

The Optimizing of Land Facilities at Port of Kolaka in Southeast Sulawesi Province

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Abstract

The optimizing of land facilities at port of Kolaka in Southeast Sulawesi Province. To improve service to port operations, optimal port facilities are needed in order to realize safety, security and comfortability for passengers, vehicles and the ship itself. The land facilities at the port which have great importance are passengers' waiting rooms, gangways, and weighbridge. This study aims to clearly determine the level of optimization of port land facilities utilization, using observational data and secondary data to compare factual conditions with conformity to standard norms of guidelines and criteria, to analyze data, researchers compare those with ideal conditions based on two government regulations (1) Decree of the Minister of Transportation Number KM 52 of 2004 concerning Land Port Management; (2) Decree of the Director General of Land Transportation Number SK.2681 / AP.005 / DRJD / 2006 concerning Land Port Operation. The result of this study showed that the facilities at the Inland Port of Kolaka had not been utilized optimally and accordingly which at some points can endanger passengers safety. Therefore, improvements are needed to optimize the function of these facilities.

Keywords: port facility, passengers, safety

Introduction

The existence of the Inland Port of Kolaka has strategic value because it is a terminal point which connects Kolaka Regency (Southeast Sulawesi) and Bone Regency (South Sulawesi). With a distance of about 85 miles and a travel time of 8 hours, the route of the Kolaka-Bajoe is expected to shorten the travel time of people as well as cargo from the mainland of Southeast Sulawesi to Bone Regency (round trip). There are four shipping companies provide ferry services on this route, they are PT. Afta Trans Mandiri, PT. Jembatan Nusantara, PT. Jembatan Laut Ferry, and PT. Juli Rahayu. The number of ships operating at the Inland Port of Kolaka is 6 units. According to Ilham, Chairul I, et al. (2019) in conducting an evaluation of ferry port land facilities, it is necessary to identify ferry port facilities and calculate the area of land facilities on passenger productivity. To improve the ferry services, adequate port facilities are needed in order to create safety, security, and comfortability for passengers, vehicles, and ships. Therefore, improvements must be made to the land facilities at the Inland Port of Kolaka. The Inland Port of Kolaka has facilities on the land area, including the passenger waiting rooms, gangways, and weighbridge stations. The land facilities currently have not provided optimal services for the

customers. The waiting rooms, for example, cannot be used optimally because of many damages due to poor maintenance. The passengers then have to stand uncomfortably when they wait for services. In addition to that, the passenger passageways/gangways, which should be able to separate passenger access and vehicle access, are not directly connected to the deck area of the ship. According to Zeryanda, Andi (2014) in evaluating port services, it is necessary to predict the number of passengers and vehicles that will use the port in the following year. This causes disorganized traffic of passengers and vehicles when they board or disembark the vessel.

In order to improve the safety, security and convenience of transportation services at the port, the government has set standard related to facilities and infrastructure at the port as outlined in the Minister of Transportation Decree No. 52 Year 2004 Concerning the Management of the Inland Ports and the Director General of Land Transportation Decree No.SK.2681 / AP.005 / DRJD / 2006 concerning the Operation of the Inland Ports. This research was conducted to further examine several problems, such as analyze the needs of passenger waiting rooms and the function of gangways, weigh bridges and portals, as well as how the internal movement patterns of passenger and vehicle flows. The objectives of this

study are overview of the conditions and problems regarding to land side facilities of port, specifically fir waiting rooms, the function and layout of the gangway, weighbridge and portal, and system of passenger and vehicle flow patterns at the Inland Port of Kolaka.

Methodology

This research was conducted at Kolaka port, which is located in Kolaka Regency, Southeast Sulawesi Province. This port serves the crossing of Southeast Sulawesi and Bone Regency. The primary data were obtained directly from the source or based on direct observation in the field. In obtaining primary data the authors used the observation methods. The authors observed directly the number of trips that were served by ships in a day, passenger arrival and departure productivity for 15 days, and land facilities data. Secondary data are supporting data obtained based on observations of other parties and in the form of a written report. Based on this method, data are collected by visiting several institutions to obtain secondary data. The author collected data from various related institutions, such as PT. ASDP Indonesia Ferry (Persero) Kolaka Branch and BPTD Region XVIII Southeast Sulawesi Province. The results of the passenger productivity survey data that have been collected are then processed to obtain predictions of the number of passengers in the future. Data processing is done by analyzing passenger growth, from processing this data then calculating the area of the effective waiting room. Then conducted a survey of the traffic flow of vehicles entering the port and the pattern of passenger flow compared with regulations SK.2681 / AP.005 / DRJD / 2006 Concerning the Operation of the Inland Ports.

Results and Discussion

Analysis of passenger growth

In this calculation, passenger growth is predicted based on the realization of transport productivity over the past 3 years. To find out passenger growth, an exponential method is used. Before analyzing the number of passengers over the next 3 years, first calculate the rate of growth each year using the following formula:

$$r = [(Pt/Po)^{1/t}] - 1 \quad (1)$$

Note:

r = rate of population growth

t = time period

Pt = Total population in the t-year

Po = Total population in the base year

To analyze the growth of passengers in the next 3 years, the authors calculate the number of passenger growth each year. The last 3 years of data are used for the analysis. The productivity of the inland port of Kolaka for the past 3 years is described as **Table 1**. The number of passengers has decreased due to transportation from Kolaka Regency to Bone that can be reached through other transportation such as air transportation where travel time is shorter than ferries transportation.

The calculation of the population growth rate is as follows:

$$r = [(Pt/Po)^{1/t}] - 1$$

$$r = [(173910/181333)^{1/3}] - 1$$

$$r = -0,05$$

Note: If the value of $r > 0$, it means there is positive population growth or an increase in the number of populations from the previous year. If $r < 0$, it means that the population growth is negative or there is a reduction in the population from the previous year. If $r = 0$, it means a change in population from the previous year.

After obtaining the annual growth rate, an estimation can be made for the next 3 years using the following formula:

$$P_t = P_0 e^{rxt} \quad (2)$$

Note: Pt = Total population in the t-year

e = An exponential number of 2.718281828

r = rate of population growth

t = time period

$$P_t = P_0 e^{rxt}$$

$$P_{2019} = P_{2018} e^{-0,05 \times t}$$

$$P_{2019} = 173910 e^{-0,05 \times 1}$$

$$P_{2019} = 165428,3$$

From the calculations above, it can be obtained that the rate of passenger growth in 2019 is 165428.3 people.

The results of the prediction of passenger productivity from 2019 to 2021 can be seen in the following **Table 2**.

Table 1. Passenger productivity at the inland port of Kolaka in the last 3 years

No.	Year	The number of passengers
1	2016	226968
2	2017	181333
3	2018	173910

Source: The Land Transportation Management Center (BPTD), 2019

Table 2 The prediction of passenger productivity

No.	Year	The number of passengers
1	2019	165428
2	2020	148885
3	2021	110175

Table 3. The Passenger Productivity Data at the Port of Kolaka

No	Date	Trip	Passenger
1	09 April 2019	3	406
2	10 April 2019	3	437
3	11 April 2019	3	401
4	12 April 2019	3	300
5	13 April 2019	3	442
6	14 April 2019	3	369
7	15 April 2019	3	443
8	16 April 2019	3	231
9	17 April 2019	3	417
10	18 April 2019	3	283
11	19 April 2019	3	288
12	20 April 2019	3	225
13	21 April 2019	3	346
14	22 April 2019	3	188
15	23 April 2019	3	202
Total			4978

Analysis of the port main facilities

To analyse the port main facilities, we can use the following formula:

$$A_1 = a \cdot n \cdot N \cdot x \cdot y \quad (3)$$

Note :

A₁ = the waiting room area (m²)

a = Area required for one person (1.2 m²/ person)

n = Number of passengers on one ship

N = Number of ships arriving / departing at the same time

x = concentration ratio (1.0 - 1.6)

y = Fluctuation Ratio (1.2)

The following **Table 3** shows the number of passengers at the Port of Kolaka for 15 days.

From the data in **Table 3**, the number of passengers in 15 days was 4978 people with the number of operations were 45 trips in 15 days. To calculate the concentration ratio, the average number of passengers in 15 days (332 people) is used.

concentrationratio (x)

$$= \frac{\text{the no. of passenger} *}{\text{Average number of passenger} * \text{x number of trips/15 days}}$$

*during the survey

$$= \frac{4978}{332 \times 45} = 0,3 \quad (4)$$

From the data above in Table 2, the prediction number of passengers in 2019 is 165428 people with the number of trips per day is 3 trips. It can be predicted that the number of trips per year is 3 trips x 365 days = 1080 trip per year. To calculate the concentration ratio, the average passenger capacity of the ship (325 people) can be used.

Concentration ratio (x) =

Prediction of passenger in 2019

The average of passenger capacity x number of trips per year

$$= \frac{165428}{325 \times 1080}$$

$$= 0,47$$

The authors took the concentration ratio in 2019 with the consideration that the prediction of 2019 reflects the productivity of passengers in the future. Therefore, the port operators can plan the necessary needs based on the prediction.

To determine the number of passengers in a ship, data are taken from the ships' characteristics operating at the Port of Kolaka. The number of passengers is based on the average of passenger carrying capacity which are 325 people. While the number of ships arriving and departing is calculated only 1 (one) because there is only 1 (one) available dock at the port. Thus, the calculation for the waiting room in 2019 is as follows:

$$A_1 = a * n * N * x * y$$

$$A_1 = 1,2 * 325 * 1 * 0,47 * 1,2$$

$$A_1 = 219,96 \text{ m}^2$$

The real condition of the waiting room has a size of 15 m x 21 m. It is recommended to add more facilities such as canteen or health counter to optimize the area.

To calculate the number of chairs needed in the waiting room, the allocated area for the chairs in the waiting room must be calculated first. Minimum width of pedestrian space is 1.5 m

To calculate the number of chairs needed in the waiting room, the allocated area for the chairs in the waiting room must be calculated first.

The number of chairs needed in the waiting room:

$$= \frac{219,96}{1,2} - (1,5 * 15)$$

$$= 164,55 \sim 165 \text{ chairs}$$

From the analysis, it is found that the total area of the waiting room is 219.96 m².

The analysis of weighing vehicles (weigh bridges)

A weighbridge has a function to measure vehicles' weight so that it can adjust the weight that can be supported by the movable bridge (MB) and adjust the cargo arrangement onboard the ship. However, not all vehicles with cargoes are

weighed. According to the Regulation of the Minister of Transportation Number 103 Year 2017 Concerning the Arrangement and Management of Vehicles Transported Using Ferry Services, each inland port is required to provide weighbridge facilities. In this case, the Port of Kolaka has a weighbridge but unfortunately, the weighbridge is not used optimally.

The analysis of passenger exit/entry (gangway)

To improve services at the Port of Kolaka and to ensure the safety of passengers when passengers enter the ship, a safe route for passengers to enter and exit the ship (the gangway) is required. At the present, the Port of Kolaka already has gangway facilities, such as separation access between passengers and vehicles heading to MB Pier. However, the gangway at the port of Kolaka is not connected to the sideramp which causes frequent encounters of vehicles and passengers in front of the rampdoor of the ship. This condition can endanger passengers who want to board the ship and obstruct vehicles that will enter the ship. The solution of this problem is to optimize the function of the gangway that has not been used optimally since it was built because the gangway is not directly connected to the sideramp. The optimal functioning of the gangway will reduce the encounters between vehicles and passengers in front of the rampdoor of the ship. The Existing condition of the gangway as seen in Figure 1.

The Analysis of passenger and vehicle flow pattern

Here is the current passenger and vehicle flow pattern at the port of Kolaka: The passenger and vehicle flow pattern at the port of Kolaka:

1. The current condition at the port of Kolaka

a. The existing condition of passengers

The passengers enter the gate and directly proceed to the passenger counter. After the passengers buy tickets at the passenger counter, they proceed to the terminal building that has a waiting room inside to wait for the ship. After the ship arrives, the passengers proceed to the jetty through the gangway. However, when the passengers want to board the ship, they have to pass the rampdoor together with the vehicles which enter the ship. This condition can threaten the safety of passengers.



Figure 1. The existing condition of the gangway (Gangway is not connected to sideramp).

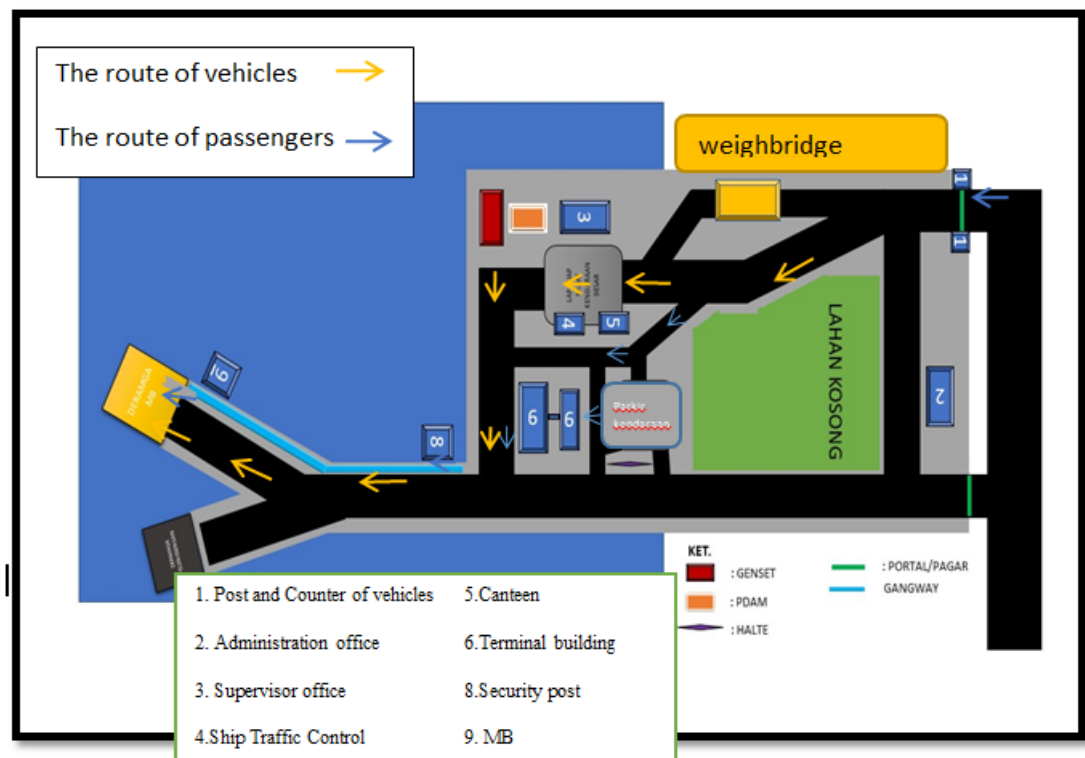


Figure 2. The existing condition of the flow pattern at the Inland Port of Kolaka.

b. The existing condition of the vehicles

The vehicles are taken to the port area and parked at the parking lot. The vehicles carrying cargoes are not measured for the weight and the height. The vehicles that will be transported onboard are

completed by tickets bought at the counter located in the terminal building. Then, the vehicles are taken to another parking lot to wait for the loading time. Next, the vehicles are moved to the rampdoor to enter the ship.



Figure 3. The plan of portal layout.

Problem solving

Waiting room for passengers

Based on the analysis, the effective area for the waiting room at the inland port of Kolaka is 219.96 m². There are 165 chairs needed to complete the facility.

Weighing the vehicles (weighbridge and portals)

From the results of the analysis, each inland port must be provided with weighbridge and portal facilities. At the Inland Port of Kolaka, the weighbridge facility should be used accordingly so that vehicles that carry cargo can be weighed. The arrangement of portal positions must be in accordance with the Regulation of the Minister of Transportation Number 103 Year 2017 Concerning the Arrangement and Management of Vehicles Transported Using Ferry Services. Based on the regulation, they must be placed before the ticketing counter.

Renovating the Passenger Entry/Exit route (Gangway)

From the results of the analysis, it is important that the gangway used by the passengers be connected to the sideramp of the ship. Therefore, the authors suggest that the gangway at the Inland Port of Kolaka must be renovated. It is important

that the gangway can be directly connected to the sideramp to avoid the passengers' access through the rampdoor.

The plan of passenger and vehicle flow pattern is described as follows:

- a. The planned condition for the passengers
 - 1) Passengers enter the gate.
 - 2) Passengers buy ticket at the counter and wait in the waiting room.
 - 3) Passengers pass through the gangway and proceed to the ship through the sideramp.
- b. The planned condition for the vehicles
 - 1) The vehicles are taken through the gate.
 - 2) The vehicles which carry cargo must be weighed using weighbridge so that the information about the weight of the cargo can be obtained.
 - 3) The vehicles which have passed the weighbridge are then completed with tickets as required.
 - 4) The vehicles which have got tickets then wait at the ready-to-be-loaded zone which is separated from the pick-up zone and the vehicles which are going to the ship.

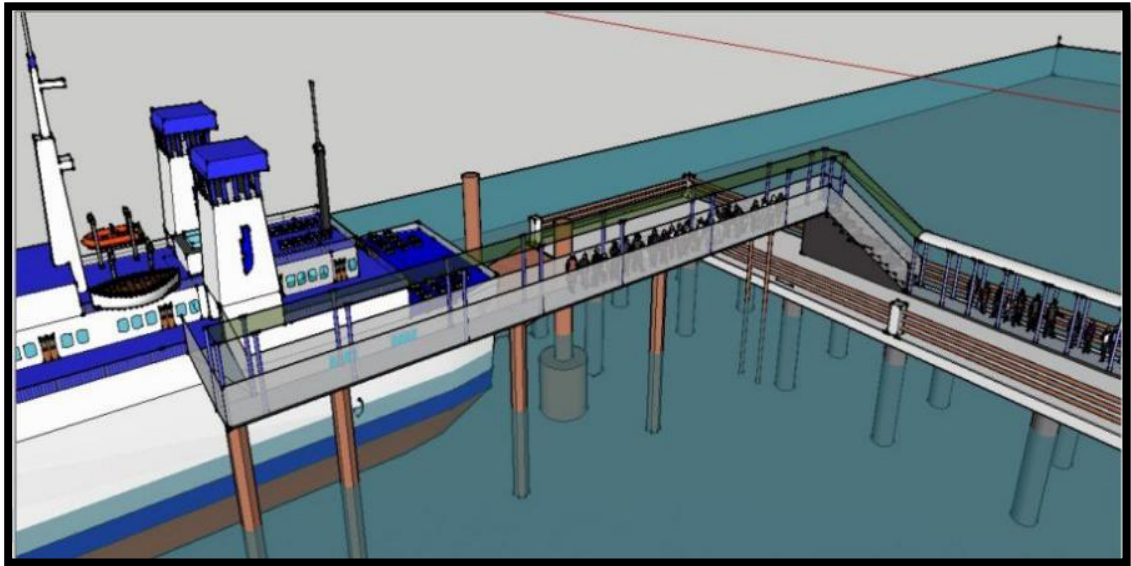


Figure 4. The gangway layout plan.

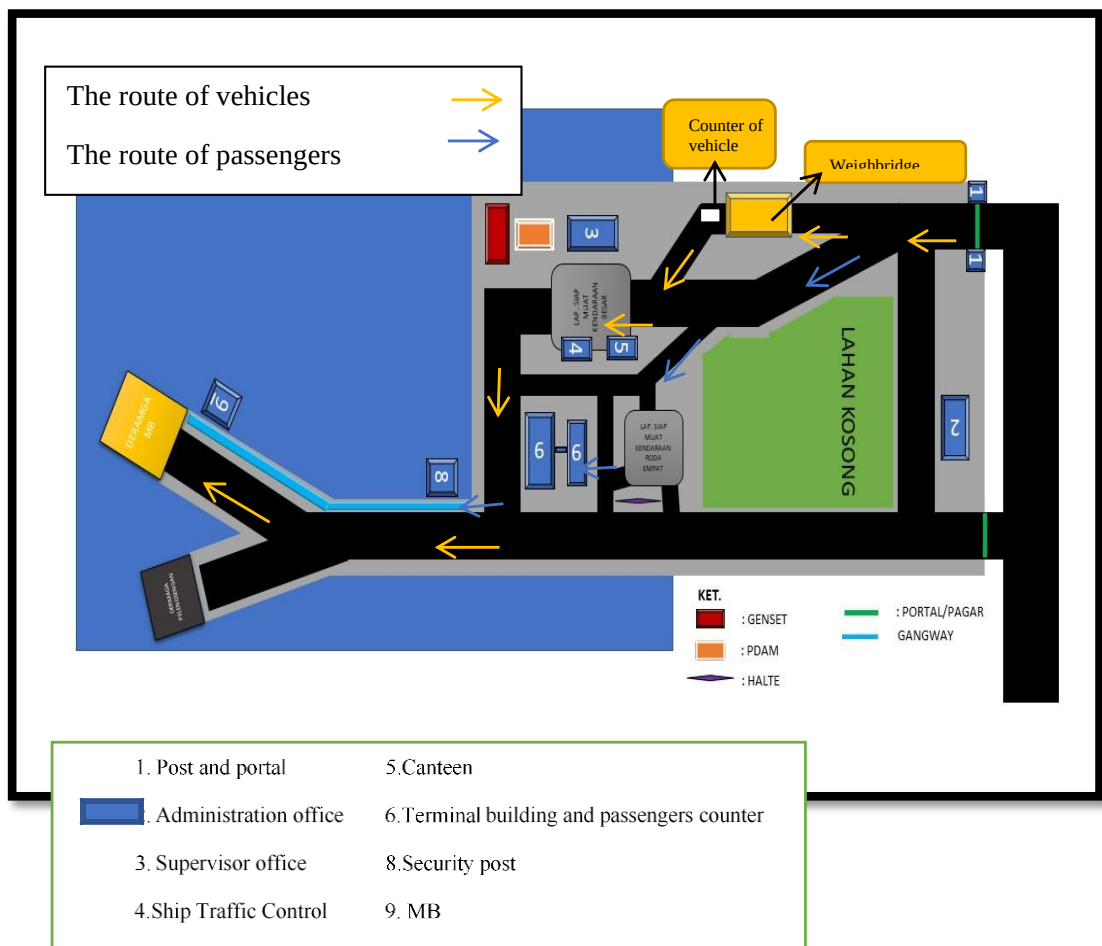


Figure 5. The plan of passenger and vehicle flow pattern.

Conclusion and Recommendations

The results of the analysis showed that the current waiting room area exceeds the ideal area. It is recommended to add more facilities such as canteen or health counter to optimize the area.

Supporting facilities need to be added to the waiting room. For example, the chairs for the passengers and fan or air conditioners for the room. It is also necessary to add entertainment facilities such as television and charger counter to make the passengers comfortable.

The gangway at the Port of Kolaka is not connected to the deck of the ship. Therefore, when boarding or disembarking from the ship, the passengers will encounter with the vehicles. This condition can endanger the safety of passengers. In the Decree of the Director General of Land Transportation Number: SK.2681 / AP.005 / DRJD / 2006 Concerning the Operation of the Inland Ports, it is explained that gangway is a place to separate the access of passengers and vehicles by using a track/bridge separated by a fence that connects directly to the ship's deck. Thus, it is recommended that the gangways at the inland Port of Kolaka be connected directly to the ship's deck.

The Inland Port of Kolaka currently has a weighbridge, but the weighbridge is not functioning properly. According to the Regulation of the Minister of Transportation Number 103 Year 2017 Concerning the Arrangement and Management of Vehicles Transported Using Ferry Services, each vehicle and its cargo that will be transported using a ferry must be weighed. Therefore, it is recommended that the weighbridge is used according to its function which is to measure the vehicles.

At the Inland Port of Kolaka, there is also no portal facility available for vehicles which makes the vehicles that will be carried onboard the ship cannot be measured. The measurement is aimed at the safety of port facilities and for the safety of the voyage. According to the Regulation of the Minister of Transportation Number 103 Year 2017 Regarding Vehicle Arrangement and

Management Using Ferry Transport Services, each inland port is required to provide portal facilities that are placed before the vehicle counter.

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