance in relation to resource utilization and outputs. Port performance also has implications beyond operational activities, particularly for the movement of goods and commercial exchange. Blonigen and Wilson (2008) examined the relationship between port efficiency and trade flows, while a review by Zhang et al. (Amin et al., 2024) discussed the different approaches used to conceptualize and measure port efficiency. Taken together, these studies indicate that port efficiency should not be assessed solely through infrastructure availability or cargo throughput; the effective utilization of resources and the performance of operational processes are also relevant.

Maritime connectivity provides a third analytical dimension by describing how shipping routes and services link ports, regions, and international markets. Connectivity depends not only on the presence of port infrastructure but also on shipping service availability and the structure of maritime networks. Evidence from the Caribbean indicates that liner shipping connectivity and port infrastructure are relevant to freight rates (Wilmsmeier & Hoffmann, 2008). Similarly, Fugazza and Hoffmann (2017) examined liner shipping connectivity as a determinant of trade, highlighting the importance of maritime networks to commercial exchange. Beyond connections

between ports, the integration of ports with inland transportation and wider economic networks is also important. This process is reflected in the concept of port regionalization discussed by Notteboom and Rodrigue (2005), which emphasizes the growing integration of port operations with inland distribution systems.

The interaction among these dimensions is particularly relevant to Indonesia, where maritime transportation supports goods distribution between geographically dispersed islands. Country-specific research has examined the optimization of Indonesia's maritime transportation network, providing a basis for considering network efficiency in the national context (Verhaeghe et al., 2021). Nevertheless, findings from other regions should be applied cautiously because infrastructure, shipping demand, network configuration, and economic conditions may differ across countries. Although previous studies have examined shipping costs, port efficiency, and maritime connectivity, these dimensions are often investigated from distinct analytical perspectives. This study addresses that analytical gap by synthesizing the relationships among the three dimensions and considering their implications for logistics expenditure, distribution performance, market accessibility, and regional economic integration in Indonesia. Rather than statistically testing causal relationships, the study develops an integrated understanding of maritime transportation economics and identifies issues for further empirical investigation.

3. | RESEARCH METHOD

This study employs a qualitative approach using a literature review method to examine maritime transportation economics in Indonesia. The method was selected to synthesize existing research on three main dimensions: shipping costs, port efficiency, and maritime connectivity. The analysis focuses on understanding how these dimensions relate to logistics expenditure, distribution performance, market accessibility, and regional economic integration.

Data were collected from secondary sources, including peer-reviewed journal articles, academic books, research reports, and publications from relevant institutions. The literature was identified based on its relevance to maritime transportation economics, port performance, shipping networks, and regional development. Priority was given to scholarly publications that discuss the relationship between maritime transport and economic outcomes, particularly studies relevant to Indonesia and other archipelagic or developing countries.

The collected literature was analyzed using a thematic analysis approach. First, relevant publications were reviewed to identify their research objectives, methods, and principal findings. Second, the findings were classified into three analytical dimensions: shipping costs, port efficiency, and maritime connectivity. Third, the results were compared and synthesized to identify recurring patterns, differences in research findings, and relationships among the three dimensions. Finally, the synthesis

was used to discuss the implications of maritime transportation for logistics efficiency, market access, and regional economic development in Indonesia.

To maintain analytical consistency, the study considered the relevance of each source to the research objectives and the clarity of its findings. Evidence from different geographical contexts was used to provide comparative insights, while recognizing that differences in infrastructure, shipping networks, and economic conditions may limit direct applicability to Indonesia. As a literature-based study, the research does not involve primary data collection or statistical testing of causal relationships. Instead, it provides a conceptual synthesis of existing evidence to develop a broader understanding of the economic role of maritime transportation in Indonesia.

4. | RESULTS

The literature review identifies three interconnected dimensions of maritime transportation economics: shipping costs, port efficiency, and maritime connectivity. Across the reviewed studies, these dimensions are associated with logistics expenditure, trade activities, market accessibility, and regional economic integration. Although the studies employ different methods and examine different geographical contexts, their findings provide complementary insights into how maritime transportation performance relates to economic activities. The literature also indicates that these dimensions cannot be considered entirely independently because changes in port performance may affect transportation costs, while the structure of maritime connectivity can influence both the accessibility of markets and the efficiency of port operations. This interrelationship is particularly relevant for Indonesia because maritime transportation serves geographically dispersed regions with different levels of infrastructure and economic activity.

Shipping costs emerge as an important dimension because they influence the expenses associated with moving goods between markets. Research examining international trade indicates that maritime transport costs are related to port performance and other transport-related factors (Clark et al., 2004; Wilmsmeier & Martínez-Zarzoso, 2010). Clark et al. (2004), for example, reported that an improvement in port efficiency from the 25th to the 75th percentile was associated with a 12% reduction in shipping costs in their sample. This finding illustrates the relationship between operational performance and transportation expenditure, although the reported estimate should not be interpreted as a direct measurement of current shipping costs in Indonesia. More recent research indicates that maritime logistics costs are also influenced by the characteristics of regional economies and cargo flows. In island regions of eastern Indonesia, increasing local economic activity has been associated with higher cargo throughput and lower maritime logistics costs, suggesting that economic capacity and transport efficiency can influence each other (Amin et al., 2024). This finding reinforces the importance of considering shipping costs within the broader economic and distribution system rather than treating them solely as operational expenses.

Port efficiency represents the second dimension identified in the literature. Studies assess port performance in relation to resource utilization, operational outputs, cargo handling, and its implications for trade. Tongzon (2001) evaluated selected Australian and international ports using data envelopment analysis, demonstrating the relevance of comparing operational efficiency. The economic significance of port performance is also reflected in its relationship with trade flows (Blonigen & Wilson, 2008). Furthermore, research has examined how port infrastructure and logistics performance relate to seaborne trade and economic growth (Munim & Schramm, 2018). Recent evidence from Indonesia emphasizes that port performance is influenced by multiple interacting factors rather than by infrastructure capacity alone. Sunitiyoso et al. (Tovar & Wall, 2022), using a systems-thinking approach, demonstrate that factors affecting port performance are interconnected, particularly in the context of Indonesia's inter-island goods movement. International research also emphasizes the critical role of ports within global trade and supply chains, indicating that disruptions or inefficiencies at important ports can have consequences beyond individual port operations (Verschuur et al., 2022). Collectively, these studies indicate that port efficiency is relevant not only to port operations but also to the broader maritime logistics system.

Maritime connectivity constitutes the third dimension. It concerns the availability and structure of shipping services linking ports and markets. Liner shipping connectivity has been examined in relation to trade performance (Fugazza & Hoffmann, 2017), while research in the Caribbean has linked shipping connectivity and port infrastructure with freight rates (Wilmsmeier & Hoffmann, 2008). These findings indicate that maritime network characteristics are relevant to transportation costs and commercial exchange. Recent research further suggests that connectivity and port efficiency may be positively associated, indicating that improvements in maritime connections can contribute to better port performance (Tovar & Wall, 2022). Similarly, research on seaport network efficiency demonstrates that shipping connectivity can be incorporated into assessments of port and network performance (Yap et al., 2023). However, connectivity alone does not establish whether transport services are affordable, frequent, reliable, or sufficiently integrated with inland distribution. Therefore, the existence of shipping routes should be considered together with the operational and economic conditions that determine their actual usefulness to businesses and regional markets.

In the Indonesian context, the reviewed literature highlights the importance of network efficiency in connecting geographically dispersed islands. Research on Indonesia's maritime transportation network addresses the optimization of connections between regions and emphasizes the potential for improving the efficiency of domestic maritime networks (Verhaeghe et al., 2021). National statistical evidence also demonstrates the continuing importance of ports through indicators such as ship calls, cargo loading and unloading, and passenger movements across Indonesian ports (BPS, 2023). These activities illustrate the scale of maritime transportation and its role in supporting regional economic connections. At the same time, differences in

infrastructure, cargo demand, shipping frequency, and regional economic capacity mean that connectivity benefits may not be distributed uniformly. Overall, the literature presents shipping costs, port efficiency, and maritime connectivity as complementary dimensions of maritime transportation economics. Nevertheless, the reviewed studies do not provide a unified measurement of these dimensions across Indonesia's domestic ports and shipping routes, indicating the need for further empirical research that combines transportation, port performance, and regional economic indicators.

5. | DISCUSSION

The findings suggest that maritime transportation economics should be understood through the interaction of transportation costs, port efficiency, and network connectivity. Examining these dimensions separately may provide only a partial understanding of maritime transportation's economic role. In Indonesia, where goods move across geographically dispersed islands, their interaction is particularly important for distribution efficiency and regional market integration. Port performance depends not only on infrastructure availability but also on operational processes and shipping networks. Sunitiyoso et al. (Tovar & Wall, 2022), for example, demonstrate that Indonesian port performance is shaped by interconnected operational and infrastructural factors, supporting a systems perspective. This interpretation synthesizes the reviewed literature rather than establishing a new statistical relationship among these dimensions.

Shipping costs influence distribution expenditure and businesses' ability to serve different markets. Clark et al. (2004) associate port efficiency with maritime transport costs, suggesting that operational improvements may reduce transportation expenditure. However, freight costs also depend on distance, shipment characteristics, and trade conditions (Wilmsmeier & Martínez-Zarzoso, 2010). Recent research shows that maritime transport costs affect international trade and can increase economic pressures when networks experience disruptions or capacity constraints (Ferrari et al., 2023). Therefore, differences in Indonesian domestic freight costs should not automatically be attributed to port inefficiency. Shipping distance, cargo volume, service frequency, port conditions, and return cargo availability must also be considered. Research on eastern Indonesia indicates that stronger local economic activity and increased cargo throughput can contribute to lower maritime logistics costs (Amin et al., 2024).

Port efficiency also influences wider logistics performance. Infrastructure investment alone may be insufficient when cargo handling, equipment utilization, and coordination between transportation modes remain inefficient. Tongzon's (2001) emphasis on resource utilization and Blonigen and Wilson's (2008) examination of port efficiency and trade flows highlight the importance of operational performance. Similarly, Sunitiyoso et al. (2022) emphasize the interaction of infrastructure, operational processes, human resources, and supporting factors. Disruptions at strategically important ports can also affect trade flows and global supply chains

(Verschuur et al., 2022). Accordingly, Indonesian port development should assess whether investment improves cargo movement and integration between maritime and inland transportation. The extent to which these improvements reduce logistics costs requires evidence from individual ports and routes.

Maritime connectivity provides a network perspective by influencing regional access to suppliers and consumers. Previous studies have linked liner shipping connectivity with trade and freight rates (Fugazza & Hoffmann, 2017; Wilmsmeier & Hoffmann, 2008). Tovar and Wall (2022) find a positive association between port-level maritime connectivity and technical efficiency, while Li et al. (2023) demonstrate that improved maritime connectivity can stimulate regional economic growth. Nevertheless, route availability does not guarantee affordable, frequent, or reliable services. Strengthening connections between major and smaller regional ports in Indonesia may improve market access, provided that cargo demand, service affordability, and inland transport connections are adequate.

These interactions also raise concerns about regional economic equity. Regions facing limited shipping services and high distribution costs may experience barriers to wider markets. However, improved connectivity does not automatically eliminate regional disparities because benefits depend on local productive capacity, infrastructure, and businesses' participation in commercial networks. International evidence associates improved port connectivity with more sustained regional economic activity (Li et al., 2023). In eastern Indonesia, stronger local economic capacity and cargo throughput may also reduce maritime logistics costs (Amin et al., 2024). Maritime policy should therefore consider both transportation performance and equitable regional economic participation.

The literature supports an integrated approach to maritime transportation in Indonesia. Shipping costs, port efficiency, and maritime connectivity are complementary dimensions of logistics performance and regional economic integration. Policy should address port operations, shipping services, network connectivity, and inland transportation together. However, this literature-based study does not directly measure current port performance or establish causal relationships. Future empirical research should combine freight rates, port turnaround times, shipping frequency, cargo volumes, and regional economic indicators to examine how these factors interact and under what conditions improvements can reduce logistics costs, strengthen market access, and promote regional economic integration.

6. | CONCLUSION

This study examined maritime transportation economics in Indonesia through a literature review focusing on shipping costs, port efficiency, and maritime connectivity. The findings indicate that these three dimensions are interconnected and play important roles in determining logistics performance, market accessibility, and regional economic integration. Shipping costs influence the affordability of goods distribution and business competitiveness, while port efficiency affects the effective use of

infrastructure and the smooth flow of cargo. Meanwhile, maritime connectivity determines the availability and quality of transportation links between regions and markets.

The reviewed literature suggests that improvements in port operations and maritime connectivity may help reduce logistical constraints and facilitate trade. In Indonesia, these aspects are particularly important because maritime transportation serves as a key link between geographically dispersed islands. However, improvements in transportation infrastructure alone may not guarantee equitable regional development. The economic benefits also depend on shipping service affordability, distribution network integration, and the capacity of regional businesses to access wider markets.

Therefore, maritime transportation policies should adopt an integrated approach that addresses shipping costs, port operational efficiency, and connectivity simultaneously. Coordination between port authorities, shipping operators, and relevant government institutions is also important to improve distribution performance. Since this study relies on secondary literature, further empirical research is needed to examine the relationships among these dimensions using Indonesian port performance data, domestic freight rates, shipping frequency, and regional economic indicators. Such research could provide more specific evidence to support policies aimed at improving maritime logistics efficiency and strengthening regional economic competitiveness in Indonesia.

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Declaration of Conflicting Interests

The authors declare that there is no conflict of interest.

Ethical Approval and Originality Statement

Ethical approval was obtained for this study. The manuscript represents original work and has not been previously published, nor is it under consideration by another journal.

Data Disclosure Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

REFERENCES

Amin, C., Hasyim, A. W., Sun'an, M., Hilman, R. M., & Fahmiasari, H. (2024). Impact of increasing local economic capacity on reducing maritime logistics costs in island Province of eastern Indonesia: A dynamic system approach. *Transportation Research Interdisciplinary Perspectives*, *27*, 101195. https://doi.org/10.1016/j.trip.2024.101195

Badan Pusat Statistik (BPS). (2023). Statistik Indonesia 2023. https://www.bps.go.id/id/publication/2023/02/28/18018f9896f09f03580a614b

Blonigen, B. A., & Wilson, W. W. (2008). Port efficiency and trade flows. *Review of international Economics*, *16*(1), 21-36. https://doi.org/10.1111/j.1467-9396.2007.00723.x

Clark, X., Dollar, D., & Micco, A. (2004). Port efficiency, maritime transport costs, and bilateral trade. *Journal of development economics*, *75*(2), 417-450. https://doi.org/10.1016/j.jdeveco.2004.06.005

Ferrari, E., Christidis, P., & Bolsi, P. (2023). The impact of rising maritime transport costs on international trade: Estimation using a multi-region general equilibrium model. *Transportation Research Interdisciplinary Perspectives*, *22*, 100985. https://doi.org/10.1016/j.trip.2023.100985

Fugazza, M., & Hoffmann, J. (2017). Liner shipping connectivity as determinant of trade. *Journal of Shipping and trade*, *2*(1), 1. https://doi.org/10.1186/s41072-017-0019-5

Li, W., Bai, X., Yang, D., & Hou, Y. (2023). Maritime connectivity, transport infrastructure expansion and economic growth: A global perspective. *Transportation Research Part A: Policy and Practice*, *170*, 103609. https://doi.org/10.1016/j.tra.2023.103609

Mangeswuri, D. R., & Budiyanti, E. (2024). Peran Logistik Dalam Mendukung Konektivitas Maritim di Indonesia. *Jurnal Ekonomi dan Kebijakan Publik*, *15*(2), 189-204.

Munim, Z. H., & Schramm, H. J. (2018). The impacts of port infrastructure and logistics performance on economic growth: the mediating role of seaborne trade. *Journal of shipping and trade*, *3*(1), 1-19. https://doi.org/10.1186/s41072-018-0027-0

Notteboom, T. E., & Rodrigue, J. P. (2005). Port regionalization: towards a new phase in port development. *Maritime Policy & Management*, *32*(3), 297-313. https://doi.org/10.1080/03088830500139885

Patampang, F., & Mokodompit, E. A. (2025). Integrasi Transportasi Laut Dalam Global Supply Chain: Kajian Literatur Mengenai Efisiensi, Keberlanjutan, Dan Daya Saing. *EKONOMIKA45: Jurnal Ilmiah Manajemen, Ekonomi Bisnis, Kewirausahaan*, *13*(1), 457-468. https://doi.org/10.30640/ekonomika45.v13i1.5317

Stopford, M. (2009). Maritime economics (3rd ed.). Routledge. https://www.routledge.com/Maritime-Economics-3e/Stopford/p/book/9780429239540

Sunitiyoso, Y., Nuraeni, S., Pambudi, N. F., Inayati, T., Nurdayat, I. F., Hadiansyah, F., & Tiara, A. R. (2022). Port performance factors and their interactions: A systems thinking approach. *The Asian Journal of Shipping and Logistics*, *38*(2), 107-123. https://doi.org/10.1016/j.ajsl.2022.04.001

Tovar, B., & Wall, A. (2022). The relationship between port-level maritime connectivity and efficiency. *Journal of Transport Geography*, *98*, 103213. https://doi.org/10.1016/j.jtrangeo.2021.103213

Verhaeghe, R., Halim, R. A., & Tavasszy, L. (2021). Optimizing the efficiency of the future maritime transport network of Indonesia. In *Freight transport modeling in emerging countries* (pp. 109-134). Elsevier. https://doi.org/10.1016/B978-0-12-821268-4.00006-X

Verschuur, J., Koks, E. E., & Hall, J. W. (2022). Ports' criticality in international trade and global supply-chains. *Nature communications*, *13*(1), 4351. https://doi.org/10.1038/s41467-022-32070-0

Wilmsmeier, G., & Hoffmann, J. (2008). Liner shipping connectivity and port infrastructure as determinants of freight rates in the Caribbean. *Maritime Economics & Logistics*, *10*(1), 130-151. https://doi.org/10.1057/palgrave.mel.9100195

Yap, W. Y., Hsieh, C. H., & Lee, P. T. W. (2023). Shipping connectivity data analytics: implications for maritime policy. *Transport policy*, *132*, 112-127. https://doi.org/10.1016/j.tranpol.2022.12.018

Zhang, J., Yang, D., & Luo, M. (2024). Port efficiency types and perspectives: A literature review. *Transport Policy*, *156*, 13-24. https://doi.org/10.1016/j.tranpol.2024.07.014