

Container Sea Transportation Demand in Eastern Indonesia

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Abstract:- Potential demand of sea transport for containers will grow rapidly along with the development of the processing industry in the region development of an integrated economy and regional strategies, or Economic Corridor conceptual of Master Plan for Acceleration and Expansion of Indonesia Economic Development (MP3EI) in Eastern Indonesia. The changes in the function of the port into a multipurpose port serving conventional and container transport. The problem that arises is the pier and container handling facility requires adjustment, unless neither special container port Makassar and Bitung, nor the limited land development for land side facilities. Geometric conditions of the road connecting the port to the hinterland and have not planned for container services. Collector and feeder ports require adjustments to the revitalization of demand load wheels and multi-pack.

Keywords:- Economic Potential, containers cargo, Sea Transportation and ports development.

I. INTRODUCTION

Indonesia is an archipelago, consisting of 17,508 islands, 2/3 (two thirds) and a sea area of the main and Gropus island. Eastern Indonesia developed more than Weastern Indonesia. The position of Sulawesi Island likely has a strategic transport interaction and dominated the mainland. The Islands of Nusa Tenggara and Maluku Islands are dominated ocean region. Papua Island has a land and sea is balanced. Lowlands are in the Maluku Islands and Papua. The highlands are on the island of Sulawesi and Nusa Tenggara Islands. Balance between high and low plains is found in Papua.

Crime-infested to natural disasters such as earthquakes tectonic and volcanic eruptions, and forest areas in the top 30% are on the island of Papua and Maluku islands with high vulnerability conditions. Areas prone to natural disasters were found on the island of Sulawesi. Judging from the amount of land use, the dominant region woke up around 70% is on the island of Sulawesi. Various land use areas contained in Nusa Tenggara Islands. Potential mining of natural resources is on the island of Papua and Maluku.

A condition of Eastern Indonesia with broad potential existence is a great opportunity to boost national economic growth, especially in agriculture, plantations and mining. There are several ports in eastern Indonesia, which has the role and function as a logistics distribution center of goods nationally and has several other types of industrial products that have the potential to transport inter-island.

II. CONTAINERIZATION OF COMMODITIES

Within the framework of *Master Plan for Acceleration and Expansion of Indonesia Economic Development (MP3EI)*, especially in the Eastern Indonesia, the government gave special treatment to the development of distribution centers outside Java, especially to businesses that are willing to finance the construction of supporting facilities and infrastructure [1, 2]. The special treatment includes taxation and customs policies, labor regulations, and licensing agreements in accordance with the corporate world.

Table 1. The probability of Container Cargo Demand

No.	Economic Corridor MP3EI	Orientation Node Port Economics	Demand and Prime Mover of Economic									
			1	2	3	4	5	6	7	8	9	
1.	Sulawesi -North Sulawesi -West Sulawesi -Gorontalo	Kupang	-		-				√	-	-	-
		Pantoloan			-				-	-		-
	-Central Sulawesi -South Sulawesi -Southeast Sulawesi	Makassar			-				-	-	-	
2.	Nusa Tenggara -East Nusa Tenggara -West Nusa Tenggara	Kupang	-		√	-			-	-	-	-
3.	Maluku-Papua -North Maluku -Maluku -West Papua -Papua	Ambon	-		-	-			√	-	-	☼
		Sorong	-		-				√			-
		Jayapura (Merauke)			-				√		-	-

Description:

A. Food Ingredients

1. Agriculture / Horticulture
2. Fishery
3. Livestock

B. Industrial Products and Tourism

4. Industry
5. Center for Economic / Trade Commodities
6. Tourism

C. Mining Products

7. Copper
 8. Oil and Gas
 9. Nickel processing
- = Potentially transportable containers
= Transported via specific ports in Bulk form.



Figure 1 Indonesia Economic Corridor [1]

To avoid enclaves of the growth centers, central and local government to encourage and pursue the linkage as closely as possible to the economic development around the centers of economic growth, such as Special Economic Zones (SEZ) are expected to evolve in each economic corridor according to the potential of the territory. Probability of domestic container transport demand as outputs or outcomes with the Master Plan Acceleration and Expansion of Indonesia Economic Development (MP3EI) are shown in Table 2.

Table 2 Container Transport Infrastructure [3].

No.	Economic Corridor MP3EI	Orientation Node Port Economics	Container Transportation Infrastructure				Explanation
			Land	Sea (Port)	Air	Multy-Modal Transport	

1.	Sulawesi	1. Bitung		Container Terminal	Not yet apparently container Cargo	Constrained to Road Infrastructure Network to Hinterland particular on the class of road construction, and Geometry	-High potential - Road construction Constraint (especially the province of Central Sulawesi and Southeast Sulawesi) -Geometry & Capacity of Roads - Access to Hinterland backed Trans-Sulawesi			
	-North Sulawesi			General						
	-West Sulawesi	3. Makassar		Container Terminal						
	-Gorontalo									
	-Central Sulawesi									
	-South Sulawesi									
-Southeast Sulawesi										
2.	Nusa Tenggara	4. Kupang		General	Not yet apparently container Cargo	Constrained to Road Infrastructure Network to Hinterland particular on the class of road construction, and Geometry	-Midle potential - Fast Economic Growth -Trans to Hinterland, Limited of Road Construction			
	-East Nusa Tenggara									
	-West Nusa Tenggara									
3.	Maluku-Papua	5. Ambon		General				Not yet apparently container Cargo	Constrained to Road Infrastructure Network to Hinterland particular on the class of road construction, and Geometry	-Medium Prospects cargo movement of majority from Makassar, Tanjung Priuk, Tanjung Perak -Economic growth began to develop -Hinterland Transport has not backed road construction
	-North Maluku									
	-Maluku	6. Sorong		General						
	-West Papua									
-Papua	7. Jayapura (Merauke)		General							

Explanantion:

- = Limited from port to National Activity Center (NAC) such as Manado-Bitung, Pantoloan-Palu, Tenau-Kupang)
- = Access is limited Hinterland (Port to Port) has not been supported by road class (Construction, Geometry, and Right of Way)
- = Access hinterland includes NAC and Economic Regional Activity Center (ERAC) in EPI backed construction / road grade between provinces (isolated).

Characteristics and type of commodity goods that is **transported inter-island** between Eastern Part of Indonesia (EPI) with Western Part of Indonesia (WPI) i.e. commodity type of food, clothing, and buildings materials are as well as raw materials and other industrial products, to EPI in the main port on the island of Sulawesi, Nusa Tenggara, Maluku and Papua, such as Makassar, Ambon, Sorong and Jayapura, majority from Tanjung Perak Surabaya and Tanjung Priuk Jakarta.



Figure 2 Cargo Commodities of Containers

Table 3 The suitability of Commodity vs Container Transport

Commodity	Container Type				Explanation
	A	B	C	D	
Comestibles	√	-	-	√	The supplying of Sulawesi from Java
Clothing Materials	√	-	-	-	
Building Materials	√	√	√	-	
Industry Materials	√	√	√	-	

Explanation:

A : Tunnel type Container B : Open Top Steel Cont.
 C : Last Rack Container D : Reefer Container

1. Comestibles Commodity: Rice, corn, soybeans, beef/chicken, flour, egg, milk, fish products, sugar, etc.
2. Clothing Materials: Textile and textile products, etc.
3. Building materials: Cement, steel/concrete, building frame, etc.
4. Industry Material: Fertilizers, cooking oil, steel, motor vehicles, electrical and household appliances, pulp and paper, electric machinery, tires, finished materials / rattan, ceramics, furniture, etc.

III. CONTAINER TRANSPORT SYSTEM

Technological advances, economic development and transportation following the trade, otherwise development is influenced by trade and technology of transportation system. Transport role expand the coverage area of distribution of goods or services, supporting an efficient distribution of industrial input and allow for specialization patterns of production activities, thus creating a concentration of production activity in a certain place, and can eventually lead to “Economics of Scale” and “Agglomeration Economics”.[4,5]

Container transport system is a combination of various modes of transport are performed using containers, aims to facilitate the transfer and unloading of goods by simplifying loading and unloading system, so effective and efficient. Container transport system integration with other transport modes, allowing performed with a combined of road vehicles, aircraft, ships and trains [6,7].

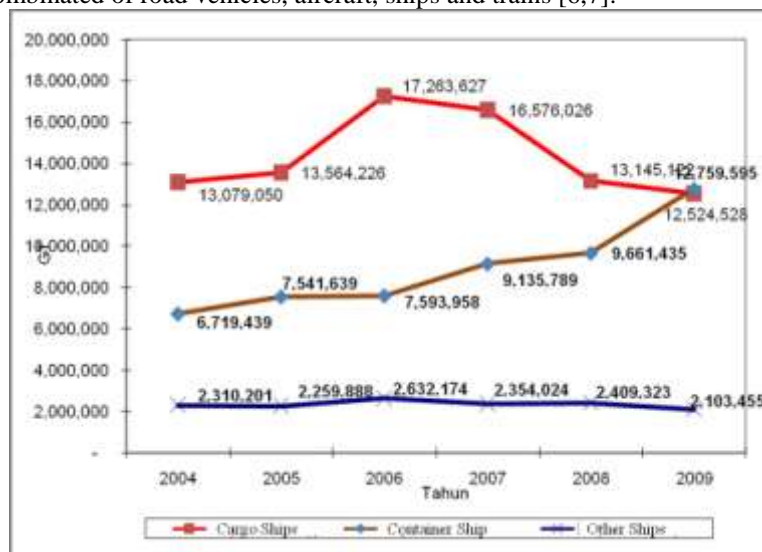


Figure 3 Gross Tonnage (GT) of Ship Call in EPI

Application of container transport in eastern Indonesia has spread to main ports and collectors such as Makassar, Bitung, Ambon, Ternate, Pantoloan, Kupang, Sorong, Manokwari Jayapura and Merauke. The development of container ship capacity has increased each year and in 2009 is higher than the cargo ship as in Figure 3. Cargo ships experiencing fluctuating growth when compared to the volume of 2004 and 2009 decreased. For other ships tended to decrease each year [8].

Number of call ships more goods than container ships, other hand, the volume of cargo container ships more. It looks at all ports, except the port of Kupang. This situation shows that the pattern of handling goods in Eastern Indonesia is more oriented toward the use of container ships. Highest frequency of ship visits in the Port of Makassar, which amounted to 68 ships per month or around 2-3 ships per day, followed by the port Pantoloan many as 23 ships per month, and the lowest is Ambon harbor as much as 6 ships per month as shown in figure 4.

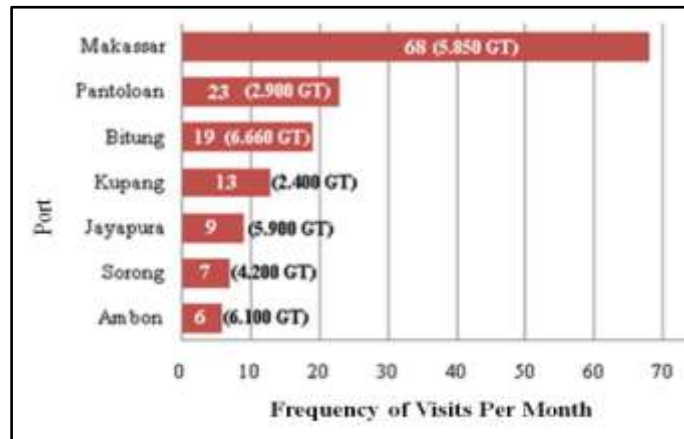


Figure 4 Frequency of Call Ship

Traffic Flow of Goods Transport

Handling of goods at the port of eastern Indonesia according to the packaging of goods, type General Cargo growth decreased on average -5.62% per year, as much container 17.22% per year and other cargo of 3.23% per year. Type of container goods experienced the highest growth occurred in 2000, which reached 39.39%, in 2005-2006 has decreased by -1.87%, as in Table 4.

Table 4 Flow of Goods According to the Packaging

No.	Year	Unit	Type of Goods			Total
			General Cargo	Container	Other Cargo	
1	2000	T/M3	6,985,323	3,764,379	61,897,316	72,647,018
2	2001	T/M3	5,642,101	4,751,878	80,619,697	90,729,547
3	2002	T/M3	5,357,972	6,279,013	76,768,580	87,662,643
4	2003	T/M3	4,857,266	7,801,355	66,845,092	85,503,713
5	2004	T/M3	4,615,050	8,757,690	65,046,982	79,446,773
6	2005	T/M3	3,937,855	9,514,280	70,196,611	83,648,746
7	2006	T/M3	3,087,970	9,336,737	61,328,170	73,180,575
8	2007	T/M3	2,515,668	10,390,043	61,121,668	74,599,681
9	2008	T/M3	2,316,024	11,814,624	73,478,796	87,609,444
10	2009	T/M3	1,220,170	14,014,331	83,448,894	98,683,395
11	2010	T/M3	1,159,160	16,396,380	85,952,470	103,508,010
12	2011*	T/M3	1,101,200	19,183,765	88,531,044	108,816,019
13	2012*	T/M3	1,046,143	22,445,004	91,186,775	114,677,922
growth (%/year)			(5.62)	17.22	3.23	3.27

Sources: Indonesia's Port IV, in 2011, (*), Prediction

Container cargo movement in Eastern Indonesia majority from the port of Tanjung Priok and Tanjung Perak Surabaya and from Makassar (both commodity surplus Sulawesi and transit goods from Java). Port receiver is generally the Port Tenau, Kupang, Bitung, Ambon, Sorong and Jayapura Papua and port to port system. Except for the circulation area of the container from the port of Bitung to Manado city is affordable) with the level of capacity and geometric/road construction is still very limited. Movement of container from Tanjung Priok, Tanjung Perak or from Makassar container yard just got each port such as Ambon, Sorong, Jayapura, Pantoloan, and Tenau. This case is caused to limited capacity, construction and road geometric. The pattern of movement of the container traffic density is as shown in Figure 5.



Figure 5 Domestic Container Volumes 2020, [IPC - Pelindo II]

For companies, commodities or goods transported and distributed will be graded on time, quality service, cheap, safe and secure, because the performance effectiveness and efficiency of the transportation system, especially in the port as shown in Figure 5 would give a powerful influence in the competitive commodity pricing for products in the country, both for domestic consumption and export. In addition, each obstacle in the implementation of transport will have an impact on the increased cost of transportation; therefore any attempt to create a transport system that is efficient and effective will also improve the economic business of transportation.

IV. TRANSPORTATION DEMAND OF CONTAINER

Demand for container in the port is different, especially the availability of goods and the number of requests in each of the port area and hinterland. To get the container demand model in each port, set the variable to be assessed by the Gross Regional Domestic Product (GRDP) as an independent variable (X) and the dependent variable (Y) is the volume of loading and unloading container. Some variables of GRDP are livestock farming, forestry and fisheries (X₁), mining and quarrying (X₂), industrial processing/manufacturing industries (X₃). X₄ is the electricity, gas and water supply, the X₅ is a construction, X₆ is trade, hotels and restaurants, transport and communication is the X₇, X₈ is the financial, real estate and business services, and X₉ are services, and X₁₀ is the number of population, basic model, that are;

$$Y = f(X_1, X_2, X_3, X_4, \dots, X_{10})$$

Explanation:

Y : Container

X₁: Agriculture, Livestock, Forestry and Fisheries

X₂: Mining and Quarrying

X₃: Industrial Processing / Manufacturing Industries

X₄: Electricity, Gas and Water Supply

X₅: Construction

X₆: Trade, Hotel and Restaurant

X₇: Transportation and Communication

X₈: Finance, Real Estate and Business Services

X₉: Services

X₁₀: Population

Container demand model shows that, population factors strongly affected the container trade. Agriculture, livestock, forestry and fisheries affect the port of Makassar and Sorong. Indications such as these show that the province of South Sulawesi oriented goods supply and serve the needs of industrialization in the Eastern Indonesia. Sectors with a very strong influence variables associated with the container trade through the Eastern Indonesia is in mining and quarrying (X₂), electricity, gas and water supply (X₄), construction (X₅), transport and communications (X₇), services (X₉), and population (X₁₀).

$$Y \text{ (EPI)} = - 201690,1 + 1,156 X_1 + 1,241 X_2 + 3,134 X_3 + 42,673 X_4 + 3,206 X_5 + 1,939 X_6 + 3,310 X_7 + 4,982 X_8 + 1,916 X_9 + 14,343 X_{10}$$

Variables that have a strong influence shows that Eastern Indonesia as a developing region and dominated the movement of containers of non-agricultural goods. Mining and other leading sectors are Eastern Indonesia. In the year 2032, container prediction that the sector has the highest contribution value is the services sector and trade, hotel and restaurant. This condition indicates a shift in the sector contribution to GDP, which in 2012 the agriculture, livestock, forestry and fisheries sector is dominant, then the Mining and Quarrying sector.

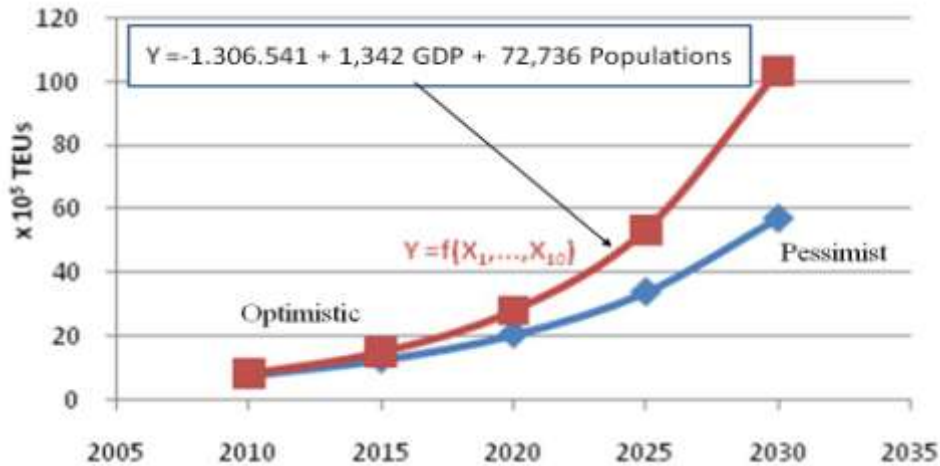


Figure 6 Prediction of Container Demand

V. CONCLUSION

There were changes in the function of a conventional cargo harbor container cargo. Most of the pier and unloading facility has not been planned to serve container, unless special container port Makassar and Bitung. Limitations of land for the development of land-side facilities, road geometric conditions connecting to hinterland to require enhanced functionality has not planned road construction and reinforcement. Commodities have not concentrated in a region and the port, unbalanced load between the port of origin and destination so the impact on the cost of logistics transportation. The majority of the ports collection and feeders require adjustments to the revitalization of demand load wheels and multi-pack. Port basin depth has not been able to serve container ships for the third Generation (capacity 2000-3000 TEUs). Conceptual preliminary design vessels, multipurpose vessels typologi (passenger, unceasing, load wheel), a measure of vessel should be adjusted to demand, using technology in the form of goods packaging container and adapted to the conditions of nature and port facilities as well as technically feasible.

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