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Cluster Analysis Of Marine Toll Service Area To Minimize Price Disparity To Inprove The Economy Of The East Indonesian Region In The Era Of The Covid-19 Pandemic

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ABSTRACT

High price disparity is an economic problem that causes the welfare level of the population to be low. The government through the Sea Highway program tries to reduce price disparities through subsidized and scheduled sea transportation to serve several ports in Indonesia, one of which is in the province of Riau Islands. The Strait of Lampa Port is one of the marine transportation nodes which is a stopover point for Sea Toll boats on the T-3 route serving Natuna Regency. This port has the status of a regional feeder port with the hinterland area of Natuna Regency with Ranai as the district capital. This study aims to provide input related to the clustering of the Marine Highway program in Natuna from several perspectives, namely from the potential of regional commodities and infrastructure for Sea Toll services in the Natuna region. The analysis method used is descriptive qualitative and comparative. The results showed that for the cluster of the western region of Indonesian waters, in this case represented by a sample of the T-3 Natuna Islands Sea Toll route service, in terms of supply and demand from the homebase of Tanjung Priok Port, it is sufficiently balanced even though there are several superior commodities in the Natuna archipelago that have not yet optimally distributed, due to the low development and increase in added value of commodities. Based on the sample Sea Toll service route that has been selected for the Western Region of Indonesia, namely the T-3 route for the Natuna Islands region, several criteria that need to be considered in the future regarding the Sea Toll service cluster include regional commodities, Port infrastructure facilities and infrastructure, hinterland transportation facilities and infrastructure, and ship type and capacity..

KEYWORDS

Clustering, Pandemic, Price, Sea Highway, Sea Toll

INTRODUCTION

The largest Indonesian territory is water and dominated by seven archipelagic provinces which have many small islands. This fact makes sea transportation a mode that plays an important role in its economic development and growth. This shows that the need for sea transportation is very important and requires more nodes, commercial and non-commercial (pioneer) shipping routes between cities/districts with effective and efficient operational performance and wide enough coverage in order to realize connectivity between cities/districts.

The implementation of the sea toll road in Indonesia is in line with the vision and mission of the Government Program, namely realizing national security that is able to maintain territorial sovereignty. Currently, the Sea Toll Road service cluster is expected to be under the needs of commodities and commodities produced by the

region. Domestic sea transportation is one of the mainstays of logistics transportation to various regions in Indonesia in large numbers. Logistic distribution is still a big problem that must be resolved, regional characteristics are also one of the problems that must be resolved so that the distribution of staple goods and essential goods can be fulfilled properly.

The existence of high price disparities in Eastern Indonesia (KTI) has made sea transportation the backbone of logistical movement activities in KTI. The GDP comparison between Eastern Indonesia (KTI) and Western Indonesia (KBI) is 18.6% versus 81.4%, which shows that economic equality is still unequal between KTI and KBI. With the very significant disparity in the price of goods, plus the per capita income of the people in KTI is much smaller than the KBI, so the purchasing power of the people in KTI is very weak.

In this study, an analysis [2];[3];[4] of global cluster criteria was carried out based on the performance data of the Sea Toll Road services for all routes, then specifically the T-3 route for the Natuna Islands will be further investigated and comparisons will be made later with other routes in the analysis of the productivity of Sea Toll services.

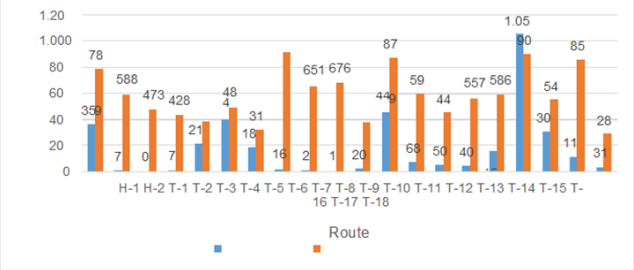

Figure 1. Productivity of Sea Highway Operations on 20 routes from January to November 2020

The purpose of this study is to analyze whether the criteria for the sea toll service cluster are in accordance with the needs of the region. Whereas the output of this research is the compilation of policy recommendations for the criteria for the Sea Highway toll service cluster. While the outcome of this research is that it is expected that there will be an increase in the regional economy served by the Sea Highway in accordance with the cluster of transportation service needs.

Legality

Legality aspects related to this research include Law Number 17 of 2008 concerning Shipping, Government Regulation Number 61 of 2009 concerning Ports, Government Regulation Number 20 of 2010 concerning Transportation in Waters, Decree of the Minister of Transportation Number KM.33 of 2001 concerning the Implementation and Business of Sea Transportation , Decree of the Minister of Transportation Number KM.54 of 2002 concerning the Operation of Sea Ports, as well as Decree of the Minister of Transportation Number KM.53 of 2002 concerning National Port Arrangements.

Policy

[10] policies can be divided into public policies and private policies. Public policy is collective action manifested through legitimate government authority to encourage, inhibit, prohibit or regulate private actions (individuals or private institutions). Private policy is an action taken by a private person or institution and is not coercive towards other people or institutions.

Sea Toll Ship

Sea Toll Ship is a ship used for maritime logistics transportation which aims to connect major ports in the archipelago in an effort to create smooth distribution of goods to remote areas. The aim is to mobilize people and goods, so that it is hoped that cheaper transportation prices, cheaper logistics costs, and eventually prices will fall.

Manajemen Operasional

Operational management (production and operations) is the management of resources / production factors in the process of transformation into various products or services [7];[8];[9]

Distribution Theory

Distribution is the process of moving goods from the place of production to various places or areas that are in need. [5] defines that

distribution will include planning, implementing and monitoring the flow of materials by obtaining the final product from the place of production at a profit.

Concept of The Sea Toll Program

The concept of the Sea Toll Program is an effective marine connectivity in the form of ships that sail regularly and on a scheduled basis from west to east of Indonesia. The Sea Toll Program aims to connect ports in Eastern Indonesia, which are areas that require the consumption of staple goods and other essential goods which are primary needs.

Forecasting

Forecasting is a prediction or estimation of the level of events that are uncertain in the future [6]. Forecasting plays an important role in several parts of the company including scheduling available resources, providing additional resources, and determining the desired resources. [1]

METHODS

The method used to answer or discuss research variables uses a survey, exploratory and comparative descriptive approach. This study uses a comparative and qualitative descriptive analysis method, namely comparing the prices of basic goods and other important goods between the port of origin and the port of destination and its hinterland area and calculating the consumption needs of the community at the port of destination and seeing potential commodities as return cargo and infrastructure from the port in the survey area, namely Natuna and Ternate. In addition, by using the moving average method, forecasting is carried out for the projection of the cargo of the Sea Highway services in the Natuna archipelago.

Data Collection

In table 1, you can see information on the ship name, port of call, number of port of call, route length, day of voyage, and capacity of all sea highway routes. These routes include routes H-1, H-2, T-1, T-2, T-3, T-4, T-5, T-6, T-7, T-8, T-9, T- 10, T-11, T-12, T-13, T-14, T-15, T-16, T-17, T-18.

In the productivity of Routes Based on Return / Departure Payloads, the regional clusters are divided into 5 criteria, namely very good, good, sufficient, poor, and very poor. This criterion (return load ratio: departure) is used to indicate balance. Regional routes that fall into the very good criteria include routes T-10, T-16, T-3, T-5, T-4, and T15. For regional routes that fall into the good criteria include routes T-14 and H-1. For routes that fall into the criteria, it is sufficient to include T-9, T-13, T-18, T-12, T-11, and T-17. For regional routes that are included in poor criteria, include routes H-2, T-2, and T-6. And the routes that need more attention from the government because they fall into the very poor criteria, namely the T-1, T-8, and T-7 routes.

The route's productivity based on payload are divided into 5 criteria, namely very good, good, sufficient, poor, and very poor. This criterion (the ratio of the arriving cargo to the ship's capacity) is related to the productivity of the ship. Regional routes that fall into the very good criteria include routes T-16 and T15. Regional routes that fall into the good criteria include routes T-3, T-5, H-1, and T-4. For routes that fall into the criteria, it is sufficient to include T-17, T-12, T-11, T-14, and T-10. For regional routes that fall short, the criteria include T-2, H-2, T-6, T-18, T-13, and T-9 routes. And the routes that need more attention from the government because they fall into the very poor criteria, namely the T-1, T-8, and T-7 routes.

Judging from 2 categories, namely the route cluster route based on return / departing cargo and route cluster based on payload, the T-1, T-8, and T-7 routes fall into these two categories and need special attention. For the research area, T-3 has entered the very good criteria for return / departure and is included in the good criteria for return / payload. Globally or in general, the results of this study do not reflect what is actually and is obtained such as on the T3 route.

Table 1. Logistics Sea Toll Routes, 2020 to 17 November 2020

Traject Code	Ship Name	Port of Call	Number of Port of Call	Rout Length (Sea Mile)	Day of Voyag e	Capacit y (TEUS)
H-1	KM. Lognus 1	Tanjung Perak - Makassar (Soekarno Hatta) - Tahuna - Tanjung Perak	3	2275	15	105
H-2	KM. Kendhaga Nusantara 3	Tanjung Perak - Makassar (Soekarno Hatta) - Bobong (Taliabu) - Luwuk - Tanjung Perak	4	2149	15	60
T-1	KM. Kendhaga Nusantara 12	Tanjung Priok - Lhokseumawe - Malahayati - Sabang - Tapak Tuan - Tanjung Priok	5	2237	17	60
T-2	KM. Kendhaga Nusantara 12	Tanjung Priok - Enggano - Mentawai (Sikakap) - Sinabang - Teluk Bayur - Sinabang - Gn. Sitoli - Mentawai (Sikakap) - Enggano - Tanjung Priok	6	2512	23	60
T-3	KM. Logistik Nusantara 4	Tanjung Priok - Jemaja/Letung - Tarempa - Midai - Selatlampa - Serasan - Tanjung Priok	6	1544	16	105
T-4	KM. Kendhaga Nusantara 6	Makassar (Soekarno Hatta) - Polewali (Tanjung Silopo) - Belang-Belang - Nunukan/Sebatik - Makassar (Soekarno Hatta)	5	1440	11	60
T-5	KM. Kendhaga Nusantara 1	Bitung - Tahuna - Tagulandang / Ulu Siau – Lirung / Melangoane - Miangas - Marore - Tahuna - Bitung	6	785	12	60
T-6	KM. Kendhaga Nusantara 13	Bitung - Luwuk - Pagimana - Bunta - Mantangisi - Ampana - Parigi/Tinombo - Tilamuta - Bitung	8	899	14	60
T-7	KM. Kendhaga Nusantara 4	Makasar (Soekarno Hatta) - Selayar - Jampea - Sikeli - Raha - Ereke (Sakkar Ereke) - Makassar (Soekarno Hatta)	6	883	12	60
T-8	KM. Kendhaga Nusantara 15	Makasar (Soekarno Hatta) - Bungku - Kolonodale - Makasar (Soekarno Hatta)	4	1125	10	60
T-9	KM. Kendhaga Nusantara 9	Tanjung Perak - Oransbari - Wasior - Nabire - Serui - Waren - Teba (Soasio/Gato) - Tanjung Perak	8	4186	25	60
T-10	KM. Logistik Nusantara 6	Tanjung Perak - Tidore (Soasio) - Morotai – Galela - Buli - Maba - Weda - Tanjung Perak	7	2940	20	300
T-11	KM. Kendhaga Nusantara 8	Tanjung Perak - Fak Fak - Kaimana - Timika (Pomako) - Agats - Elat - Tanjung Perak	6	3278	20	60
T-12	KM. Kendhaga Nusantara 5	Tanjung Perak - Kalabahi - Kisar - Moa - Larat - Tepa - Tanjung Perak	6	2452	18	60
T-13	KM. Kendhaga Nusantara 11	Tanjung Perak - Rote (Ndao) - Sabu (Biu) - Tanjung Perak	3	1421	11	60
T-14	KM. Kendhaga Nusantara 7	Tanjung Perak - Lembata (Lewoleba) - Tabilota/ Larantuka - Tanjung Perak	3	1332	11	60
T-15	KM. Logistik Nusantara 3	Tanjung Perak - Makassar (Soekarno Hatta) - Jailolo - Morotai (Daruba) - Tanjung Perak	4	2607	17	105
T-16	KM. Kendaga Nusantara 10	Tanjung Perak - Wanci - Namrole (Leksula) – Namlea - P.Obi - Tanjung Perak	5	2218	16	60
T-17	KM. Curug Mas	Tanjung Perak - Saumlaki - Dobo - Tanjung Perak	3	2677	16	175
T-18	KM. Logistik Nusantara 2	Tanjung Perak - Badas - Bima - Merauke (Kelapa Lima) - Bima - Tanjung Perak	4	3519	22	105

The T-3 Sea Toll Route in the Natuna region in 2020 also experienced a route change from the previous year to Tanjung Priok - Jemaja / Letung - Tarempa - Midai - Selat Lampa - Serasan - Tanjung Priok. The route covers a shipping distance of 1544 nautical miles with an estimated 16 sailing days. The role of KM. Kendhaga Nusantara 10 which serves the Sea Highway in the Natuna region in 2019 was replaced by KM. Logistik Nusantara 4 in 2020. Recapitulation of cargo departing and returning the Sea Highway at Natuna in 2020 can be seen in Table 2.

Table 2. Recapitulation of Cargo Departing and Returning Sea Toll Road in 2020

	Depart	Arrive	
Month	**TEU**	**TEU**	***Voyage***
February	41	13	2
March	30	11	1
April	49	29	2
May	31	16	2
June	21	11	1
July	39	14	2
August	36	23	2
September	39	26	2
October	60	34	2
November	33	32	1
Total	**379**	**209**	**17**

Based on Table 2, it can be seen that the distribution of cargo departing and returning on the Sea Highway activities in the Natuna region. The number of voyages that took place throughout 2020 was 17 voyages with an average distribution of 2 voyages per month.

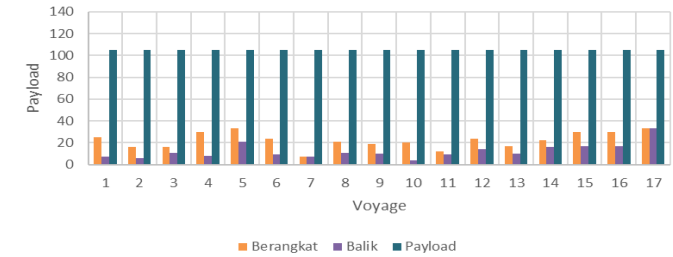

Figure 2. Graph of Voyage Realization and Sea T-3 Cargo in 2020

Information :
Total Voyage: 13
Max payload: 1,365
Total Departure: 379
Total Turns: 210

It can be seen in Figure 2 that it can be used as a reference for analyzing the performance of the Sea Highway in 2020. It can be seen that the actual graph on T-3 to voyage 14 where the cargo departs is 379 TEU while the return cargo is 210 TEU. The percentage of return cargo when compared to the total cargo carried by the ship is poor than 50%. And it can be seen in the graph that if you take into account that not all of the containers transported are full and there are empty containers (MT containers) so that the number (percentage) will change but not too far. This is because both the departure and return loading of MT containers will always be there. In general, when compared to the transport capacity of KM Logistik Nusantara 4 (105 TEU), the percentage of containers unloaded / unloaded at the Selat Lampa Port for 17 voyages is also not too high with an unloaded calculation of 27.76% while those loaded back are smaller, namely amounted to 15.38%.

RESULTS AND DISCUSSION

Numerical Results

Based on data from the recapitulation of cargo departing and returning in Natuna in 2020, which is distributed through the loading and unloading process at the Selat Lampa Port, a simple projection is made using the Single Moving Average method 2 months. The results of the simple projections carried out can be seen in the Table 3.

Based on the table 3, it can be seen that the projection results for the departure and return cargo activities of the Sea Toll in the Natuna region for 2021. The projection results start from April because the projection uses the Single Moving Average method 2 months.

Table 3. Projection of Cargo Departing and Returning the Sea Toll Road in 2021

	Existing Conditions 2020			Projection 2021	
	Depart	Return		Depart	Return
Month	TEU	TEU	*Voyage*	TEU	TEU
Februari	41	13	2		
Maret	30	11	1		
April	49	29	2	35.0	12.0
Mei	31	16	2	39.0	20.0
Juni	21	11	1	40.0	22.0
Juli	39	14	2	26.0	13.0
Agustus	36	23	2	30.0	12.0
September	39	26	2	37.0	18.0
Oktober	60	34	2	37.0	24.0
November	33	32	1	49.0	30.0
Total	**379**	**209**	**17**	**293**	**151**

Graphical Results

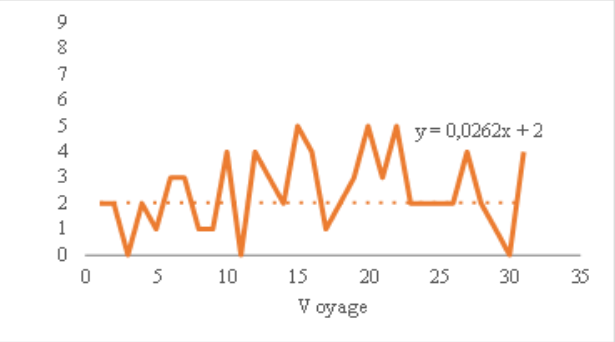

Figure 3. Graph of Reefer Container Contents, Return

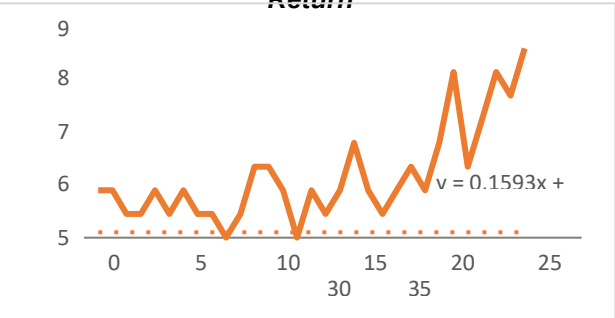

Figure 4. Graph of Reefer Container Contents, Return

It can be seen from the forecast results in Figure 3 and Figure 4 that the trend of increased percentage increases by 2.6% for reefer container and by 15.9% for a dry container. On reefer containers, the contents of the return tend to increase although not too high and despite the slowdown in early 2020.

For dry containers, it is better to experience an increase seen from the trend. Based on fluctuations and projections of the amount of loading and unloading cargo that occurs in Lampa strait port has an increasing trend where despite the pandemic season in 2020, small areas such as the Natuna Islands are not very affected and affect the pandemic season and also business or employment remains high.

Proposed Improvements

Several criteria need to be considered in the future about the cluster of Sea Toll services, among others:

1. Regional commodities

The loading and unloading process at each sea toll service port, especially related to the region's leading commodities, needs to be well documented and can be integrated with the relevant Local Government Organization. Every region that gets Sea Toll services needs to consider what commodities are needed by the community and what superior products can be offered to meet the ship's cargo target of course with the support of stakeholders in the working area such as Port Operators and The Government.

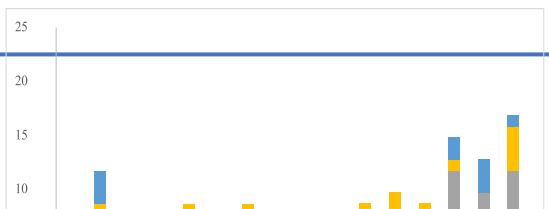

Figure 5. Total Return Load From Lampa Strait to Tanjung Priok, 2020

2. Port Infrastructure Facilities and Infrastructure Containers are added up to 7-10 containers for optimization of the storage and loading and unloading process. The number of workers has not been optimal, the absence of cranes to support the process of container transfer, dwelling time is still lacking, and requires means for cold storage loads.
3. Hinterland Transportation Facilities and Infrastructure
   To support the facilities and infrastructure of hinterland transportation in the Natuna Islands, The Sea Toll in its loading and unloading activities will have a greater impact if supported by the spread of cargo with small ships and people's shipping vessels that can reach the deepest areas to improve sea transportation services to areas that have not been served by pioneer ship transportation.
4. Ship type and capacity

Table 4. Route Comparison

	T-3	***T-5***
Ship Capacity/Payload	***105***	***60***
Total Voyage	*13*	*18*
Max Load	*1.365*	*1.080*
Total Departure	*379*	*317*
Total Return	*210*	*183*
Departure Load Factor	*27,77%*	*29,35%*
Return Load Factor	*15,38%*	*16,94%*
Return Load : Departure	*55,41%*	*57,73%*

Increasing ships with large capacity will be more and more to reduce logistics costs that have a positive impact on the decrease in the price of basic goods and reduced-price disparity, especially in the Natuna Islands.

Conclusion

According to the result of this study, there was a change in the route on the T-3 route from the pendulum in 2016- 2017 to round the world starting from 2018 to the period 2020 and the latest route has reduced the screen days compared to 2016-2017 and is quite good at balancing between supply and balance of commodities in the Natuna archipelago. The implementation of the Sea Highway policy has had a positive impact in the form of lowering prices in Natuna Regency for goods such as LPG, cement, mineral water, and others. Based on the forecast on table 3, and the analysis shown in figure 1 and 2, in terms of implementation, the Sea Highway on the T-3 route is considered good because it is able to reach remote areas, but the route network determination is still not optimal which has an impact on the delivery time to the destination port. The Sea Toll Road still has a less than optimal impact on price disparities in general in Natuna Regency due to constraints on shipping conditions that take a long time, and limited land transportation. This is because there are traders who regularly use Sea Toll boats at lower costs, so the selling price to the public is also lower.

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