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Towards Smart Green Blue Infrastructure

A Suez Canal Logistics Hub Role in the Global Shipping Network: A Case Study of a Stainless-Steel Product

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ABSTRACT

This research explores the implications of developing a logistics hub along the Suez Canal for worldwide shipping routes, with specific attention given to effects on the stainless-steel business. As a methodology, it applied the Total Landed Cost (TLC) and transportation scenarios on selected trade lanes, such as those going through the Suez Canal. The main findings have revealed that the Suez Canal Logistics Hub has lower TLC than alternative logistic hubs through direct and transshipment services. The development of this logistics hub could lessen transportation costs for numerous industries by streamlining the shipment of goods through the Suez Canal. Further analysis may reveal additional time and money savings benefits to specific sectors like stainless steel. While this research provides insightful initial data, more comprehensive exploration is needed to fully comprehend the diverse impacts across various import-export industries.

The implication of this research relies on the significance of strategic positioning for boosting shipping operations and accelerating business growth. It draws attention to the TLC as an indicator for determining efficiency and competitive advantage. Finally, it highlights the need for continuous infrastructure development and government support.

Keywords: Maritime Network, shipping Route, Suez Canal, Total Landed Cost.

INTRODUCTION

Hafez and Madney [1] mentioned that the Suez Canal plays a vital role in international trade, carrying nearly 10% of global commerce. Logistics hubs positioned along significant global trade routes have grown in popularity recently because of rising interest. These hubs serve as crucial nodes in the worldwide maritime network. The Suez Canal Logistics Hub represents one such logistics center that has attracted considerable attention. Situated in proximity to the Suez Canal, it has the capacity to significantly influence the global maritime network and transform trade patterns on a global scale. Nevertheless, the strategic positioning of hub ports in close proximity to vital routes such as the Suez Canal plays a pivotal role in their operational effectiveness within global transportation systems.

LITERATURE REVIEW

Significance of the strategic location of the Suez Canal

Positioned in a strategically important location, the Suez Canal directly connects the eastern and western hemispheres. Situated at the intersection of Africa, Asia, and Europe, the canal grants entry to a wide range of markets and manufacturing centers nearby on three continents. Due to its efficient operation and comparatively low costs, the Suez Canal plays an outsized role in global commerce by facilitating shorter voyages for ships. With reduced distances come diminished fuel usage and lower operational expenses for the transport of goods between distant ports. Azab *et al.* [2] assured that global trade and maritime transportation have been impacted by the Suez Canal's strategic location since it acts as a direct route between the East and the West. Its convenience and affordability continue enhancing the canal's significance on the global economic stage.

Logistics hub's Significance

Chou *et al*. [3] mentioned that the significance of any logistics hub lies in its ability to efficiently handle and facilitate the flow of goods and services through various modes of transportation. Thus, it optimizes supply chains, reduces costs, minimizes transit times, enhances efficiency, and provides value-added services. Liu and Wang [4] stated that A logistics hub coordinates transportation, warehousing, distribution, and related activities as a central point. Logistics hubs vitally support industry and economic growth by concentrating and integrating logistics service providers. Yorulmaz *et al.* [5] cited the need for an international maritime network to accommodate expanding global logistics hubs like Dubai and Singapore.

Suez Canal Logistics Hub

The global maritime network is anticipated to be significantly enhanced by the development of a logistics hub in the Suez Canal. El-Sakty [6] mentioned that industries would reap benefits like reduced costs, smoother operations with efficiencies gained, and shorter transit times. Furthermore, implementing such a plan would strengthen supply chain visibility. Cha *et al.* [7] suggested that it can lower the risks associated with global logistical catastrophes, providing a safeguard against disruptions like the recent Suez Canal blockage. World Bank [8] noted that embracing technology and digital solutions within operations has tremendous potential to vastly amplify their influence over global maritime routes.

Analyzing the Geographical Patterns of the Worldwide Maritime Network

To better understand the potential of establishing a logistics hub in the area, Ducruet [9] underlines the importance of examining how the maritime network functions on a day-to-day basis. By investigating its typical operations and flows, valuable insights can be gained regarding implications for shipping routes, port linkages, and overall transport efficiency. It is also important to carefully consider planning factors such as available land, infrastructure development needs, and sustainability during hub construction. Wan *et al.* [10] and Arvis *et al.* [11] emphasize the necessity of coordinated transportation networks for influencing how the maritime network performs. As an economy expands, demands for movement of goods and services rise considerably too, underlining the strategic value of well-integrated road, rail, and air links alongside accessible port facilities. Careful transportation planning can help maximize value from any logistics center by facilitating smooth interchange between seaborne and terrestrial cargo flows.

METHODOLOGY DESCRIPTION

The researchers adopted a positivist ontology, believing that objective facts exist independently of any observer. They developed a specific hypothesis that they intended to test through their research. Relying on authoritarian and empirical knowledge, the researchers gathered information from scholarly books and publications to enlighten their research. They employed a deductive approach where they began with broad general ideas and theories about their topic before collecting and analyzing data to reach a defined conclusion. To conduct the research strategy, the researchers utilized a combination of different sources of information including publications, government reports and case studies. The research focused solely on qualitative data collection techniques by applying a mono method. A cross-sectional time frame was used to examine various aspects related to the logistics operations of the Suez Canal at a single point in time. Data was acquired for research from both primary and secondary sources of information. Primary data involved phone interviews conducted with a representative from a shipping line to gain first-hand insights. Secondary data incorporate published information from government sources. The data analysis in this research adopted a quantitative approach, utilizing the usage of TLC.

TOTAL LANDED COST (TLC) THEORY

Kannan and Tan [12] stated that lowering production costs is an effective way to enter new markets and provide higher margins. However, Young *et al.* [13] mentioned that a Total Landed Cost model would include six groups of expenses: transportation costs, purchasing costs, import fees, inventory costs, risk, and administration costs. In addition, it is noted that cost reduction is becoming exceedingly complex as organizations face challenges such as lead time and transportation costs. Eloranta [14] summarized that the Total landed cost (TLC) i.e., the total of all expenses incurred in acquiring or producing the good or service and transporting it from the supplier to the consumer. This covers packing, freight, import duty, and customs in addition to material pricing, labor costs, and overhead, taxes, insurance, holding costs for inventory, currency exchange, and so forth. As a result, Chaudhry *et al.* [15] assumed that TLC model could include both visible and invisible expenses across the entire supply chain in relation to each sourcing activity. Jansson [16] cited that Total Landed Cost is a model used to regulate an organization's cash flow and conserve money. Jacobs [17] declared that it includes manufacturing, transportation, handling, and insurance costs, and increases as transportation or distance costs increase.

Total Landed Cost and Transport Expenditure

Developing the Suez Canal logistics hub holds great significance for the worldwide shipping network because of the potential savings it can provide in both costs and time. Coyle *et al.* [18] pointed out, the total cost of delivering a product to its final destination, known as the landed cost, incorporates manufacturing expenses, transportation charges from the point of production to the end location, as well as additional costs like handling and insurance. Caplice [19] proposed that companies can successfully compete in foreign markets by guaranteeing their product's landed cost is lower than domestic manufacturing costs, allowing them to offer a more competitive price. With its strategic location connecting Europe, the Middle East and Asia, the Suez Canal logistics hub has the potential to substantially reduce transportation costs and delivery times for goods traveling between these regions. By establishing world-class facilities and services around the Canal, shipping lines and global businesses stand to benefit from improved efficiency and savings. Overall, investing in the development of the Suez Canal logistics hub appears integral to maintaining the smooth and affordable flow of global trade into the future.

Maritime Network Scenarios (Direct and Transshipment)

In this paper, the TLC calculated based on two different operators, namely Maersk shipping lines and Hapag Lloyd. Actual quotation prices requested, including duration of the voyage, ocean freight (f), export sub charges (e) (THC origin, sealing charges at origin), freight sub charges (fs) (peak season surcharges, marine fuel recovery), import sub charges (im) (THC destination, TSC destination, Equipment inspection fee). Two situations were considered in the comparison: direct and transshipment. Stainless steel (HS code is 7218) assumed the type of commodity transported in one 20 TEU container. Three scenarios were proposed in the following sections:

- Maersk Shipping Lines Rates

  Scenario A: Voyage from the Japanese Tokyo Port to the Dutch Rotterdam Port (via the Suez Canal).

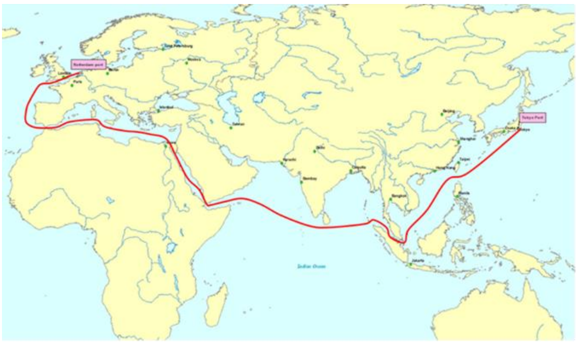

Figure 1: Port of Tokyo to Port of Rotterdam in Scenario A.
Source: Developed by the authors.

Table 1. TLC Calculations for Scenario A (Maersk)

Shipment	Direct Shipment through Maersk Shipping Lines
Voyage Duration	42 Days
Freight Surcharges	• Peak Season Surcharges : USD 1,000 • Environmental Fuel Fee: USD 396 • Low Sulphur Surcharge: USD 23 • Basic Ocean Freight: USD 3,425
Origin Charges	• Documentation Fee Origin: USD 25.46 • THC orig. : USD 232.75 • Export Service: USD 5.46 • Inland Haulage Export: USD 150
Destination Charges	• Documentation fee Dest. : EUR 40 ≈ USD 40 • THC Dest. : EUR 230 ≈ USD 230
Total Price	USD 5,527.67

Source: Developed by the authors

Scenario B: Voyage from the UAE Jebel Ali Port to the Dutch Rotterdam Port (via the Suez Canal).

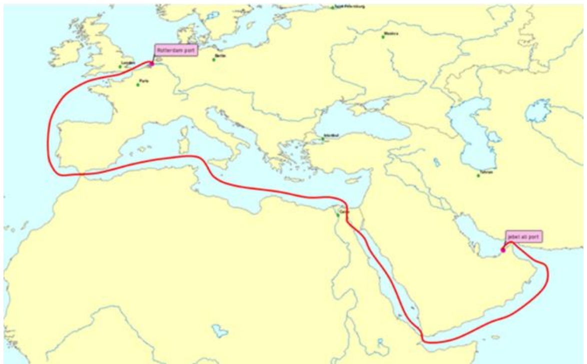

Figure 2: Port of Jebel Ali to Port of Rotterdam in Scenario B.
Source: Developed by the authors.

Table 2. TLC Calculations for Scenario B (Maersk)

Direct Shipment	Direct Shipment through Maersk Shipping Lines
Voyage Duration	37 Days

Freight Surcharges	• Environmental Fuel Fee: USD 248 • Gulf Emergency Risk Surcharge: USD 42 • Basic Ocean Freight: USD 4,140
Origin Charges	• Documentation Fee Origin: USD 136.12 • THC orig. : USD 288.58 • Export Service: USD 8.17
Destination Charges	• Documentation fee Dest. : EUR 40 ≈ USD 40 • THC Dest. : EUR 230 ≈ USD 230
Total Price	USD 5,132.87

Source: Developed by the authors

Scenario C: Voyage from the Egyptian Port Said Port to the Dutch Rotterdam Port.

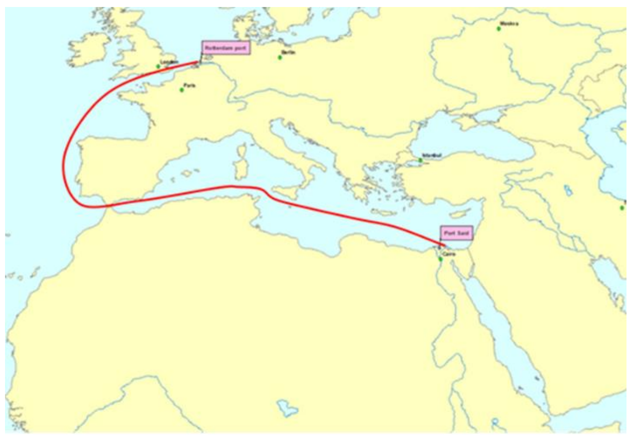

Figure 3: Port Said Port to Rotterdam Port in Scenario C.
Source: Developed by the authors.

Table 3. TLC Calculations for Scenario C (Maersk)

Shipment	Direct Shipment through Maersk Shipping Lines
Voyage Duration	11 Days
Freight Surcharges	• Environmental Fuel Fee: USD 230 • Basic Ocean Freight: USD 225
Origin Charges	• Documentation Fee Origin: USD 10 • Free Service: USD 150
Destination Charges	• Import fee: EUR 255 ≈ USD 255.
Total Price	USD 870

Source: Developed by the authors

- Hapag Lloyd Shipping Lines Rates

Scenario A: Voyage from the Japanese Tokyo Port to the Dutch Rotterdam Port (via the Suez Canal).

Table 4. TLC Calculations for Scenario A (Hapag Lloyd)

Shipment	Direct Shipment through Hapag Lloyd Shipping Lines
Voyage Duration	28 Days

Export Surcharges	• THC Orig. : USD 233.08 • Sealing Charges At Origin: USD 7
Freight Surcharges	• Peak Season Surcharges: USD 500 • Marine Fuel Recovery: USD 420
Import Surcharges	• THC Dest. : EUR 210 ≈ USD 210 • TSC Dest. : EUR 25 ≈ USD 25 • Equipment inspection fee: EUR 20 ≈ USD 20
Total Price	USD 5,311.08

Source: Developed by the authors

Scenario B: Voyage from the UAE port of Jebel Ali to the Dutch port of Rotterdam (via the Suez Canal).

Table 5. TLC Calculations for Scenario B (Hapag Lloyd)

Shipment	Direct Shipment through Hapag Lloyd Shipping Lines
Voyage Duration	25 Days
Ocean Freight	USD 4,113
Export Surcharges	• THC Orig. : USD 288.58 • Sealing Charges At Origin: USD 9.52
Freight Surcharges	• Vessel Risk Surcharges: USD 42 • Marine Fuel Recovery: USD 395
Import Charges	• THC Dest. : EUR 210 ≈ USD 210 • TSC Dest. : EUR 25 ≈ USD 25 • Equipment inspection fee: EUR 20 ≈ USD 20
Notes	• Subject to administration fee Destination: EUR 40 Per B/L ≈ USD 40 • Subject to Document charge: AED 495 Per B/L ≈ USD 134.76 • Subject to Security Manifest Document Fee: USD 35 Per B/L
Total Price	USD 5,312.86

Source: Developed by the authors

Scenario C: Voyage from the Egyptian Port Said Port to the Dutch Rotterdam Port.

Table 6. TLC Calculations for Scenario C (Hapag Lloyd)

Shipment	Transshipment (Via Piraeus) through Hapag Lloyd Shipping Lines
Voyage Duration	21 Days
Ocean Freight	USD 1,301
Export Surcharges	• Equipment Release Fee: USD 6.16 • Loading Expenses Full: USD 135
Freight Surcharges	• Marine Fuel Recovery: USD 249
Import Charges	• THC Dest. : EUR 210 ≈ USD 210 • TSC Dest. : EUR 25 ≈ USD 25
Total Price	USD 1,926.16

Source: Developed by the authors

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Scenarios for TLC Through Suez Canal logistics hub

- Results of TLC from Tokyo, Japan to Port Said, Egypt

Given Assumptions:

Sea Rates [20] assured that the distance from the initial manufacturer in Tokyo, Japan to Rotterdam, Netherlands is confirmed to be is 11,119.49 nautical miles (12,796.08 miles). Moreover, the distance between the second manufacturer in Port Said, Egypt and Rotterdam, Netherlands is 3,247.07 nautical miles (3,736.66 miles).

Distance between Manufacturer (Tokyo) - Distance between Manufacturer (Port Said) = Difference between Manufacturers (1)

12,796.08 miles - 3,736.66 miles = 9,059.42 miles (2)

In order to determine the transportation expense for each unit per mile, the total transportation cost is divided by 24 tons. This is based on the assumption that an average 20ft container carries about 24 tons. As an illustration, let's consider two manufacturers located 9,059.42 miles apart. Manufacturer A is located in Tokyo, Japan with a unit cost of $757 and a transportation cost of $ 162.33 per unit/mile, whereas Manufacturer B in Port Said, Egypt has a unit cost of $600 and a transportation cost of $ 54.21 per unit/mile. The point where the landed cost is equal is the boundary of the market between the two manufacturers.

Landed Cost of Manufacturer (A/ Tokyo) = Landed Cost of Manufacturer (B/ Port Said) (1)

Landed Cost (A) = Landed Cost (B) (2)

Production Cost (A) + Transportation Cost (A) = Production Cost(B) + Transportation Cost(B) (3)

$$\$757 + 162.33\ (X) = \$600 + \$54.21\ (9{,}059.42 - X)$$

$$\$757 + 162.33x = \$600 + (\$54.21)(9{,}059.42) + (\$54.21)(-X)$$

$$\$757 + 162.33x = \$600 + 491{,}111.1582 + -54.21x$$

$$162.33x + \$757 = (-54.21x) + (600 + 491{,}111.1582)$$

$$162.33x + \$757 = -54.21x + 491{,}711.1582$$

$$216.54x + \$757 = 491{,}711.1582$$

$$216.54x = 490{,}954.1582$$

$$X = 2{,}267.267748\ \text{Miles}$$

Manufacturer (A) in Tokyo, Japan is capable of covering a distance of 2,267.267748 miles. On the other hand, Manufacturer (B) in Port Said, Egypt is capable of covering a distance of = (9,059.42 - 2,266.937787) = 6,791.732252 Miles.

- Results of TLC from Jebel Ali, United Arab Emirates to Port Said, Egypt

Given Assumptions:

Sea Rates [20] reported a distance of 6,098.5 nautical miles (7,018.03 miles) from the first manufacturer in Jebel Ali, UAE to Rotterdam, Netherlands, while the distance between second manufacturer in Port Said, Egypt and Rotterdam, Netherlands is 3,247.07 nautical miles (3,736.66 miles).

Distance between Manufacturer (Jebel Ali) - Distance between Manufacturer (Port Said) = Difference between Manufacturers (1)

7,018.03 miles - 3,736.66 miles = 3,281.37 miles (2)

To calculate the cost per unit/mile of transporting goods, divide the total transportation cost by 24 tons since the average 20-foot container holds about 24 tons. This example compares two manufacturers located 3,281.37 miles apart. Manufacturer A in Jebel Ali, UAE, charges $670 per unit and $171.38 per unit/mile for transportation, while Manufacturer B in Port Said, Egypt, charges $600 per unit and $54.21 per unit/mile for transportation. The point where the landed cost is equal is the boundary of the market between the two manufacturers.

Landed Cost of Manufacturer (A/ Jebel Ali) = Landed Cost of Manufacturer (B/ Port Said) (1)

Landed Cost (A) = Landed Cost (B) (2)

Production Cost (A) + Transportation Cost (A) = Production Cost(B) + Transportation Cost (B) (3)

$\$670 + 171.38\ (X) = \$600 + \$54.21\ (3{,}281.37\ -X)$

$\$670+171.38x= \$600 +(54.21)(3{,}281.37) + (54.21)(-x)$

$\$670+171.38x = \$600+177{,}883.0677+ -54.21x$

$171.38x +\$670= (-54.21x) + (\$600+\$177{,}883.0677)$

$171.38x +\$670= -54.21x + 178{,}483.0677$

$225.59x+\$670 = \$178{,}483.0677$

$225.59x= \$177{,}813.0677$

$X = 788.21343$ miles

Manufacturer (A) is capable of covering a distance of 788.21343 miles. On the other hand, Manufacturer (B) in Port Said, Egypt = (3,281.37 - 788.117146) = 2,493.15657 miles.

Table 7. TLC Calculations are based on different operators

P.O.C	***Maersk Shipping Lines***	***Hapag Lloyd Shipping Lines***
Scenario A	*USD 5,527.67*	*USD 5,311.08*
Scenario B	*USD 5,132.87*	*USD 5,312.86*
Scenario C	*USD 870*	*USD 1,926.16*

Source: Developed by the authors

As a result, it becomes quite evident after deeper analysis that the Total Landed Cost (TLC) is lower when goods pass through the Suez Canal Logistics Hub than other potential hubs as clearly demonstrated in Table 7. This is because the Suez Canal Logistics Hub facilitates highly efficient direct shipping or transshipment activities which translates to reductions in overall voyage times, fuel expenditures, and other associated costs.

CONCLUSIONS AND RECOMMENDATIONS

This research investigates how developing the Suez Canal affected global maritime networks. It examines the Suez Canal's importance as a shipping lane. It also compares its efficiency to other routes and strategic bottlenecks. Establishing a logistics hub near the Suez Canal will result in a decrease in the overall cost of transportation, lead time, and manufacturing. This is because the components of production have a competitive cost compared to other highly developed nations. Additionally, the establishment of the logistics hub will enhance business cycles, as the Suez Canal possesses significant potential to serve as the most efficient global distribution point, thereby positively impacting global economic growth. However, substantial investments are necessary to accommodate the anticipated high demand and facilitate manufacturing and distribution channels.

The Suez Canal Logistics Hub has the lowest total landed cost (TLC) of the other two scenarios presented. Furthermore, it relied on two distinct operators to demonstrate that despite their differences, we still obtain the same outcome, namely that the Suez Canal Logistics Hub remains the most cost-effective option. Furthermore, TLC at the Suez Canal Logistics Hub remains the most affordable, regardless of whether the consignment is for direct delivery or transshipment services.

Regarding the Recommendations, it would be wise for the Suez Canal Authority to leverage certain key metrics as tools to gauge effectiveness when promoting the canal and evaluating operations. Specifically, focusing on metrics like vessel calls, and cargo tonnage transported would allow the Authority to better understand patterns in traffic and adjust their marketing strategies accordingly. Periodically analyzing trends in these transport statistics could offer meaningful insights into periods of high and low demand. In addition, there are several advantages for shipping lines to leverage Suez Canal Logistics Hub due to its ability to reduce overall expenses. Utilizing this hub allows goods to be transported in a more cost-effective manner by minimizing total delivery costs. Furthermore, the Egyptian government would be wise to sustain its initiatives in further improving the growth of the Suez Canal Logistics Hub. There is an opportunity to leverage this geographic advantage by establishing the surrounding area as a major global logistics hub.

REFERENCES

[1] Hafez, R. M., & Madney, I. (2020). Suez Canal Region as an economic hub in Egypt location analysis for the mass real estate appraisal process. HBRC Journal, 16(1), 59-75. https://doi.org/10.1080/16874048.2020.1734347.

[2] Azab, Ahmed, Jaehyun Park, and Noha A. Mostafa. "Smart Mobile Application for Short-Haul Cargo Transportation." Logistics 5, no. 2 (June 8, 2021): 36. https://doi.org/10.3390/logistics5020036.

[3] Chou, C. C., Ding, J. F., Chang, T. M., Wong, C. P., Lin, W. C., Wang, C. Y., Chang, W., Lin, C. Y., & Chang, K. E. (2013). Operation management of port logistics in the global supply chain. Advanced Materials Research, 706-708, 2087-2090. https://doi.org/10.4028/www.scientific.net/amr.706-708.2087

[4] Liu, Tian, and Haiyan Wang. "Evaluating the Service Capacity of Port-Centric Intermodal Transshipment Hub." Journal of Marine Science and Engineering 11, no. 7 (July 12, 2023): 1403. https://doi.org/10.3390/jmse11071403.

[5] Murat Yorulmaz and Semra Birgün, "Maritime Transport Logistics Service Capabilities Impact On Customer Service And Financial Performance: An Application In The Turkish Maritime Sector," Journal of Business Research-Turk 3, no. 9 (September 30, 2017): 468–86, https://doi.org/10.20491/isarder.2017.309.

[6] El-Sakty, K. (2014, June 21). SUEZ CANAL LOGISTICS HUB: COMPETITION AND CHALLENGES. https://jscm.au.edu/index.php/jscm/article/view/98.

[7] Cha, Jaeung, Jun Young Lee, Changhee Lee, and Kim Yulseong. 2021. "Legal Disputes under Time Charter in Connection with the Stranding of the MV Ever Given." Sustainability 13 (19): 10559. https://doi.org/10.3390/su131910559.

[8] The World Bank, 2020. "Accelerating Digitization: Critical Actions to Strengthen the Resilience of the Maritime Supply Chain." World Bank, Washington, DC. License: Creative Commons Attribution CC BY 3.0 IGO.

[9] Ducruet, César. 2020. "Port Specialization and Connectivity in the Global Maritime Network." Maritime Policy & Management 49 (1): 1–17. https://doi.org/10.1080/03088839.2020.1840640.

[10] Wan, Z., Su, Y., Li, Z., Zhang, X., Zhang, Q., & Wan, Z. (2023). Analysis of the impact of Suez Canal blockage on the global shipping network. Ocean & Coastal Management, 245, 106868. https://doi.org/10.1016/j.ocecoaman.2023.106868.

[11] Arvis, Jean Francois, Vincent Vesin, Robin Carruthers, César Ducruet, and Peter De Langen. "Maritime Networks, Port Efficiency, and Hinterland Connectivity in the Mediterranean." Washington, DC: World Bank eBooks, October 22, 2018. https://doi.org/10.1596/978-1-4648-1274-3.

[12] Kannan, Vijay R., and Keah Choon Tan. 2002. "Supplier Selection and Assessment: Their Impact on Business Performance." Journal of Supply Chain Management 38 (3): 11–21. https://doi.org/10.1111/j.1745-493x.2002.tb00139.x.

[13] Young, Richard R., Peter F. Swan, Evelyn Thomchick, and Kusumal Ruamsook. 2009. "Extending Landed Cost Models to Improve Offshore Sourcing Decisions." International Journal of Physical Distribution & Logistics Management 39 (4): 320–35. https://doi.org/10.1108/09600030910962267.

[14] Eloranta, Eero. 2011. "A Model of Total Landed Cost for Global Supply Chain Management." September 28, 2011. https://www.politesi.polimi.it/handle/10589/23441.

[15] Chaudhry, Muhammad Sohaib, and Kun-Zhe Lee. (2022, June 10). Total landed cost model. https://dspace.mit.edu/handle/1721.1/142945.

[16] Jansson, Emil. 2016. "Cost Comparison Model on Total Landed Cost for Purchased Items : A Case Study of an Industrial Company." DIVA. 2016. https://www.diva-portal.org/smash/record.jsf?pid=diva2%3A943344&dswid=-273.

[17] Jacobs, M. (2012). Dynamic Supply Chains: The Origin Consolidation Model. In The Shipping Point, P.J. Levesque (Ed.). https://doi.org/10.1002/9781119199663.ch11.

[18] Coyle, John J., Robert A. Novack, Brian Gibson, and Edward J. Bardi. Transportation: A Global Supply Chain Perspective. Cengage Learning, 2015.

[19] Caplice, Chris. 2010. "Using a Total Landed Cost Model to Foster Global Logistics Strategy in the Electronics Industry." 2010. https://dspace.mit.edu/handle/1721.1/60836.

[20] "International Container Shipping | Online Freight Marketplace." SeaRates, n.d. https://www.searates.com/.