Chapter 3

Impact of the Maritime Highway on Public Welfare and Regional Economic Activities

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Chapter 3

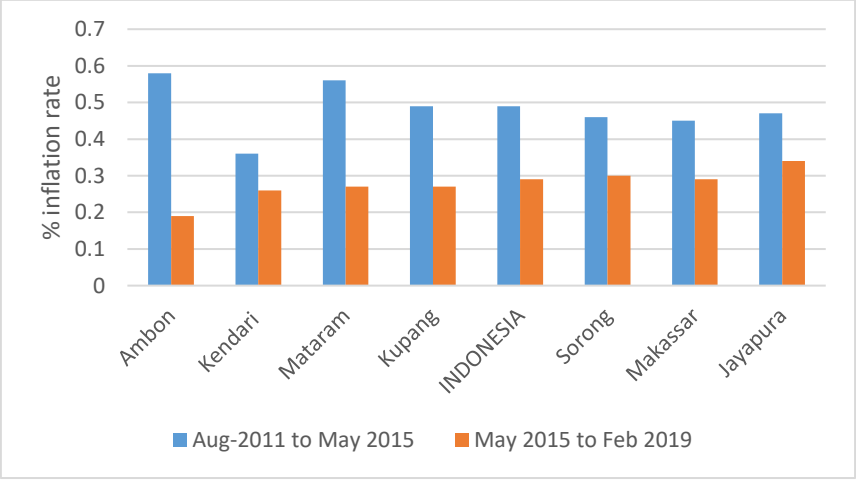
Impact of the Maritime Highway on Public Welfare and Regional Economic Activities

In evaluating the implementation of the Maritime Highway policy, the focus of the analysis in this study covers two main issues. First, identifying the impact of the existence of the Maritime Highway programme on the welfare level of people living in eastern Indonesia by using the indicators of price and household consumption levels. Second, identifying improvements in connectivity between western and eastern Indonesia that will support the acceleration of economic growth in eastern Indonesia after the programme is fully operational. Specifically, this study discusses the issue of price disparities between regions by focusing on the problem of connectivity between areas around ports supporting the Maritime Highway programme and hinterland areas. This will lead to the analysis of regional economic activities influenced by the program.

3.1 Price Disparity Changes

Since the Maritime Highway programme became operational in 2015, developments in the monthly inflation rate in several large cities in eastern Indonesia have shown a declining trend. Average monthly inflation in several cities such as Ambon, Kendari, Kupang, and Mataram is even lower than the national average. Figure 3.1 shows a comparison of the average monthly inflation values in selected cities before and after implementation of the Maritime Highway programme. Nevertheless, the monthly inflation that has declined cannot immediately be concluded as resulting from the existence of the Maritime Highway programme.

Figure 3.1. Inflation Rates of Selected Cities in Eastern Indonesia (before and after Maritime Highway Implementation)

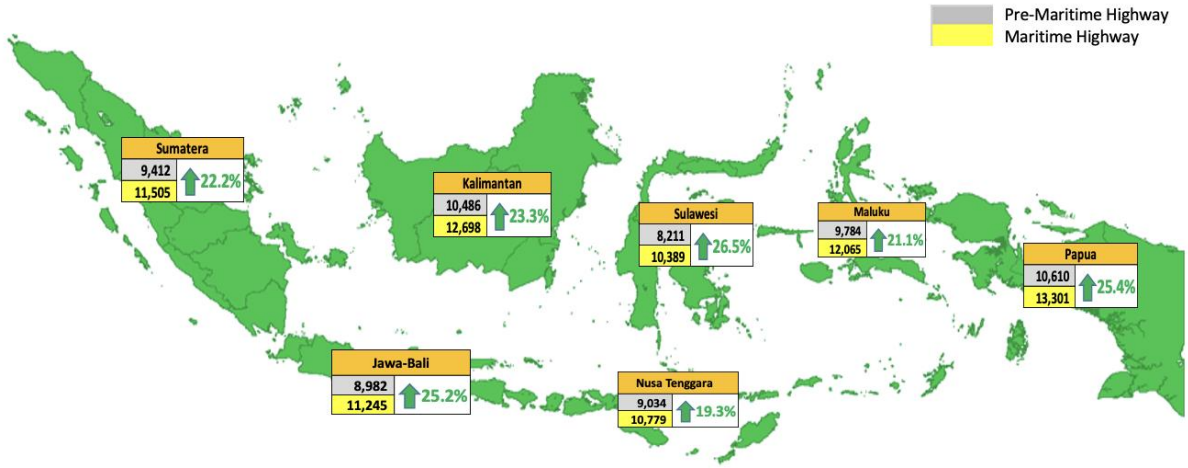


Note: Maritime Highway Program is launched in May 2015.
Source: Adapted from Central Bureau of Statistics (BPS) data (2019).

The study then analyses the development of selected commodity prices (rice and cement) as an alternative approach in obtaining indications of the impact of the Maritime Highway programme on price disparities in eastern Indonesia. Figures 3.2 and 3.3 show the comparison of the average monthly prices of rice and cement between islands before and after the implementation of the programme.

Figure 3.2 shows that when the Maritime Highway programme started operations, there was no decline in the average monthly price of rice, both in western and eastern Indonesia. Conversely, there was an increase in the average monthly price of rice throughout the country. The average monthly price of rice in the Western Indonesia Region rose by 22%, while it only rose by 19.6% in the Eastern Indonesia Region. In other words, there is a possibility that the Maritime Highway programme will contribute to curbing the effect of rising rice prices in the west and improving price disparities in the Eastern Indonesia Region.

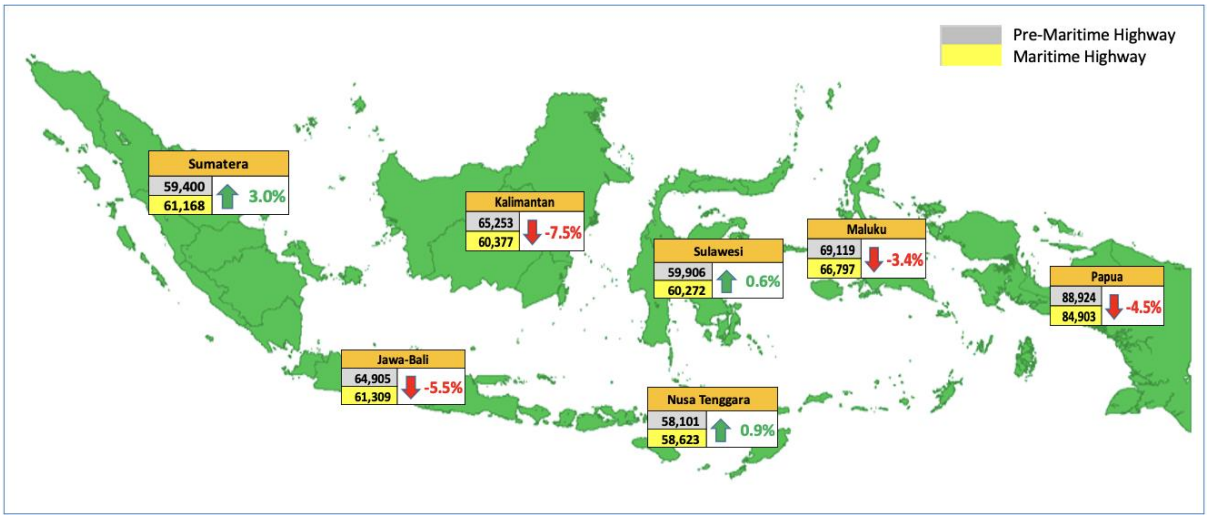
Figure 3.2. Average Increases in Rice Prices Before and After Implementation of the Maritime Highway Programme



Source: Adapted from BPS data (2019).

Figure 3.3 shows that when the Maritime Highway programme became operational, the average monthly price of cement in the Maluku and Papua regions decreased significantly, by 3.4% and 4.5%, respectively. However, it should also be noted that at the same time, the average monthly price of cement in the Java region as the centre of the cement industry in Indonesia also dropped significantly by 5.5%. The Maritime Highway programme might contribute to the decline in commodity price disparities in eastern Indonesia, but the factor of reduced cement prices in the Java region cannot be ignored.

Figure 3.3. Average Monthly Prices of Cement Before and After Implementation of the Maritime Highway Programme



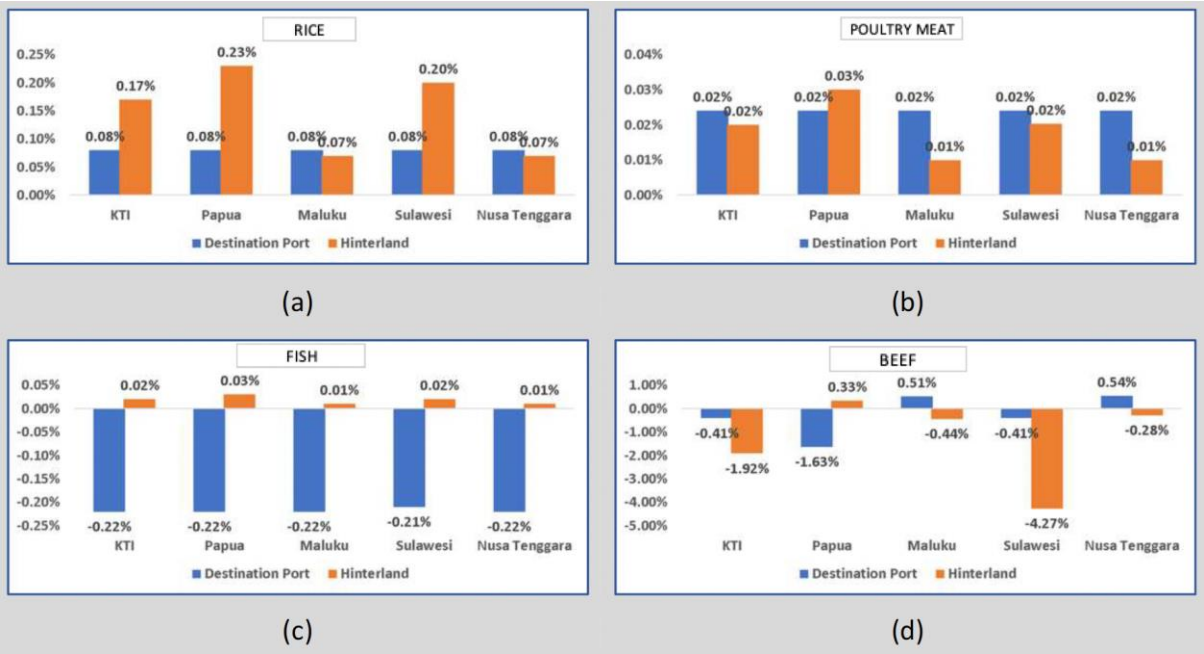
Source: Adapted from BPS data (2019).

3.2 Spillover Effect of the Maritime Highway Programme and Price Disparities in Eastern Indonesia

To obtain the results of a more in-depth analysis of the impact of the existence of the Maritime Highway programme on changes in price disparities in the Eastern Indonesia Region, this study examines and compares the price developments of some staple commodities transported using maritime highway vessels, for distribution in port and hinterland areas. The prices of basic commodities are also compared, for example rice, fresh fish, chicken, and beef.[5] Furthermore, the price data of the four commodities are used as a database in economic modelling, which is compiled to estimate the impact of the existence of the Maritime Highway programme on price disparities by region in eastern Indonesia. A comparison of estimated results between regions according to commodity types is presented in graphical form consisting of four panels (Figure 3.4), which implicitly shows how the Maritime Highway programme has influenced the price disparities between the port areas and the hinterland areas in the Eastern Indonesia Region.

[5] The commodities of rice, fresh fish, chicken, and beef were selected as samples based on the findings of focus group discussions with shipping operators who are maritime highway operators in the Eastern Indonesia Region in Sorong and Makassar.

Figure 3.4. The Maritime Highway Impact on Commodity Price Disparities



KTI = Kawasan Timur Indonesia [Eastern Indonesia Region].
Source: Calculations based on the data from BPS (2019).

There is no significant statistical evidence showing that the level of rice prices in eastern Indonesia is at a relative decline following the implementation of the Maritime Highway. Conversely, the level of rice prices has increased in all regions. Also, the price level in the hinterland areas is almost always relatively higher compared to the price level in the port areas. The highest increase in rice prices for the hinterland areas occurred in the Papua region (0.2%), while the increase for the port areas was relatively the same in all regions at 0.1%.

There is no significant statistical evidence showing that the level of chicken meat prices in eastern Indonesia is at a relative decline after the implementation of the Maritime Highway. However, the price level of chicken meat tends to be constant or experience minuscule changes in all regions, both in the port areas and in the hinterland areas, ranging from 0.01% to 0.03%.

There is significant statistical evidence showing that the level of fresh fish prices in eastern Indonesia is at a relative decline following the implementation of the Maritime Highway. However, the impact was only seen in the port areas, albeit with a slim margin of 0.2%. Meanwhile, the level of fresh fish prices in the hinterland tends to be constant or experience very small changes in all regions, ranging from 0.01% to 0.03%.

There is significant statistical evidence showing that the level of beef prices in eastern Indonesia, both in the port areas as well as the hinterland, is at a relative decline after the implementation of the Maritime Highway. In general, beef price levels fell by 0.41% in the port areas and 1.92% in the hinterland areas. At the regional level, the greatest decrease in beef prices for the port areas was in the Papua region (1.6%), while for the hinterland it was in the Sulawesi region (4.3%). Interestingly, beef prices in the interior hinterland in the Papua region rose slightly by 0.3%. Implicitly, this shows

that Sulawesi currently has relatively better connectivity between the ports and the hinterland than Papua.

Based on Figure 3.4, there are three conclusions that can be drawn. First, the Maritime Highway programme has had the effect of changing price disparities between port areas and the hinterland areas. Second, the change in price disparities in each port area and hinterland area is of a different magnitude for each type of staple commodity. Third, although there is sufficient statistical evidence to state that the Maritime Highway programme has had an impact on reducing price disparities in the Eastern Indonesia Region, the amount remains too small and has not yet had a significant impact in terms of economic value.

3.3 Changes in Household Consumption Levels

To analyse the impact of the existence of the Maritime Highway programme on increasing regional economic activity in eastern Indonesia, this study uses an economic model that utilises information on changes in night-time light intensity based on satellite data imaging published by NASA.[6] In recent years, data on night lights to help complete the analysis of the development of social and economic statistical indicators has been used quite frequently in various countries (Elvidge et al, 2012; Henderson, Storeygard, and Weil, 2012; Stathakis, Tselios, and Faraslis, 2015; Zhou, Hubacek, and Roberts, 2015; Roberts, 2018).

Assuming that all socio-economic activities carried out at night require light, the night-time light intensity in an area correlates to the development of higher economic development in the region. Therefore, when mapping night-time light intensity at the national level, a portrait of the imbalance of the development of economic activities between western and eastern Indonesia is evident.

As shown in Figure 1.1 the night-time imaging data in 2016 portrayed striking differences of intensity between western and eastern Indonesia. It implicitly indicates an imbalance in economic development between the two regions.

If the mapping of night-time light is focused on eastern Indonesia (as shown in Figure 3.5), the difference in economic development disparities within eastern Indonesia itself are evident. Panel (a) and Panel (b) in Figure 3.6 show the conditions of night-time light intensity in 2012 and 2016, respectively. There are indications that night-time economic activity increased after the Maritime Highway programme began operating in 2015. The increase in night-time light intensity was significant in the Sulawesi region. Meanwhile, the regions of Nusa Tenggara, Maluku, and Papua do not appear to exhibit significant differences in night-time light intensity compared to the previous 4 years. This has led to allegations that the Maritime Highway programme has not yet provided a sufficiently large impetus for increasing development activities in the Nusa Tenggara, Maluku, and Papua regions.

[6] Accessible through the following link: https://earthobservatory.nasa.gov/features/NightLights

Figure 3.5. Night-Time Light Intensity, Eastern Indonesia Region

(a) December 2012 (b) December 2016

Source: Adapted from NASA data.

Furthermore, based on night-time light intensity data, this study measures the impact of the implementation of the Maritime Highway programme on the improvement of economic disparity in eastern Indonesia with modelling in which the level of light intensity is a function of the distance of villages or districts *(kelurahan)* to the port area supporting the Maritime Highway. The results of estimates are presented briefly in Table 3.1, while more detailed estimates are provided in Appendix 5.

Table 3.1. Changes in Night-Time Light Intensity in the areas of participating ports as an Impact of Maritime Highway Programme Operations (2012–2017)

Dependent Variables: Night-Time Light Intensity	Average	Zoning for the Radius of Village/District Locations to Participating Ports					
		≤2 km	≤5 km	≤7 km	≤10 km	≤12 km	≤15 km
Maritime Highway Programme:							
Eastern Region	0.43%	0.06%	0.08%	0.08%	0.08%	–0.06%	–0.05%
Nusa Tenggara	0.45%	-	-	-	-	-	-
Sulawesi	0.51%	0.01%	0.08%	0.07%	0.07%	–0.05%	–0.093 %
Maluku	0.36%	-	-	-	-	-	-
Papua	0.37%	1.14%	1.18%	1.20%	1.19%	–0.03%	–0.07%

km = kilometre.
Notes: Number of observations according to radius zoning is insufficient for the regions of Nusa Tenggara and Maluku.
Source:Calculations by authors.

After the Maritime Highway programme started operating in 2015, there was a significant increase in night-time light intensity by an average of 0.43% in the districts/cities that are port areas supporting the Maritime Highway. If the impact of the programme is measured based on a certain distance radius, there is evidence that is statistically significant enough to state that the increase in night-time light intensity in the Eastern Indonesia Region has increased by 0.6% in a radius of less than 2 kilometres (km), by 0.08% within a 7-km radius, and 0.08% within a 10-km radius. After exceeding a 10-km radius from port areas, the night-time light intensity continued to decrease, rendering distance to port areas no longer significant.

There are two conclusions that can be drawn from Table 3.1. First, the decrease in night-time light intensity along with the increase in distance to port areas implicitly shows that the Maritime Highway programme has a relatively limited spatial impact. Second, the existence of the programme has driven more economic activity in port areas supporting the Maritime Highway than in the hinterland areas.

3.4 Connectivity and economic activities

The Maritime Highway moves forwards from the concept of subsidies in the economy that aims to improve public welfare. The beneficiaries in this context are citizens who live in remote island areas that are generally scattered across eastern Indonesia. Subsidies were increased between 2016 and 2018 from Rp219 billion to Rp335 billion, and then Rp448 billion, and then followed by a decrease in 2019 to Rp264 billion. On the other hand, the number of designated lines has grown rapidly, starting with 6 designated lines in 2016, 13 in 2017, 18 in 2018, and 20 in 2019. The development of designated lines and increased loads also has implications on the reduction in average subsidies per designated line from Rp36 billion in 2016 to Rp13 billion in 2019, alongside a decrease in average subsidies per tonne from Rp2.7 million to Rp1.1 million during the same period.

For future improvement, the determination of routes must be based on spatial demand rather than mere sectoral deliberations or regional input. The design for including subsidies inevitably needs to be rethought as well to ensure targeting accuracy to reduce price disparities between regions.

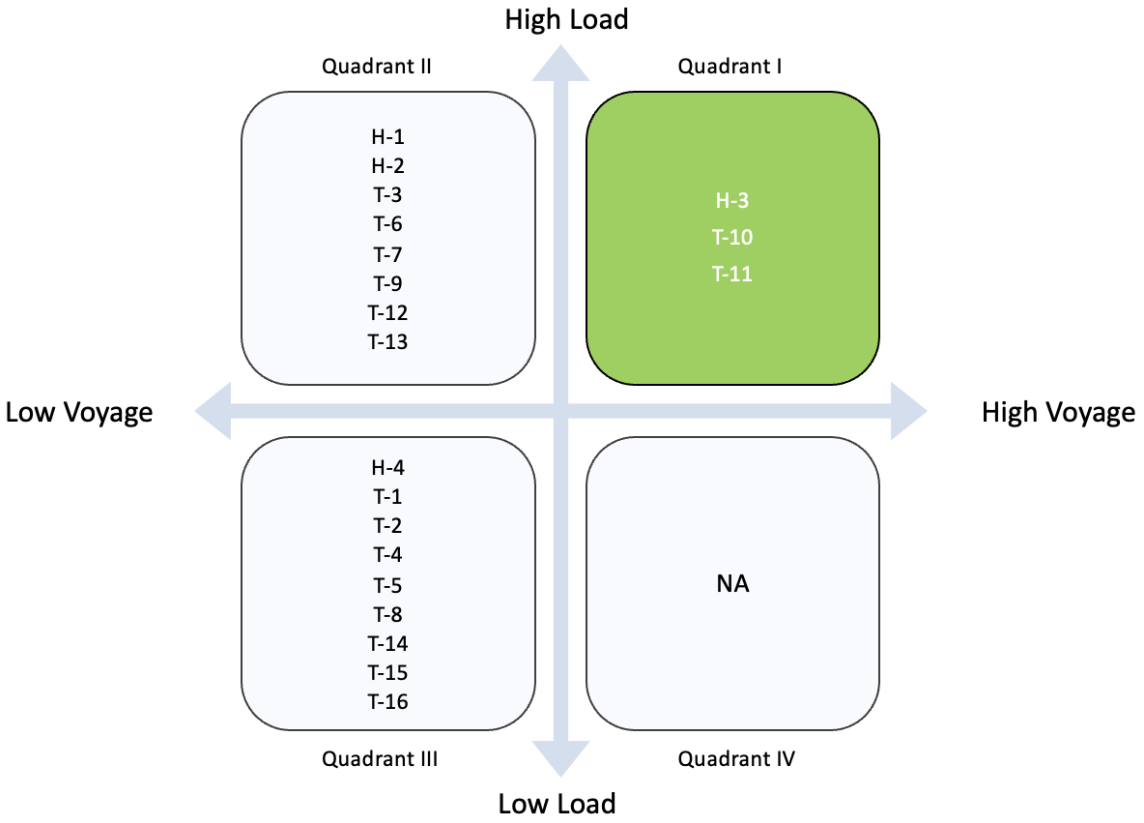
The disaggregation of the figures provides information on the proportion of subsidies per component. Subsidies for shipping activities that cover freight (berth to berth)/port to port are the smallest at 19%. Port activities such as lift on lift off container costs, costs of shipping to port, terminal handling costs, cargo loading and unloading costs (cargo hold to jetty), haulage costs, and lift on lift off container costs absorb 31% of the budget. The largest component is logistical support activities, namely transportation management services and the cost of shipping to the consignee, with a proportion of 50%.

The high logistics cost in hinterland areas shows the importance of multimodal support in the logistics chain. Moreover, based on our calculations (Figure 3.4) price reductions due to the Maritime Highway only occurred at a radius of 10 km from the logistics warehouse, known as *Rumah Kita*. There is an urgency for coordination between maritime transportation and better hinterland connectivity through the integration of the *Rumah Kita* support programme with the Ministry of Trade and regional governments.

A spatial cost analysis of the Maritime Highway provides an illustration of the unit cost of the Maritime Highway subsidies per designated line and Maritime Highway subsidies per designated line per

voyage. First, the Maritime Highway subsidy for each designated line considers load volume. The T-15 designated line serving the Tanjung Perak–Tidore–Morotai–Tanjung Perak route receives the largest subsidy at Rp264 billion or 50%. Second, the Maritime Highway subsidy per designated line per voyage considers the volume of the load and the frequency of services. The H-3 designated line serving Tanjung Perak–Tenau-Saumlaki–Dobo–Tanjung Perak receives the largest subsidy at Rp9.2 billion or 22.6%.

Figure 3.6. Evaluation Matrix of Maritime Highway Routes



Source: Authors' analysis.

A spatial cost analysis of the Maritime Highway becomes the basis for mapping the performance of Maritime Highway routes. There are two criteria for voyages and loads, 'High' with a target realisation of more than 50% and 'Low' with a target realisation of less or equal to 50%. In 2019, only three designated lines were in Quadrant I or performing well: H-3 (Tanjung Perak–Tenau-Saumlaki–Dobo), T-10 (Tidore–Morotai–Buli–Maba–Gebe–Tidore Island), and T-11 (Tanjung Perak–Fakfak–Kaimana–Timika–Agats–Boven Digoel–Tanjung Perak). All three lines have the potential to be developed by commercial shipping outside the subsidy mechanism. The routes in Quadrant II require further evaluation because the high shipping frequency is not followed by adequate loads. Meanwhile, routes in Quadrant III require fundamental justification if they are to be continued or the possibility of route rationalisation.

Mapping can also be conducted at ports that are navigable by the Maritime Highway routes. It is important to determine the strategic ports to be included in the Maritime Highway programme. One

way to define the strategic ports is by calculating the betweenness centrality, which is the frequency of the shortest call voyages between two ports across the questioned port. We found that the most important ports are Tanjung Perak, Makassar, Tenau, Kendari, and Morotai.

Other indicators of centrality are hub and authority centrality. Hub centrality shows the amount of connectivity between ports with high impact through port *i* (forwards linkage). Authority centrality refers to the extent to which port *i* is connected to a port with high impact (backwards linkage). Tanjung Perak and Waren both have high scores as hub and authority centrality.

The use of big data is also relevant in understanding the Maritime Highway discourse. Searching trends through Google's search engine show fluctuations in search interest over the last 5 years. This variation was caused by several events related to the Maritime Highway in the news. Spatial identification was also conducted.

In addition, the text analysis approach in the release of Maritime Highway news on the five most popular pages on the Google search engine site can be modelled with Bigram. Bigram was developed based on the conditional probability logic of two words. In this analysis, searches for the term 'Maritime Highway' in a news text were conducted. Maritime Highway often appeared with the following bigram terminology: Tanjung Perak (hub port), Ministry of Transportation (implementing authority), empty containers, price disparities (target), and sea transportation (connectivity).