ROUND TRIP TIME EVALUATION OF PADANGBAI - NUSA PENIDA CROSSING VESSELS TO IMPROVE PERFORMANCE AT RORO FERRY IN BALI PROVINCE

Khafid Nurochman¹, Muhammad Khairani², Isman Djulfi², M. Taufiqurrahman³, c

¹Sekolah Tinggi Ilmu Pelayaran Jakarta
²Politeknik Transportasi Sungai, Danau dan Penyeberangan Palembang
³email: mkhairani.work@gmail.com

Abstract

Padangbai Harbor is a port located in a village in Manggis District, Karangasem Regency, on the east side of Bali Island, Indonesia. Padangbai Port is a port that serves ship crossings from Bali to Lombok and Nusa Penida and vice versa serves ships heading to Bali. The Padangbai ferry port is a very busy ferry port because it has 2 routes, namely the Padangbai-Sheet route and the Padangbai-Nusa Penida route. There are 25 ships operating on the Padangbai - Selamat route, of which 2 ships belong to ASDP and 23 privately owned ships and 1 ship on the Padangbai - Nusa Penida route belongs to the Klungkung Regency Government. The Padangbai Ferry Port also has a schedule made by the Bali Class II Transportation Management Agency. However, there is a mismatch between the ship's arrival and departure times and the schedule that has been made. This research is research using qualitative methods.

Based on the results of the analysis of problems in scheduling departures and arrivals at the Padangbai Ferry Port, delays of 20 minutes were still found which caused delays in the ship's onward performance. Therefore, it is very necessary to evaluate the ship's round trip time to improve performance at the Padangbai Ferry Port.

Keywords: Port, Ship, Scheduling, Delay, Round Trip Time
1. Introduction

Transportation is one of the important and strategic things in smoothing the wheels of development, strengthening unity and integrity, and influencing almost all aspects of life. Transportation also plays a role as a supporter, driver and driving force for the growth of regions that have potential but have not yet developed. Transportation must be able to answer existing geographic challenges so that it can be felt by all levels of society regardless of location. It is not limited to big cities or provincial capitals but must reach isolated areas. Conditions like these require the creation of integrated transportation on land, sea and air. In the maritime transportation system, ships are used as a means of mobility, especially to transport goods, vehicles and people to move places. The role of ferry transportation is very important in Indonesia due to the geographical conditions of Indonesia as an archipelagic country so that connecting facilities are needed. Crossing transportation is transportation that functions as a bridge that connects the road network and railway network which are separated by water to transport passengers and vehicles and their cargo. In Indonesia, there are many crossing routes that serve ferry transportation, especially in Bali Province. In Bali Province there are several operating ports, one of which is Padangbai Port.

Padangbai Harbor is a port located in a village in Manggis District, Karangasem Regency, on the east side of Bali Island, Indonesia. Padangbai Port is a port that serves ship crossings from Bali to Lombok and Nusa Penida and vice versa serves ships heading to Bali. The Padangbai ferry port is one of the very busy ferry ports because it has 2 routes, namely the Padangbai-Sheet route and the
Padangbai-Nusa Penida. There are 25 ships operating on the Padangbai - Selamat route, of which 2 ships belong to ASDP and 23 privately owned ships and 1 ship on the Padangbai - Nusa Penida route belongs to the Klungkung Regency Government. Based on these conditions, this port must ensure that services are running optimally and ship arrival and departure times are in accordance with the predetermined schedule.

At Padangbai Port there are often problems regarding the arrival and departure of ships as well as accumulation of vehicles which results in problems with the loading and unloading process. If the arrival and arrival of ships does not match the predetermined schedule it will disrupt the schedule of other ships which will result in port performance not being optimal and delays can also occur. disturb service users, so it is very necessary to evaluate the ship's round trip time with the aim of not disrupting the ship's next schedule and to improve port performance.

Padangbai Ferry Port is a Ferry Port which has set a schedule made every month by the Bali Class II Land Transportation Management Agency as stated in the Regulation of the Minister of Transportation of the Republic of Indonesia No. 6 of 2023 concerning the Organization and Work Procedures of the Land Transportation Management Center, which initially changed the BPTD to be divided into regions in Indonesia to be divided based on the class of the BPTD. In this schedule, the length of the ship's sailing time (Sailing Time) has not been determined and the ship's time at the dock is in accordance with the predetermined schedule. The schedule that has been set aims to improve port performance so that it can run as it should. Based on the results of the author's survey, there is a discrepancy between the ship's arrival and departure times and the schedule that has been made. Delays that occur at the Padangbai Ferry Port can trigger schedule changes, disrupting ship entry and exit activities and disrupting port performance. For this reason, it is necessary to evaluate the Round Trip Time so that activities running at the port can run smoothly and efficiently. Based on the problems described above, the author took the title "ROUND TRIP TIME EVALUATION OF PADANGBAI - NUSA PENIDA CROSSING VESSELS TO IMPROVE PERFORMANCE AT THE RORO pier
2. **Research Methodology**

The type of research used in this research is qualitative research. Qualitative research methods aim to describe analytical data narratively. And also analyze the percentage of conformity to existing service standards.

3. **Results and Discussion**

3.1. **Data Analysis**

   a. **Scheduling Analysis**

      Minister of Transportation Regulation Number Republic of Indonesia Number PM 6 of 2023 concerning the Organization and Work Procedures of Land Transportation Management Centers. One of the main duties and functions of the Road, River, Lake and Ferry Facilities and Transport Section is determining ship operation schedules. Based on the Ministerial Regulation, the Bali Class II Land Transportation Management Center makes a predetermined schedule with the following provisions:
<table>
<thead>
<tr>
<th>DATE</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRIP</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

**SHIP SCHEDULE FOR PADANGBAI – NUSA PENIDA CROSSING VESSEL KMP. NUSA JAYA ABADI**

<table>
<thead>
<tr>
<th>DATE</th>
<th>16</th>
<th>17</th>
<th>18</th>
<th>19</th>
<th>20</th>
<th>21</th>
<th>22</th>
<th>23</th>
<th>24</th>
<th>25</th>
<th>26</th>
<th>27</th>
<th>28</th>
<th>29</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRIP</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

**DATE**

**TRIP**

**COM**

**LEAV**

**COM**

**LEAV**
In connection with the adjustment of schedules and service times for vehicles and passengers, at the Padangbai ferry port the sailing time must be determined, including outbound and sailing times, dock time, inbound processing time, loading and unloading time, passenger cargo service time and vehicle, ticket claim time, manifest printing, ship clearance processing time and rampdoor closing time.

1) Padangbai – Nusa Penida Crossing Route

1. Determining the Ship's Sailing Time (*Sailing Time*)

The time a ship sails is the distance traveled by the ship from origin to destination in units of time. To seek *Sailing Time* then it can be found by dividing the distance traveled by the speed of the ship, the distance between Padangbai - Nusa Penida is 9.8 miles, while the average speed of the ship is 9 knots based on the results of interviews conducted with the ship's captain, it can be calculated in the following way:

\[
t = \frac{s}{v}
\]

Where:

\( t = \text{Ship Sailing Time (hours)} \)

\( s = \text{Track Distance (miles)} \)

\( v = \text{Speed (knots)} \)

\[
t = \frac{9.8 \text{ mil}}{9 \text{ mil/jam}}
\]

\( t = 1.08 \text{ hours} \)

\( t = 64.8 \text{ minutes rounded to } 65 \text{ minutes} \)

So, it can be concluded that the sailing time is 65 minutes
2. Determining Ship Maneuvering Time

   Based on a Layover Time survey conducted for 30 days at Padangbai Port, data on incoming and outgoing maneuvering times was obtained. It was found that the maneuvering of arriving ships was 12 minutes and the maneuvering of departing ships was 14 minutes. This data can be seen in table 4.10.

3. Determining the ship's layover time (Lay Over Time)

   Based on the results of a survey conducted for 30 days at the Padangbai Ferry Port on the Padangbai - Nusa Penida Route, the average layover time was 94 minutes. This data can be seen in table 4.10.

4. Determining the Ship's Round Trip Time

   After the Sailing Time and Layover Time are obtained, the RTT (Round Trip Time) can be calculated by adding up the ship's travel time and the length of time the ship is docked at the pier.

   \[
   RTT = (Sailing Time + Layover Time) \times 2
   \]
   
   \[
   RTT = (65 + 95) \times 2
   \]
   
   \[
   RTT = 320 \text{ Minutes}
   \]

<table>
<thead>
<tr>
<th>Trajectory</th>
<th>Sailing Time</th>
<th>Layover Time</th>
<th>RTT = (ST + LOT) x 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Padangbai - Nusa Penida</td>
<td>90 Minutes</td>
<td>60 minutes</td>
<td>300 minutes</td>
</tr>
</tbody>
</table>

Based on the calculation above, the round trip time at the crossing port is 320 minutes, while the round trip time should be 300 minutes. So the ship experiences an average delay of 20 minutes on each trip.

b. Analysis of the Effect of Sailing Time and Time at the Pier.

   At Padangbai Port there are still schedule discrepancies for both departures and arrivals. The causes come from several aspects, namely delays in berthing and delays in starting so that the ship does not follow the time that has been set, which causes delays during sailing (sailing
time) and greatly affects the ship's arrival schedule. At Padangbai Port, sailing times are very affected by weather conditions, based on conditions on the ground at Padangbai Port, strong winds and large waves often occur.

c. Analysis of the Effect of Loading and Unloading on the effectiveness of port performance

During loading and unloading activities at the pier there was still a queue of vehicles because the ship was still loading beyond the schedule set by the regulator, namely the Bali Class II Land Transportation Management Agency. This of course has a big impact on scheduling delays at the Padangbai Ferry Port. If the ship experiences delays, it will result in delays for the next ship. The mismatch in ship departure and arrival times causes disruption to the ship's established schedule and many passengers miss the ship or wait too long because the ship does not depart according to the specified schedule. At Padangbai Port there are no reminders for ships regarding the remaining loading and unloading time, so it is necessary to add a Count Down Timer and an Alarm Warning System as a reminder and notification regarding loading and unloading service times at each pier.

4. Conclusion

Based on the results of the analysis carried out, the author draws the following conclusions:

1. The arrival and departure times of ships operating at the Padangbai Ferry Port are not in accordance with the schedule set by the Bali Class II Land Transportation Management Center, there are still delays of 20 minutes per trip.

2. Shipping time and time at the pier greatly influence delays at Padangbai Port. The causes of ship delays are caused by many aspects, namely delays in berthing and delays in starting, so that the ship does not follow the time that has been set and is the cause of delays during the voyage. In services at the dock, the ship is still loading beyond the predetermined schedule, which
greatly affects the ship's next arrival schedule.

3. To increase the efficiency of loading and unloading times at the Padangbai Ferry Port, it is necessary to add a Count Down Timer

5. **Suggestion**

   Based on the conclusions from writing this Mandatory Working Paper, there are several suggestions given by the author. The suggestions given are as follows:

   1. It is necessary to provide confirmation from the service unit regarding the movement of mutants at the dock in order to speed up handling when delays occur and to impose sanctions on ships that are still late so that ship operations are in accordance with the ship schedule set by the Bali Class II Land Transportation Management Center.

   2. It is necessary to allocate a budget for the procurement of Count Down Timers and Alarm Warning Systems at each pier at the Padangbai Ferry Port.
6. Reference


Regulation of the Minister of Transportation of the Republic of Indonesia No. 6 of 2023 concerning the Organization and Work Procedures of the Land Transportation Management Center


Shipping Law Number 17 of 2008 concerning Shipping