

Performance Of Vehicle Loading Effectiveness On The Simanindo - Tigaras Flying Ship On Samosir Island

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Abstract

Transportation is the physical activity of moving goods or passengers from one place to another, which has a significant role in economic, social, cultural, and political development. With transportation, the distribution of these goods and production results can be carried out and reach all regions evenly, ultimately increasing regional and national income, opening up isolated areas, and increasing revenue for the local region and the country in general. The increasing interaction of transportation between economic and social activities in an area causes the need for a beneficial transportation role to assist movement in that area. A region's economic and social development is also strongly influenced by the transportation system, which will ultimately increase the region's growth. The success of the development of a part is strongly influenced by the role of transportation as the lifeblood of an area, including political, economic, social and cultural life as well as defense and security. To realize the mission championed by transportation, namely to improve the quality of services and management of transportation services that are reliable, competitive and provide added value that can support the recovery of the national economy, especially in the field of River Lake and Crossing Transportation (ASDP), the port as one of the transportation nodes is considered it is necessary to improve the quality and quantity as well as performance in serving port service users. Simanindo Port, located in Samosir Regency, North Sumatra Province, is a commercial port

managed by the Department of Transportation which serves public services to carry out crossing activities that connect the Simanindo Port in Samosir Regency with Tigaras Port in the Simalungun Regency area.

Keywords: Effectiveness of Loading Vehicles on the Crossing ship.

INTRODUCTION

Transportation is the physical activity of moving goods or passengers from one place to another, which has a significant role in economic, social, cultural, and political development. With transportation, the distribution of these goods and production results can be carried out and reach all regions evenly, ultimately increasing regional and national income, opening up isolated areas, and increasing revenue for the local region and the country.

The increasing interaction of transportation between economic and social activities in an area causes the need for a beneficial transportation role to assist movement in the area. A region's economic and social development is also strongly influenced by the transportation system, which will ultimately increase the region's growth. The success of the development of an area is strongly influenced by the role of transportation as the lifeblood of a room, whether political, economic, social, or cultural, as well as defense and security. To realize the mission championed by transportation, namely to improve the quality of services and management of transportation services that are reliable, competitive, and provide added value that can support the recovery of the national economy, especially in the field of River Lake and Crossing Transportation (ASDP), the port as one of the transportation nodes deemed necessary to improve the quality and quantity as well as performance in serving port service users.

Simanindo Port, located in Samosir Regency, North Sumatra Province, is a commercial port managed by the Department of Transportation which serves public services to carry out crossing activities that connect the Simanindo Port in Samosir Regency with Tigaras Port within the Simalungun Regency area.

The existence of the Simanindo: Tigaras crossing is significant because this port can support economic development efforts and as the lifeblood of land transportation due to the disconnection by Lake Toba.

Security and safety are prioritized in the transportation system as good service delivery. Safety is shown to service users and ship operators and vehicles both in port and while sailing as with the regulation and handling of vehicle cargo on board, the better the arrangement and handling of cars on board, the better the level of security and safety of vehicles on board and conversely, the worse the arrangement and handling of vehicles on board ships, the worse the level of security and safety of vehicles on board crossings.

Problem Formulation

Based on the background described above, and so that the target does not deviate from the main problem, the authors make a problem formulation, namely:

- 1) What is the load factor of the Ferry ship operating at Simanindo Port on the Simanindo - Tigaras route?
- 2) What is the load capacity of the vehicle following the SUP used by SPM based on SK.4608/AP.005/DRJD/2012 concerning Minimum Service Standards for Crossing?
- 3) How is the vehicle cargo handling system to keep it safe and secure on the ship?

Objectives and Benefits

Objectives

The objectives of this study are as follows:

- a) To determine the load factor of the Ferry ship operating on the Simanindo - Tigaras route;
- b) To find out the vehicle load capacity following the SUP used by SPM based on SK.4608/AP.005/DRJD/2012 concerning Minimum Service Standards for Crossing Transport;
- c) To know the vehicle cargo handling system to keep it safe and secure on the ship.

Benefits

The benefits of this research are:

- a) The results of this study are expected to be used as input for the Regional Government of Samosir Regency for transportation planning in developing ferry transportation at Simanindo Port for the future;
- b) In particular, this research is intended to provide input to the ferry management related to the condition of facilities and infrastructure as well as the operation of the Simanindo - Tigaras ferry transportation system so that it can be used as

material for consideration in improving facilities, infrastructure, and operational performance in the future.

Scope

So that the main issues to be discussed cannot be separated from the targets to be achieved, it is necessary to limit the scope of the problem, namely by analyzing the breadth of facilities and prioritizing the arrangement and handling of vehicles based on the Production Unit (SUP) and based on the deck area of the vehicle on the ship. Ferry and vehicle cargo handling systems on board. This study does not analyze the effect of waves on ship stability.

METHODOLOGY

Collecting Data Method

Several approaches are used to obtain data as reference and comparison in collecting this data. This approach is adapted to the conditions and location of the place where the object is located. The data obtained in this study are as follows:

a) Primary Data

Is data obtained directly from the source, observed and recorded from what happened in the field. In getting primary data, the author uses the following methods:

1) Observation

Is to make direct observations of the actual conditions in the area, namely observations on the state of the vehicle handling and regulation system on ships at Simanindo Port, both in terms of service, loading and unloading activities of vehicles and disembark passengers. The data obtained are:

(a) Vehicle productivity data for 2 weeks

(b) Data on the distance between vehicles on the ship

(c) Data on the area of the ship's deck

2) Interview

Is a way of collecting data obtained by holding questions and answers for interviews with resource persons who can be trusted.

b) Secondary Data

is data obtained indirectly, but already exists in every relevant agency. This secondary data can be obtained by using the following methods:

1) Library Method

That is by studying theory, literature, and lecture modules related to the problem to be studied as a theoretical basis for analyzing and solving problems.

2) Institutional

This method collects data from agencies related to research, namely the Central Bureau of Statistics of Samosir Regency and the Central Agency for Regional Development and Development, namely population data, GRDP, RTRW and other data.

Data Analysis

So that the theories on the chosen topic cannot be separated from the intended target, the authors limit the following:

Calculating carrying capacity based on the area of the ship contained in PM. 18 of 2012 concerning amendments to the decision of the minister of transportation number KM. 58 of 2003 concerning the mechanism for determining and formulating the calculation of tariffs for ferry transportation is determined based on the division of groups and the amount of the Production Unit (SUP) of each vehicle, as follows:

Table 1. Distribution of Vehicle Production Units (SUP)

No.	Group	Type of Vehicle	SUP
1.	I	Bicycle	1,6 SUP
2.	II	Motorcycle below 500 cc and wheelbarrow	2,8 SUP
3.	III	Large motorbike above 500 cc and 3 wheel vehicle	5,6 SUP
4.	IV a	Jeep, saloon car, minicab, minibus, microbuses up to 5 m in length	21,63 SUP
	IV b	Pick up, Station Wagon with a length of up to 5 m	17,98 SUP
5.	V a	Bus car with a size of 7 m	37,39 SUP
	V b	Goods car (truck) / tank with a size of 7 m	31,55 SUP
6.	VI a	Bus car with a length of 7 – 10 m	63,28 SUP
	VI b	Goods car (truck) / tank with a length of 7 – 10 m and the like, and towing carts without trailers	52,33 SUP

Source: PM No. 18 Year 2012

Arrangements for the placement of loading vehicles in accordance with the width of the ship's deck and calculated based on the SUP contained on each ship, and also adjusted to the SPM (Minimum Service Standards) for vehicles on board.

The system for regulating and handling vehicle loads is contained in the Regulation of the Director General of Land Transportation Number: SK.4608/AP.005/DRJD/2012 concerning Minimum Service Standards for Crossing Transportation, the provisions of which are contained in Appendix II concerning Minimum Service Standards for Vehicle Loading. The minimum distance between vehicles as follows:

- a. Right : Minimum 60 cm
- b. Left : Minimum 60 cm
- c. Front and back : Minimum 30 cm
- d. To the wall : Minimum 60 cm

In determining the maximum capacity of the vehicle on the ship, several analytical techniques are needed that are supported by existing theories, so that results can be found that are in accordance with the target. The theories and analytical techniques used are as follows:

Calculation of Load Factor (Load Factor)

According to the 2010 Crossing Transportation Book, load factor is the number of passengers and vehicles carried by the ship compared to the capacity provided. The formula needed to determine the loading factor of the ship is:

$$LF = \frac{KP}{KT} \times 100 \%$$

Note:

LF = Loading Factor

KP = Capacity Used (SUP Used)

KT = Capacity Available (SUP Available)

SUP Used = Number of Vehicles Unloaded x SUP of Each Ship

Available SUP = Vehicle Deck Area x Number of Boat Trips 1 SOUP

Average Load Factor =
$$\frac{\text{unloading load factor} + \text{loading load factor}}{2}$$

Calculation of Ship SUP Amount

To find out the ship's carrying capacity based on area, it is necessary to first calculate the ship's area with the following formula:

The ship's empty space = $L \times B$

Where:

L : Length of empty space of ship

B : Width of empty space of ship

The area of empty space using the formula above is only for square-shaped buildings, while for buildings with other shapes, it is adjusted to factors based on the theory of building space. After knowing the effective area of the ship, the ship's carrying capacity in SUP is searched using the following formula:

$$\text{Transport Capacity} = \frac{\text{ship's empty space}}{\text{One SUP}}$$

$$\text{Where one SUP} = 0.73 \text{ m}^2$$

This provision is obtained from KM. 58 of 2003 concerning Stipulation of Ferry Transport Tariffs.

Percentage of Vehicles per Group

$$\text{Percentage of Vehicles per Group} = (\text{Number of Vehicles per Group}) / (\text{Total of All Vehicles}) \times 100 \%$$

Calculation of the Number of Vehicles that Can Be Transported

RESULTS AND DISCUSSION

Discussion

The problem faced at the Simanindo Ferry Port is the lack of a system for regulating and handling vehicle cargo on board the ship. This is due to the lack of awareness and understanding of ship operators about the importance of controlling vehicles on ships, namely based on the rules regarding Minimum Service Standards (SPM) contained in the Regulation of the Director General of Land Transportation Number:

SK.4608/AP.005/DRJD/2012 concerning Standards Minimum Service for Crossing Transportation so that when carrying out loading and unloading activities it is possible to damage the vehicle. Sometimes people in the vehicle are difficult to get out of the vehicle due to the distance between vehicles that does not comply with the minimum requirements.

a. Means

Facilities are an important factor in transportation because moving from one place to another requires a tool that can be used to make a move. The ferry transportation facilities owned by Simanindo Port are 1 unit of Ferry Motor Ship, namely KMP. SUMUT II is a government-owned ferry managed by the North Sumatra Provincial Transportation Service and PT. North Sumatra Infrastructure Development. The following are the characteristics of KMP data. SUMUT II:

b. Infrastructure

The existing Infrastructure at Simanindo Port consists of supporting Infrastructure for operational activities and services to service users who will cross as well as a place to dock in supporting vehicles' loading and unloading process. The following is the existing infrastructure data at Simanindo Port:

c. Port Operations

Each port must have a fixed schedule of ship departures and arrivals, so the certainty of ship departures and arrivals will be known. The right ship departures and arrivals program at a port will improve that port's performance.

At the beginning of its operation, KMP. SUMUT II is carried out for the Sipingingan - Muara route, one of Samosir Regency's crossings. Meanwhile, the Simanindo – Tigaras route is carried out by KMP. SUMUT II. Because of KMP engine maintenance reasons. SUMUT II, which is not optimal to travel every day than KMP. SUMUT II, which serves the Simanindo – Tigaras route, exchanged with KMP. SUMUT I serves the Sipingingan – Muara route. This ferry boat exchange was only carried out in April 2014.

Figure 1. Vehicle Productivity Graph

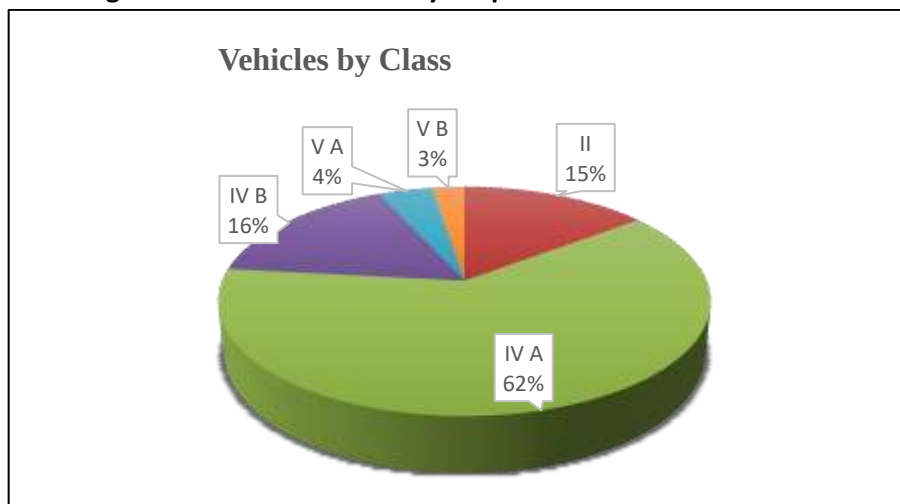


Table 2. Number of Loaded Vehicles Average KMP. SUMUT I

Vehicle	Load (Unit)	Amount of SUP
Group II	1	2,80
Group III	-	-
Group IVA	9	194,67
Group IVB	2	35.96
Group VA	1	37,39
Group VB	-	-
Total	13	270,82

Source: Survey Results, 2019

From the data above, the results of the SUP used are:

Table 2. Large Vehicle SUP above KMP. SUMUT I

SUP Available	224.74 SUP
SUP Used	270.82 SUP

Source: Survey Results, 2019

Load Factor is the ratio between the capacity used and the capacity available on the ship. In this analysis, the load factor used will be calculated by comparing the SUP available on the ship with the SUP used on the ship. The available ship SUP is a comparison between the area of the ship and the amount for one SUP multiplied by the number of ship trips. Where, 1 SUP = 0.73m². This provision is obtained from KM. 58 of 2003 concerning Stipulation of Ferry Transport Tariffs.

Table 3. Number of loading and unloading vehicles per group for two weeks

Vehicle Class	Unloading		Loading	
	Total Vehicles	SUP	Total Vehicles	SUP
Total Trip	56	56	56	56
Grup II	19	53,20	31	86,80
Grup III	-	-	1	5,60
Grup IVA	380	8219,40	482	10.425,66
Grup IVB	83	1492,34	99	1.780,02
Grup VA	38	1420,82	40	1.495,60
Grup VB	5	157,75	14	441,70
TOTAL	525	11.343,51	667	14.235,38

Source: Survey Results, 2019

Table 4. Deck Area and Vehicle Capacity in SUP Units KMP. SUMUT II

Vehicle Deck Area (m ²)	Ship Capacity (SUP)
164.06/0.73 = 224.74	224.74

Source: Analysis Results, 2019

Table 5. Amount of SUP at KMP. SUMUT II

Available Capacity (SUP)	Used Capacity (SUP)	
	Unloading	Unloading
Number of trip	56	56
224.06 x 56 = 12,585.44	11,343.51	11,343.51

Source: Analysis Results, 2019

Table 6. Load Factor Unloading Vehicles for Two Weeks

Load Factor (%)		Load Factor Average Unloading
Unloading	Loading	
90.13	113.11	90.13

Source: Analysis Results, 2019

Table 7. Percentage of Vehicles per Vehicle

Class	Number of Vehicles (Unit)	Percentage (%)
Group II	50	4.19
Group III	1	0.08
Group IVA	862	72.32
Group IVB	182	15.27
Group VA	78	6.54
Group VB	19	1, 59
TOTAL	1,192	100

Source: Analysis Results, 2019

Table 8. Large SUP Vehicle above KMP. SUMUT I

SUP Available	SUP Used
224.74	270.82

Source: Analysis Results, 2019

RESULT**Plan Conditions Based on Vehicle Dimensions****Table 9. Number of Vehicles at KMP. SUMUT II**

Vehicle Class	Number of Vehicles	Width (m²)	Total Vehicle
Vehicle	Vehicle		Width (m²)
Class II	4	2.94	11.76
Group IV A	4	12.17	48.68
Group IV B	1	12.17	12.17
Class VA	1	21 .08	21.08
Group VB	1	19.53	19.53
TOTAL	11		113.22

Source: Analysis Results, 2019

Capacity Based on Similar Vehicles**Table 10. KMP Similar Vehicle Scenarios. SUMUT II**

Vehicle Class	Number of Vehicles		Number of Vehicle Areas (m²)	
	Goods	Passenger		Goods
Category IV	6	6	73.02	73.02
Group V	2	2	39.06	42.16
TOTAL	8	8	112.08	115.18

Source: Analysis Results, 2019

Based on the table above, it can be concluded that the total area used in the scenario for goods vehicles is 112.08 m² with a maximum capacity of goods vehicles, namely 8 vehicles, while the total SUP used in the scenario for passenger vehicles is 115.18 m² with a maximum capacity of passenger vehicles, namely 8 vehicles.

Table 11. Comparison of Number of Vehicles between Real Conditions and Planned Conditions of KMP. SUMUT II (Based on SUP)

Class Vehicle	Real	Condition Planned Condition (Based on SUP)		
	Mixed	Mixture		Mixed
Category II	1	4	Category II	1
Group III	-	-	Group III	-
Group IVA	9	5	Group IVA	9
Group IVB	2	2	Group IVB	2
Group VA	1	1	Group VA	1
Group VB	-	1	Group VB	-
Total	13	13	Total	13
Total SUP	270.82	224.25	Total SUP	270.82

Source: Analysis Results, 2019

Table 12. Comparison of Number of Vehicles between Real Conditions and Planned Conditions of KMP. SUMUT II (Based on Deck Area)

Class Vehicle	Real Condition	Planned Condition (Based on Deck Area)		
	Mixed	Mixture	Vehicles of Goods	Passenger Vehicles
Group II	1	4	-	-
Group III	-	-	-	-
Group IVA	9	4	-	6
Class IVB	2	1	6	-
Group VA	1	1	-	2
Group VB	-	1	2	-
Total	13	11	8	8
Total Deck	Width 157.89 m²	113.2 m²	112.08 m²	115.18 m²

Source: Analysis Results, 2019

1. KMP load factor. SUMUT I at Simanindo Port is very high, reaching 90.13% to 113.11%. Therefore, it is necessary to regulate and handle the vehicle loading system on the ship.

2. Required limits regarding vehicle load capacity at KMP. SUMUT I, both based on the ship's SUP and based on the ship's deck area.
3. Provide awareness and understanding to operators and officers on board the ship regarding the importance of vehicle regulation on the distance between vehicles on the ship based on the rules regarding Minimum Service Standards (SPM) contained in the Regulation of the Director General of Land Transportation Number SK.4608/AP.005/DRJD/ 2012 concerning Minimum Service Standards for Crossing Transportation.

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