

Sea Transportation Network Order of Sulawesi Corridor for Supporting Connectivity of Region

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Abstract— This study aims to formulate a model of network development services and infrastructure network of sea transport in Sulawesi Corridor. The method that used in this study is the gravity method for determining the index value of connectivity, as well as a SWOT quantitative method to determine the port cluster.

The results show counties/cities that located on the first hierarchy that serves as a major growth center are Bitung City, Makassar, Palu, Kendari, District of Kolaka, and District of Gowa. Required the development of short-distance shipping network in some coastal areas of Sulawesi Corridor while development of infrastructure networks Pantoloan Ports and Port Gorontalo has power to take advantage of long-term opportunities.

Keywords; *Connectivity, network performance of sea transportation, port hierarchy.*

I. INTRODUCTION

Strengthening of national connectivity is one way to realize the welfare of the people of Indonesia, as contained in the Master Plan for the Acceleration and Expansion of Indonesian Economic Development (MP3EI) in 2011 - 2025. The lack of a national connectivity can be seen from the concentration of economic activity in urban areas and industrial activities that do not spread to areas underdeveloped regions and isolated due to limited transportation infrastructure. focus of the national connectivity development include connectivity intra-island connecting the centers of economic growth corridors and connectivity between islands where facilities and infrastructure (especially marine transport) to distribute basic commodities and other products to outside the island and bring commodities from outside the island into the island. The existence of economic growth centers in a region requires support of the transport network to ensure connectivity between regions. Likewise with Sulawesi corridor in the present, where there are still gaps economy and inequality of development among internal areas that cause less optimal economic growth in some provinces, the

concentration of economic activities is limited to the capital of the province is also less impact on equity for other regions, the agglomeration of economic activities while This is limited to the main nodes. (Sulawesi Strategic Plan, 2011).

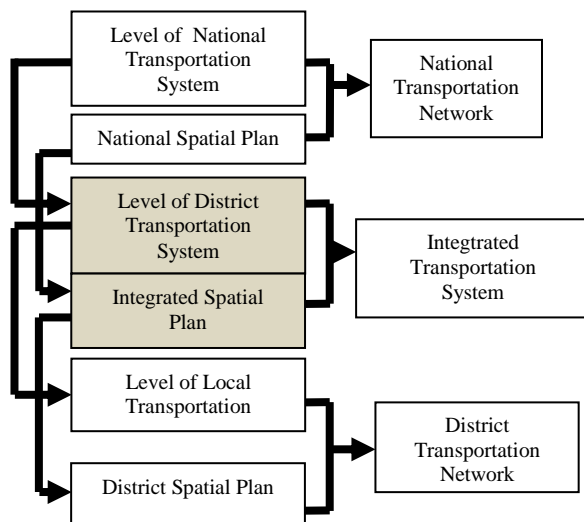
The role of sea transport is needed to support the development and connectivity between growth centers on Sulawesi corridor, which is geographically comprised of land and sea areas that separates some the archipelago area. Geographically, Sulawesi corridor is flanked by two grooves sea shipping, ALKI II across the Celebes Sea and the Makassar Strait and ALKI III across the Pacific Ocean, the Maluku Sea, the Seram Sea and the Banda Sea to the Indian Ocean where most of the major cruise world passes and utilize the groovesuch as the shipping lane so that this region has a great opportunity to expand the network of national and international trade. The role of marine transport in the corridor of Sulawesi is quite large, but still faces constraints on the availability of low quality and quantity of infrastructure and weak integration of multimodal transport networks between regions (Sulawesi Strategic Plan, 2011). Marine transportation infrastructure network in Sulawesi corridor nowadays are as many as three international ports, namely port of Makassar, Bitung, and Pantoloan, 7 ports nationwide scale and 71 ports local scale. And the order of service network (route) stipulated in Decree of Directorate General of Sea Transportation Number: AL.59 / 1 / 9-02 for general cargo through Sulawesi corridor as many as 30 route network and for container cargo as many as 13 route network.

With potentials that are owned and weaknesses that exist today, the economic corridor of Sulawesi require a model of network development of maritime transport is able to support intra and inter corridors so as to maximize economic growth based on the principles of integrity, capable of connecting The main of centers economic growth and expand economic growth through increased accessibility of centers of economic growth to the behindregion. Given the implementation of the main principles of strengthening national connectivity as the MP3EI is increasing the flow of goods, services and information, lower logistics costs, reducing the high cost

economy, realizing equitable access across the region, and to realize synergies between centers of economic growth.

II. LITERATUR STUDY

In the spatial plan, the central activity of region is the primary node where the central configuration useful as a basis for the preparation of the transport network or node that is effective and efficient. Influence or service Domain is a broad range of services each center or node concerned. The transport network is a route that connects between the node and the node with the surrounding area. There is a functional relationship between the node/city to another city as a trading orientation where the functional relationship in the form of the goods flow and people traveling. As for the relationship between spatial planning with transport level as in Figure 1 below.



Source: Siahaan, 2014

Fig. 1. Spatial Plan dan Transportation

A. Analysis Approach Transportation Network Order

1) Typologi Klassen Analysis

Klassen Typology analysis is used to determine an overview of the structure and pattern of economic growth in each region. Typology Klassen basically divided areas based on two main indicators, namely regional economic growth and per capita income of the region. By determining the average of the economy growth as the vertical axis and the average income per capita as the horizontal axis, the area observed can be divided into four classifications, namely: high growth and high income, high income but low growth, high growth but low income, and low growth and low income (Syafrizal, 1997: 27-38; Kuncoro, 1993: Hill, 1989).

2) Schallogram Analysis

Schallogram method was conducted to determine the service center based on the number and type of units of service facilities that exist in each region. The assumption used is that the region has the highest ranking is a location that can be set to be the growth center (Amas Yamin et al in Pardede, 2008). The indicator used is the number of population, population density, area, GDP per capita, distance to the capital province, road length, number of species and

units and the quality of service function of each district/city. The stages are carried out in the method schallogram is (Pardede, 2008): 1. Regional district/city in each province composed ranked by population, population density, area, 2. These areas are arranged sequence based on the number of facilities owned. 3. The ranking is compiled sequence of facilities based on the total number of facility units.

3) Generation and Atraction Trip Analysis

The basic purpose of modeling generation / pull movement is how to produce a model of relations that link the land use parameters with the amount of movement toward a zone or a number of moves which leaves a zone. By knowing resurrection and pull of the movement, the number of trips each region or zone on the present and the future can be predicted. (Mc Nally, 2007). In the modeling of generation/pull movement can use multiple regression analysis model. Multiple linear-regression model of the further development of a single regression model with the following general formula:

$$Y = a + b_1X_1 + b_2X_2 + \dots + b_nX_n \quad (1)$$

Y = dependent variables

$X_1 \dots X_n$ = independent variables

a = Intercept or constant regression

$b_1 \dots b_n$ = regression coefficients.

4) Gravity Analysis

The depiction of movement patterns most commonly used is the matrix of movement or Origin-Destination Matrices (OD Matrix) is a two-dimensional matrix that contains information about the amount of movement inter-zone (Tamin, 2000). Line in the OD expresses origin zone and column in the OD expresses states the goal zone, so that every cell in the OD stating the magnitude of the movement of currents that move from origin zone i to destination zone during a certain time interval.

One method to get OD is one of the models in synthetic methods, the model of gravity (GR). The model is a spatial interaction method most well-known and often used because it is very simple, easy to understand and use.

Here are some of the equations used in the model GR:

$$T_{id} = A_i \times O_i \times B_d \times D_d \times f(C_{id}) \quad (2)$$

Where:

T_{id} is the amount of movement of the origin zone i to destination zone d

A_i and B_d is a balancing factor so that the requirements of equation (2) and (3) can be met

O_i is the amount of movement that comes from the origin zone i

D_d is a number of moves that led to the destination zone d

$f(C_{id})$ is a function of the barriers / accessibility size between zone i and zone d

III. RESULT

A. Sulawesi Corridor Region Order

Development of the Sulawesi island is directed at the development of industry-based logistics, as a national industrial development based on cocoa, rice, corn, industrial

development based rattan, asphalt, nickel, and iron ore, as well as the acceleration of economic development based on maritime (marine) through the development of industry fisheries and marine tourism, given the Sulawesi region is one of the gates of international trade and the gateway of Eastern Indonesia (Preliminary draft RPJMN 2015-2019). To realize the integration and balance of development between regions, in RTRWN (PP 26 of 2008) in each province in the region of Sulawesi has been designated National Activity Centers, Regional Activity Center, and the Center for Local Activities, as in Table 1.

TABLE 1. CENTERS OF ACTIVITY ACCORDING PROVINCE IN SULAWESI REGION

No	Provinces	PKN	PKW	PKSN
1	North Sulawesi	- Urban area of Manado, Minahasa (Bimido)	- Tomohon - Bitung - Tondano - Kotamobagu	- Melonguane - Tahuna
2	Gorontalo	- Gorontalo	- Isimu - Kwandang - Tilamuta	-
3	Central Sulawesi	- Palu	- Poso - Luwuk - Buol - Kolonedale - Toli toli - Donggala	-
4	Southeast Sulawesi	- Kendari	- Unaaha - Lasolo - Raha - Kolaka	-
5	West Sulawesi	-	- Mamuju	-
6	South Sulawesi	- Urban area of Makassar	- Pangkajene - Sungguminasa - Takalar - Palopo - Watampone - Bulukumba - Barru - Pare pare	-

Source: PP Num. 26 of 2008

Bimindo urban areas in North Sulawesi is the center of national activities oriented to building tourism and processing industry. Maminasata regionis Directed as a center of global activity which encourages the growth of cities in the vicinity, as well as the production center of the island region as a prime mover for the Eastern Region of Indonesia. Both of these urban areas is central to the growth of Sulawesi. There are six priority areas that the city is a center of activity that is focused on equity in the region of Sulawesi, namely; Kotamobagu in North Sulawesi are directed as agropolitan city that serves as the center of growth in provincial areas which supports the growth of agricultural production, which is also directed Gorontalo city as a city Agropolitan addition to encouraging the growth of agricultural production as well as fishing and fish processing center for marine tourism; Palopo in South Sulawesi Province oriented service activities center for

processing of agricultural and plantation; Pare-Pare in South Sulawesi focused as central processing industry to encourage economic activity and agro-industries in the surrounding region; Kendari in Southeast Sulawesi oriented tourism activities, the processing of plantation crops, catch fish and trade; and Bau-bau in Southeast Sulawesi oriented marine tourism activities. (Preliminary Draft RPJMN 2015-2019).

To accelerate economic development in the region of Sulawesi some areas set some strategic areas include 2 Special Economic Zones (KEK) that KEK Palu and KEK Bitung, as well as 4 Integrated Economic Development Zone (KAPET) is KAPET Manado - Bitung in North Sulawesi province, KAPET Batui in Central Sulawesi province, KAPET Pare-Pare in South Sulawesi and KAPET Bangejahtera in Southeast Sulawesi. In addition Sorowako Regions, Border North Sulawesi - Gorontalo - Central Sulawesi, as well as Urban Maminasata also included as a strategic area in the region of Sulawesi. Sulawesi Economic Corridor focuses on the development of the production and processing of agricultural, plantation, fisheries, and national nickel mining and oil and gas to the center of economic activity is in the capital of each province.

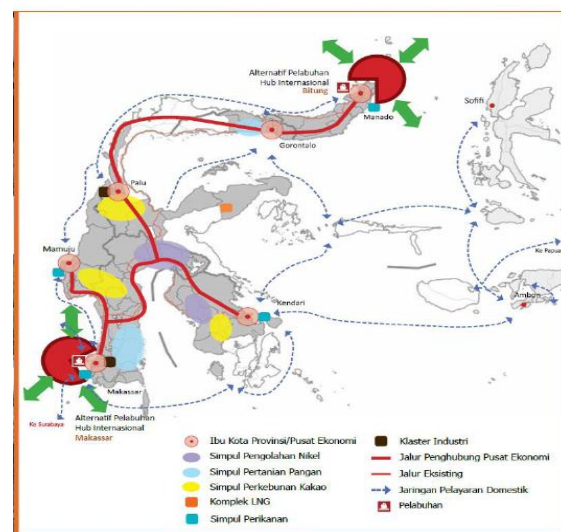


Fig 2. Nodes Of Activity Sulawesi Region

Areas that are node activity on Sulawesi among other node agricultural activities of food in Makassar, Wajo and Maros in South Sulawesi and Gorontalo province, knot cocoa plantations are in Mamuju in West Sulawesi Donggala regency in Central Sulawesi and Southof Konawe in Southeast Sulawesi, knot nickel processing are Luwu, South Sulawesi Province, Kolaka, Konawe, and Mandiodo in Southeast Sulawesi and Morowali in Central Sulawesi province, knot fisheries are in Kendari Southeast Sulawesi Province, Banggai, Morowali and Tojo Una Una in Central Sulawesi and Bitung in North Sulawesi, the node processing of oil and gas contained in Wajo in South Sulawesi, Mamuju in West Sulawesi province, district Luwuk, Banggai, Morowali in Central Sulawesi province, as well as Kotamobagu and Tomohon in North Sulawesi Province.

B. Analysis of the spatial structure in Sulawesi Corridor

Analysis of the spatial structure in Sulawesi Corridor using schallogram analysis by considering multiple variables, among others; population density and GDP per capita as an indicator of the economy, the availability of facilities and infrastructure as an indicator of the potential of the area, distance to the provincial capital, the length of road, the index of accessibility and mobility index as a measure of the accessibility of the region, as well as the number of population and area.

Based on the analysis, districts/cities that are in the hierarchy I and serves as a major growth center among other Bitung, Makassar, Palu, Kendari, Kolaka, and Gowa. There are 59 (79.73%) districts/cities in Sulawesi corridor located on the second hierarchy. While there are 9 districts/cities located on the third hierarchy among Bolaang North Mongondow, Sitaro Islands, Bone Bolango, Tojo Una-una, North Buton, North Konawe, Polewali Mandar, Selayar, and Soppeng.

Schallogram analysis results show Manado and Gorontalo is located on the second hierarchy as secondary growth centers, while in the second RTRWN the city is a center of national activities. This shows that the necessary development of service facilities, especially transportation network to improve the accessibility of the region so as to support the role of the city of Manado and Gorontalo as PKN and the central government. Likewise with Maros and Takalar in South Sulawesi to support the role of National Activities Centre Maminasata. Bolaang Mongondow Utara, Bone Bolango, North Konawe and Polewali Mandar be on third hierarchy III also requires an increase in the number of public facilities and infrastructure as well as improving the transportation network services in order to support its role as center of regional activities.

C. Performance of Network Services and Sea Transport Infrastructure Sulawesi Corridor.

Indicators to assess the performance of sea transport network are grouped into output, outcome and efficiency. Output performance indicator is the level of stocks (supply), the outcome is the level of service, while the efficiency is the utilization of infrastructure and facilities.

1) Performance of Sea Transport Infrastructure Network

a) Ports availability level

The level of availability of ports in each province on Sulawesi corridor is still very low. Value harbor high levels of availability are in the centers of national activity in view of the existence of the main ports of the primary and secondary. While the value of the level of availability for the district / city to the other is still very low, with a value of 0.01 was taken. In North Sulawesi, Sangihe Islands and Islands Sitaro have a high level of availability, namely 0.027 and 0.023 of the existence of local ports that support the movement in the island region. IN Gorontalo, high availability are in the city of Gorontalo (0.076) given the

existence of a national port and the Gorontalo area of which only 0.62% of the Gorontalo province.

In Central Sulawesi province, where the International Port Pantoloan greatly affect the value of the level of availability of the harbor in the city of Palu, while in the Banggai Islands where 65 local ports that affect the value of the level of availability of the harbor. In Southeast Sulawesi province, where the national port of Kendari and an area of high value kendari affect the level of availability of the harbor in the city of Kendari, while for Wakatobi existence of three regional ports greatly affect the value of the level of availability of ports in the region.

TABEL 2. PORTS AVAILABILITY LEVEL IN SULAWESI CORRIDOR

Province	District	Number of Port	Port Weight	Ports Availability
North Sulawesi	Bitung	2	7	0,021
	Manado	1	3	0,018
	Kep. Sangihe	15	16	0,027
	Kep.Sitaro	5	5	0,023
Gorontalo	Kota Gorontalo	4	6	0,076
Center Sulawesi	Kota Palu	2	6	0,015
	Banggai Kepulauan	65	67	0,027
Southeast Sulawesi	Kendari	4	6	0,020
	Wakatobi	4	7	
West Sulawesi	-	-	-	-
South Sulawesi	Makassar	2	6	0,034
	Pare-pare	2	4	0,040
	Selayar	13	15	0,017

Suorce : KM 53 Tahun 2002, Hasil analisis 2014

In West Sulawesi port value level of availability is still very low (below 0,010), although in Mamuju there Streaks National Port and Port Regional Mamuju but with an area of 8014.06 km² greatly affect the value of the level of availability of ports in the region. In South Sulawesi, where the International Port of Makassar greatly affect the value of the level of availability of the harbor in Makassar, in Pare-pare affected by the presence of the National Port Pare-pare and an area of only 99 km², while in the District Selayar influenced by the presence of 13 ports in the region.

• Capacity levels of Port Facility

Port facility consists of the main facilities and supporting facilities. Major facilities in the form of means that must always exist in seaport activities such as shipping lanes, ponds harbor, and retaining the wave while supporting facilities such as the structure of construction equipment that support port activities such as docks, warehouses, container yard, the street, the main tools for loading and unloading. In terms of the depth of a pool of ports, the Port of Kendari, Gorontalo and Manado do not meet the requirements of the criteria, which for national ports must have a port basin with a depth of -7m LWS. So as to improve services to the ship then the ports should add depth to an appropriate port specified requirements. For the length criterion dock and spacious yard, around the main ports have met the criteria set limit. But to criteria loading and unloading equipment crane /

mobile cranes, the Port Toli-Toli and Manado need to set up a minimum of mobile cranes with capacity of 50 tons.

• Performance of Port Operational Service

The performance indicators of port services has been established by the Decree of the Director General of Sea Transportation No.UM.002 / 38 / DJPL.11 about Port Operational Performance Standards (Appendix 14). The performance indicators are distinguished port services on labor productivity unloading cargo, utilization of port facilities, as well as service performance boats. Performance operational service the major ports in the region of Sulawesi is as in Table 3:

TABLE 3. Performance of Main Port Sulawesi Corridor in 2014

Port	(T/G/J)	(B/C/J AM)	Utility			Ship Service Performance		
			BOR (%)	SOR (%)	YOR (%)	WT	AT	ET:BT
Bitung	21,50	22	65,77	62,23	78,01	0,40	1,00	63,51
Makassar	22,93	27	48,98	14,02	79,34	0,15	1,65	86,62
Pantoloan	11,47	20,22	63,75	5,81	13,77	2,70	3,77	68,62
Manado	26,19	-	62,30	45,90	0,00	0,00	0,00	33,33
Gorontalo	11,88	10	83,00	0,14	56,75	1,00	1,00	53,57
Toli-toli	18,00	8,29	33,47	0,09	52,19	0,31	0,14	25,00
Kendari	16,66	13	56,50	24,19	60,59	1,59	3,14	42,71
Pare-pare	12,06	-	69,91	0,00	0,00	9,69	0,53	38,74

Source: PT. Pelindo IV

Based on service performance standards specified port operations, the labor productivity of loading and unloading of general cargo port of Bitung and Manado Harbour has met the standard values of performance, while the other main ports do not meet the performance standards. For labor productivity loading and unloading of containers, ports that do not meet the standards is the Port of Bitung, Gorontalo and Toli-Toli. For service performance boats, Port Pantoloan, Port Kendari and Pare-pare not meet the standard waiting time of ships, to service time scouting the views of value approach time the Port Pantoloan and Pare-pare not meet the time standard set, while the ratio between the effective time used for loading and unloading ships at moorings with time while in Makassar port moorings just that meet the standards set. It shows that the Port of Makassar who had the best performance of the ship service between the main ports in the corridor of Sulawesi. While the performance of ships in the port of Pare-pare Pantoloan and yet meet all the standard indicators of service performance boats set.

In terms of utility dock facilities, the utilization rate has exceeded the docks of the Port Gorontalo standard values it demonstrates now requires the development of a jetty available. Another port that has a value BOR was approaching the default value is the port of Pare-pare, Bitung and Manado Pantoloan. For warehouse utilization rate at the Port of Bitung and Manado is already quite high, while other ports are still very low. As for the level of utilization of container yard, Port Pantoloan still very low, while the other port already quite high.

b) Cluster of Major Ports

As a basic consideration in determining the development strategy of network infrastructure in the corridor of Sulawesi, the analysis positioning the main ports using SWOT quantitative analysis by considering the internal and external conditions are factors that influence the development of the port. Internal factors associated with the facility, operational performance, production and rates prevailing at each port. While external factors related to the geographical location of the port and the hinterland. Based on the coordinate points of each port, then the position of the ports located in Sulawesi are as in Figure 3.

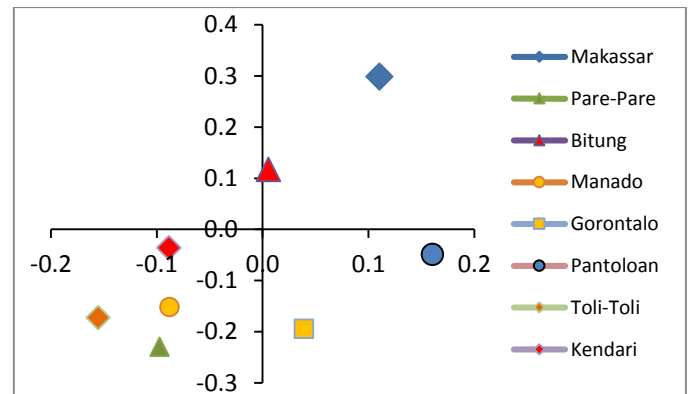


Fig 3. Port Position in SWOT Quadrant

Makassar and Bitung port is in quadrant I shows that both these ports have the strength and great opportunities for growth. Pantoloan port and Gorontalo is in quadrant II shows both these ports have the opportunity to continue to grow but still has weaknesses in competing. While Manado Harbour, Kendari, Toli-Toli and Pare-Pare is in quadrant IV indicates that the ports have the power competition but facing greater threats than opportunities for developing the port.

2) Network Performance of Marine Transportation Services

a) Level of Availability Services Network

Connectedness between PKN in Sulawesi region through a network of marine transport is almost entirely supported by the network unless cruise liner between PKN Gorontalo and between PKN Kendari Kendari with PKN Mamuju. When viewed from the ratio between the number of route network linking the number of connected PKN still very unbalanced. The highest connectivity level is between PKN Manado - Bitung and PKN Maminasata it really support the movement of goods in view of both the city is a major growth center in Sulawesi corridor. Low sea transport connectivity between PKN PKN Gorontalo and Palu with PKN Kendari, as well as between PKN Manado - Bitung with PKN Gorontalo but both PKN connectivity is supported by a network of ground transportation. FGM Mamuju prepared as PKN connectivity sea transport is still very low with the whole PKN contained in Sulawesi. Sea transport connectivity between PKN with FGM and regions mainstay in each province is still very low. Even in Gorontalo and West Sulawesi there is no liner marine transportation network that supports connectivity between PKN with FGM in the region. Sea transport

connectivity between PKN and PKW can be seen in appendix 20.

b) Port connectivity with Hinterland region

Interaction between Sulawesi corridor space in the region has gone smoothly. All districts / cities in each province on Sulawesi corridor has been connected by a road transport network. Main ports as marine transport node in each province in Sulawesi corridor entirely located in the central area of national activity. So that the connectivity between ports with the hinterland can be seen from the road network connecting status. Based on the status of the road network that connects the areas growth centers with PKN region in each province is largely the arterial road network except in the province of West Sulawesi and Central Sulawesi, which is still largely supported by a collector road network. Connectedness growth centers with PKN in each province that is still supported by a collector road network, among others, FGM Kotamobagu, Molibagu and Tutuyan with PKN Manado - Bitung in North Sulawesi province, KSP Sumatua with the City of Gorontalo, PKW Toli-Toli, Kapet Palapas , FGM Luwuk Banggai, Donggala, FGM Poso, Ampana, Sigi, and Buol with PKN Palu in Central Sulawesi, PKW Bau-bau in Southeast Sulawesi province and FGM Mamuju in West Sulawesi province. More can be seen in appendix 21.

Land transport connectivity between growth centers can also be viewed from the level of service based aksesibilitas index value as an indicator of the availability of the road network that is accessible to the public and the mobility of the index as an indicator of the availability of the road network that can accommodate the mobility of society. Magnitude parameter minimum service standards (SPM) for accessibility index is based on population density (inhabitants / km²) while the SPM parameters for mobility index based on the value of GDP per capita (million USD / year).

TABLE 4. LEVEL OF SERVICE LAND TRANSPORTATION NETWORK

NO	PROVINCES	IA	IA/SPM	IM	IM/SPM
1	North Sulawesi (NS)	0,28	1,25	1,20	0,41
2	Centre Sulawesi(CS)	0,57	5,36	7,76	2,09
3	South Sulawesi (SS)	2,28	6,35	4,57	2,54
4	Southeast Sulawesi (SES)	0,48	4,40	3,54	3,11
5	Gorontalo (GRT)	1,06	4,35	7,71	3,88
6	West Sulawesi (WS)	0,46	4,05	3,77	3,77

Source: Data Processing, 2015

SPM accessibility index ratio with all provinces in Sulawesi corridor shows the level of availability of the road network accessible to the public has met the standard of care. While based on the mobility index ratio with a value of SPM demonstrates the ability of the road network to accommodate the mobility of people in North Sulawesi province is still

below the minimum service standards. Based on the value of the index of accessibility and mobility index and the status of the road network linking major ports with the hinterland show a fairly high connectivity between the main port with its hinterland.

c) Level Of Connectivity between the Growth Center

Connectivity index score is the ratio between the movement of cargo from a place of origin and destination with a total cargo in and out of the area. Connectivity variables used are the number of visits of ships in port, the number of fleets that it serves, the number of shipping companies, fleet capacity, and the number of routes, serving between provinces.

TABLE 5 INDEX MATRIX OF CONNECTIVITY MARITIME TRANSPORTATION REGIONAL SULAWESI

Province	NS	GRT	CS	SES	WS	SS
NS	0,08	-	-	-	-	-
GRT	0,06	0,11	-	-	-	-
CS	0,18	0,16	0,32	-	-	-
SES	0,04	0,02	0,19	0,03	-	-
WS	0,04	0,01	0,10	0,02	0,00	-
SS	0,36	0,28	0,42	0,29	0,33	0,58

Source: Data Processing, 2014

Sea transport connectivity in Sulawesi shows that the province has a high level of connectivity with other provinces in Sulawesi is a province of South Sulawesi. Level of connectivity Central Sulawesi province with other provinces shows fairly good value, while the connectivity between each other provinces is low. The provinces that have high levels of sea transport connectivity is very low with the other provinces in Sulawesi is the province of West Sulawesi. This shows that the rate of sea transport connectivity for cargo in the region of Sulawesi still need improvement considering sea transport has an important role in the distribution of cargo between centers of major growth.

IV. CONCLUSION

Strategy development of infrastructure networks in Sulawesi Corridor, among others, the Port of Bitung and Makassar is a port that plays an important role in Sulawesi Corridor. The second strategic position of the port is a great opportunity to develop. Bitung port should be able to utilize the role of Hub International Port to the Asia Pacific market, while the port of Makassar is one of the logistics chain in the national pendulum system. Pantoloan port and harbor Gorontalo has the power to take advantage of long-term opportunities. The port of Manado, Kendari, Toli-Toli and Pare-pare still face a variety of threats and internal weaknesses. Increased port capacity needed to reduce internal weaknesses and improve service performance.

Route network development in Sulawesi to support the connectivity between PKN in the Sulawesi region by developing coastal shipping network west corridor linking PKN Maminasata Sulawesi, Mamuju PKW, and PKN Palu. Development of route network in the region of Sulawesi to support connectivity between PKN with FGM and the leading areas in Sulawesi among others the development of multiple

tissues cruise short distances (short sea shipping) linking PKN Manado - Bitung with centers of regional activities in coastal areas north and coastal the south coast, the development of short-distance shipping network (short sea shipping) in the southern coastal region of Gorontalo Province and in the southern coastal areas of South Sulawesi province.

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