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The Development of the Logistic Transportation Networks to Support the Development of Hinterland Kolaka Regency

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Abstract: The Development of the Logistic Transportation Network to Support the Regional Development of the Hinterland of Kolaka Regency. This study aims to analyze the demand for transportation of logistic, knowing the network infrastructures and explain the logistic transport network development strategy, using secondary data and interviews. Using the method of analysis of the origin-destination is simple regression and SWOT. The results showed that the transportation demand of the entring logistics is a results industries, building materials, logistics of basic needs of local communities and the hinterland. The logistic out is the result of the local region's natural resources and hinterland. Of the projected sea port infrastructure was inadequate for the needs until 2018. The priority development of the logistic transport networks is to improve services to the port infrastructure as the central node out of the logistic and an increase in the classification of the road to the hinterland.

Keywords: Transport, Network, Logistics, Hinterland

I. INTRODUCTION

Transport infrastructure network is a factor supporting economic development for the region [1], but the problems of transport, especially logistic transportation infrastructure network is a major issue that always gets more attention from the government. It is always a major issue ancient times until today. The problems Transportation of logistics is an ongoing problem and will even continue to rise, in tune with the population growth, population dynamics and social and economic demands are growing.

It was, occurred in the port of Kolaka Regency as the central knot movement of logistics, the volume of the flow of logistic increase strongly about 38.13% in the last five years [2,3] due to the development and natural resource products hinterland of Kolaka Regency continues to increase, but it is not in time to developing a network infrastructure. Based on the description of the problem is necessary conducted research how the handling flow of logistic continues to increase the readiness of the existing network infrastructure to create a distribution of logistic effectively and efficiently.

II. METHODS OF STUDY

The transportation demand of the logistics was assessed on the needs of the local area and hinterland by looking at population and economic growth in the region. Transport network analysts use patterns of origin-destination, so found the area of transportation services of logistics [4], the measurement of the level of service in transport node using flow forecasting logistics transport of logistics with simple regression [5] then forecasting results as a basis for forecasting the needs of the port facility.

The SWOT analysis is a tool which can be used for the analysis of the development strategy of logistic transportation by maximizing the strengths and opportunities simultaneously and can minimize your weaknesses and threats [6]. The SWOT analysis is used to determine policy strategy in the development of the transport network in the region hinterland logistic transport of Kolaka Regency. Furthermore, to formulate the right strategy with the use of force and the availability of existing resources in the face of competition in the outdoor environment or to gain a comprehensive strategy. This research is descriptive and qualitative, is a case study by conducting surveys and field observations. The object of research conducted on sea ports and the ferrry port of Kolaka Regeny, Southeast Sulawesi province of Indonesia. The location of this research can be seen in Figure 1.

Figure 1. Locus of Research

III. RESULTS AND DISCUSSIONS

The Transportation Demand of the Logistics

The pattern of movement of logistic transportation in the discussion was assessed from the interaction destination and origin of logistic transport from the port of Kolaka, to and from the hinterland is the regional development/physical project, warehouse/depot, or commercial areas, and vice versa. The destination of the logistics can be seen in Table 1.

Table 1. Stuff Sign in Ferry Port and Sea of Kolaka

Port	Origing	Type of Logistics	Information
Ferry Crossing	Makassar Enrekang Malino Sidrap,Wajo dan Bone	Staple Food materials buildings Vehicles (Cars and New) Electronic logistics Vehicle Equipment Exavator New truck Furniture Household appliance vegetable Onion Rice Chicken Egg	Moda crossings Trucks and Pick Up
Sea Ports	Biringkassi, Tarjun, Kalimantan, Surabaya, Bengkulu, Bima NTB	Cement Fertilizer Iron, Tegel, and Materials buildings Coal Onion	Bulk and packaged
	Surabaya	Staple food (instant noodles, drinks, cooking oil, flour, etc.) Iron Tile Building material Salt	Container

Source: The Results of the Field Survey, 2016

Table 2. Exit of Logistics in the Port Crossing and Sea of Kolaka

Port	Origin	Type of Logistics	Information
Ferry Crossing	Makassar	Cacao bean Clove Pepper Coprah Seaweed Fish Shrimp Crab Wood Patchouli oil Empty bottle	Moda crossings Trucks and Pick Up
	Enrekang, Sidrap, Bone	Wood Empty trucks Pick Up Empty	
Sea Ports	Surabaya	Wood Palm Kernel CPO Iron and Plastic Waste	Bulk
	Surabaya Makassar	Copra Chocolate Clove Pepper Seaweed	Container

Source: The Results of the Field Survey, 2016

Based on the analysis of the origin-destination that the Kolaka port serves the local area and hinterland (Kolaka, East Kolaka, Konawe and Bombana). Potential demand for transportation of logistics in the hinterland Kolaka, are industrial products, foodstuffs, buildings/constructions originating from outside the Southeast Sulawesi (Surabaya and Makassar) and the results of Natural Resources come from the local area and hinterland (East Kolaka Regency, Konawe, and Bombana), Patterns transportation movement of logistics can seen in Figure 2.

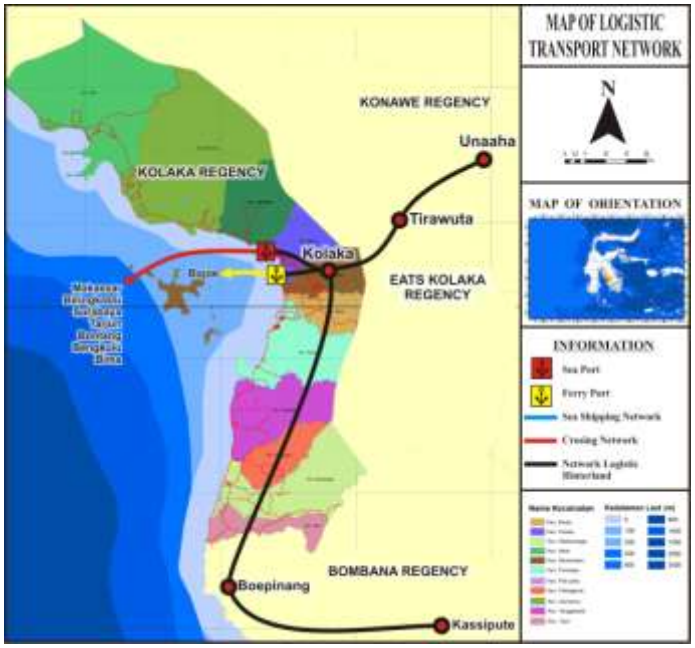

Figure 2. The pattern of movement of logistics transportation

The condition of the Infrastructure Knot Logistics

The number of vehicles down at the ferry port in Kolaka by regression in 2016 amounted to 18 709 units, in 2021 amounted to 28.270 units, in 2026 amounted to 38 806 units, 2031 amounted to 49 893 units, and year 2036 amounted to 61 341 units. The number of vehicles up by multiple regression projections are obtained in 2016 amounted to 15 778 units, in 2021 amounted to 24 614 units, in 2026 amounted to 36 030 units, 2031 amounted to 49.007 units, and in 2036 amounted to 63 046 units in the form of graphs projected up and down in Kolaka ferry port can be seen in Figure 3.

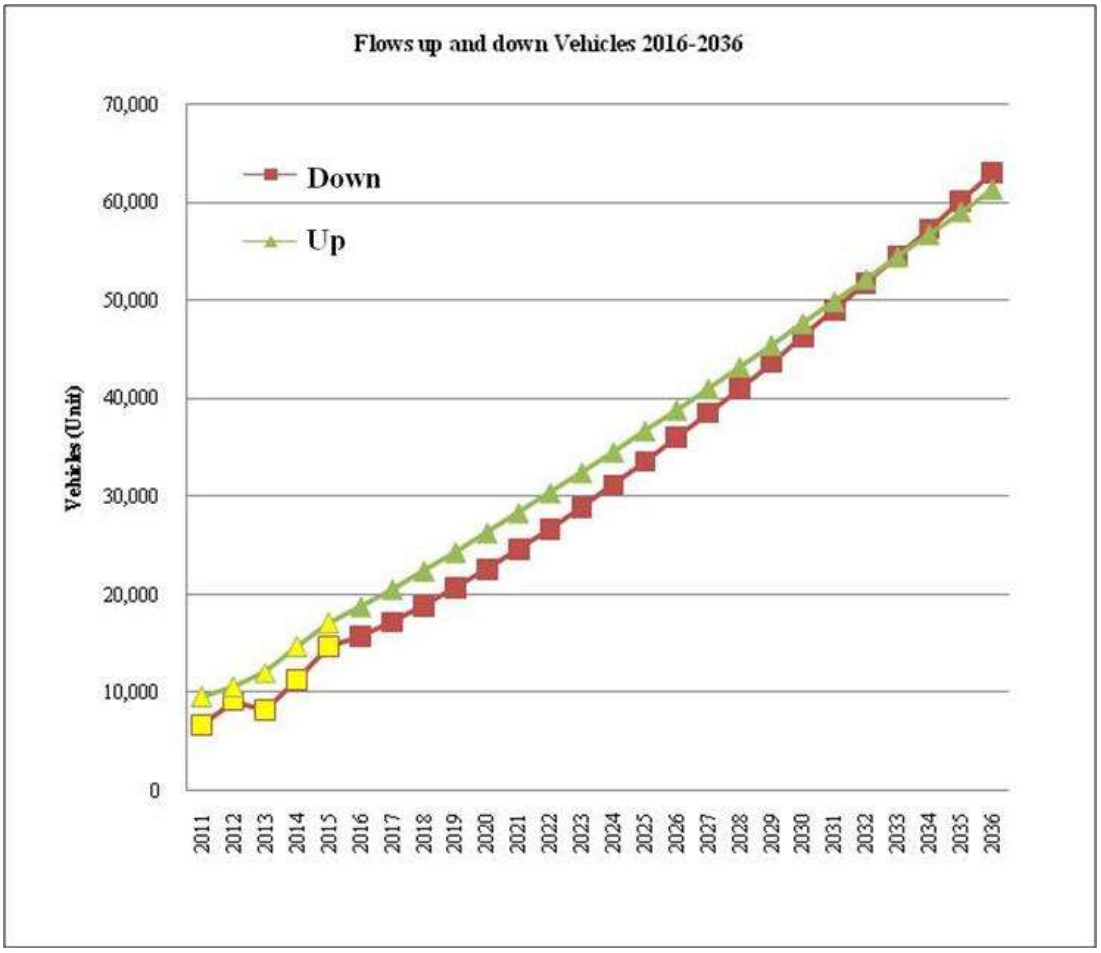

Figure 3. Graph growth in the flow of logistic vehicles 2016-2036

From the results of forecasting the number of up-down the vehicle will be determined demand for port services crossing of Kolaka. The number down vehicles will be used in the calculation of the performance due to larger than the amount of load. Calculation of port performance can be seen as follows:

Port Capacity:

- The number of dock = 2 docks
- Capacity Pier = 2 ships
- Call Ship = 3 x 365 = 1 095 ships / year
- Time mooring = 2 hours
- The capacity of the boat dock = 2/2 hours (time Loading/unloading)
  = 2 boats x 24/2 = 24 ships / day
  = 24 x 365 = 8760 ships / year

The capacity of the dock today as much as 8760 ships/year with ferry port of Kolaka serve three ships/day, so that in one year serving as many as 3x365 = 1095 ships/year with a carrying capacity of 14704 vehicles/year, so the carrying capacity of the vehicle per ship:

$$\text{Capacity/ship} = \frac{capacity\ \ per\ year}{call\ ships\ per\ year}$$
$$= \frac{14704}{1095}$$
$$= 13{,}42 \sim 14 \text{ vehicles/ship}$$

The number of vehicles transported in 2036 according to the forecast is 63 046 units, so the numbers of ship visits in 2036 are:

$$\text{Visits ship} = \frac{Total\ \ freig\ ht\ in\ 2036}{Capacity\ \ per\ ship}$$
$$= \frac{63046}{14}$$
$$= 4.503 \text{ ships}$$

So the facility of the pier does not need to be developed because of the capacity of the pier is now capable of serving 8,760 ships per year while in 2036 the number of ship visits is estimated at 4,503 ships.

Flow call ships at sea port ocean based on the projection with the projection of regression with population growth and the GDP as pariabel x then obtained projections of 2016 amounted to 221, in 2021 amounted to 311 call, 2026 by 398, 2031 by 482, and in 2036 amounted to 563, to the ship call growth of 4.6% per year. In graphical form the results projected in the port of call ship the Oceasn Sea Port of Kolaka can be seen in Figure 4.

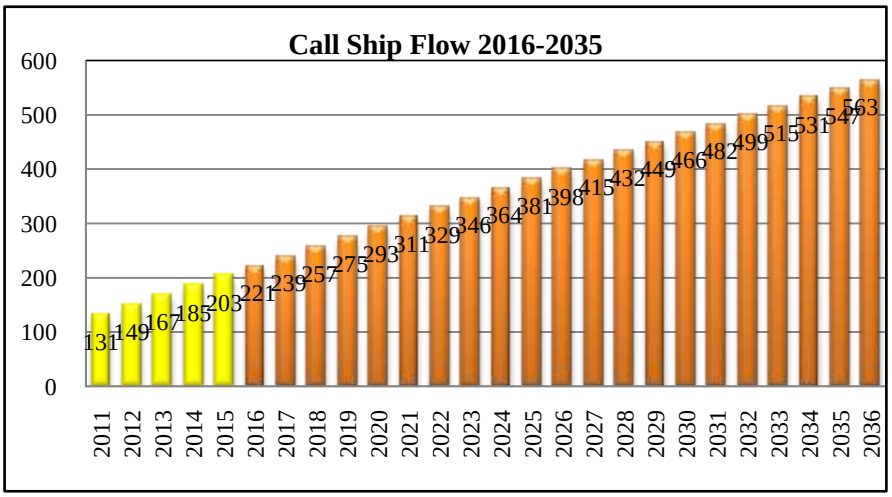

Figure 4. The resulting graph projection ships call in 2016-2036

The projected results of the call ships used to calculate the BOR. The BOR is the ratio between the amounts of usage time of each pier provided with the amount of time is ready for operation during the period (month / year) in the percentage [7]. The level of utilization of the dock can be based on the study of the PELRA General of Sea Transportation of the Republic of Indonesian [8] giving linkage between the utilization rate of the dock can be seen in Table 3 as follows:

Table 3. Utilization Rate dock

Total Dock	Utilization Rate Dock
1	0,55
2	0,60
3	0,60
4	0,60
5	0,65
6	0,70
7	0,70
8	0,75
9	0,75
10	0,80

Source: Diktor General of Sea Transportation

$$\text{BOR} = \frac{\text{Total } (\text{Lenggth Ship} + \text{space}) \text{ x The amount of time late}}{\text{Length Pier x 24 x Day Calendar}} \text{x100\%}$$

Where:
- The length of the pier = 150 meters
- The length of the ship = 65 meters
- Spacing between ship = 5 meters
- Retention Time = 24 hours
- Time available = 365 days x 8 hours = 2920 hours

Capacity:
- Capacity = 2 ships
- Retention time = 24 hours
- Capacity = 2 ships / 24 hours
  = 2 boats x 8/24 = 2 boats / 3 days
  = 2 boats x 8/24 x 365 = 242 ships/year

The calculation results of the BOR of Sea Port Ocean can be seen in Table 4:

Table 4. The BOR's prediction of the Ocean Sea Ports of Kolaka

Year	Call Ship	BOR
2015	203	47,53 %
2018	257	60,18 %
2026	398	93,20 %
2036	563	131,83 %

Source: The Results of the analysis, 2016

From the above table can be seen the BOR in 2018 by the number of ship visits 257 60% <60.18% means that in that year had to be carried deep sea port facility development of Kolaka, there are two solutions in development:

- Knowing the needs of pier length in order to provide the level of utilization of developing a dock. By using the formula [2].

$$\text{Length Pier} = \frac{\text{Total } (\text{Length Ship} + \text{space}) \text{x Total of Retention Time}}{\text{60\% x 24 x Time avalaible}}$$

- Reduction in retention time to speed up loading and unloading. By using the formula [2].

$$\text{Retention Time} = \frac{\text{60\% x Length x Available Time}}{\text{Call Ship x (Length Ship + Space Ship)}}$$

The result of the calculation time efficiency needs of the pier and retention the ship, by using a value of the BOR and flow of ship visits can be seen in Tabel 5:

Table 5. Prediction need long dock and retention time

Year	Call Ship	BOR	Length Pier (m)	Retention Time (hour)
2015	203	47,53 %	150	24
2018	257	60,18 %	155	23
2026	398	93,20 %	233	15,35
2036	563	131,83 %	330	10,92

Source: The results of the Analysis, 2016

The Strategy Development of the Logistic Transport Networks

The development of transport networks in Kolaka Regency or logistics to its hinterland has been traversed by the national road network, but the classification of the road has not been able to support heavy vehicles. Development of sea port facilities must be improved to be able to achieve efficiency in transportation costs and effective in terms of safety and security, but they are constrained in the speed and timeliness.

In accordance the SWOT analysis, based on data identifying the internal and external aspects of the discussion of logistics transport movement patterns (Table 5), it can be proposed several concepts for the application of Kolaka Regency and its hinterland;

1. Improve services on the primary knot in Kolaka port along with an increase in the flow of logistics Kolaka and its hinterland.
2. Developing industrial / processing and warehousing Natural Resources results thus enhancing the local economy and its hinterland. Such conditions will improve the movement of traffic in Kolaka. It lowers the capacity of the existing traffic services, requiring management of road network development gradually and increase the capacity of the existing road network
3. Warehousing / depot or an industrial area in Kolaka Regency as center shift/modal transfer of logistic, to transport logistics has a good network pattern,
4. The main knot of Kolaka port is developed network connectivity both nationally and internationally, to see the needs of the logistics. In this case, the result of industrial and natural resources owned by Kolaka Regency and its hinterland.

Table 5. Identify the internal aspects of the strengths and weaknesses and the external aspects of the opportunities and threats

	Strengths	**Weaknesses**
Internal	The flow of logistics grew strongly in seaports (38.13% tonnes/5 years) the flow of containers began giving speeches January 2016 had an increase (47% bpx/month), one of the factors influence the increase in population and the GDP hinterland.	Kolaka port as a distribution center container/logistics to the territory of Kolaka Regency, East Kolaka, Konawe, and Bombana, Good Technology has not been matched.
	Kolaka port as distribution center container/logistics to the territory of Kolaka Regency, East Kolaka, Konawe, and Bombana. With the current loading and unloading logistics increased strongly.	The classification of roads for movement of logistic transport to the hinterland and vice versa does not yet support for heavy vehicles
	The movement of logistic transport to the hinterland and vice versa has supported national road network	The absence of a central location logistics / warehousing so that the distributions of logistics are still using traditional systems.
	The economic of the region of Kolaka Regency continues to increase, especially agriculture, mining, trade and construction.	
	Opportunities	**Threat**
External	The policies of Southeast Sulawesi, Kolaka is as a central processing/warehousing and distribution of Natural Resources.	Increasing the number of loading and unloading of logistics and containers are not accompanied with the transportation technology at seaports knot of Kolaka.
	The development policies of the railway network Kendari-Kolaka.	In the next 2 years Kolaka port capacity no longer able to serve the call of the ship.
	The issue of policy creation and operation of an integrated logistics center or cargo terminal.	Logistics vehicles/trucks that distribute logistics directly to stores, depots and trade center, causing a potential bottleneck
	Economic development potential of transport in line with the policy of regional development in Southeast Sulawesi	The hinterland of Kolaka Regency threatened behind its development, because the results of the production of Natural Resources area on the export to Surabaya.

5. Kolaka Port has an intense relationship to the movement of warehousing in Kolaka and surrounding area (East Kolaka, Konawe and Bombana), require increased functionality and classification of road networks that support it.
6. For production areas that have natural resources can contribute to progress rapidly, it is necessary to reduce commodity export raw materials, but developing the processing industry in the district of Kolaka Regency.

IV. CONCLUSION

The potential of the transportation demand of logistics in the hinterland of Kolaka, are industrial products, foodstuffs, buildings/constructions originating from outside the Southeast Sulawesi (Surabaya and Makassar) and the results of Natural Resources come from the local region and the hinterland (East Kolaka Rengency, Konawe, and Bombana), the potential demand for logistic transport is influenced by population and economic growth rate in this case the GDP.

The infrastructure network of the logistics transport to its hinterland of Kolaka Regency centered on the port and the main knot node Kolaka connected by national road network, but has not supported by the good roads clasification for heavy vehicles (logistics vehicles). Infrastructure capacity at the port knot in Kolaka

Regsncy, to knot ferry crossing port of Kolaka still fulfill for the next 20 years, while for knot sea port ocean pier Kolaka need to increase capacity in 2018.

The development strategy of network transport logistics to the hinterland of Kolaka Regency to be effective and efficient, if it were necessary to consider planning the development of its hinterland by developing the vertices of the movement of logistics, especially knot ports to meet the increased flow of logistics rise strongly, improving service and developing the network connectivity both nationally and international. Development of the primary knot in this case Kolaka developed into an industrial center/processing and warehousing for Natural Resources results hinterland.

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