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Shipping Connectivity as a Pioneer of Logistics Distribution System Supporting Success of Sea Toll Program

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Abstract

Purpose: This study aims to discuss the success of the implementation of the Sea Toll, the Sea Toll is a concept to improve the logistics transportation process in Indonesia, so that the distribution process of goods (especially food) in Indonesia can run smoothly becomes easier and has a more even impact on the price of basic commodities throughout Indonesia.
Research Methodology: The research method is quantitative and emphasizes data processed by distributing questionnaires to parties involved in the implementation of the Sea Toll, including shipping, loading and unloading, freight forwarding, transportation fleet, and goods supplier companies.
Results: The study shows that the Sea Toll Program has reduced price disparities between Western and Eastern Indonesia. Hypothesis testing reveals that the number of fleets significantly impacts price disparity ($\beta = 0.906$), with tariff determination and logistics distribution systems also influencing it. The model's goodness of fit (GoF) is 0.6586, indicating predictive relevance ($Q^2 = 0.422$).
Conclusions: The results show that Fleet Size and Tariff Determination significantly affect Price Disparity in the Sea Toll Program, while Commodity Type and Logistics Distribution System do not have significant effects. Fleet Size is the most influential variable, and the model explains 76% of the variability in Price Disparity.
Limitations: The study is limited to specific maritime routes within the Sea Toll Program and uses a small sample of shipping and logistics respondents. It does not fully account for long-term factors affecting regional price disparities or broader economic impacts.
Contributions: This research offers insights into how maritime logistics and fleet management reduce price disparities in Indonesia. It highlights the key roles of fleet availability, tariff determination, and logistics distribution in the success of the Sea Toll Program.

Keywords: *Cruise Pioneer, Distribution, Disparity Price, Shipping Connectivity*

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1. Introduction

The government launched the Maritime Toll Program, driven by the significant price disparity between Western and Eastern Indonesia. Centralized economic growth in Java has resulted in inefficiencies in maritime transportation in Indonesia due to an imbalance in return cargo from regions with lower economic growth, particularly in Eastern Indonesia (Abdullah, 2021; Saputra et al., 2022). The government has established several legal bases for the Sea Toll Program, including Presidential Decree No. 106 of 2015 concerning the Implementation of Public Obligations for the Transportation of Goods at Sea and

Ministerial Regulation No. PM. 4 of 2016 concerning Amendments to the Regulation of the Minister of Transportation No. PM 161 of 2015 concerning the Implementation of Public Service Obligations for the Transportation of Goods at Sea (Arimbawa & Suryawan, 2022; Lesmini et al., 2022).

The government has set six toll routes. The first phase of sea transportation was carried out with Decree AL.108/7/8/DJPL-15 concerning the Sea Toll Shipping Route Network for the 2016 Fiscal Year and its Implementing Provisions (Ricardianto et al., 2021; Saputra & Kusnadi, 2021). In addition, Minister of Transportation Regulation No. 10 of 2016 concerning Freight Transport Tariffs at Sea in the Context of Implementing Public Service Obligations was also stipulated (Hendiyana et al., 2022; Ricardianto et al., 2021). Consumer Price Index and Monthly Inflation in Relation to Price Disparity, source of Central Statistics Agency, the services and prices that have been provided have a significant impact on customer loyalty to the company (Harywibowo & Hariadi, 2022). The data above show that the highest Customer Loyalty is at the age of one year of cooperation, while the lowest is at the age of five years of cooperation, which means there is a tendency for customer loyalty to decrease. Therefore, it is necessary to understand the influence of service quality and price, both partially and together, on the company 's customer loyalty (Rizqi & Sakinah, 2021; Wardhani & Ully, 2024).

Table 1. Consumer Price Index and Inflation (2015–2019)

Month	2015		2016		2017		2018		2019	
	CPI	Inflation	CPI	Inflation	CPI	Inflation	CPI	Inflation	CPI	Inflation
Jan	118.71	-0.24	123.62	0.51	127.94	0.97	132.10	0.62	135.83	0.32
Feb	118.28	-0.36	123.51	-0.09	128.24	0.23	132.32	0.17	135.72	-0.08
Mar	118.48	0.17	123.75	0.19	128.22	-0.02	132.58	0.02	135.87	0.11
Apr	118.91	0.36	123.19	-0.45	128.33	0.09	132.71	0.10	136.47	0.44
May	119.50	0.50	123.48	0.24	128.83	0.39	132.99	0.21	137.40	0.68
Jun	120.14	0.54	124.29	0.66	129.72	0.69	133.77	0.59	138.16	0.55
Jul	121.26	0.94	125.15	0.69	130.00	0.22	134.14	0.28	138.59	0.31
Aug	121.73	0.39	125.13	-0.02	129.91	-0.07	134.07	-0.01	138.75	0.12
Sep	121.67	-0.05	125.13	0.22	130.08	0.13	133.83	-0.18	138.37	-0.27
Oct	121.57	-0.08	125.59	0.14	130.09	0.01	134.20	0.28	138.40	0.02
Nov	121.82	0.21	126.18	0.47	130.35	0.20	134.56	0.27	138.60	0.14
Dec	122.99	0.96	126.71	0.42	131.28	0.71	135.39	0.62	–	–
Level Inflation		3.35		3.02		3.61		3.13		2.37

Source: Central Bureau of Statistics Indonesia

Based on Table 1, the Consumer Price Index (CPI) and inflation rate in Indonesia during 2015–2019 fluctuated monthly. The annual inflation rate showed relatively stable conditions, with inflation levels ranging from 2.37% to 3.61%. The highest annual inflation occurred in 2017 at 3.61%, while the lowest was recorded in 2019 at 2.37%. These conditions indicate that Indonesia maintained relatively controlled inflation during the observed period (Wahyuningsih et al., 2021).

The vessels used to traverse the sea toll road have a very large capacity and volume. This is to ensure that the maximum possible supply of commodities reaches the 3TP (Outermost, Frontier, Underdeveloped, and Border) regions (Syahrial & Sudono, 2021). The following are Indonesia's sea toll routes:

Table 2. Indonesia Sea Toll Routes

Route 1	Route 2	Route 3	Route 4	Route 5	Route 6
Tanjung Perak	Tanjung Perak	Tanjung Perak	Tanjung Priok	Makassar	Tanjung Priok
Wanci	Kalabahi	Larantuka	Makassar	Tahuna	Hiu
Namlea	Moa	Lewoleba	Manokwari	Lirung	Natuna
Fakfak	Saumlaki	Rote	Wasior	Morotai	–
Dobo	Saumlaki	Rote	Nabire	Tobelo	–
Timika	Merauke	Waingapu	Serui	Ternate	–
–	–	–	Biak	Sabang	–

Source: CNBC Indonesia (2019)

Based on Table 2, the Indonesia Sea Toll Program consists of several shipping routes connecting western, central, and eastern regions of Indonesia. The routes cover strategic ports and remote areas such as Makassar, Manokwari, Morotai, Natuna, Timika, and Merauke. The Sea Toll routes are intended to improve shipping connectivity, reduce logistics costs, and support the equitable distribution of goods across Indonesia's archipelagic regions.

It is clear that the ships used to traverse the sea toll road have very large capacity and volume. Therefore, it is important to maximize transportation to send goods on a large number of ships. The sea toll must also be able to cross the sea distance sufficiently far (Hasan, 2022; Lesmini et al., 2022). The implementation of the Sea Toll Program differs from the initial concept of the Sea Toll Road. The planned route will be a scheduled voyage from west to east Indonesia and vice versa using large-capacity vessels. The government must immediately design and establish a master plan for the Sea Toll Road. The Plan parent is required as a reference ministry/institution related to the implementation of the Toll Sea (Kusuma & Tseng, 2019). This reference is also necessary for actors and other stakeholders involved in the Sea Toll Program, including shipping firms. Route planning must consider the flow and volume of goods between regions, including the potential of each region (Saputra et al., 2018). This planning is medium- to long-term and therefore must be integrated with relevant ministry plans, such as the 2015-2035 National Industrial Development Master Plan (RIPIN) and the National Fish Logistics System (SLIN) of the Ministry of Maritime Affairs and Fisheries. Sea Toll Program planning must be integrated and synergistic with regional development plans, both related to the development of superior commodities and the respective Regional Spatial Plans (RTRW) (Narendra et al., 2021; Rosiadi et al., 2022). The characteristics of regional commodities determine the physical infrastructure and superstructure of ports. The Sea Toll Road should involve national shipping companies, both state-owned and private ones. Sea Toll operations must be integrated with existing shipping companies, including People's Shipping. Sea Toll development must also be integrated with hinterland transportation systems. each region. Integration includes support for transportation infrastructure (roads and railways) and its actors (transportation service companies as feeders) (Ratnawati, 2019; Supartono et al., 2020).

Chicken Meat								
Region	Average Price				Disparity			
	2016		2018		2016		2018	
Jakarta	Rp	30,325	Rp	36,329	Rp	(2,492)	Rp	1,233
Kupang	Rp	37,350	Rp	47,921	Rp	4,533	Rp	12,825
Papua	Rp	37,425	Rp	41,158	Rp	4,608	Rp	6,063
Maluku	Rp	35,708	Rp	43,500	Rp	2,892	Rp	8,404
National	Rp	32,817	Rp	35,096	-		-	

Shallots								
Region	Average Price				Disparity			
	2016		2018		2016		2018	
Jakarta	Rp	46,725	Rp	42,267	Rp	5,925	Rp	1,417
Kupang	Rp	33,450	Rp	40,567	Rp	(7,350)	Rp	(283)
Papua	Rp	52,192	Rp	53,800	Rp	11,392	Rp	12,950
Maluku	Rp	42,083	Rp	47,333	Rp	1,283	Rp	6,483
National	Rp	40,800	Rp	40,850	-	-	-	-

Rice								
Region	Average Price				Disparity			
	2016		2018		2016		2018	
Jakarta	Rp	10,892	Rp	13,196	Rp	(367)	Rp	1,400
Kupang	Rp	10,850	Rp	11,646	Rp	(408)	Rp	(150)
Papua	Rp	11,867	Rp	12,192	Rp	608	Rp	396
Maluku	Rp	12,308	Rp	12,942	Rp	1,050	Rp	1,146
National	Rp	11,258	Rp	11,796	-		-	-

Figure 1. Disparity Price Basic necessities
Source: National Strategic Food Price Information Center

Based on Figure 1, the average prices of Chicken Meat, Shallots, and Rice in 2016 and 2018 are compared across different regions: Jakarta, Kupang, Papua, Maluku, and National. The data also highlights the disparities in prices for each year and region, showing notable price differences for each commodity. For example, Chicken Meat prices in Jakarta increased from Rp 30,325 in 2016 to Rp 36,329 in 2018, while the disparity in prices varied significantly across regions. Similarly, the price of Shallots in Papua showed a major increase, while Maluku experienced a smaller price variation for Rice. This data provides insights into regional price trends and disparities for these key commodities.

One concrete implementation of this commitment is the development of a maritime toll road, a strategy to reduce price disparities and promote equitable economic development across Indonesia, as well as improve connectivity in frontier, outermost, and disadvantaged regions (Kuncoro & Harahap, 2021; Setyawati & Aristiyanto, 2021). The strategic choice of maritime toll road development is essentially an elaboration of inclusive development, which prioritizes economic justice by focusing more on Indonesia's less developed regions. frontier and outermost regions, so that they can enjoy prices for basic commodities and other necessities that are relatively the same as those enjoyed by their brothers and sisters in other regions of Indonesia (Saputra et al., 2022).

The sea toll road concept was designed to strengthen shipping routes. This aims to equalize growth in eastern Indonesia, reduce logistics costs, and ensure the availability of strategic commodities throughout Indonesia's regions at relatively equal prices, so that people's welfare becomes more evenly distributed (Agusinta et al., 2021; Keke et al., 2021). The maritime toll program is expected to accelerate the integration of port areas and the economy. industrial areas, economic areas, and economic clusters to support the flow of goods and logistics at ports. The sea toll road is also a solution to address the gap between the western and eastern regions of Indonesia. This program developed new industries or economic areas around the main ports and collection ports to ensure continuity in the transportation of goods.

The sea toll road is a form of sea connectivity via large ships in Indonesia. Western to Eastern Indonesia

and vice versa in a regular, planned, continuous, or sustainable manner. One of the goals is to overcome the disparity in the price of goods from one region to another. Based on the background of the problem described above, the identification of problems in this study are as follows: 1) The limitations of the shipbuilding industry have not been optimally developed, thus affecting the readiness of the national fleet in operating the sea toll; 2) commodity price disparities are still an obstacle due to the logistics distribution system that is not yet connected to the Port; 3) the varying types of commodities cause the operational costs of handling cargo at each port to differ; and 4) it is necessary to open pioneer shipping routes connected to special economic zones.

In the formulation of this research problem, the following research questions are proposed: 1) Does the number of fleets influence price disparities? 1) Does tariff determination influence price disparities? 2) Does the logistics distribution system influence price disparities? 3) Does the type of commodity influence price disparities? 4) Does the type of commodity influence price disparities? The amount arm has a way of determining the tariff, system logistics distribution, and type of commodities together on price disparity. This research was conducted with the following objectives: 1) to determine the effect of the number of fleets on price disparity; 2) to determine the effect of tariff setting on price disparity; 3) to determine the effect of the logistics distribution system on price disparity; 4) to determine the influence of commodity types on price disparity; and 5) to determine the influence of the number of fleets, tariff setting, logistics distribution system, and commodity types on price disparities.

2. Literature Review & Hypothesis Development

Research on the success of the Maritime Toll Road in Indonesia is still rare, especially in the shipping and maritime transportation sectors. However, to demonstrate the state of the art of the study conducted, the author presents some research that is considered relevant to describe studies that support the success of the sea toll road.

List of titles of studies related to the Sea Toll:

Table 3. Previous Research Studies

No	Research Title	Year
1	Implementation of the Sea Toll Program at PT Pelni Indonesia and Notes on Jokowi's Sea Toll Policy	2017
2	Notes on Jokowi's Sea Toll Policy	2018
3	Technological Innovation to Support the Sea Toll Program and the Competitiveness of the National Shipping Industry	2018
4	Refunctioning Indonesian Sea Transportation Through the Sea Toll Program for Eastern Indonesia Development	2019
5	Pioneer Shipping Development Strategy Using SWOT Analysis Toward Strengthening the Sea Toll Program as the World Maritime Axis	2019

Based on Table 3, previous studies generally discussed the implementation and development of the Sea Toll Program in Indonesia. Several studies focused on the role of sea transportation in supporting national logistics distribution, improving connectivity in eastern Indonesia, and strengthening Indonesia's maritime sector. In addition, some researchers analyzed technological innovation and strategic development approaches, such as SWOT analysis, to enhance the effectiveness and competitiveness of the Sea Toll Program. These previous studies indicate that the Sea Toll Program has an important role in supporting economic distribution and national maritime development.

Researchers have not yet found research that discusses supporting the success of the Sea Toll Road supports the success of the Sea Toll Road (shipping) in Indonesia. The novelty of this research also lies

in the achievements of sea highways, which are used to analyze the implementation of the success of the sea toll road in Indonesia. In addition, in terms of method, the researcher used a qualitative method with Analytical Hierarchy Process (AHP) obtained through observation and in-depth interview with the people of Eastern Indonesia (Hermawan, 2008; Rosardi et al., 2022). According to the Minister of Transportation Regulation No. PM 93 of 2013 concerning the Implementation of Sea Transportation, and/or remote areas, the implementation of sea transportation for underdeveloped areas is carried out by the minister, governor and/or mayor implemented with cruise pioneer and assignment. Activity cruise pioneers were carried out using seaworthy ships for cargo and/or cargo and passengers. The sea toll program for transporting passengers is a form of pioneering shipping for transporting goods.

In the case of transportation by sea, means or equipment of transportation are used using sea vessels to connect one island to another in moving cargo in the form of goods and people. According to Article 310, paragraph (1) of the Commercial Code, sea vessels are all ships used for sea voyages or are designated for that purpose. With this agreement, the carrier is responsible for the security and safety of the ship. and its contents, especially during shipping or transportation, as stated in Article 468 of the Commercial Code. Pioneer Shipping is designed to support the Indonesian economy, enabling the government to create regulations that support the implementation of Pioneer Shipping in the field, covering all aspects, and supported by adequate facilities and infrastructure, as well as human resources.

For an archipelagic country like Indonesia, the sea port transportation system plays an important role. Ports are the mode of communication between shipping systems and the shipping industry, marine transportation, and land transportation in order to support and develop the economic development of a region or country (Dewa, 2016). Ports are also places for loading and unloading (B/M) of trade commodities, and embarkation and disembarkation of ship passengers. Planning and developing a maritime transportation system requires consideration and integration of many aspects, such as ship services at the port, port infrastructure, including container yards, regional potential, and land transportation networks from and to the port hinterland area.

One of the areas that is the focus for the development of Indonesian ports is the T3P (Remote, Outermost, Underdeveloped and Border) area to support connectivity, for example, the development of the special cruise system in the T3P (Remote, Outermost, Underdeveloped and Border) area, namely pioneering shipping and planning port development in Jayapura, Papua Province, which is the easternmost region of Indonesia. The Central Government's policy in the Nawa Cita vision and mission program through the Ministry of Transportation and the Regional Government of Papua Province and Jayapura City in the sea toll and maritime axis program, especially for pioneering shipping in the development of the Jayapura port area, is expected to have a positive impact on the development of Jayapura City as the capital of Papua Province. Moreover, specifically, merchant ships will operate on pioneering shipping routes on remote, outermost, underdeveloped, and border routes to support connectivity, the development of pioneering port facilities and infrastructure to support all port activities and efficiency, and the development of the hinterland area to maximize the function of busy and congested pioneer shipping (Fofid, 2019).

The increase in loading capacity and speed affects the improvement of the distribution process of passengers and goods as well as sailing time so that the level of efficiency can be achieved in terms of the total costs. To further improve the level of optimization of the performance of the marine transportation network distribution system, further analysis is needed regarding the existing routes by modeling or arranging the routes to obtain more optimal routes or routes based on regional characteristics, movement patterns, and contributions to each existing port (Johannes et al., 2012).

Numerous efforts are underway to support the maritime toll road concept, which, according to a draft plan prepared by the National Development Planning Agency (Bappenas), involves the construction of 24 strategic ports. These ports will be divided into ports serving as international hubs, main ports,

and collection ports. The Sea Toll Road concept is a maritime transportation route from Sumatra to Papua, passing through all the major ports in Indonesia. Sea routes can provide an alternative to the high transportation burden currently associated with land and rail routes. The Sea Toll Road can support maritime transportation and the economy of eastern Indonesia, particularly Papua.

The concept of national logistics connectivity and distribution and inter-island trade to support the MP3EI program is called "Pendulum Nusantara", which connects major ports with routes from Belawan to Sorong and is supported by feeder and pioneer routes. This concept is essentially the same as the "Sea Toll" program launched by the president-elect from 2014 to 2019. This requires the provision of infrastructure and a sufficiently large fleet of boats to improve national logistics and accelerate equitable development.

Logistics distribution management control policies will have an impact on increasing the company's performance in distributing requests to customer outlets and managing product inventory in distribution centers (Fahmiasari & Parikesit, 2017). In line with the logistics distribution philosophy that requires integration between systems, performance measurement in logistics distribution is designed based on processes. A process is a collection of activities that span time and space with a clear beginning, end, and input and output. Good inventory management and an appropriate transportation model can improve the performance of logistics distribution in the supply chain (Giannakis et al., 2019). This study proposes an inventory and distribution control system called an inventory and distribution planning system (IDP inventory distribution plan) (Ristovska et al., 2017).

Logistics distribution performance is a logistics activity on the outbound side, with distribution performance that can be measured in the form of on-time delivery, which indicates the perfection of delivery and reflects the level of customer service. Distribution performance measures, namely: order fulfillment rate, delivery according to due date, fulfillment of order lead-time sequence, perfect invoice amount, system flexibility delivery for meeting specific customer needs, and productivity. The logistics distribution performance construct in this study consisted of six indicators (Tarigan et al., 2021).

The national logistics system must be encouraged to produce quality products at competitive prices. Fundamental efforts to encourage improved national logistics performance require eliminating various logistics sector barriers, namely coordination barriers between institutions related to an integrated national logistics system, professional human resources in the logistics sector, high port costs that create high costs in the loading and unloading process, increasing investment fulfillment in port infrastructure for the loading and unloading process, shortening the licensing process, and the use of information technology in improving logistics performance (Giannakis et al., 2019).

Logistics is a management activity that focuses on goods through ways to manage the determination and planning of needs, procurement, storage, distribution, and maintenance. Deletion for achieving the goal has besides management been determined. In logistics, it is necessary to know Supply Chain Management (Ristovska et al., 2017). The opinions of experts related to logistics and supply chain management are as follows:

1. Logistics involves activities that focus on getting the right amount of the right products to the right place at the right time at the lowest possible cost.
2. Supply chain management (SCM) involves managing a network of interconnected businesses that provide the products and services required by end customers in a supply chain. Supply chain management spans all movements and storage of raw materials, work-in-process inventory, and finished goods from the point of origin to the point of consumption.

The aim of logistics is to deliver finished goods and various materials in the right amount at the right time and at the lowest total cost. Complex logistics processes distribute vast quantities of materials

from industrialized countries and products through distribution channels to consumer logistics. The organization provides time and place utility. This utility is an important aspect of the company's operations, and the main ones are: (1) Order processing, including very powerful information about the flow of the logistics system and the number of operations. (2) Inventory management: how to organize the stockpiling of goods that will be produced, sent, and sold. (3) Freight transportation has a significant influence on the economic sector because cargo transportation usually involves very large distances between one place and another (Tarigan et al., 2021).

The maritime toll program was initiated because of the significant price disparity between Western and Eastern Indonesia. Many areas in Eastern Indonesia remain underdeveloped, necessitating the improvement of transportation infrastructure. The main transportation for distributing goods is based on Regulation Number 71, Year 2015, from already developed or advanced areas. The GDP of Eastern Indonesia was 18.6% compared to 81.4% in the Western Region of Indonesia. The Maritime Toll concept is effective for maritime connectivity, with ships sailing regularly and on schedule from west to east (Saputra et al., 2018).

The sub-criteria with the highest priority is price disparity because it is one of the goals of the sea toll program. Price disparities occur due to accumulation costs incurred in distributing goods from the origin to the destination, including the cost of goods, shipping costs, and distribution costs. So far, goods have been sent by sea, where there are limitations on return cargo because the cost of the ship returning to the harbor of origin is charged to consumers. Indicators of the success of the sea toll program include reduced price disparities in underdeveloped, remote, outermost, and border areas. The government consistently monitors price disparities in areas through which the sea toll vessels pass. The sea toll program has successfully reduced price disparities in eastern Indonesia by approximately 20–25% (Panjaitan, 2017).

The sea toll road refers to infrastructure in the form of ports and sea transportation. Unlike land toll roads, all waters that are not too shallow are passable by ships. Therefore, the sea toll road consists of specific sea transportation routes with certain ports that operate regularly. The key to the sea toll road is connectivity through sea routes. Therefore, the construction of a sea toll road from west to east, east to west, and connecting islands can reduce transportation costs, thereby lowering logistics costs. Job and business opportunities will open up, productivity and competitiveness are predicted to increase, and logistics costs will decrease, thus lowering the prices of goods. Goods will become increasingly cheaper so that the burden on people in Eastern Indonesia can be reduced, and ease of distribution of goods and logistics can be provided, logistics costs can be reduced, and high prices can be suppressed (Kusuma & Tseng, 2019).

2.1 Connection Connectivity Cruise Pioneer with Sea Toll

Pioneer shipping connectivity is key to enhancing and developing regional economies, as it is linked to various infrastructures. The implementation of pioneer shipping must be more efficient and innovative, with the hope that it will be more efficient. will increase productivity and push financing transportation services to the sea, making it an efficient, innovative, and sustainable pioneer. The Sea Toll Road can provide a solution so that pioneer ship services are not interrupted even if the ship serving the route is undergoing maintenance or docking at a port. If the ship Pioneers enters docking, services to the public often experience obstacles due to the unavailability of replacement ships (Ratnawati, 2019).

2.2 Connection System Distribution Logistics with Success Sea Toll

Distribution and logistics are two different but closely related concepts. Both play vital roles in the business world. Both manufacturing and industry contribute significantly to this. Businesses selling goods and services require both logistics and distribution. Distribution and logistics are inseparable from the management of a company. Distribution is defined as the channels producers use to deliver their

goods and services to consumers. Hence, we know the term distributor, which is used to fulfill this role (Giannakis et al., 2019).

Logistics, however, has a different meaning. This term can be interpreted as controlling the flow of materials, finished goods, and information related to a business. Logistics is related to distribution. Logistics involves planning and controlling the flow of materials and goods from the factory or producer to the consumer. The distribution of goods via sea toll vessels must be transparent using the " No Service, No Pay " policy. In the future, all costs charged for shipping goods through the Sea Toll program will be known from the shipper's warehouse to consumers in remote areas so that the selling price of goods transported will be subsidized by public service obligations. can be determined and easily controlled to improve connectivity and program implementation of maritime toll roads and increase economic equality in underdeveloped, outermost, and underdeveloped regions (Fahmiasari & Parikesit, 2017). High logistics costs, particularly in maritime transportation, appear to be a serious problem for this nation, especially given its geographical location as an archipelagic country. Optimizing sea transportation has become an appropriate choice with the existence of toll seas and improvements in connectivity. Overall, the government hopes that the national logistics system will improve and logistics costs will be reduced. reduced significantly (Ristovska et al., 2017).

The Sea Toll program is expected to accelerate integration between port areas and industrial and economic zones, economic growth areas, and economic clusters to support the flow of goods and logistics at the ports. The Sea Toll program is also a solution for overcoming the gap between Indonesia West and Indonesia East. This program develops new industrial areas or economic zones around major ports and collection ports to ensure balance in freight transport. Based on the explanation above, the researcher compiled a constellation of exogenous variables in this study, namely, the number of fleets, tariff determination, logistics distribution systems, and types of commodities as variables of sea toll service, especially pioneer transportation, which can influence price disparity as an endogenous variable to achieve the success of sea toll (Fahmiasari & Parikesit, 2017; Kusuma & Tseng, 2019; Ratnawati, 2019).

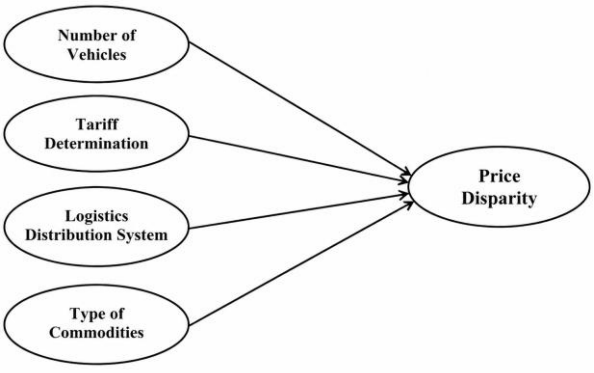

Figure 2. Research Framework

Information:

- X_1 : Amount of Fleet
- X_2 : Tariff Determination
- X_3 : Logistics Distribution System
- X_4 : Commodity Types
- Y : Price Disparity

Based on Figure 2, the study consists of four independent variables, namely the amount of fleet (X_1), tariff determination (X_2), logistics distribution system (X_3), and commodity types (X_4), which are assumed to influence the dependent variable, namely price disparity (Y). These variables are used to analyze the effect of sea transportation and logistics distribution performance on reducing price disparities in Indonesia through the Sea Toll Program.

2.3 Hypothesis Development

Based on the literature reviewed above, the following hypotheses are proposed:

- H_1: The number of fleets influences price disparities.
- H_2: Allegedly, there is an influence between the determination of the tariff and the disparity price.
- H_3: Allegedly there is influence between system distribution logistics to disparity.
- H_4: It is suspected that there is an influence between commodity types on price disparities.
- H_5: Allegedly, there is an influence on the fleet in a way, determination tariff, system distribution logistics, and types of commodities together with price disparities.

3. Methodology

In this study, the data used were primary data obtained from in-depth interviews with experts and practitioners who have an understanding of the issues discussed. A questionnaire was then compiled and completed in a second meeting with the respondents. In general, this study aims to clarify the variables that can influence the success of the Sea Toll Road project. Specifically, this study aims to identify and analyze the identified and formulated problems.

The research method used in this study was a survey with a descriptive level of explanation. The analysis technique used was quantitative data analysis supported by qualitative data. The characteristics to be tested in this study are pioneer shipping connectivity and logistics distribution systems, which are suspected to have a positive and significant influence on the success of the maritime toll road. The sample in this study consisted of users of sea toll shipping services, including sea toll operators, goods owners (freight forwarding), loading and unloading companies, and sea shipping expedition companies (EMKL) on sea toll shipping, which have homogeneity (Hermawan, 2008; Ramaditya et al., 2022).

4. Results and Discussion

The results of hypothesis testing and discussion of the hypothesis test were statistically tested using the SmartPLS 3.0 software application, while respondent characteristic tests and descriptive statistical analysis of data were conducted using SPSS version 28. The AVE square root value for each construct was greater than its correlation value with a very small difference value, even almost the same as the correlation, so that the constructs in this research model could still be said to have quite good discriminant validity. The research model produced composite reliability values above 0.70 for all constructs. With these values, all constructs had good reliability according to the minimum required limits. The Cronbach's Alpha value for the variable constructs of Commodity Type, Fleet Size, and Logistics Distribution System were above 0.70, while the Cronbach's Alpha values for the variable constructs of Price Disparity and Tariff Determination were below 0.70 but close to 0.70, so they were rounded up to 0.70. With these resulting values, all constructs have quite good reliability and can be said to be reliable.

Commodity Type, Fleet Number, Tariff Determination, and Logistics Distribution System on Price Disparity have VIF values of less than 10 and are still in the interval range of 2–4, so in the research model, it can be stated that there is no multicollinearity. Commodity Type, Fleet Number, Tariff

Determination, and Logistics Distribution System can explain the variability of the Price Disparity construct by 76%, and the remaining 24% is explained by other constructs outside the model in this study. Based on the f-square value above, the effect size that can be categorized as having a large influence is the Number of Fleets on Price Disparity with a strong category above 0.35, while the weak effect size category is found in the Logistics Distribution System with a value below 0.02. The Tariff Determination value was 0.208, and the Commodity Type was 0.097, which are still categorized as strong because they have values above 0.02.

From the calculation results based on the equation above, the goodness of fit (GoF) value in this research model is 0.6586. Overall, this research model has a combined performance higher than the 0–1 scale, which is divided into small GoF = 0.1, medium GoF = 0.25, and large GoF = 0.38. With these calculation values, it can be concluded that the model or performance of the relationship between the outer and inner models is fit and valid. The value of Q^2 predictive relevance of 0.422 shows that $Q^2 > 0$, indicating that the observed values have been well reconstructed, and thus the model has predictive relevance.

4.1 Testing Hypothesis

Hypothesis testing can be conducted after obtaining the results of testing the inner model (structural model) and outer model (measurement model), which include the output. R-squared, goodness of fit, convergent validity, discriminant validity, and composite reliability. To determine whether a hypothesis can be accepted or rejected, among other things, by considering the significance value between constructs, t-statistics, and p-values. Hypothesis testing was conducted using SmartPLS (Partial Least Squares) 3.0 software. These values can be observed from the bootstrapping results. The rule of thumb used in this study is a t-statistic >1.96, with a significance level of p-value of 0.05 (5%) and a positive beta coefficient. The results of this research model are depicted in Figure 3.

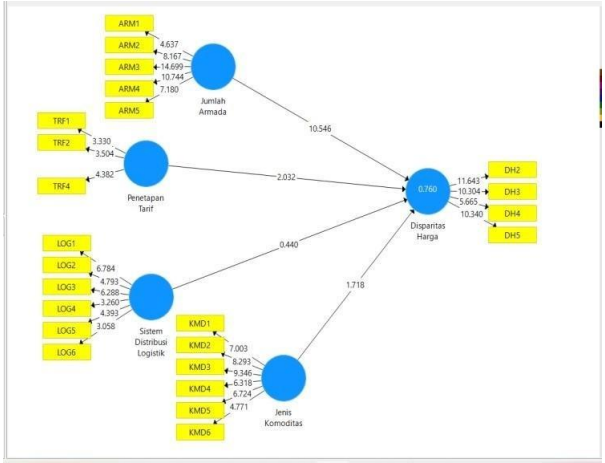

Figure 3. Results of Research Model

Based on Figure 3, the factors influencing price disparity are analyzed through multiple variables. The model shows that the "Number of Vehicles" (Jumlah Armada) and "Tariff Determination" (Penetapan Tarif) have significant impacts on the disparity. The "Logistics Distribution System" (Sistem Distribusi Logistik) and "Type of Commodities" (Jenis Komoditas) also contribute, but to a lesser degree. The path coefficients indicate that the Number of Vehicles (with a coefficient of 10.546) and Tariff Determination (with a coefficient of 2.032) have the most significant direct effects on the Price Disparity (with a total value of 0.760). Other factors like Logistics Distribution System and Type of Commodities have relatively

smaller influences. The results suggest that optimizing the number of vehicles and improving tariff setting are key to reducing price disparity, while logistics and commodity management also play supporting roles.

The rule of thumb for forming a research hypothesis is as follows: (1) if the coefficient or direction of the relationship between variables (indicated by the original sample value) is in line with the hypothesis, and (2) if the value of the t statistic is more than 1.64 (two-tiled) or 1.96 (one-tiled) and the probability value (p-value) is less than 0.05 or 5%. Calculation for the significance test: The first hypothesis tests whether the Commodity Type significantly influences Price Disparity. The test results show that the relationship between Commodity Type and Price Disparity is insignificant, with a p-value of 0.092 and a t-statistic of 1.686 (> 1.96). The original sample estimate value is negative, namely -0.305, which shows that the direction of the relationship between Commodity Type and Price disparity is negative or inversely proportional. Therefore, hypothesis (H_1) in this study, which states that commodity type has a significant effect on price disparity, is rejected.

The second hypothesis tests whether the number of fleets has a significant effect. on Price Disparity. The test results show that the relationship between the Number of Fleets and Price Disparity is significant, with a p-value of 0.000 and a t-statistic of 9.931 (> 1.96). The original sample estimate is positive at 0.906, indicating that the direction of the relationship between the Number of Fleets and Price Disparity is positive or unidirectional. Thus, the (H_2) hypothesis in this study, which states that the Number of Fleets has a significant effect on Price Disparity, is accepted.

The third hypothesis tests whether Tariff Determination has a significant effect on Price Disparity. The test results indicate that the relationship between Tariff Determination with Price Disparity is significant, with a p-value of 0.048 and a t-statistic value of 1.986 (> 1.96). The original sample estimate is positive at 0.320, indicating a positive or unidirectional relationship between Tariff Determination and Price Disparity. Therefore, hypothesis (H_2) in this study, which states that Tariff Determination has a significant effect on Price Disparity, is accepted.

The fourth hypothesis tests whether the Logistics Distribution System has a significant effect on Price Disparity. The test results indicate that the relationship between the Logistics Distribution System and Price Disparity is insignificant, with a p-value of 0.670 and a t-statistic of 0.427 (> 1.96). The original sample estimate value is negative, namely -0.067, which shows that the direction of the relationship between the Logistics Distribution System with Price disparity is negative or inversely proportional. Therefore, hypothesis (H_1) in this study, which states that the logistics distribution system has a significant effect on price disparity, is rejected original sample estimate value, it is obtained that the variable with the highest value that influences Price Disparity is the Number of Fleets, which is 0.960. This shows that the Number of Fleets has a higher influence on Price Disparity than the other three variables, namely, Tariff Determination, Logistics Distribution System, and Commodity Type. The variable with the least dominant influence on Price Disparity is Commodity Type, with the smallest original sample estimate of -0.067, as shown in Table 4 below:

Table 4. Summary of Hypothesis Testing Results

Hypothesis	Results	Information	Decision
(H_1)	Commodity Type has a significant influence on Price Disparity	$\beta = -0.305$ T-Statistics = 1.686 P-value = 0.092	Rejected
(H_2)	Fleet Size has a significant influence on Price Disparity	$\beta = 0.960$ T-Statistics = 9.931 P-value = 0.000	Accepted
(H_3)	Tariff Determination has a significant influence on Price Disparity	$\beta = 0.320$ T-Statistics = 1.986 P-value = 0.048	Accepted
(H_4)	Logistics Distribution System has a significant influence on Price Disparity	$\beta = -0.067$ T-Statistics = 0.427 P-value = 0.670	Rejected

Source: Primary Data Processed (2021)

Based on Table 4, the results of hypothesis testing show that Fleet Size (H_2) and Tariff Determination (H_3) have a significant effect on Price Disparity, with P-values of 0.000 and 0.048 respectively, therefore both hypotheses are accepted. Fleet Size has the strongest influence with a beta coefficient of 0.960, indicating that the availability of fleets greatly affects price disparities in the Sea Toll Program. Meanwhile, Commodity Type (H_1) and Logistics Distribution System (H_4) do not have a significant effect on Price Disparity because their P-values are greater than 0.05, namely 0.092 and 0.670, therefore both hypotheses are rejected. These findings indicate that Fleet Size and Tariff Determination are the main factors influencing price disparities in Indonesia's Sea Toll Program.

4.2 Type Commodity to Disparity

The type of commodity is a factor that is expected to dominate in making the government program a success in the maritime toll road and can minimize the high price disparity so that all resources, both natural and human, between islands and between regions can maximize their value. production and added value to improve the economy. The first hypothesis was tested, namely, whether commodity type significantly influences price disparity. The test results show that the relationship between commodity type and price disparity is insignificant, with a p-value of 0.092 and a t-statistic of 1.686 (> 1.96). The original sample estimate value is negative, namely -0.305, which shows that the direction of the relationship between Commodity Type and The price disparity is negative or inversely proportional. This means that if there is an increase in the variety or type of commodities in the sea toll program, the price disparity will decrease. Therefore, (H_1) hypothesis in this study, which states that commodity type has a significant effect on price disparity, is rejected. This may be due to the fact that the commodities transported via toll sea are still few in number and have not yet reached optimization. It is hoped that we still have to dig or explore the wealth of our natural resources found in several islands in Indonesia, especially eastern Indonesia, so that it can provide maximum contribution to the community's Per Capita Income and National Income in aggregate, and price disparities can be reduced, so that the prices of goods and services between islands do not have significant price differences.

4.3 Amount Fleet against Disparity Price

The availability of a fleet of transportation vehicles directly involved in the success of the maritime toll road program is expected to contribute significantly to its success in the future. can maximize its primary function of transporting various commodities throughout the country, thereby reducing or resolving price disparities between islands and regions. The second hypothesis was tested, namely, whether the number of fleets significantly influences price disparities. The test results showed that the relationship between

the Number of Fleets and Price Disparity was significant, with a p-value of 0.000 and a t-statistic of 9.931 (> 1.96). The original sample estimate value is positive, namely 0.906, which shows that the direction of the relationship between the Number of Fleets and Price Disparity is positive or in one direction. This means that if the availability of fleets in sea toll transportation increases, the price disparity will be further reduced, or the sea toll program will be more successful. Therefore, Hypothesis (H_2) in this study, which states that the number of fleets has a significant effect on price disparity, is accepted.

4.4 Determination Rates against Price Disparity

It is hoped that the government will not set sea toll tariffs and will consider them feasible for sea toll users. It is hoped that this will increase the number of sea toll users and support the success of this sea toll program, which is reflected in the reduction in price disparities, and income distribution between islands can be effectively achieved through this. The third hypothesis test examines whether tariff-setting has a significant effect on price disparities. The test results indicate that the relationship between Tariff Determination with Price Disparity is significant, with a p-value of 0.048 and a t-statistic value of 1.986 (> 1.96). The original sample estimate value is positive, namely 0.320, which shows that the direction relationship between Determination Tariffs with Disparity Price is positive or unidirectional. This means that increasingly affordable or feasible sea toll tariffs will increase the success of the sea toll road, as reflected in a decreasing or narrowing price disparity. Therefore, hypothesis (H_2) in this study, which states that tariff setting has a significant effect on price disparity, is accepted.

4.5 System Distribution Logistics against Disparity Price

The fourth hypothesis test examines whether the Logistics Distribution System significantly influences Price Disparity. The test results indicate that the relationship between the Logistics Distribution System and Price Disparity is insignificant, with a p-value of 0.670 and a t-statistic of 0.427 (> 1.96). The original sample estimate value is negative, namely -0.067, which shows that the direction of the relationship between the Logistics Distribution System with Price disparity is negative or inversely proportional. This means that the better the logistics distribution system, both technologically and operationally, within the maritime toll program, the faster the program will achieve success, as reflected in the decreasing price disparity between islands and regions. Overall testing can be seen based on the original sample estimate value, it was found that the variable with the highest value that influences Price Disparity is the Number of Fleets variable, which is 0.960. This indicates that the Number of Fleets has a greater influence on Price Disparity. higher than the other three variables, namely determination rates, System Logistics and Distribution Type Commodities. The variable with the least dominant influence on the Price Disparity is The type of commodity, with the smallest original sample estimate of -0.067.

5. Conclusions

This study concludes that Fleet Size and Tariff Determination have a positive and significant effect on Price Disparity in the Sea Toll Program, indicating that increasing the number of fleets and determining appropriate tariffs can reduce price disparities between regions in Indonesia. Meanwhile, Commodity Type and Logistics Distribution System do not have a significant effect on Price Disparity, although both variables show a negative relationship, meaning that better commodity variation and logistics systems tend to reduce price disparities. The f-square test shows that Fleet Size is the variable with the greatest influence on Price Disparity. In addition, the Goodness of Fit (GoF) and Q^2 tests indicate that the research model is fit, valid, and has good predictive relevance. The determination test result shows that the variables in this study explain 76% of the variability in Price Disparity, while the remaining 24% is influenced by other variables outside the research model.

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Author Contributions

PCS was responsible for the conceptualization of the study and interpretation of the research data. YP was responsible for data collection, field observations, and analysis of cargo handling processes in airline operations. TMS contributed to the literature review, research methodology design, manuscript preparation, participated in reviewing and finalizing the manuscript.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this study. This research was conducted independently, and no financial or personal relationships influenced the results or interpretation of the findings.

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