Kapal: Jurnal Ilmu Pengetahuan dan Teknologi Kelautan
(Kapal: Journal of Marine Science and Technology)
journal homepage : http://ejournal.undip.ac.id/index.php/kapal
2301-9069 (e)
1829-8370 (p)

Domestic Container Shipping Market Profile: A Case Study of Indonesia

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Article Info

Keywords:
Container Shipping Market;
Indonesian Ship Owners Association (INSA);
Herfindahl-Hirschman Index (HHI);
Supply Curve;

Article history:
Received: 16/04/2025
Last revised: 16/07/2025
Accepted: 18/07/2025
Available online: 18/07/2025
Published: 18/07/2025

DOI:
https://doi.org/10.14710/kapal.v22i2.72477

Abstract

Given Indonesia's status as the world's largest archipelagic nation, the shipping industry is a crucial contributor to its economy. However, the Indonesian Ship Owners Association (INSA) has reported an oversupply in the nation's commercial shipping sector. This study aimed to identify the equilibrium between supply and demand within Indonesia's container shipping market. The analysis focused on nine key container shipping liner routes and employed several methodologies, including regression, relational, supply and demand curve, market equilibrium, market structure, and voyage calculation analyses. The data for this research was sourced from Ship Arrival and Departure Report Data (LK3) and generic simulation data from business professionals. The findings indicate that the demand curve for containers is inelastic, with a value of 0.31. This suggests that cargo owners are compelled to accept the freight rates set by shipping companies. In contrast, the supply capacity curve is elastic, valued at 3.16, demonstrating that shipping companies have the flexibility to adjust their supply capacity. For instance, on the Surabaya-Makassar route, the demand and supply curves intersect at an equilibrium point of 99 million TEUs.Nm and a price of IDR 2.16 million per TEU. Conversely, on the Jakarta-Surabaya route, the demand curve does not intersect the supply curve, indicating an oversupply. To rectify this market imbalance, the supply curve would need to shift to the left, reducing the supply capacity by 258 thousand TEUs to reach equilibrium.

1. Introduction

Indonesia, as the world's largest archipelagic state, comprises over 17,000 islands, approximately 6,000 of which are inhabited. To facilitate distribution and connectivity across its vast geography, the country has developed more than 1,500 ports. Among these, 120 are managed by state-owned enterprises and are equipped with container handling terminals. The volume of container throughput in Indonesian ports has experienced substantial growth, rising from 7.2 million TEUs in 2009 to 14.7 million TEUs in 2019. This upward trend underscores the continued relevance and expansion of containerization, reflecting the growing importance of the container shipping sector within Indonesia's logistics and maritime landscape.

Indonesia's merchant fleet encompasses 24,046 vessels with a cumulative capacity of 38.5 million GT. However, a detailed breakdown by vessel type, particularly for container ships, remains unavailable. Furthermore, according to the Indonesian Shipowners Association (INSA), the country's commercial shipping sector currently faces an issue of oversupply [1]. This situation presents a key challenge: how to accurately assess the supply side of the container shipping market on select commercial routes within Indonesia. It also points to a critical gap in understanding market behavior, underscoring the necessity for further research into the domestic shipping industry's conditions in order to elucidate supply and demand levels for container shipping.

This paper advances the analysis of supply and demand in the domestic container shipping sector, centering on three primary research questions. The first concerns the methodology for estimating the domestic container shipping demand curve and determining whether demand is elastic or inelastic in response to market dynamics. Following the demand analysis, the same evaluative framework is applied to the supply side, addressing the second question regarding the market structure of domestic container shipping and the responsiveness of supply capacity to prevailing market trends. The third research question merges the supply and demand analyses to explore the dynamics between the two. The overarching objective of this research is to assess market behaviour by measuring market elasticity.

Demand for the Container Shipping Industry

A substantial body of academic literature asserts that the demand for marine transportation services arises from economic activity, which can be measured via cargo flow into and out of ports [2]. Numerous studies employ regression analysis to estimate demand in the container shipping sector, utilising various combinations of explanatory variables.

Stopford [2] , for instance, expands the analysis to four categories: macroeconomic conditions, types of cargo commodities, random shocks, and emerging technologies.

Demand forecasting for the container shipping industry frequently served to anticipate future trends. Esmer [3], for example, used multiple regression to predict port cargo demand in Turkey, incorporating variables such as gross domestic product (GDP), foreign trade, and population over the preceding five years. Chou [4] adapted this approach by introducing a non-stationary contribution coefficient into the GDP and port throughput regression model, aiming to address issues of forecasting error.

Despite the diversity of analytical variables, the most common approach derives cargo demand from economic output, especially GDP. Consequently, the present study adopts GDP as the sole independent variable in its regression analysis. Understanding demand in shipping is vital not only for the shipping market (including both liner and tramp segments), but also for the shipbuilding industry, given that an increase in shipping demand inevitably drives shipbuilding demand. For example, Han et al. [5] sing a system dynamics model, demonstrated how demand projections in LNG shipping can be translated into future shipbuilding requirements, reinforcing the interconnectedness of maritime transport and industrial manufacturing sectors.

Market Structure of the Shipping Industry

Market structure pertains to the fundamental elements and configuration of a market. Uzonwanne et al. [6] identify three principal components: the distribution of market participants (sellers/buyers), the extent of product differentiation, and the conditions governing market entry. Scholars typically measure market structure using metrics such as the Concentration Ratio of the top four companies (CR4) or the Herfindahl-Hirschman Index (HHI). Research by Lijesen et al. (aviation) [7] , Alegria et al. (banking) [8], and Noam (internet and media) [9] have all utilised this approach.0.

In the shipping industry specifically, Sys [10] calculated the HHI and CR4 for the global liner sector before and after significant consolidation from 1995 to 2008, concluding that market concentration increased during this period and confirming the hypothesis of an oligopolistic market structure. Charłampowicz [11] further interrogated the competitiveness of the global container shipping market, again applying CR4 and HHI, and reached similar conclusions as Sys [10]. Still using the same method, Goulielmos [12] noted that increasing the sample size in HHI analysis tends to produce lower concentration values, but the underlying trend remains consistent. These studies collectively affirm that the global container shipping market exhibits characteristics of an oligopoly, where a limited number of firms control a substantial market share. This structural configuration likely extends to national contexts such as Indonesia, warranting further empirical investigation.

Dynamics of Supply and Demand Curves in Container Shipping

Economists illustrate market conditions using supply and demand curves, with price on the vertical axis and quantity on the horizontal axis. These curves offer visual explanations for market interactions during surpluses or shortages. H. L. Moore first derived the demand curve from statistical data around 1915, depicting it as a line sloping downward from left to right, while the supply curve slopes upward.

Within the context of shipping, Stopford [2] elucidates the unique nature of the industry′ s supply curve, arguing that the supply curve for a single ship exhibits a J-shape. The aggregate industry supply curve is constructed by combining these individual J-shaped curves, resulting in a flatter overall appearance than traditional supply curves. Conversely, the shipping industry′ s demand curve is noted for its steepness, reflecting a relatively inelastic response to supply.

Efes et al. [13] proposed a model for supply-demand interaction in China′ s shipping industry, positing that increased demand leads to higher freight rates, while increased supply exerts downward pressure on prices. In the short term, capacity cannot respond quickly, but over the longer term, gradual supply adjustments lead to lower freight rates as the market equilibrates. Luo et al. [14] employed the cobweb model to analyse the dynamic interplay of supply and demand in the container shipping industry, showing that periods of high freight correspond to surplus supply and declining prices, eventually giving way to increased demand and a cyclical return to higher rates. This cycle of supply and demand interaction perpetuates the volatility observed in freight rates and capacity utilisation within the industry.

2. Method

The analysis was conducted in three sequential stages: demand-side analysis, supply-side analysis, and market equilibrium analysis. The initial phase focused on the demand side, aiming to ascertain the prevailing conditions of demand for domestic container shipping. This was achieved by regressing components of the Gross Regional Domestic Product (GRDP) against data on domestic container throughput at the ports. For the demand projection, growth figures for Indonesia's GRDP, as published by the World Bank, were employed and subsequently regressed against container throughput in Indonesia. Consequently, as outlined in the literature review, the authors applied the following regression model:

$$Throughput = Demand = c_0 \times GDRP \quad (1)$$

where c_0 the regression coefficient linking GRDP to demand for maritime transport.

In addition to regression, a demand curve was constructed based on primary data obtained from structured interviews with cargo owners and freight forwarders. During these sessions, respondents were presented with a simulation of freight rate adjustments and asked to indicate expected changes in cargo volume. This enabled the construction of a demand curve where quantity (TEUs.Nm) and price (freight rate in IDR/TEU) could be plotted. To quantify the price elasticity of demand, an elasticity analysis was conducted employing the mid-point elasticity method.

$$Elasticity = \frac{\frac{Q_2 - Q_1}{\frac{(Q_2 + Q_1)}{2}}}{\frac{P_2 - P_1}{\frac{(P_2 + P_1)}{2}}} \tag{2}$$

where Q_2 and Q_1 represent quantity demanded at freight rates P_2 and P_1 respectively.

The supply-side analysis commenced with a market structure assessment using the Herfindahl–Hirschman Index (HHI). The index was calculated for nine major liner routes in Indonesia, as follows:

$$HHI = \sum_{i=1}^{n} {s_i}^2 \tag{3}$$

where S_i denotes the market share held by each identified company. The purpose of determining market structure is to validate the simulated domestic container shipping demand curve, which was derived from interview data.

Subsequently, an analytical process was undertaken employing a generic voyage calculation model to estimate the capacity of Indonesia's container ship fleet, measured both in Twenty-foot Equivalent Units (TEUs) and TEU-miles. This model additionally facilitates the computation of unit costs on the supply side, which can be utilised for further investigative research. The supply side is represented by the following equation:

$$Capacity\ (TEUs) = Ship\ Population\ \times Ship\ Capacity \tag{4}$$

$$Capacity\ (TEUs.Miles) = Ship\ Population\ \times Ship\ Capacity\ \times distance \tag{5}$$

where:

$Ship\ Capacity$	= Container Ship Capacity (TEU' s)
$Freq$	= Frequency of service (Ship' s call) per annum
$Distance$	= Total distance travelled per route (N.miles)
$Ship\ Population$	= Number of container ships operating in a particular route (unit of ship)

The quantity variable corresponds to the capacity of the container fleet, whereas the price variable reflects the prevailing freight rate. Freight rates were obtained through interviews and the collection of both primary and secondary data. Furthermore, an elasticity analysis was performed employing the mid-point elasticity method (see Eq. 2).

The subsequent phase involves market equilibrium analysis, which is predicated upon short-run conditions. Inputs at this stage comprise the demand and supply estimations derived from the preceding analyses. These are combined and examined to establish the equilibrium state of the domestic container shipping industry. Market equilibrium is achieved only if the demand and supply curves intersect. In the absence of such an intersection, the market is deemed unbalanced. An unbalanced market indicates either an oversupply condition–when the demand curve lies above the supply curve–or a shortage–when the supply curve lies above the demand curve. To restore equilibrium, the supply curve shifts horizontally until it intersects with the demand curve, thereby resolving the imbalance. This implies that, in the event of disequilibrium, adjustments occur primarily on the supply side.

Mathematically, the analysis utilises a parabolic equation approach. The horizontal axis (x-axis) represents the quantity variable, while the vertical axis (y-axis) denotes the shipping rate variable. The demand curve is expressed as a demand function (D) in the form of a quadratic equation as follows:

$$D = f(x) = ax^2 + bx + c \tag{6}$$

The parameters *a*, *b*, *c* represent coefficients of the demand function, which is expressed as a quadratic equation to be estimated through regression analysis. Correspondingly, the supply curve is formulated as a supply function (*S*) with the quadratic equation as follows:

$$S = f(x) = ix^2 + jx + k \tag{7}$$

where *i, j, k* denote parameters to be determined for the supply function. Using the quadratic nonlinear equation methodology, the roots for both the de demand and supply functions are calculated as follows:

$$(a - i)x^2 + (b - j)x + c - k = 0 \tag{8}$$

$$x_1 and\ x_2 = \frac{-(b - j) \pm \sqrt{(b - j)^2 - 4((a - i)(c - k)}}{2(a - i)} \tag{9}$$

The *x* roots represent the quantities at which the demand and supply curves intersect. In addition, substituting the non-negative root back into either the demand or supply function enables the determination of the equilibrium price (the y-axis of price) at the intersection point. Should the demand and supply functions fail to share the same root, where $(b - j)^2 -$

$4((a-i)(c-k) < 0$, indicating no intersection, the supply curve is adjusted horizontally leftwards to restore equilibrium. The shift in the supply function f (s) incorporates a constant z, corresponding to the quantity reduction required. This adjustment z is derived by calculating the load factor ratio observed on the routes where market equilibrium prevails.

This approach ensures the modelling of market disequilibrium scenarios wherein supply must be adapted to achieve balance with demand, reflecting typical dynamic adjustments in the domestic container shipping market. The application of quadratic functions and root-finding methods thus provides a robust framework to analyse market equilibrium conditions and the necessary supply shifts to resolve imbalances.

3. Results and Discussion

3.1. The Demand Side Analysis

The Relation between Economic and Demand

This section examines the relationship between economic conditions and the demand for maritime transport services, specifically testing how economic variables influence the growth of container traffic in domestic shipping. In this analysis, the Gross Regional Domestic Product (GRDP) serves as the proxy for economic variables. The study focuses on the nine busiest liner routes, chosen as representing the full market mechanism where container freight rates are determined by supply and demand dynamics. These routes are illustrated in the accompanying map (Figure 1) providing a spatial reference for the market under investigation.

This approach aligns with economic transport demand theory, where regional economic output (GRDP) is a primary driver of cargo volumes and, consequently, container throughput. Selecting the busiest routes allows analysis within markets exhibiting active demand–supply interactions, ensuring that the estimated relationships accurately reflect prevailing market mechanisms and constraints.

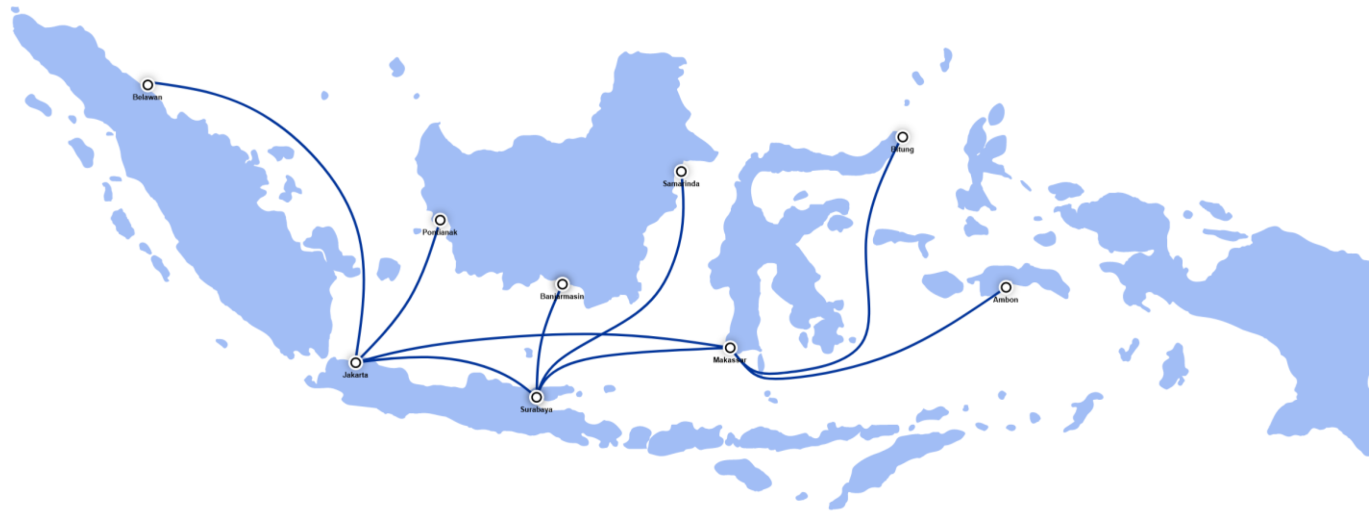

Figure 1 Route Map of Domestic Container Shipping

The analysis was conducted by aggregating the GRDP values of the two regions corresponding to each shipping route and correlating this combined indicator with the volume of cargo flow on the respective routes. This aggregation reflects the bidirectional nature of cargo movement, encompassing both loading and unloading activities. Consequently, the combined GRDP of the origin and destination areas represents the total economic activity influencing cargo volumes, as detailed in Table 1. The results of the analysis reveal a coefficient of determination (R^2) ranging from 0.87 to 0.97 across the examined routes. Such values signify that the GRDP variable accounts for approximately 87% to 97% of the variance observed in container volumes.

Table 1. The Relation between Economic and Shipping Demand

Route	RSQ	CORREL	Equation	
			Slope	Intercept
JKT-BLW	0.89	0.94	0.05819	204206
JKT-SBY	0.92	0.96	0.07189	55787
JKT-PNK	0.87	0.93	0.05598	94997
SBY-BNJRM	0.97	0.99	0.13257	-65057
SBY-MKS	0.90	0.95	0.01891	379607
SBY-SMRND	0.93	0.97	0.06558	-6883
MKS-JKT	0.97	0.99	0.01886	124129
MKS-AMB	0.89	0.94	0.05090	16340
MKS-BIT	0.92	0.96	0.03996	10589

Demand Curve

The demand curve serves as a graphical representation of the relationship between the quantity of goods demanded in the market and the corresponding expected price. Within the context of the domestic container shipping industry, the quantity variable (Q) is expressed as the volume of container demand on each route, weighted by the distance of that route. The price variable is derived from data obtained through interviews with representatives of the shipper association and is subsequently transformed into a demand curve that reflects empirical conditions observed in the field, utilising Eq. 6. The analysis thus yields the following results:

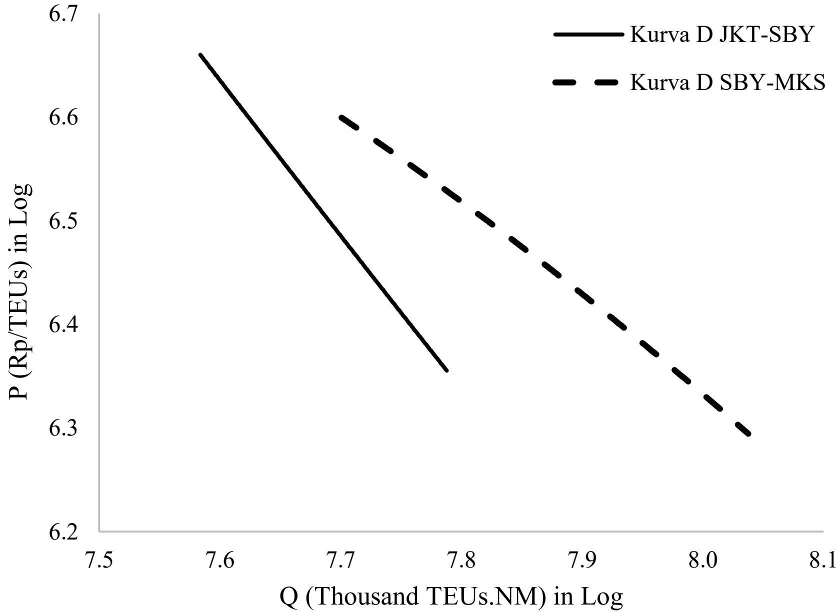

Figure 2. Demand Curve of Domestic Container Shipping

The shipping demand curve illustrated above represents the relationship between container demand and prevailing freight rates, focusing specifically on two routes: Jakarta-Surabaya and Surabaya-Makassar. To characterise the domestic container shipping industry's demand, an elasticity analysis was performed using the midpoint elasticity method. This approach was selected due to its ability to accurately measure elasticity between two points over a given period, using the lowest and highest points on the demand curve depicted in Figure 2.

The calculated elasticity of demand (Eq. 3) for the domestic container shipping sector was 0.31, indicating that demand is inelastic with respect to price changes (i.e., elasticity less than 1). This inelasticity suggests that cargo owners have limited alternatives when faced with increased ocean freight rates imposed by shipping companies, compelling them to accept these rates to ship their goods. Nonetheless, the demand curve is not perfectly inelastic, as there is a minor reduction in quantity demanded when tariffs increase. However, if freight rates become excessively high, it may render the transportation of goods uneconomical for end-users, potentially reducing demand further. Thus, the evidence indicates that domestic container shipping demand exhibits relative price inelasticity, reflecting the essential nature of shipping services and limited substitutes for cargo owners within these key routes.

This finding concurs with prior research indicating that transport demand within shipping markets is characteristically highly inelastic with respect to freight rates. Beenstock and Vergottis [15], Wada et.al. [16], Bai et.al. [17] have posited that demand is effectively perfectly inelastic in relation to freight rate fluctuations.

3.2. The Supply Side Analysis

Market Structure Analysis

The Herfindahl-Hirschman Index (HHI) is utilised in this analysis as a metric to assess market concentration within the domestic container shipping industry. It is calculated by squaring the market share of each individual company and then summing all these squared values, as expressed in Eq. 3. The resulting HHI value provides a quantitative measure of the degree to which the market is dominated by a small number of firms. In the context of 2019, the computed HHI reflects the concentration conditions prevailing in the domestic container shipping market, serving as an evaluative indicator of competitive intensity and market structure.

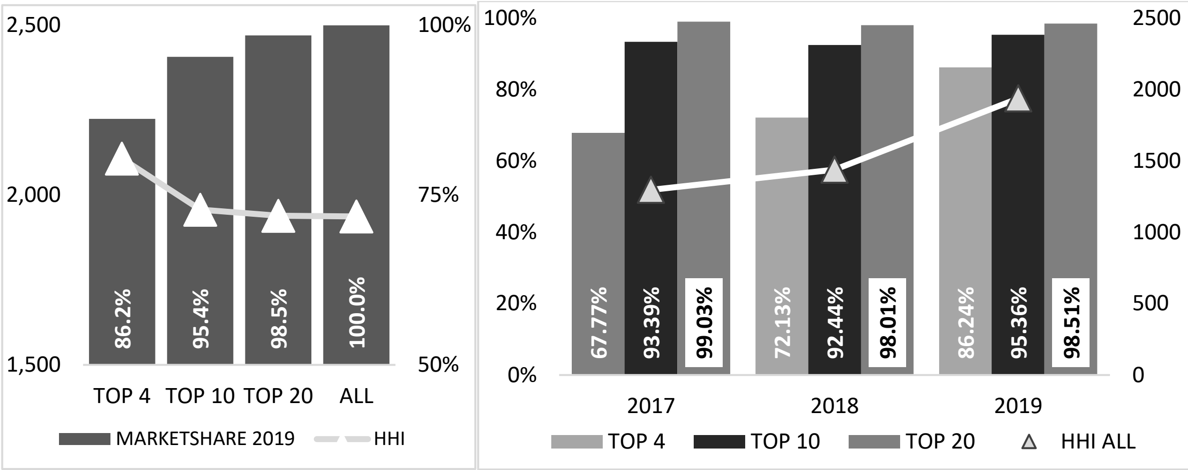

Figure 3. HHI Score the Whole Shipping Industry

Theoretically, the HHI ranges from 0 to 10,000, where lower values indicate a more competitive market with numerous firms of similar size, while higher values signify greater market concentration and potential oligopolistic or monopolistic control. This index is commonly used by regulators and researchers to characterise market competitiveness and to infer the potential for anti-competitive behaviour based on the distribution of market shares among firms.

Based on the analysis depicted in Figure 3, the domestic container shipping industry at the national level was characterised by moderate market concentration in 2019, with an HHI value below 2,500. The four largest firms collectively commanded a substantial market share of 86.2%, corresponding to an HHI score of 2,108. Furthermore, the top ten and top twenty companies held market shares of 95.4% and 98.5%, respectively, with respective HHI values of 1,957 and 1,939.

A time series examination spanning 2017 to 2019 reveals an upward trend in market concentration, as evidenced by a rising HHI from 1,297 to 1,937 over this period. Concurrently, the market share of the four dominant companies exhibited a marked increase, rising from 67.7% to 86.24%. In contrast, firms outside of this top-four cohort experienced a decline in HHI values, indicative of a diminishing capacity to exert market control and thereby heightened competition within those segments of the domestic container shipping market not dominated by the leading four companies.

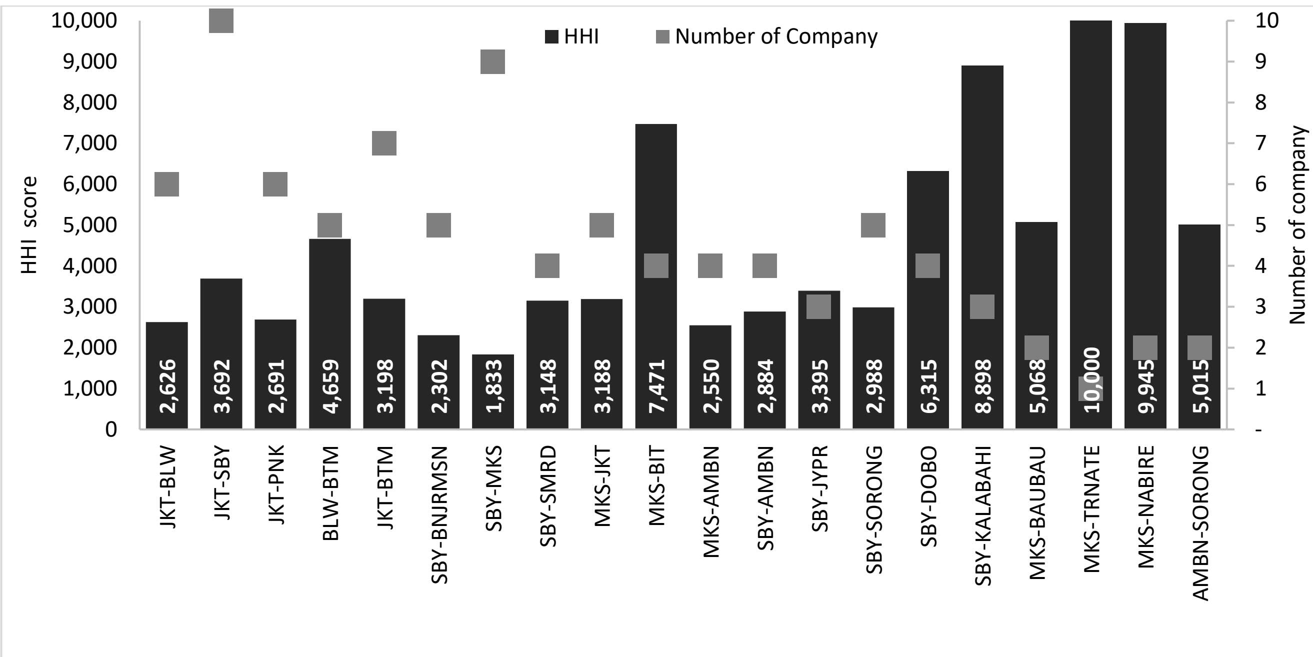

Figure 4. HHI Score for Every Route

Following the national-level assessment of the HHI, the authors proceeded to examine HHI values for selected liner routes. As illustrated in Figure 4, none of the principal domestic container routes fall within the competitive zone, with all HHI scores exceeding 1,500, which signifies elevated market concentration. Notably, the mere presence of numerous market participants does not necessarily equate to a competitive environment. This is exemplified by the Jakarta–Surabaya route, which, despite hosting ten companies, exhibits an HHI value of 3,692–indicating a highly concentrated market where a single firm controls approximately 80% of the market share.

The divergence between industry-wide HHI values and those calculated on a per-route basis suggests that the four dominant firms do not generally compete directly on identical routes. Rather, these major companies tend to hold distinct, non-overlapping market shares within their respective operating routes. Consequently, route-level HHI analyses yield substantially higher concentration measures, reflecting weaker competition, compared to national aggregated figures–for instance, the national aggregate HHI stands at a markedly lower value of 1,558.

Furthermore, it is important to note that a high HHI is not necessarily indicative of adverse market conditions. Several routes depicted on the right side of the graph correspond to non-commercial lines, which operate primarily to facilitate trade rather than generate profit. These routes typically lack market competition and are often serviced by state-subsidised vessels. Hence, elevated HHI scores in such contexts reflect the structured nature of service provision rather than market failure or monopolistic behaviour.

The Flexibility of the Supply Side in the Liner Shipping Industry

Based on the data processing of Ship Arrival and Departure Reports at Indonesian ports for the period 2017 to 2019, the capacity of ships operating on domestic routes has been determined. According to Figure 5, domestic container shipping companies operating on domestic routes maintained relatively consistent vessel sizes across the observed periods. However, a more detailed examination comparing the total number of ships calls with the count of unique vessels servicing the routes during the same timeframe revealed a contrasting outcome. Specifically, no significant correlation was found between the number of ships calls and the number of distinct ships. The coefficient of determination (R^2) calculated to assess the relationship between ship calls and unique vessel numbers was notably low, at 0.03.

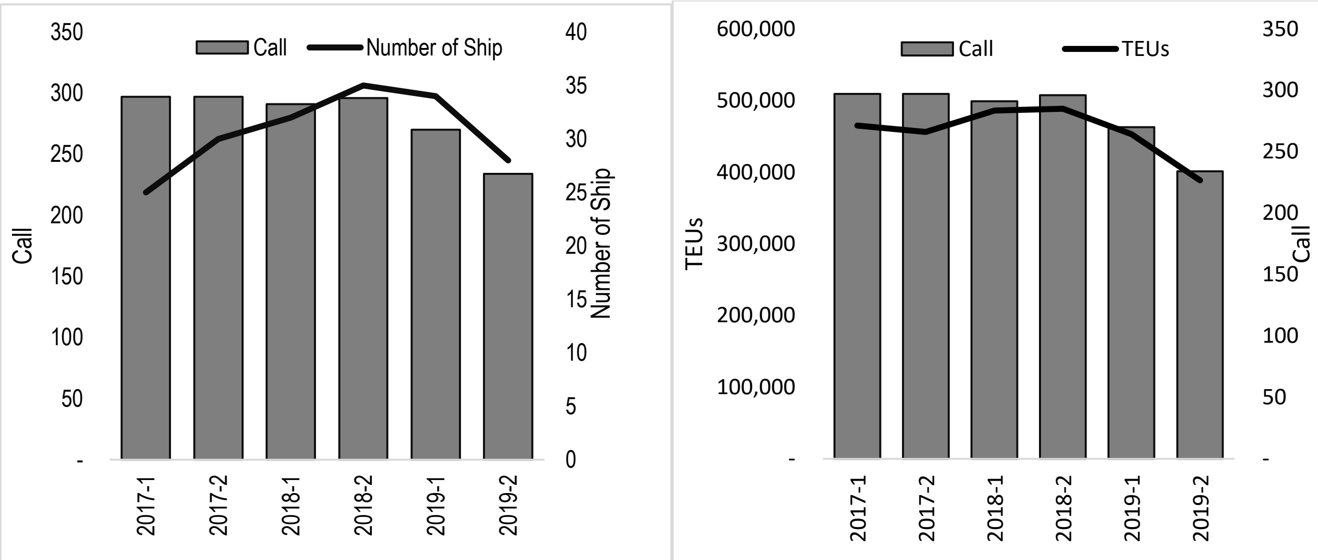

Figure 5. Relation between Capacity- Call and Relation between Ship Number-Ship Call

This finding suggests that vessels within Indonesia's domestic container shipping sector exhibit a high degree of operational flexibility, allowing shipping companies to reassign vessels between routes as needed. Consequently, the fleet serving domestic liner routes is not fixed; operators can substitute, reduce, or augment their deployment of ships in response to fluctuating market demands and conditions. This adaptability reflects a dynamic market environment where capacity adjustments are made rapidly to align with evolving commercial factors.

Supply Curve

The supply curve for the domestic container shipping industry, as depicted in Figure 6, exhibits a distinct J-shape characteristic: it remains relatively flat and low at the initial quantity levels and then rises steeply as quantity increases. This shape aligns with the explanation provided by Stopford [2], who described the aggregate supply curve in shipping as formed by the sum of individual ship supply curves, each of which has a J-shape. The initial flat segment reflects relatively stable prices when capacity utilisation is low, as existing vessels can accommodate additional shipments without incurring substantial incremental costs. However, as the quantity shipped rises beyond a certain threshold, constraints due to the finite dimensions and availability of ships become binding. At this juncture, industry participants face the necessity of investing in new vessels to expand capacity, which drives the freight rates higher, resulting in the steep upward slope.

In operationalising this analysis, the quantity (Q) was measured by the number of containers shipped in the first and second semesters of 2019 across the ports under review, while the price (P) was derived from freight rates collected through interviews with container shipping companies, freight forwarders, and cargo owners familiar with sea container shipping services. To avoid numerical distortions caused by large differences in variable scales, a logarithmic scale was employed.

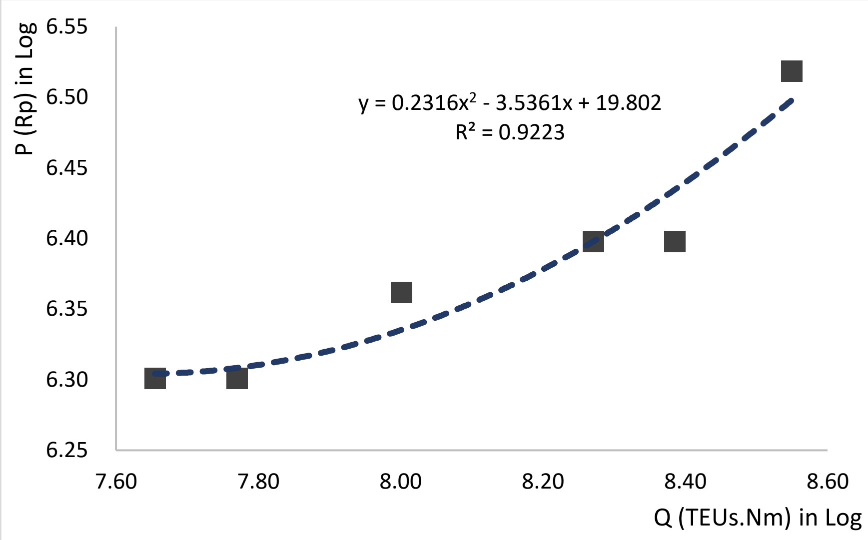

Figure 6. Supply Curve of Domestic Container Shipping

The elasticity of supply was calculated using the midpoint method outlined in Eq. 2, measuring responsiveness between the lowest and highest supply points on the curve illustrated in Figure 6. The resulting supply elasticity value of 3.16 indicates a highly elastic supply condition within Indonesia's domestic container shipping sector. This suggests that shipping companies have significant flexibility to adjust their offered quantities in response to price changes, increasing or decreasing capacity as market conditions fluctuate.

This elasticity finding is consistent with prior analyses, which showed that vessel capacity exhibits a dynamic market characteristic: ships allocated to one route can be redeployed quickly to another, enabling rapid capacity adjustments. This operational flexibility underpins the elastic supply response to price variations observed in the domestic container shipping market.

In summary, the supply curve shape and elasticity analysis together reflect that while initial capacity additions impose low marginal costs, expansions requiring new vessels entail significant investment and higher prices, and that the sector can actively modulate supply in response to market signals.

3.3. Market Equilibrium in Domestic Container Shipping

Following the derivation of the demand and supply curves within the domestic container shipping industry, as illustrated in Figures 2 and 6, respectively, these curves were subsequently superimposed to analyse their interaction, as depicted in Figure 7. The intersection analysis reveals that the demand and supply curves intersect on the Surabaya–Makassar route, whereas on the Jakarta–Surabaya route, no such intersection occurs.

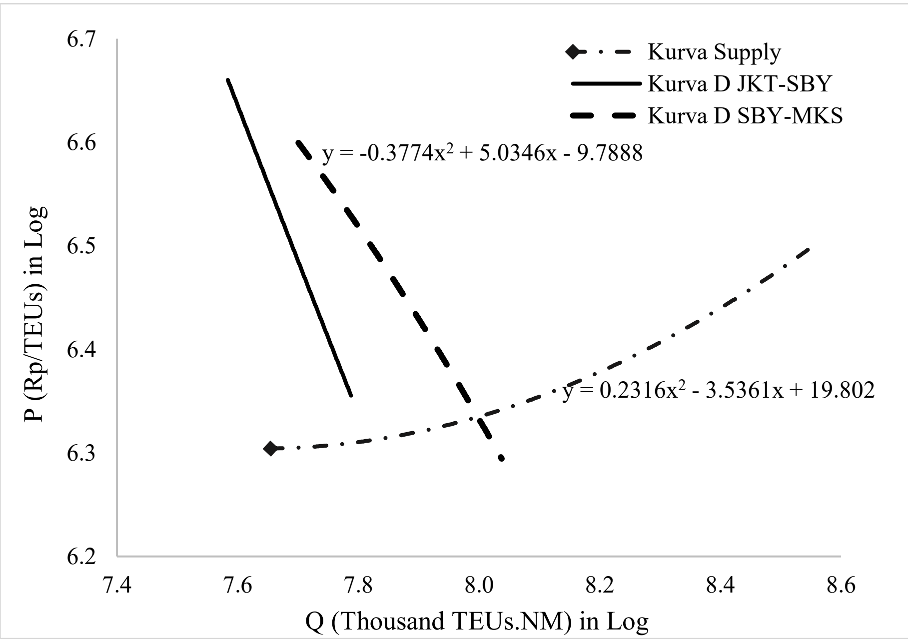

Figure 7. Market Equilibrium

To determine the precise points of intersection, the equations representing both the supply and demand curves were subjected to root analysis. This procedure identified two intersection points at logarithmic values of 7.99 and 6.33. When converted from the logarithmic to the original scale via exponentiation, these correspond to an equilibrium quantity of approximately 99,764,654 TEU.Nm and an equilibrium freight rate of Rp 2.16 million. The presence of an intersection point between the demand and supply curves signifies market equilibrium, indicating that supply reliably meets demand and the market operates under balanced conditions.

Conversely, examination of the Jakarta–Surabaya route reveals no intersection between the demand and supply curves within Figure 7. Here, the demand curve consistently lies above the supply curve. Although such a configuration is atypical in conventional market theory and empirical practice, this scenario suggests a surplus of shipping capacity in the Jakarta–Surabaya market segment.

Considering the market dynamics, where the demand side predominantly governs the quantity demanded and the supply side controls the pricing, the demand side is willing to accept freight rates as determined by the supplier, while the supply side adjusts vessel capacity to meet the demanded quantity. Therefore, the absence of intersection, attributed to insufficient demand at prevailing supply levels, implies that the market mechanism should facilitate a reduction in vessel capacity. This adjustment would affect a horizontal leftward shift of the supply curve until an equilibrium quantity is restored, realigning supply and demand.

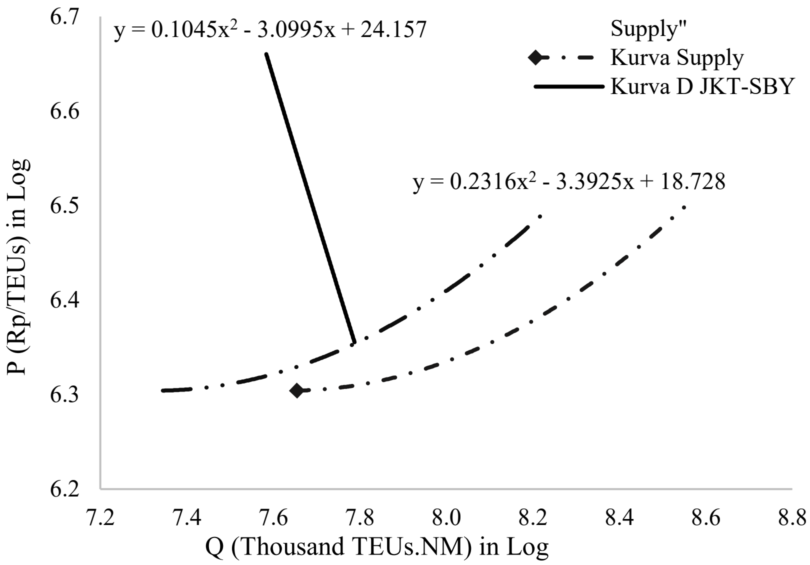

Figure 8. Movement of Supply Curve

Based on the analysis presented in Figure 8, the supply curve on the Jakarta–Surabaya route shifts horizontally leftwards to intersect the demand curve at logarithmic points 7.78 and 6.35. Solving the joint supply and demand equations (Eq. 8 and 9) yields an equilibrium quantity of approximately 61.5 million TEUs·Nm and an equilibrium price of Rp 2,262,945 per TEU upon conversion from the logarithmic scale. This leftward shift in the supply curve represents a reduction in supply quantity by approximately 100 million TEUs·Nm, equivalent to a decrease of around 258,000 TEUs annually, reflecting the correction of a prior capacity surplus. Initially, the route's capacity stood at 186 million TEUs·Nm, or 481,000 TEUs per year.

As a consequence of this supply adjustment, the average load factor on the Jakarta–Surabaya route increased markedly from 0.31 to 0.71, indicating improved vessel utilisation. Currently, this route is serviced by 59 container vessels managed by 10 shipping companies, with a combined capacity of 22,183 TEUs. Data from LK3 for the ports of Tanjung Priok and Tanjung Perak indicate that these vessels collectively achieved a total productivity of 788,123 TEUs per year, although the average load factor remained low at approximately 0.2 prior to the capacity reduction.

This analysis demonstrates that addressing the excess capacity through supply contraction significantly enhances fleet utilisation, aligning supply more closely with actual demand on the Jakarta–Surabaya route. Such adjustments underline the dynamic nature of shipping fleet deployment in response to imbalances between supply and demand within domestic container shipping markets.

4. Conclusion

Our detailed analysis of Indonesia's domestic container shipping industry elucidates the intricate interplay between supply and demand, each exhibiting distinct characteristics that collectively shape the market dynamics. On the demand side, elasticity is notably low, with an estimated value of 0.31. This figure reflects a high degree of inelasticity, indicating that cargo owners, constrained by the paucity of alternative shipping options, generally acquiesce to the freight rates established by shipping companies. Consequently, demand remains relatively insensitive to price fluctuations, underscoring the essential and captive nature of these shipping services.

Conversely, the supply side reveals a markedly oligopolistic market structure, as evidenced by Herfindahl-Hirschman Index (HHI) values ranging from 1,833 to 10,000, signifying medium to high market concentration. The market is dominated by the four largest domestic container shipping firms, which appear to have effectively segmented the market by operating on distinct routes with minimal overlap, thereby mitigating direct competition. Notably, supply exhibits substantial elasticity, quantified at 3.16, implying that shipowners possess considerable operational flexibility to modulate vessel capacity and deployment in response to shifting market conditions. This responsiveness enables the supply side to adjust scale effectively as demand varies.

The interplay between supply and demand indicates that the quantity of cargo shipments (Q) is primarily determined by the demand side, whereas the supply side exercises control over freight rates (P). A definitive equilibrium was identified on the strategically significant Surabaya–Makassar route, where the interaction of demand and supply curves converges at approximately 99.7 million TEU.Nm and a freight rate of Rp 2.16 million. This equilibrium reflects a balanced state where shipping capacity is well aligned with cargo volumes at a mutually acceptable price point.

However, equilibrium is not uniformly observed across all major routes. On the Jakarta–Surabaya route, an excess of shipping capacity relative to demand results in a disequilibrium state wherein the demand curve lies consistently above the supply curve, precluding intersection. Rectifying this imbalance necessitates a leftward horizontal shift of the supply curve, corresponding to a reduction in capacity by an estimated 258,000 TEUs annually. This adjustment would restore market equilibrium through capacity realignment, underscoring the imperative for strategic capacity management tailored to route-specific demand conditions.

In summary, these findings highlight the nuanced and route-dependent nature of market dynamics within Indonesia's domestic container shipping sector, driven by inelastic demand, oligopolistic supply structures, and variable equilibrium conditions that require responsive fleet management to sustain market balance.

Acknowledgments

The authors acknowledge the Department of Marine Transportation Engineering for the facilities and support provided during the entire study of this project. The authors faced many challenges, as this is the first attempt to portray the so-called "domestic container market" in Indonesia.

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