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An Analysis of the Container Terminal Development as the Concept of Archipelago Pendulum at Soekarno-Hatta Port

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Abstract: The aims of this study were (1) to analyze the effectiveness and efficiency of development system of Sukarno Hatta Port, (2) to analyze the development needs of Sukarno Hatta container Port to implement the concept of archipelago pendulum; and (3) to analyze the development strategy of Makassar container port as pendulun of archipelago. The method used in this research was SWOT matrix that concerned analysis of strengths, weaknesses, opportunities, and threats. This method was used to obtain a balance between internal and external capabilities. The results show that the short-time impact of the program of Makassar port as pendulun of archipelago is to resolve the problem of congested flow of loading and unloading traffic. In the long term, it shows that the program has great contribution to the economy of Makassar South Sulawesi through the economic scale of ship in general as well as extension of port competitive position. However, the development will have negative impact for the liner ship industry that has yet no ship container as Panamax level. Other negative impact includes certainty of decrease in the logistic cost that still depends on readiness essential that the development strategy of Makassar port to have an orientation of infrastructure development for large container ship supported by professional logistic staff without employment of private operator. In addition, the development system needs to facilities the decrease of logistic tariff to overcome the treat of economic sluggishness. It is important for the port to account for as the open gate for various currencies as a means of tariff and transaction determination in order to achieve a balanced economic and logistic cost.
Keywords: Port, archipelago, loading and unloading.

I. INTRODUCTION

A port is a knot chain transport system, especially for sea transport in the framework of the traffic of logistic, container, movement of passengers and animals, thus the port has an important role and functions in supporting economic growth. Through the Port, the relationship between the activity of the island and inter-state relations can be established either, so it can bring in foreign exchange for the country.

Logistics costs comprise the cost of the cruise (ship) and charge port. High logistics costs due to relatively high port charges (INSA, 2013). For it is currently being developed concept *pendulum* archipelago. *Pendulum* archipelago is a system of shipping routes along an east-west path Indonesia that operates like a pendulum. To support the concept of a *pendulum* in order for an efficient transport system in the port, then the movement of transport and loading and unloading operations should be smooth and should also be guaranteed their ease of stacking aspect.

The ports of Pelindo IV, which is the main link for the flow of logistic in eastern Indonesia by having the main infrastructure of the third terminal in the port of the terminal of Soekarno-Hatta and terminal Paotere, providing container terminal, multipurpose terminal, terminal liquid and dry bulk, forwarder multimodal, pilot services and delay the passenger terminal.

The main problem at the Port of Makassar in supporting the concept of the archipelago where the *pendulum's* path would be navigable *pendulum* large ships with a capacity of 3,000 containers, and supported by the uniformity of service is relatively poor condition of the infrastructure and port services. The problems that arise in Makassar port can be seen from the indicator *Yor (Yard Occupancy Ratio)* .YOR port high as 75% based on data from 2012. These indications are Pelindo IV suggests two things: the progressive increase in through put container terminal with a positive impact for the development of the port or vice versa caused by the high-Dwelling Time adversely affects the performance of the port.

Seeing the development trend of the flow of logistics (14.148 million TON/M^3) and the flow of containers (529,000 TEU's) in the same year at Makassar port due to high dwelling time is up to 5 days so detrimental to the port's performance whereas the optimal capacity of existing conditions is 936 225 TEU's per year, assuming a 900 TEU's per hectare.

The competitive advantage of a port seen from the performance of the utilization of the means of production do not always rely on land development as a solution to improve productivity but also dependent on effective use of the means of production of the existing, in order to prevent excessive investment which have an

impact on the imbalance between the cost of investment and return on investment in the port, it takes an assessment of the operational performance of the technical side to get the Makassar port facility planning in the process of developing the port of Makassar fore. Thus, this study aims to analyze the effectiveness and efficiency of development, container port development needs as well as strategy development Soekarno-Hatta container port in order to implement the system and the concept of the *pendulum* archipelago.

II. MATERIALS AND METHODS

Research sites

This study was done at Soekarno-Hatta International Port of Makassar-Indonesia

Technique of data analysis

Data analysis techniques in this study using SWOT matrix to obtain a balance between internal capabilities and external opportunities by comparing the capabilities and weaknesses of the port with the opportunities and threats from the environment.

III. RESULT

Description of the Port Facilites of Makassar

In Makassar port, pier for terminal Soekarno along 1360 meters/-9 m LWS, Hatta 850 meters/-12 meters LWS, Hassanudin (part Hatta) 510M / -3 m LWS, Paotere 525.88 meters/-3 meters LWS. The passenger terminal is situated in front of the pier terminal of Soekarno-Hatta container 103. Hatta's container fields of 114.416 m^2, 7962 m^2 Paotere buildup fields and field Soekano of 56.4 thousand m^2 in Table **1**.

Table 1. Description of the Port Facilities of Makassar

No.	Facility	SAT	Volume
1	Pier	M'	2.685
2	Warehouse	M^2	23.8
3	Field	M^2	187
4	Boat Towing	UNIT	4
5	Vessel pilot	UNIT	3
6	Guide	Person	8
7	CC/LC	UNIT	5
8	TT/RS/SL	UNIT	10/3/1
9	Passenger Terminal	M2	3.62

Source: Data of Pelindo IV, 2015

Development of Makassar Port phase 1 and 2

Makassar port development plan consists of two phases where the first phase is the development of a container terminal with a capacity of 650,000 TEU's, dock measuring 600 meters and a field of 300,000 m^2. Terminal container is fitted with a new unloading Panamax class. The second phase of the development of container terminal with a capacity of 1.2 million TEU's, pier measuring 1,200 meters and also with the addition of loading and unloading crane cradle 8 units can be seen in Figure 1.

Figure 1. Layout of the Development of Makassar Port Phase 1 and 2

Analysis of the effectiveness of the system development of the container port of Soekarno-Hatta

One of the basic analysis Makassar port development strategy, it is necessary overview at the beginning of competition between ports. Network of container ports in Indonesia from the port of origin to the destination port hub can be seen in Figure 2.

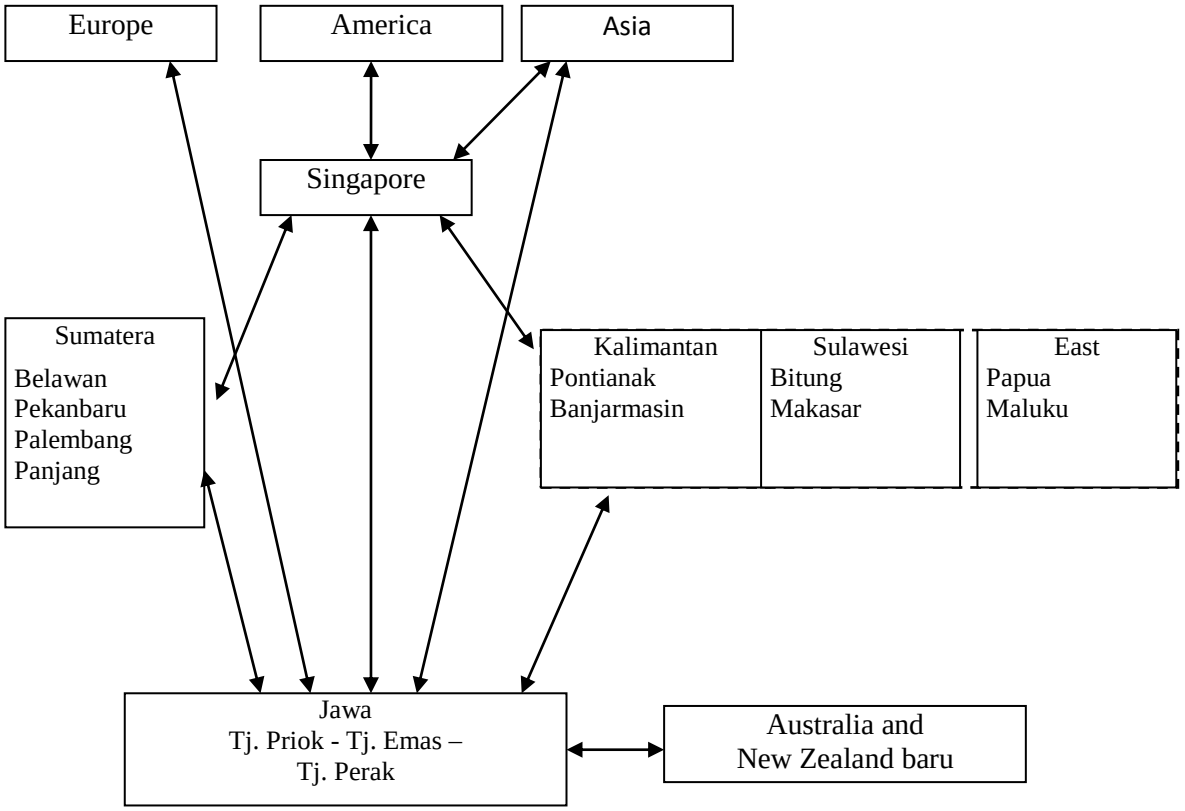

Figure 2. Contaner Port Networks in Indonesia

Based on the figure 2 can be seen that the main competitor of container port in Indonesian is the port of Singapore. In terms of connectivity and market share cargo, logistics systems for the network between the ocean Indonesia still relies on connections at the port. So one of the ways to increase the competitiveness of the port of Makassar and Indonesia is to reduce dependence on the port.

Traffic development of container Makassar and Singapore

Makassar although the overall quantity of the port of Makassar (300-500 thousand TEU's) so far compared with ports in Singapore (25-30 million TEU's) but not Singapore port traffic grew as well as the port of Makassar.

An analysis of the efficiency of the port development system of Makassar

Table 3 shows that the highest effectiveness in Makassar port is on working hours crane, document checking process, the depth of the harbor, the setting arrangement of container location and the smooth exit gate. While the factor is the lowest effectiveness was the number of loading and unloading equipment and width of the road.

Table 3. Perception of the effectiveness and port services efficiensies of Makassar

Item	Measuring	Mean
EF1	Strategies maximum capacity utilization of the field (number of TEUs per hectare field)	3.11
EF2	Placement of containers in the base to be easily taken by truck	2.89
EF3	Area maneuver trucking container	3.11
EF4	Total Tool unloading crane	3.00
EF5	Better use of loading and unloading cranes (crane working hours)	3.78
EF6	Setting the preparation of the location of the container	3.44
EF7	Traffic conditions in the field of land transport-gates	2.88

Item	Measuring	Mean
EF8	The process of checking documents	3.67
EF9	Management container location data	3.22
EF10	Container stacking heights	3.38
EF11	The number of containers is lifted crane per hour	3.22
EF12	Total time the container is in the yard (dwell time)	2.89
EF13	The waiting time before demand for mooring facilities	3.29
EF14	Hours effective unloading	3.43
EF15	Ship speed Exit-Entry (turn around time)	2.86
EF16	Long pier	3.13
EF17	Number of moorings	3.13
EF18	The depth of the port	3.53
EF19	Loading and unloading equipment	2.58
EF20	The smoothness of the gate entrance	2.67
EF21	The smoothness of the gate exit	3.44
EF22	Smoothness toll access	3.11
EF23	The width of the road	2.67
EF24	Traffic checking documents	3.13
EF25	Efforts to decrease the factors that lead to high transport costs such as cultural tipping	2.78

Source: Data processed, 2016

The analysis of port development strategies in order to implement the concept of *pendulum* archipelago

The main objective of this study is to look at the impact of the program *pendulum* archipelago of the concept development of the port of Makassar. Based on the authority and interests matrix shows that the government is the party with the greatest authority on any development project in Makassar. These ports pendulum archipelago and Pelindo IV can be seen in Figure 3.

Figure 3. The rute of the Pendulum Archipelago and Port of Pelindo IV

The SWOT analysis

The determining of the needs and container port development strategies of Makassar is in order to implement the concept of the archipelago *pendulum* using SWOT matrix. The process of drafting the SWOT matrix using information from responden. Alike shown in Table 4, this research form the probability of a strategy that can be developed at the port of Makassar.

Table 4. Probability strategy that can be done

SO strategy - Expansion ports - Improved infrastructure for large container ships	**WO strategy** - Plowing via incentives for professional workers in the field of logistics - Improved information technology integrated supply chain
ST Strategy - Lowering the cost of port - Rates of subsidies for feeder to improve connectivity	**WT Strategy** - Rates of non USD - Creating a long-term contract with the shipping company orientation non USD as transshipment locations

IV. DISCUSSION

Makassar port terminal consists of three main terminal of Soekarno, Paotere and Hatta container terminal, with the condition of existing facilities on the source data retrieved from the data source to the terminal Pelindo IV. The pier of Soekarno along 1360m / -9 meters LWS, Hatta 850 m / -12 meters LWS, Hassanudin (part Hatta) 510 m / -3 meters LWS, Paotere 525.88 meters / -3 meters LWS. The passenger terminal is situated in front of the pier Soekarno terminal 103. The fields are divided over the field of Hatta container amounted to 114, 416 m², 7962 m² Field Paotere buildup, and Soekarno field of 56.4 thousand m². Makassar port has competitive advantages as a seaport with natural conditions that support into the current draft ships where the port has a draft of up to 11 meters. Makassar Port is currently revitalizing and relocating port development plans and the location of the new port of Makassar. The development plan of the port of Makassar consists of two stages where the first stage is the development of container terminals/capacity of 650,000 TEUs, wharf: 600 M, container yard at: 300,000 m^2, the new terminal will also be equipped with loading and unloading equipment new class panamax so as to accelerate the rate of loading unloading. Development of the second phase consists of a container terminal development / capacity of 1.2 million TEUs, wharf: 1,200 M, container yard at: 600,000 M^2, which is also, accompanied by the addition of Cradle crane loading and unloading equipment 8 units. One of the basic to analysing strategy developments Makassar port the necessary overview at the beginning of competition between ports.

Ports are the main competitors in the Indonesian container port is the port of Singapore, and in terms of connectivity and market share charge because Indonesia logistic system for inter-oceanic networks still rely hub in the port. So one way is to increase the competitiveness of the port of Makassar and Indonesia in general is to reduce dependence on the port.

Although Makassar in terms of overall quantity Makasar ports (300-500 thousand TEUs) so far compared to the port of Singapore (25-30 million TEUS) but Singapore port traffic does not develop as well as to Makassar, even in the case of the port decreased traffic flow goods, the rate of decline in Makassar, tend to be smaller than the port of Singapore. This condition indicates that the port of Makassar in the stage of development towards a better rate.

For service of port with an additional cost of container is empty, the port of Makassar only compete in the cost efficiency of the Port Kelang Malaysia which is effectively able to achieve cost $ 116 with a capability of 50 motions crane per hour, while the port of Makassar still setting the rates $ 133 to the productivity of container 40 boxes per crane per hour. For inter-island fare seemed that the Makassar port is much more effective and cheaper than the others, namely the Indonesian port of Surabaya silver cape.

The highest effectiveness in Makassar port is on working hour's cranes, document checking process, Depth port, setting the composition of the location of a container, and the smoothness of the gate exit. While the factor with lowest effectiveness was the number of loading and unloading equipment, road width, and road Smoothness entrance gates are also measures to reduce the factors that lead to high transport costs such as the culture of giving a tip, the traffic conditions in the field of land transport-gates.

From the port of Makassar have advantages in terms of the depth of the port and the disadvantage of the quantity of loading and unloading equipment, although the cranes working hours are considered quite efficient.

For the perception of port container yard has efficiency and effectiveness in setting the composition of the location of a container, but has problems in the management of location data containers, tools unloading non quay crane and container dwelling time in the yard as a result of the checking process the document.

Land transport traffic on the access gates stand out, and the smooth highway access, but low on the entrance gate access, high transport costs culture such as tipping, traffic checking documents and traffic conditions on the ground container to the gate.

Based on authority and interests matrix shows that the government is the party with the greatest authority on the scope of Makassar port development project. The interests of port operators have the biggest

interest in the project because the development of these parties will have an enormous impact upon the projects were implemented. See in Table 5.

Tabel 5. Authority Matrix and Interests

Authority			
	High	Central Government, Provincial, City Policy	TPK MKS, Pelindo, ADPEL Organizer
	Low	Monitor	Other Cruise Liners, Land Transport, General container terminal, PELNI Businessmen
		Low	High
		Importance	

The determining of the needs and the development strategy of the container port of Makassar in order to implement the concept of *Pendulum* Archipelago with the SWOT matrix. The process of drafting the SWOT matrix as a qualitative analysis of this study using information from respondents and secondary data drawn conclusions on the basis of subjective, where internal information as a basis for the preparation (strengths and weaknesses) with more emphasis on primary data of respondents, while the external information as a basis for the preparation (opportunities and threats) is a combination of secondary and primary data information. The concept of this analysis is based on a model quantity and efficiency of cargo container terminals. The components in this SWOT analysis form the probability of a strategy that can be developed in Makassar.

V. CONCLUSIONS AND RECOMMEDATIONS

The aim of this study to assess the Makassar sport development program and the concept of Archipelago *Pendulum* in order to achieve effieciency and effectiveness of the logistics costs of transportation logistic in Indonesia. Based on the analysis it could be conclude that; 1) Effectiveness system Makassar Port development based on Figure 2, the port of Makassar should reduse dedepndence on the port of Singapore's inter-ocean network in order to to increase the competitiveness of the port of Makassar more effectively. The efficiency of the system development of the port o Makassar based on Table 3, the most efficient service such as service utilization crane loading and unloading equipment with an average of 3.78 and the lower most services is the availability of loading and unloading equipment with an average of 2.58 services, 2) In order to implement the concept of the Archipelago *Pendulum* at Soekarno-Hatta container port based on the process of preparing the necessary SWOT strategic location, space geography and vast domestic market as well as infrastructure and new facilities to bring in large container ship arrivals and increased trade lanes Indonesia east to west. Makassar port should be able to cope with threats to the impact of the application of concepts pendulum archipelago of competition from other ports and the economic crisis, weak management and collaboration system unbalance amount of cargo loading and unloading, 3) This research formed a strategy that can be developed in Makassar as the Archipelago *Pendulum* concept based on the Table 4. The resulting strategy is to use force to exploit opportunities by increasing the infrastructure for large container ships, uses force to cope with the threat of tariff reduction to stimulate the vessel, utilizing opportunity to overcome weaknesses by improving information technology integrated supply chain, and reduce the weaknesses and address the threat by creating long-term contracts with shipping companies non USD orientation as a transshipment location.

Recommedations

Based on the analysis, it can be given advice ie; 1) This study analyzes efektifitasdanefisiensi system of development of the port of Makassar, expected future research should improve port services, especially in activities with an average value of service is low such as loading and unloading equipment, the smooth road entrance gate and the total time is in the container yard, 2) This study analyzes the development of the port of Makassar in terms of competitiveness against large container ships; therefore, expected future studies should look at a variety of diversity patterns port operations primarily from the operating side feeder for the transshipment of huge container ships from the main port, 3) This study develops criteria for the evaluation of the qualitative side of the container port of Makassar, the future research are expected to conduct the evaluation criteria for the development of quantitative data to obtain simulation results oriented operating strategies passenger port of Makassar.

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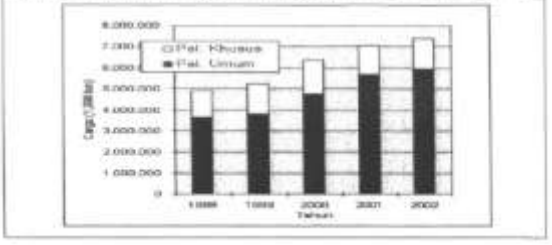
Attachments:

Realisasi Arus Barang, Kontainer, Penumpang, dan Kapal

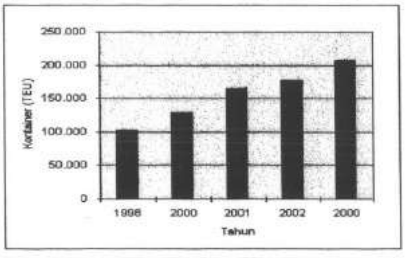
Tabel 2.9 Lalu lintas Barang di Pelabuhan Makassar, 1998 – 2002

Tahun	1998	1999	2000	2001	2002
Pel. Umum	3.637.176	3.779.121	4.743.873	5.671.902	5.918.573
Pel. Khusus	1.274.439	1.441.477	1.609.162	1.357.913	1.504.199
Jumlah	4.911.615	5.220.598	6.353.035	7.029.815	7.422.772



Tabel 2.10 Lalu Lintas Kontainer di Pelabuhan Makassar, 1998 – 2002

Tahun	1998	1999	2000	2001	2002
Barang (ton)	1.147.881	1.191.194	1.513.918	1.612.565	2.369.213
TEUs	102.418	129.014	164.684	177.416	207.485
Pertumb./year		26%	28%	8%	17%



Tabel 2.11 Lalu Lintas Penumpang di Pelabuhan Makassar, 1998 – 2002

Tahun	1998	1999	2000	2001	2002
dalam 1,000	1.108	1.358	1.258	1.183	1.130
Pertum./tahun		22,56%	-7,36%	-5,96%	-4,48%