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EVALUATION OF THE REALIZATION OF SHIP TRIP ACHIEVEMENTS ON THE MERAK – BAKAUHENI ROUTE AT MERAK FERRY PORT BANTEN PROVINCE

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ABSTRACT

Merak Ferry Port with the Merak – Bakauheni route located in Banten Province, operates 30 ships in March with operational hours of 24 hours/day, resulting in many trips per pier. However, the realization of trips often falls short due to several factors such as breakdowns, vehicle breakdowns, facility damage, bad weather, and ship speed being below the minimum.

he existing condition of ship trips per pier resulted in a target of 153 trips, with 103 trips realized, a difference of 50 trips, and a trip percentage of 68%. The result of ship service time in the waters produced an evaluation of effective time against berth working time, with 56 points meeting the standard and 28 points not meeting the standard. The effective time against berth working time met the standard. The conformity of sailing time for executive ships was 60 minutes, and for regular ships, it was 96 minutes. The realization of sailing time was 27 trips, while the scheduled trips were 115, showing that the conformity of sailing time to the realization and scheduled trips did not meet the standard. The results of this study call for faster loading and unloading processes, more effective penalties, provision of tow trucks, heavy equipment, technicians specializing in different types of vehicles, ship performance indicators, side ramp improvements, and changes in ship operation patterns.

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1. INTRODUCTION

Ferry transportation is a mode of transport that connects to land via a port. As a public service element, a port is a general transportation facility with local, regional, national, and international connections. These connections are not limited by administrative boundaries or the interests of other governments or countries. Therefore, the importance of a port makes countries and regions with such potential consider it a great blessing, serving as a valuable asset for both the region and the nation. One of the important ports on a national and local scale, particularly in the context of regional autonomy, is the Merak Ferry Port [1].

Merak Ferry Port is a ferry transport hub in Indonesia, located in Banten Province, specifically in the Sunda Strait, providing crossings from Java Island to Sumatra Island. It is one of the busiest ports, with

hundreds of ferry trips daily, serving passengers and vehicles traveling to Sumatra through Bakauheni Port in Lampung Province [2]. The distance between Merak Port and Bakauheni Port is 15 miles, with the standard ferry speed at the executive dock being 15 knots and at the regular dock 10 knots. The travel time is 108 minutes for the regular dock and 60 minutes for the executive dock, with dock time being 72 minutes for the regular dock and 60 minutes for the executive dock. The Merak – Bakauheni route is served by 66 ships. Merak Ferry Port consists of two types of dock locations: the executive dock (Dock VI) and the regular docks (Docks I, II, III, IV, V, and VII.

According to the Indonesian Ministry of Transportation Regulation No. PM 104 of 2017 on the Management of Ferry Transportation, it is required that a ship on a ferry route must operate within 30 (thirty) days of the approved operating schedule without any unclear reasons for non-operation. Based on a letter from the Head of the Class II Land Transportation Management Center of Banten, Directorate General of Land Transportation, Ministry of Transportation of the Republic of Indonesia, Number: AP.005/2/5/BPTD-Banten/2024 regarding the Ferry Schedule for the Merak – Bakauheni Route for the March 2024 period, there are schedule adjustments and service times for vehicles and passengers, which include service patterns and ship operational regulations. Merak Port has 66 ships ready to operate, with 30 ships operating in March and 24-hour operations per day, resulting in many trips per dock. However, the realization of the number of trips per day often falls short of the scheduled targets due to several obstacles. The most frequent obstacles occur at the moorings or docks. Dock time is often reduced due to vehicle breakdowns during the loading and unloading process, causing congestion on the ship, damage to the ramp door, dock repairs, and delays in ship arrival and departure times. Other hindrances include natural conditions such as bad weather, where high sea waves cause difficulty for ships to dock. Additionally, there are repairs on ships, and some ships fail to meet the minimum speed requirement.

2. METHOD

The method used to collect data as a reference for this research is the quantitative method, which processes numerical data with the aim of describing general principles [3]. This research uses a population and sample by including the entire population of docks, consisting of 7 docks: regular docks I, II, III, IV, V, and VII, and the executive dock VI. The sample used is selected through purposive sampling, a non-random sampling technique in which the researcher knows the characteristics of the population and selects certain individuals to serve as the sample [4]. Based on information from the Merak Port regulatory authority, the following ships were prioritized for selection.

a. Dock I (Regular) = KMP. Virgo 18
b. Dock II (Regular) = KMP. Mabuhay Nusantara
c. Dock III (Regular) = KMP. Wira Artha
d. Dock IV (Regular) = KMP. ALS Elvina
e. Dock V (Regular) = KMP. Menggala
f. Dock VII (Regular) = KMP. BSP I
g. Dock VI (Eksekutive) = KMP. Batu Mandi

Existing Condition of Ship Trips per Dock

The existing condition of ship trips per dock presents the target number of ship trips operating during the 14-day survey period, based on the letter from the Head of the Class II Land Transportation Management Center of Banten, Directorate General of Land Transportation, Ministry of Transportation of the Republic of Indonesia, Number: AP.005/2/5/BPTD-Banten/2024 regarding the Ferry Schedule for the Merak – Bakauheni Route for the March 2024 period. The ships operating in the field may not necessarily align with the scheduled trips, so the data on realized ship trips is presented. The realized trips in the field consist of two types of achievements: regular ship achievements and substitute ship achievements. The calculation used for the field realization in analyzing the existing condition of ship trips per dock focuses on regular ships, as they are aligned with the target trips from the determined schedule. The daily comparison percentage is between the target trips and the realized trips of regular ships.

The steps to determine the existing condition of ship trips per dock are as follows.

a. Create a table of ships per dock, starting with the date the ship trip operates;
b. Create a table of target trips (number of ship trips per day based on the BPTD schedule);
c. Create a table of realized trips, consisting of regular ships and substitute ships (number of ship trips per day based on field realization);
d. Create a table of times and notes for ships that did not meet the scheduled trips;
e. Create a table of justifications (supporting reasons) for why the ships did not meet the trip targets; and

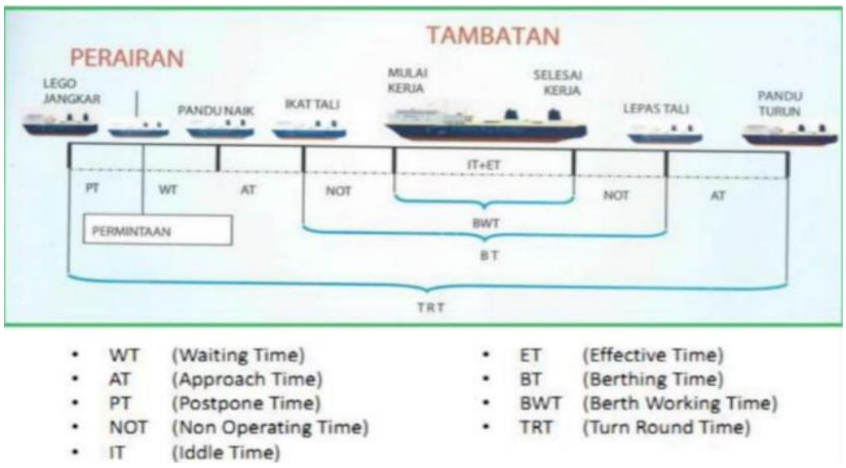
f. Calculate the percentage of total ships per dock in accordance with the number of trips during the survey period.

Ship Service Time in Waters

Ship service time in waters is calculated from the time the ship arrives at Merak Port until the time it departs from Merak Port. The ship service time includes ramp door opening time, ramp door closing time, berthing time (BT), berth working time (BWT), effective time (ET), non-operation time (NOT), and idle time (IT).

The steps for calculating ship service time in waters are as follows.

a. Create a table of trip dates and the number of ship trips per dock based on actual operating ships;
b. Present the ship's arrival time at Merak Port in WIB (Western Indonesian Time);
c. Present the ramp door opening time by adding 5 minutes to the ship's arrival time, based on the letter from the Head of the Class II Land Transportation Management Center of Banten, Directorate General of Land Transportation, Ministry of Transportation of the Republic of Indonesia, Number: AP.005/2/5/BPTD-Banten/2024, regarding the Ferry Schedule for the Merak – Bakauheni Route for March 2024, for the ramp door opening time in WIB;
d. Present the ramp door closing time in WIB;
e. Present the ship's departure time in WIB;
f. Calculate the berthing time (BT), or the time the ship is docked, from the ship's arrival time at Merak Port to its departure time from Merak Port in WIB;
g. Present the berth working time (BWT), or the time allocated for loading and unloading activities, based on the provisions from the letter from the Head of the Class II Land Transportation Management Center of Banten, Directorate General of Land Transportation, Ministry of Transportation of the Republic of Indonesia, Number: AP.005/2/5/BPTD-Banten/2024, regarding the Ferry Schedule for the Merak – Bakauheni Route for March 2024, which is 60 minutes or 1 hour;
h. Calculate the effective time (ET), or the actual time for loading and unloading, as the difference between the ramp door opening and closing times, in hours;
i. Calculate the idle time (IT), or wasted time, as the difference between berth working time (BWT) and effective time (ET);
j. Calculate the non-operation time (NOT), or non-working time, as the difference between berthing time (BT) and berth working time (BWT), in hours;
k. Assess the conformity of effective time (ET) to berth working time (BWT), where the time allocated for loading and unloading is 60 minutes or 1 hour, based on the letter from the Head of the Class II Land Transportation Management Center of Banten, Directorate General of Land Transportation, Ministry of Transportation of the Republic of Indonesia, Number: AP.005/2/5/BPTD-Banten/2024, regarding the Ferry Schedule for the Merak – Bakauheni Route for March 2024. The standard conformity is as follows.
   1) Conforms, if effective time (ET) < berth working time (BWT) < 60 minutes or 1 hour; and
   2) Does not conform, if effective time (ET) > berth working time (BWT) > 60 minutes or 1 hour.



Gambar 1. Ship Service Performance Diagram

Source: Muharam & Saputro (2022)

Sailing Time Conformity

The conformity of the ship's sailing time, or travel time, is presented by showing the existing conditions in the field and then comparing these conditions with the schedule outlined in the letter from the Head of the Class II Land Transportation Management Center of Banten, Directorate General of Land Transportation, Ministry of Transportation of the Republic of Indonesia, Number: AP.005/2/5/BPTD-Banten/2024, regarding the Ferry Schedule for the Merak – Bakauheni Route for the March 2024 period, as follows.

Table 1. Details of BPTD Letter Provisions on Sailing Time

DOCK	DOCKING MANEUVER TIME (minutes)	UNDOCKING MANEUVER TIME (minutes)	*SAILING TIME* (minutes)
EKSEKUTIVE	15	15	60
REGULAR	12	12	96

Source: Class II Banten Land Transportation Management Office (2024)

Based on Table 1, detailing the provisions of the BPTD letter regarding sailing time, the executive dock has a maneuvering time of 15 minutes for entry, 15 minutes for exit, and a sailing time of 60 minutes. The regular dock has a maneuvering time of 12 minutes for entry, 12 minutes for exit, and a sailing time of 96 minutes.

The steps for calculating the conformity of sailing time are as follows.

a. Create a table of trip dates and the number of ship trips per dock based on the actual operating ships;
b. Present the departure time at Bakauheni Port in WIB (Western Indonesian Time);
c. Add 15 minutes for executive ships and 12 minutes for regular ships to the departure time at Bakauheni Port in WIB;
d. Present the arrival time of the ship at Merak Port in WIB;
e. Subtract 15 minutes for executive ships and 12 minutes for regular ships from the arrival time at Merak Port in WIB;
f. Create a table of sailing time by comparing the actual field realization with the scheduled times: 96 minutes for regular ships and 60 minutes for executive ships;
g. Calculate the percentage of conformity of the realized sailing time in the field compared to the total trips made by ships per dock;
h. Assess conformity with the standards by considering the sailing time provisions based on the letter from the Head of the Class II Banten Land Transportation Management Office, Directorate General of Land Transportation, Ministry of Transportation of the Republic of Indonesia, Number: AP.005/2/5/BPTD-Banten/2024, regarding the Ferry Schedule for the Merak – Bakauheni Route for March 2024. The sailing time standard is 96 minutes for regular ships and 60 minutes for executive ships. The conformity standards are as follows.
   1) Conforms if the realized sailing time (ST) < scheduled sailing time (ST) < 60 minutes; and
   2) Does not conform if the realized sailing time (ST) > scheduled sailing time (ST) > 60 minutes.

3. RESULTS AND DISCUSSION

Based on the analysis of the research methods described, the following findings are obtained:

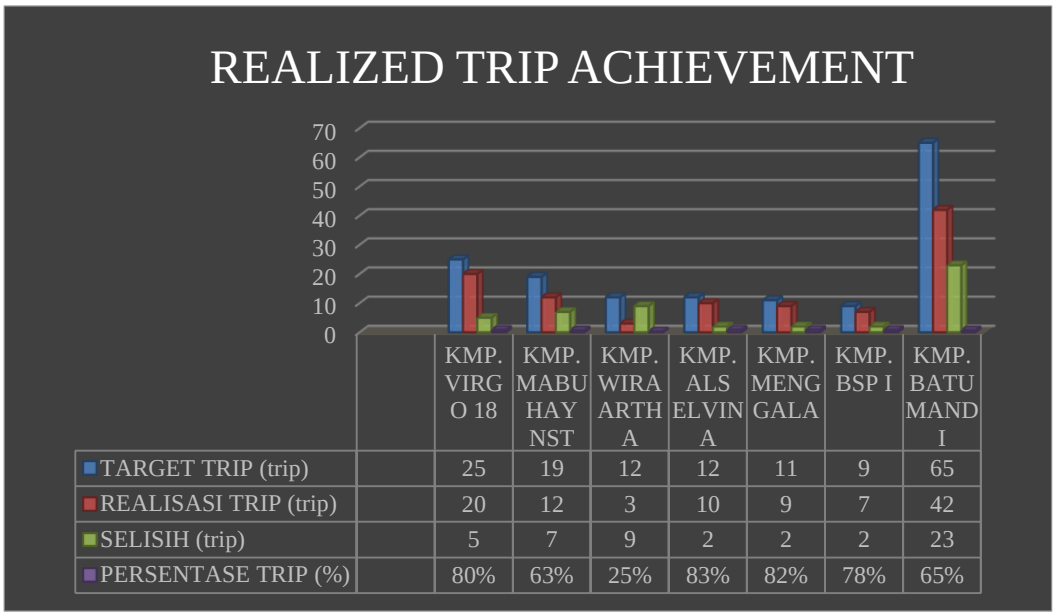
3.1. Analysis of Existing Conditions of Ship Trips per Dock

The analysis of existing conditions of ship trips per dock includes two categories of trip realization: regular ship trips and substitute ship trips. The realization of regular ship trips is used for comparison against the target trips specified in the letter from the Head of the Class II Banten Land Transportation Management Office, Directorate General of Land Transportation, Ministry of Transportation of the Republic of Indonesia, Number: AP.005/2/5/BPTD-Banten/2024, regarding the Ferry Schedule for the Merak – Bakauheni Route for March 2024. This is expressed as a percentage to assess the level of trip achievement for the ships. Substitute ship trips are not included in the target trips, as shown in Table 2.

Table 2. Comparison Data of Target Trips and Realized Trips

DOCK	SHIPS	TARGET (trip)	REALIZED (trip)	DIFFERENCE (trip)	PERCENTAGE (%)	DESCRIPTION

I	KMP. VIRGO 18	25	20	5	80%	Breakdown due to bad weather
II	KMP. MABUHAY NST	19	12	7	63%	Breakdown of 2 trips due to (speed 7 - 7.5 knots and bow ramp door issues) and 5 trips because the ship operated at another dock
III	KMP. WIRA ARTHA	12	3	9	25%	1 trip due to breakdown from bad weather and 8 trips due to damage to the hydraulic column of the movable bridge at Dock III
IV	KMP. ALS ELVINA	12	10	2	83%	Breakdown due to bad weather, 10 - 20 knots
V	KMP. MENGGALA	11	9	2	82%	Breakdown due to vehicle breakdown and bad weather, 10 - 15 knots
VII	KMP. BSP I	9	7	2	78%	Breakdown due to bad weather
VI (EKS)	KMP. BATU MANDI	65	42	23	65%	Breakdown due to bad weather, 10 - 20 knots, hydraulic bow ramp door issues, engine (generator) issues, and dock repairs
NUMBER OF TRIP		**153**	**103**	**50**	**476%**	
AVERAGE TRIP					**68%**	



Picture 2. Diagram of Trip Realization Over 14 Days in March 2024

Based on Table 2 and Picture 2, the data percentage comparing target trips and realized trips only uses the achievement of regular ship trips for calculations. The target trips for the 7 docks over 14 days amount to 153 trips, with the realized trips for regular ships being 103 trips. The difference

between the target and realized trips is 50 trips. This comparison of target and realized trips over 14 days results in an average percentage of 68%.

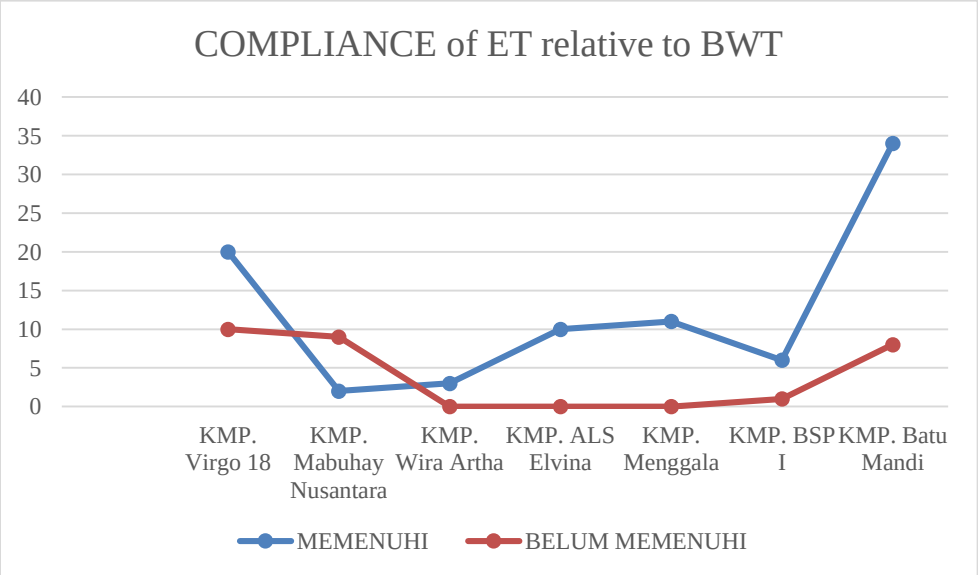
The factors causing the failure to meet trip targets can be categorized into internal and external factors. Internal factors include breakdowns (schedule disruptions) such as engine (generator) malfunctions, ships not reaching the minimum speed (7 – 7.5 knots), and natural conditions (bad weather) resulting in abnormal wind speeds of 10 – 15 knots and 10 – 20 knots. External factors include the obstruction of the hydraulic column of the movable bridge causing regular Dock II to be inoperative, dock facility repairs, and breakdowns of truck units.

3.2. Analysis of Ship Service Time in the Waters

The analysis of ship service time in the waters is based on the time from when the ship arrives from Bakauheni Port to Merak Port. According to the analysis, the effective time (ET) relative to berth working time (BWT) where the time provided for loading and unloading is 60 minutes or 1 hour, as stated in the letter from the Head of the Class II Banten Land Transportation Management Office, Directorate General of Land Transportation, Ministry of Transportation of the Republic of Indonesia, Number: AP.005/2/5/BPTD-Banten/2024, regarding the Ferry Schedule for the Merak – Bakauheni Route for March 2024, as shown in Table 3.

Table 3. Assessment of Effective Time (ET) Relative to Berth Working Time (BWT) for Ship Service Time in the Waters

DOCK		SHIPS	STANDARDS ET Relative to BWT (points)	
			MEETS STANDARD	DOES NOT MEETS STANDARD
I	REGULAR	KMP. Virgo 18	20	10
II	REGULAR	KMP. Mabuhay Nusantara	2	9
III	REGULAR	KMP. Wira Artha	3	0
IV	REGULAR	KMP. ALS Elvina	10	0
V	REGULAR	KMP. Menggala	11	0
VII	REGULAR	KMP. BSP I	6	1
VII	EKSEKUTIVE	KMP. Batu Mandi	34	8



Picture 3. Chart of Effective Time (ET) Relative to Berth Working Time (BWT) for Ship Service Time in the Waters

Based on Table 3 and Picture 3, the effective time (ET) relative to berth working time (BWT) meets the standard for KMP. Virgo 18 (Dock I Regular), KMP. Wira Artha (Dock III Regular), KMP. ALS Elvina (Dock IV Regular), KMP. Menggala (Dock V Regular), KMP. BSP I (Dock VII Regular), and KMP. Batu Mandi (Dock VI Executive). However, the compliance does not meet the standard for KMP. Mabuhay Nusantara (Dock II Regular). Thus, the effective time (ET), which is the actual time used for loading and unloading activities, exceeds the berth working time (BWT),

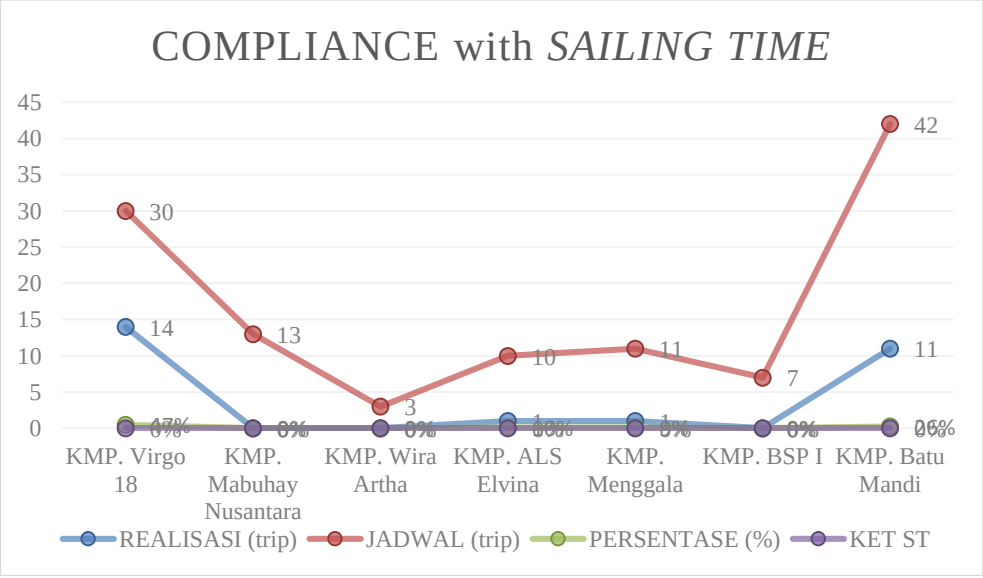
which is the time allocated for loading and unloading activities as set by the Head of the Class II Banten Land Transportation Management Office, Directorate General of Land Transportation, Ministry of Transportation of the Republic of Indonesia, Number: AP.005/2/5/BPTD-Banten/2024, regarding the Ferry Schedule for the Merak – Bakauheni Route for March 2024, which is 60 minutes or 1 hour, and this is in line with the established standard.

3.3. Analysis of Sailing Time Compliance

The analysis of sailing time (ST) compliance with the time specified in the letter from the Head of the Class II Banten Land Transportation Management Office, Directorate General of Land Transportation, Ministry of Transportation of the Republic of Indonesia, Number: AP.005/2/5/BPTD-Banten/2024, regarding the Ferry Schedule for the Merak – Bakauheni Route for March 2024, shows various levels of compliance for the sample vessels: KMP. Virgo 18 (Dock I Regular), KMP. Wira Artha (Dock III Regular), KMP. ALS Elvina (Dock IV Regular), KMP. Menggala (Dock V Regular), KMP. BSP I (Dock VII Regular), and KMP. Batu Mandi (Dock VI Executive). Compliance is assessed based on the sailing time requirements of 96 minutes for regular vessels and 60 minutes for executive vessels. The percentage and assessment of compliance with the sailing time standards for both realization and schedule are presented in Table 4.

Table 4. Data Comparison of Sailing Time Compliance Percentages for Realization and Trip Schedule

DOCK		SHIPS	REALIZED (trip)	SCHEDULE (trip)	STANDARDS *SAILING TIME* (ST)	
					PERCENTAGE (%)	DESC ST
I	REG	KMP. Virgo 18	14	30	47%	Does Not Meets Standard
II	REG	KMP. Mabuhay Nusantara	0	13	0%	Does Not Meets Standard
III	REG	KMP. Wira Artha	0	3	0%	Does Not Meets Standard
IV	REG	KMP. ALS Elvina	1	10	10%	Does Not Meets Standard
V	REG	KMP. Menggala	1	11	9%	Does Not Meets Standard
VII	REG	KMP. BSP I	0	7	0%	Does Not Meets Standard
VI	EKS	KMP. Batu Mandi	11	41	27%	Does Not Meets Standard



Picture 4. Percentage Compliance with Sailing Time Relative to Realization and Trip Schedule

Based on Table 4.63 and Figure 4.30, the graph comparing the percentage compliance of sailing time with realization and trip schedules indicates variability due to sailing time on each vessel per berth. The analysis shows that the actual sailing time differs from the scheduled sailing time across various vessels.

a. KMP Virgo 18 achieved 14 trips out of 30 with executive sailing time < 60 minutes, resulting in a compliance percentage of 47%.
b. KMP ALS Elvina achieved 1 trip out of 10 with regular sailing time < 96 minutes, resulting in a compliance percentage of 10%.
c. KMP Menggala achieved 1 trip out of 11 with regular sailing time < 96 minutes, resulting in a compliance percentage of 9%.
d. KMP Batu Mandi achieved 11 trips out of 42 with executive sailing time < 60 minutes, resulting in a compliance percentage of 26%

The analysis indicates that the actual sailing time for the specified vessels did not meet the standard compliance because the sailing time exceeded 60 minutes for executive vessels and 96 minutes for regular vessels.

Several factors may contribute to longer sailing times.

a. The difficulty of the vessel in front and/or the vessel itself in docking.
b. Difficulty in docking at other berths (either incoming or outgoing vessels). If a vessel is leaving the port, the incoming vessel may need to wait around the Port of Merak.
c. Problems experienced by the vessel in front at the berth, causing subsequent vessels to wait.

4. CONCLUSION

Based on the analysis, the conclusions are as follows:

a. The trip achievement for the Merak-Bakauheni crossing route, with a sample of 1 ship per berth over 14 days from March 4 to March 18, 2024, resulted in an average percentage of 68% for schedule and realization. Factors causing the trips not to be achieved can be categorized into internal and external factors. Internal factors include breakdowns (schedule delays) such as engine malfunctions (generators), the ship's speed not reaching the minimum (7-7.5 knots), and natural conditions (bad weather) causing abnormal wind speeds of 10-15 knots and 10-20 knots. External factors include hydraulic bridge pillar collisions causing regular berth II to be non-operational, berth facility repairs, and breakdowns of truck units.
b. The service time for ships on the Merak-Bakauheni route, with effective time (ET) compared to berth working time (BWT), indicates that the real-time used for loading and unloading is within the standards set by the Head of the Class II Banten Land Transportation Management Office, Directorate General of Land Transportation, Ministry of Transportation of the Republic of Indonesia No.: AP.005/2/5/BPTD-Banten/2024. The effective time (ET) is less than 60 minutes, which meets the standard since ET < 60 minutes.
c. The compliance of sailing time with realization and target schedule indicates that the realization of trips has not met the standards set by the Head of the Class II Banten Land Transportation Management Office, Directorate General of Land Transportation, Ministry of Transportation of the Republic of Indonesia No.: AP.005/2/5/BPTD-Banten/2024. The standards for sailing time have not been met because the sailing time realization is greater than the standard sailing time—more than 60 minutes for executive ships and more than 96 minutes for regular ships.

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