

Potential cargo demand of Kuala Tanjung Port as international hub port in Western Indonesia

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Abstract. The Port of Kuala Tanjung will provide a logistical diversification opportunity in which the need for freight services for both export, import, and inter-island distribution through port will continue to increase. Seeing the magnitude of this potential, it is hoped that Kuala Tanjung Port can become an alternative International Hub Port in Western Indonesia that can provide added value for economic growth significantly. As a potential port to become an international Hub Port, Kuala Tanjung must have a large cargo demand, coming from its own hinterland as well as shifting from other nearby ports. The largest potential hinterland of Kuala Tanjung Port is in the form of oil palm and rubber plantations with derivative goods. Kuala Tanjung Port is predicted to accommodate 65% of total goods production in North Sumatra, both containerized and bulk liquid.

1 Introduction

Kuala Tanjung Port has the potential to become a hub of logistics for the Asia Pacific region (Coordinating Ministry for Economic Affairs, Republic of Indonesia). The development of the Port of Kuala Tanjung as the International Hub Port has been proclaimed by the government in the Blueprint of the National Logistics System (Sislognas) which is part of the Masterplan for the Acceleration of Economic Development and Expansion of Indonesia (MP3EI) and the Concept of Sea Tollway.

Kuala Tanjung Port will be developed as an Industrial Gateway Port that integrates a harbor with an industrial area of 3,000 Hectare and Sei Mangkei Special Economic Zone (SEZ). It has a natural depth location of -14 m LWS at a distance of 2.7 km from the coast with the waters around the port open directly to the Strait of Malacca. Kuala Tanjung Port is located on the east coast of North Sumatra Province. The location is strategic because it is on the busy path of world trade, the Strait of Malacca. In addition, the natural condition of the surrounding area is also considered the criteria as the International Hub Port, in addition to the growing industrial clusters around it [1-6].

The potential of hinterland of the Kuala Tanjung Port is enormous. Many large scale companies such as PT Indonesia Asahan Aluminum and PT Multimas Nabati Asahan and other industrial companies. The most dominant hinterland potential is the product of Palm

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Oil / CPO and its derivative goods, so that the Port of Kuala Tanjung can be an alternative port other than Belawan Port for the delivery of industrial products located in Batubara Regency and surrounding areas throughout Indonesia and export.

In addition, the existence of the Special Economic Zone (SEZ) Sei Mangkei in Simalungun Regency which has an area of 140 Ha and is 50 km from the Port of Kuala Tanjung will has opportunities for diversification in the field of logistics where the need of freight services for the distribution of goods through ports will continue to increase. Seeing the large potential of such demand, Kuala Tanjung Port is expected to be one of the International Hub Port in the Western Indonesia that can provide added value for economic growth significantly. This paper aims to analyze the potential of cargo (container and liquid bulk) at the Kuala Tanjung Port, so it can be predicted the capability of Kuala Tanjung Port as an alternative hub port in Indonesia.

2 Methodology

The analytical method used is descriptive analysis. Identification of hinterland area characteristics include geographical, socio-economic, PDRB, and commodity. The potential demand for sea transport generated by the hinterland area of Kuala Tanjung Port is analyzed using multiple regression. This analysis is based on the identification of potential sea transport demand in the hinterland area. To get the clarity of the potential used model time series of the last few years [7]. The general theoretical model is $P = f(X_1, X_2 \dots \dots)$, with X_1, X_2 is the potential variable of demand for hinterland. The regression analysis model can made modeling the relationship between two or more variables. The general relationship for multiple regression is as follows:

$$Y = A + B_1X_1 + B_2X_2 + \dots \dots \dots + B_mX_m \tag{1}$$

where:

- Y = the dependent variable, $X_1 \dots X_m$ = independent variable
- A = regression constant, $B_1 \dots B_m$ = regression coefficient

3 Result and discussion

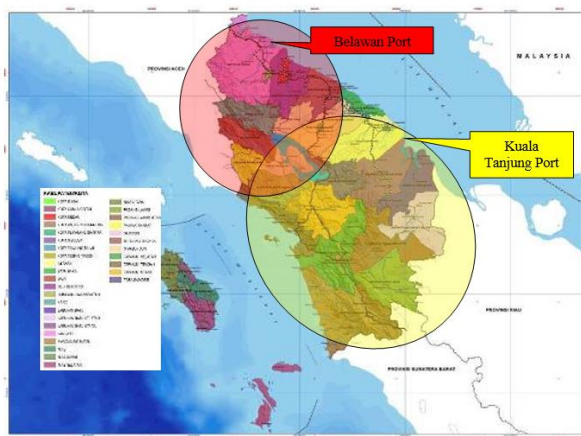


Fig 1. Hinterland of Kuala Tanjung Port

3.1 Hinterland area of Kuala Tanjung Port

The location of Kuala Tanjung Port which is quite close to the Belawan Port, hinterland area of Kuala Tanjung Port and Belawan Port will be intersected. The determination of hinterland boundary of Kuala Tanjung port is based on the accessibility level of land transportation to access the port. In addition, hinterland area is also based on the state preference (level of desire) of business people to make the Kuala Tanjung Port as a gateway activity distribution of goods that shows on Figure 1.

3.2 Formatting the title, authors and affiliations

3.2.1 Potential liquid bulk

The Bulk Liquid terminal is planned to have a production capacity of 3.5 million tons per year. Based on the result of the study before, considering the possibility of moving loading and unloading traffic from Belawan Port to Kuala Tanjung Port and based on the potential of the hinterland area of Kuala Tanjung Port and development of Sei Mangkei SEZ, the projected demand for liquid bulk as in the following table 1.

Table 1. Liquid bulk projection demand of multipurpose terminal in Kuala Tanjung Port

No	Commodity	2020	2021	2022	2023	2024	2025	2026	2027
1	Biodiesel Industry								
	FAME	500.000	500.000	500.000	500.000	500.000	500.000	500.000	500.000
	MES	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000
	B-Caroline								
	Glycerine	47.000	47.000	47.000	47.000	47.000	47.000	47.000	47.000
2	Oleokimia Industry								
	Fatty Alcohol	80.000	80.000	80.000	80.000	80.000	80.000	80.000	80.000
	Soap Noodle								
3	Refinery Industry								
	Cooking oil	500.000	500.000	500.000	500.000	500.000	500.000	500.000	500.000
	RBD Olain								
	RBD Slarina	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000
4	Palm Oil Industry								
	PKO	51.600	51.600	51.600	51.600	51.600	51.600	51.600	51.600
	PKM								
5	Other Oleochemical Product Derivatives								
	Fatty Ester	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000
	Emulsifier	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000
	Pharmaceutical								
6	CPO/PKO	1.219.742	1.181.679	1.153.325	1.011.990	926.102	1.209.533	1.195.663	1.515.293
	Total	2.698.342	2.680.279	2.431.925	2.490.590	2.404.702	2.688.130	2.674.263	2.993.820

Source : RIP Kuala Tanjung KP. 148/ 2016

3.2.2 Potential of container

The Based on the result of potential demand analysis, total demand for container in Multipurpose Terminal is the sum of the three components (geographic area, palm oil industry and rubber of SEZ Sei Mangkei) as presented in the following table.

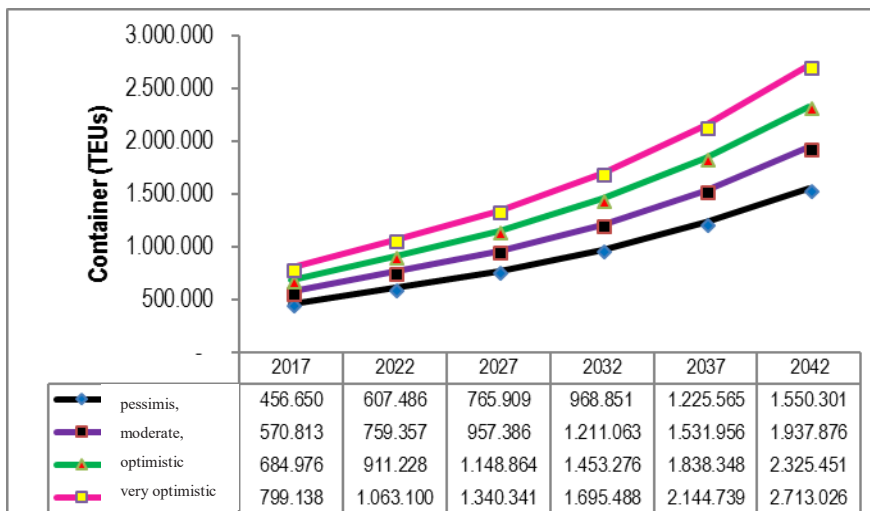


Fig . Container demand of Kuala Tanjung Multipurpose Terminal

3.2.2 Potential cargo in terminal hub-international

Demand analysis for Container Terminal (International Hub) is done through evaluation of RIP Pelabuhan Kuala Tanjung (KP 148/2016). This review is aimed at identifying differences in assumptions about the development of the Port of Kuala Tanjung. The result of this review is the determination of development assumptions and scenarios for the Port of Kuala Tanjung

a. Probability of shifting cargoes

Stakeholder perceptions analysis is conducted with the aim of obtaining preferences from users to move from origin port to Kuala Tanjung port. This preference is expressed in units of probability of displacement. For example, if a preference score of 0.5 can be concluded that 50% of users will move from the origin port to Kuala Tanjung Port.

Belawan Port and Tanjung Priok Port are made into 2 (two) harbors of comparison with reason (1) Belawan Port is an existing port operating in North Sumatra and (2) Tanjung Priok Port is a port in Indonesia that represents an international port.

Probability of shifting used for the Port of Kuala Tanjung is carried out using the Belawan Port Curve drawn from the Tanjung Priok Port curve. Figure 2 explains that if the Kuala Tanjung Port competes with Tanjung Priok Port, then to reach the equilibrium point, Kuala Tanjung Port must be able to operate with TRT for 14 hours. While, the real condition, Kuala Tanjung Port compete directly with the Belawan Port. Therefore, the 14 hour TRT value is then inputted as an input in the transition curve at Belawan Port. By entering the TRT input for 14 hours, we have a transition probability of 65%. That is, if the Kuala Tanjung Port operates with TRT for 14 hours it will occur a transition of 65% from Belawan Port to the Kuala Tanjung Port.

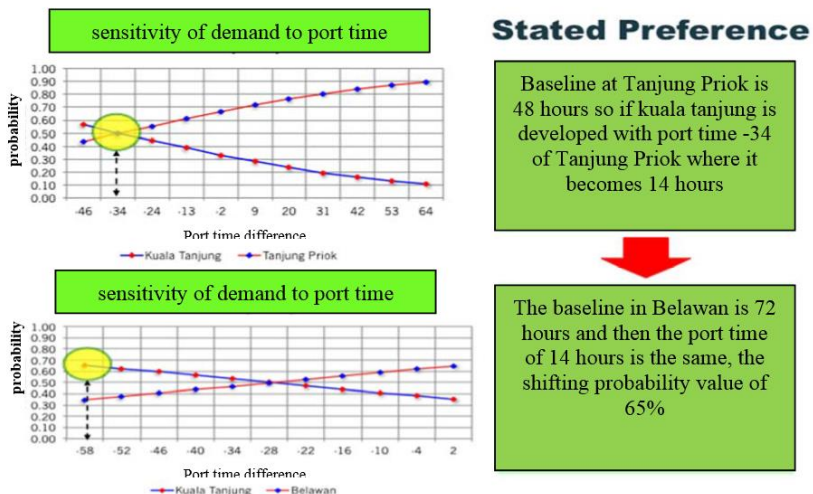


Fig 2. Probability of shifting to Kuala Tanjung Port

By assigning TRT plan of the Kuala Tanjung Port for 14 hours or in other words is 0.58 days, it is certain that Kuala Tanjung Port will be able to compete with other competitor ports such as Port of Singapore, Port of Tanjung Pelepas, Port Klang and Port of Penang for quite a long time. Because, as a comparison only, the dwelling time in Port of Singapore is 19 hours or equivalent to 0.8 days.

b. Demand based on hinterland geographic aspect

Based on geographical aspects of hinterland, Kuala Tanjung Port will be able to attract demand from several provinces, namely North Sumatra, West Sumatra, Riau, and Jambi. Demand projection is done by using multilinear regression model which variables are provincial PDRB, production of potential commodities such as palm, rubber and coffee. Here is an example of multilinear regression model development for several commodities in North Sumatra Province.

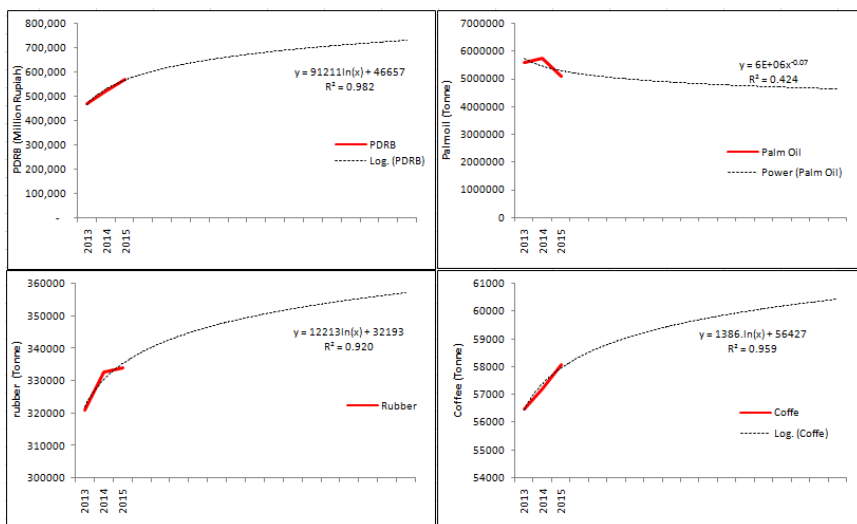


Fig. 3. Projection of demand hinterland determinant variables

Kemenhub study (2014), demand from North Sumatra is predicted to be captured by Container Terminal (International Hub) of Kuala Tanjung Port. However, taking into account the operation of Multipurpose Terminal then the prediction is modified on the basis that there will be a container demand that is shifted to the multipurpose terminal. Figure 3 shows the number of transitions that occur for each terminal.

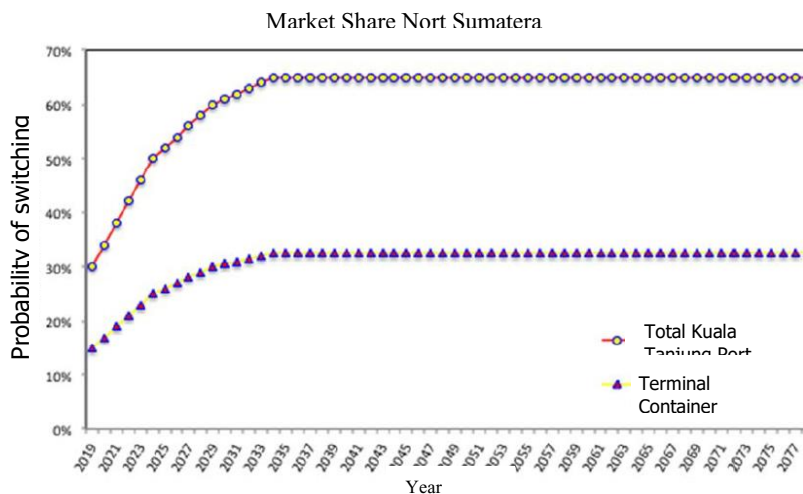


Fig. 4. Proportional shifting of North Sumatra demand to Kuala Tanjung Port

From Figure 4 can be seen that with the operation of multipurpose terminals, demand for containers will be divided between Multipurpose Terminal and Terminal Hub International. Based on preference, it is predicted that 65% of total production in North Sumatra will go to Kuala Tanjung Port and demand will be equally divided between the two terminal.

c. Demand of SEZ Sei Mangkei

Table 2. Projection of downstream production of oil palm industry SEZ Mangkei

No.	Palm Downstream Products	Projection of Downstream Industry Based Palm Products			Total	
		2018	2020	2025	Liquid	Solid
1	CPO	2.550.000	2.650.000	3.000.000	29.900.000	
2	CPKO	100.000	100.000	100.000	930.000	
3	Basic Oleochemistry					
	Fatty Acid	135.000	135.000	135.000		1.485.000
	Fatty Alcohol	90.000	90.000	90.000	810.000	
	Soap Noodle					440.000
	Glycerine	16500	16500	16500	148.500	
4	Oleochemical Derivatives:					
	Fatty Alcohol Amide	10.000	10.000	10.000	70.000	
	Methyl Ester Sulfonate	15.000	15.000	15.000	135.000	
	Fatty Alcohol Sulfonate				52.500	
	Fatty Ester				87.500	
5	Olefood					
	Cooking Oil	600.000	600.000	600.000	4.800.000	

	Margarine	10.000	10.000	10.000	70.000	
	Shortening	15.000	15.000	15.000	90.000	
6	Paper Industry Products	-	100.000	100.000		700.000
7	Wood Products Industry	-	-	300.000		1.500.000
8	Industrial Fertilizer Products	100.000	100.000	100.000		900.000
	Total	3.701.500	3.901.500	4.551.500	37.093.500	5.025.000

Table 3. Projection of downstream rubber industry of Sei Mangkei

No.	Rubber Downstream Products	Unit	Projection of Rubber-Based Downstream Industry Products		
			2018	2020	2025
1	Dry Rubber Products	Ton	1.100.000	1.400.000	2.000.000
2	Motorcycle Tire (Tire R-2)	Million /Unit	34	35	37
3	Car Tires (Tire R-4)	Million /Unit	20	24	30
4	Automotive Rubber Parts	Million /Unit		10	25
5	Green Tyres	Million /Unit		15	30
6	Rubber Thread	Ton	500	1.000	2.500
7	Retread Aircraft Tires	Million /Unit	1	1	3
8	Medical Devices	Million /Unit	5	10	30
9	Natural Rubber Based Resin	Ton	1.500	1.500	3.000
	Total	Million /Unit	60	95	155
		Ton	1.102.000	1.402.500	2.005.500

Based on Sei Mangkei's development plan data, Sei Mangkei will be able to produce containers equal to 68,364 TEUs in 2019 and increase up to equivalent to 453,595 TEUs in 2078.

d. Total demand of container (multipurpose and hub-international)

The projection of demand for Container Terminal of Kuala Tanjung Port is presented in Figure 4 for 5 years demand. Alternative projection is done with a pessimistic approach, moderate, optimistic and very optimistic.

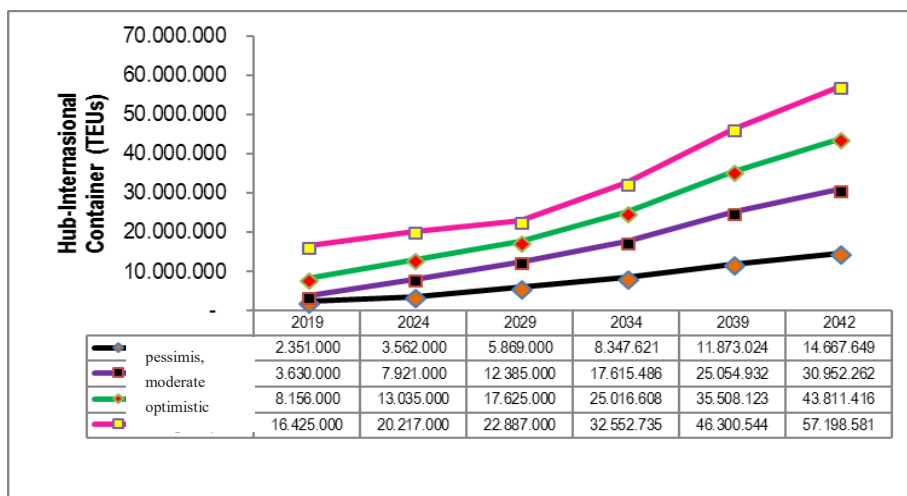


Fig. 4. Container demand projection (international hub)

Based on the results of analysis, prediction of Container Terminal (International Hub) based on a pessimistic approach will capture demand of 2.3 Million TEUs in 2019, and increase to 14.5 million TEUs in, 2042, Based on a moderate approach will be able to capture demand by 3.6 Million TEUs in 2019, and increase to 30.5 million TEUs in 2042. Based on the optimistic approach will capture demand by 8, 1 Million TEUs in 2019, and increased to 43.8 million TEUs in 2042. While based on a very optimistic approach will capture demand of 16.2 Jt TEUs early in 2019, and increased to 57.1 million TEUs in 2042. It is also known that over time the demand growth rate will decrease indicates that demand is starting to show saturation.

Table 4. Comparison of demand terminal multipurpose, demand hub-international, demand transshipment *)

Year	Demand Multipurpose	Demand Hub International	Demand Transshipment	Difference Demand Hub-International to Multipurpose Terminal	Percentage (%)		
					Demand Multipurpose to hub-internasional	Internasional Demand Transshipment to International Hub Terminal	Against Total Cargo in the Malacca Strait
2019	570,813	3,630,000	363,000	3,059,187	15.72%	10%	3%
2024	759,357	7,921,000	1,188,150	7,161,643	9.59%	15%	6%
2029	957,386	12,385,000	2,105,450	11,427,614	7.73%	17%	9%
2034	1,211,063	17,615,486	5,108,491	16,404,422	6.87%	29%	12%
2039	1,531,956	25,054,932	7,265,930	23,522,976	6.11%	29%	12%
2042	1,937,876	30,952,262	8,976,156	29,014,387	6.26%	29%	12%

Notes: *) Moderate alternatives

Source: Analysis result, 2016

4 Conclusion

The development of Kuala Tanjung Port is predicted to accommodate 65% of total goods production in North Sumatra, both containerized and bulk liquid. Predicted sea transport demand generated by Sei Mangkei SEZ and industrial area in hinterland of Kuala Tanjung Port as follows:

- a. Prediction of cargo in multipurpose terminal shows that liquid demand trend to fluctuate. In 2017 is predicted to reach 2.93 million tons and then decreased by 2020 only 2.69 million tonnes and then increased again in 2027 reached 2.99 million tonnes. While the predictions of container trend to increase recorded in 2017, the prediction of container reached 570,813 TEUs, 2020 to 672,234 TEUs, then increased in 2025 to 871,476 TEUs.
- b. Prediction of container in international hub port shows that SEZ Sei Mangkei region becomes the largest contributor to the production of palm oil industry in 2020 reached 3.90 million tons, increased in 2025 to 4.55 million tons. The production of rubber industry in 2020 reached 1.40 million tons and increased by 2025 to 2.05 million tons. While for 2020 container is estimated to reach 0.9 million TEUs, 2025 reaches 2.6 million TEUs, 2030 reaches 8.1 million TEUs and 2035 reaches 10.3 million TEUs.

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