Evaluate The Number Of Boat Trips On The Crossing Ketapang – Sheet At The Ketapang Crossing Port Of East Java Province

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Abstract
In this study, the authors took a case study regarding the evaluation of the number of ship trips on the Ketapang – Lembar crossing at the Ketapang Ferry Port, East Java Province. The Ketapang Ferry Port is one of the commercial Ferry Ports managed by PT. ASDP Indonesia Ferry (Persero) Ketapang Branch and supervised by the Land Transportation Management Center Region XI, East Java Province. At this port, the operating vessels are Ro-Ro type ships that carry passengers, vehicles and goods and operate for 24 (twenty four) hours every day. Ketapang Ferry Port is one of the most crowded ferry ports. The routes at the Ketapang ferry port are the Ketapang – Gilimanuk route which connects the islands of Java and Bali and the Ketapang – Lembar route which connects the islands of Java and the islands of West Nusa Tenggara. The Ketapang – Lembar route is a new route because this route opened in December 2020. This route includes the LDF (Long Distance Ferry) route or long distance ferry service. With the existence of the Ketapang – Sheet route, it will create centers of economic growth and support overall development and it is hoped that it will reduce congestion on the island of Bali as a result of logistical transportation to the island of West Nusa Tenggara via the Padang Bai Port. Because this causes many service users going to the island of West Nusa Tenggara to prefer to use the Ketapang - Lembar cross ship because it is more efficient in travel costs and travel time. Because of this, the number of ships operating must be in accordance with existing service users so that there is no accumulation of service users and there is no vehicle overload on the ship so as not to reduce the comfort of passengers on board. The number of requests from service users for this often causes the accumulation of vehicles in the parking lot ready to load and results in overload when loading on the ship. This can be dangerous when the ship is sailing.

Keyword: Loading and unloading factor; overload; trip.

1. Introduction

Ketapang Crossing Port is one of the commercial Crossing Ports managed by PT. ASDP Indonesia Ferry (Persero) Ketapang Branch and supervised by the Regional Land Transportation Management Center XI of East Java Province. In this port, the ship in operation is a Ro-Ro type ship that transports passengers, vehicles and goods and operates for 24 (twenty-four) hours every day. Ketapang Crossing Port is one of the very crowded crossing ports. The track track at the Ketapang crossing port is the Ketapang – Gilimanuk Pass that connects Java island and Bali island and the Ketapang – Lembar track that connects Java island and West Nusa Tenggara Island. Ketapang track tray – Sheet includes a new track tray because this track opened in December 2020. This track includes an LDF (Long Distance Ferry) or long-
distance ferry service. With the ketapang — This sheet will give rise to economic growth centers and support overall development and is expected to reduce congestion that occurs on the island of Bali due to logistic transportation that will go to west Nusa Tenggara island through Padang Bai Port. Because it causes the number of service users who will go to West Nusa Tenggara pualu prefer to use the ship cross Ketapang - Lembar because it is more efficient in travel costs and travel time. Because of this, the number of ships operating must be in accordance with existing service users so that there is no buildup of service users and there is no overload of vehicles on the ship so as not to reduce the comfort of passengers on board. The number of requests for service users for this often causes a buildup of vehicles in the parking lot ready to fit and causes overload when loading on board. This can be dangerous while the ship is sailing.

2. Research Methods

1) Observation Method
   Data retrieval activities are carried out directly in the actual conditions in the field regarding the condition of the Ketapang Crossing. Data that has been obtained and then recorded so that it can be used in analyzing existing problems precisely and accurately.

2) Calculation Method
   In this method the surveyor counts the number of objects within 14 days. The data obtained is 14-day passenger and vehicle productivity data. To obtain the data, surveyors calculated the number of passengers and vehicles entering the ship for 14 days, starting from March 22, 2021 until April 4, 2021.

3) Literature Methods
   This method is derived from the literature or books in the library of the Lake River Transportation Polytechnic and Palembang Crossing and other books related to this research.

4) Institutional Methods
   This method is related to the collection of data from various related agencies, namely:
   a. PT. ASDP Indonesia Ferry (Persero) Ketapang Branch
   b. Land Transportation Management Center Region XI Of East Java Province
      Ketapang Crossing Port Service Unit

3. Results And Discussions

The analysis used in this study is as follows:

1) Load Factor Analysis

Analysis of load factor of cross-road crossing ships — Sheets there are several things that need to be considered, namely, the number of passengers and vehicles and the capacity of ships carrying passengers and vehicles. The number of passengers and vehicles transported will affect the load factor of the ketapang - Lembar crossing ship.
in East Java Province. From the calculation can be calculated the average load factor of passengers and vehicles at the Ketapang Crossing Port of ketapang crossing - Sheet:

Table 1

<table>
<thead>
<tr>
<th>LF Departure</th>
<th>LF Arrivals</th>
<th>Average LF - Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger</td>
<td>Vehicle</td>
<td>Passenger</td>
</tr>
<tr>
<td>27 %</td>
<td>178 %</td>
<td>26 %</td>
</tr>
</tbody>
</table>

Based on the above, it is found that the average passenger load factor is 26.5% while for driving is 175.5%.

2) Analysis of Passenger and Vehicle Growth Predictions

In this calculation, the growth or demand for passenger and vehicle transportation based on the realization of transportation productivity in the last six months. To find out the organization of passengers and vehicles used a simple linear regression method that is with the formula:

\[ Y = a + bX \]

Information:
- \( Y \) = Passenger Growth
- \( X \) = Variable of the coming year
- \( a \) and \( b \) = Constant Number

a. Calculation of Passenger Growth Prediction

Calculation of passenger predictions in July 2021 - December 2021 using simple linear regression calculations as follows:

Table 2

<table>
<thead>
<tr>
<th>Moon</th>
<th>Passengers (People)</th>
</tr>
</thead>
<tbody>
<tr>
<td>July 2021</td>
<td>3442</td>
</tr>
<tr>
<td>August 2021</td>
<td>3870</td>
</tr>
<tr>
<td>September 2021</td>
<td>4298</td>
</tr>
<tr>
<td>October 2021</td>
<td>4726</td>
</tr>
<tr>
<td>November 2021</td>
<td>5154</td>
</tr>
<tr>
<td>December 2021</td>
<td>5582</td>
</tr>
</tbody>
</table>

Based on the table above, it can be seen that there was an increase in passenger productivity in July 2021 - December 2021.
b. Calculation of Vehicle Growth Prediction

Calculation of vehicle predictions in July 2021 - December 2021 using simple linear regression calculations as follows:

<table>
<thead>
<tr>
<th>Month</th>
<th>Vehicle (Unit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>July 2021</td>
<td>63454</td>
</tr>
<tr>
<td>August 2021</td>
<td>72605</td>
</tr>
<tr>
<td>September 2021</td>
<td>79757</td>
</tr>
<tr>
<td>October 2021</td>
<td>88908</td>
</tr>
<tr>
<td>November 2021</td>
<td>96060</td>
</tr>
<tr>
<td>December 2021</td>
<td>105211</td>
</tr>
</tbody>
</table>

Based on the table above, it can be seen that there was an increase in vehicle productivity in July 2021 - December 2021.

3) Analysis of the Number of Trips Needed

a. Frequency of ships

Calculation of the frequency of this ship is done to find out the number of trips and ships needed, while the results of the calculation can be seen as follows:

a) Based on passengers

In the ideal trip analysis based on the growth in passenger numbers, it is used the results of predictions of passenger numbers in the 6th month (six) of December 2021, namely 4512 passengers:

\[
F_p = \frac{N_p}{30 \times K \times LF \times M}
\]

\[
F_p = \frac{4512}{30 \times 0.9 \times 0.7 \times 279} = 0.8 \text{ trip/day} = 1 \text{ trip/day}
\]

b) Based on vehicle

In the ideal trip analysis based on the growth of the number of vehicles, it is used the results of predictions of the number of vehicles in the 6th month (six) of December 2021, namely 83833 vehicles:
Based on the calculations above, it was found that the appropriate number of ship frequencies was 6 trips / day.

c) Number of ships

Based on the survey it is known that layover time is 151 minutes. After knowing Sailing Time (ST) and Lay Over Time (LOT) then you can determine Round Trip Time (RTT) as in the table:

<table>
<thead>
<tr>
<th>Trajectory</th>
<th>Sailing Time</th>
<th>Layover Time</th>
<th>RTT = 2x(ST+LOT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Braids - Sheet</td>
<td>750 minutes</td>
<td>151 minutes</td>
<td>1802 mins</td>
</tr>
</tbody>
</table>

Based on calculations it is known that the Ship's Round Trip Time (RTT) is 1802 minutes. After getting Round Trip Time (RTT) then the Ship's Trip Capability (KT) can be known by using the formula:

\[
KT = \frac{RTT}{1440} \times 10 \text{ min}
\]

\[
KT = \frac{1802}{1440} \times 10 \text{ min} = 1.26 \text{ RTT/ship}
\]

d) Number of ships needed

Number of ships needed = \( \frac{FK}{KT} \)

Number of ships needed = \( \frac{5,7}{1} \) = 6 ships

Based on calculations that have been done with RTT for 1802 minutes, the frequency of ships as many as 6 ships per day with the ability to trip 1 trip per ship. For the number of ships needed, there are 6 ships.
4) Headway

Before determining the schedule of departure and arrival of the ship, must first determine the Headway (the time span of departure of the ship) with the formula:

\[ \text{Headway Time} = \frac{1}{F} \]
\[ \text{Headway Time} = \frac{1440 \text{ minutes}}{6 \text{ round trip/day}} \]
\[ \text{Headway Time} = 240 \text{ minutes} \]

Based on the results of calculations, obtained data Headway which is 240 minutes. The schedule can be done by considering the time of port operation in the current condition. Therefore, the analysis and preparation of departure and arrival schedules on the Ketapang – Sheet crossing is as follows:

Based on the results of the analysis above is known:

- RTT = 1866 minutes
- Layover Time = 151 minutes
- Headway = 240 minutes
- Port operating time = 1440 minutes
- Travel time = 750 minutes

With the ship departure operation time starting from 07.00 WIB
Initial departure time = 07.00 WIB
Arrival time = Sailing Time + Layover Time

\[ = 750 \text{ minutes} + 151 \text{ minutes} \]
\[ = 901 \text{ mins} \]
\[ = 15 \text{ hours} \]

Based on the results of the analysis with field conditions it was found that the scheduling of the ship on existing conditions was not in accordance with the results of the analysis where in the analysis results should be 6 trips per day while in the condition of existing 5 trips per day.

The reason is because the loading and unloading time is too long, so that the headway and trip that should not be achieved. Then it is necessary to reduce the loading and unloading time and headway that is considered inefficient or too long. Here is a calculation of the plan to realize a trip per day that is able to meet the demand for service users and in accordance with the analysis conducted.

<table>
<thead>
<tr>
<th>Name of ship</th>
<th>Ketapang Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ship 1</td>
<td>07.00</td>
</tr>
</tbody>
</table>
4. Closing

a. Conclusion

Based on the results of the analysis obtained from the writing of this Mandatory Working Paper, conclusions can be taken, among others:

1) Based on the calculation results obtained that the average load factor of vehicles and passengers based on data from the last 6 (six) months is 26.5% for passengers and 175.5% for vehicles
2) The number of ships serving the ketapang – Lembar track has not been in accordance with the needs of service users. Based on the analysis that the need for ships / facilities to serve the ketapang - Lembar track requires 6 ships so that with the condition of the number of ships that exist, it is not ideal to serve vehicle productivity.
3) The number of trips and the frequency of ship departures that are now not in accordance with the needs of service users due to trips on the Ketapang track – Sheets are only 5 (two) trips / day that cause service users not to be caught up in the ship. This makes the ship exceed the load capacity and service users who are not summarized must wait for the next departure.

b. Suggestion

From the conclusion above the author gives some advice on the problems in the field as follows:

1) Improve service to service users, through scheduling of arrivals and departures at the Ketapang Crossing – Lembar
2) It is necessary to add ships so that future ship needs can be met.
3) Scheduling the ship at the Ketapang Crossing – Sheet in accordance with the change in the frequency of departure of the ship.
5. Reference

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