Performance of The National Road Transport Network Service Trans Island Maluku Ambon

SIHALOHO, ANTONIUS and JINCA, M. YAMIN

Abstract-- Trans Maluku is a national transportation network that links 12 island groups in Maluku Province. Island Group seventh (VII) is Ambon Island that became PKN of Maluku province. This study aimed to find out how the performance of the national road network in Island Group Seventh (VII) of Ambon Island and formulate development strategies. Analysis using quantitative descriptive method and SWOT analysis. The results of the national road network Passo-Galala, Latuhalat-Batu Gantong and Waihaong-Batu Merah indicates that: indicators of accessibility, capacity and integrated quite effectively. Indicators are classified as not effective is Road Safety. The use of the road network of relatively efficient aspects of the VCR. Construction of support facilities necessary for the security of road users and an increase in financing the road network.

Index Term-- Road capacity, traffic volume, efficiency and effectiveness.

INTRODUCTION

Development of downtown Ambon as Activity Center of Maluku province and its function as a regional government and economy had a great impact on the transportation system. Road transport system in the trans Maluku island Group seventh (VII) (Ambon Island) based in the city of Ambon, and become the main access road network Passo-Galala national arterial, collector road network Latuhalat-Batu Gantong and the local road network Waihaong-Batu Merah has the city of Ambon to support community activities. However, there seems imbalance between the level of service capacity of road network to accommodate the transport demand continues to increase every year. This problem resulted in the accumulation of vehicles on the road network, slow vehicle speeds, travel time becomes longer, the inconvenience of traffic and causing congestion on the road network, which in turn can affect the performance of the road network. Based on the above issues, the main problem can be formulated national roads in the Trans Maluku island group VII of Ambon Island is as follows: How does the performance of services and infrastructure improvement strategy of the national road network trans seventh (VII) Maluku island group on the island of Ambon. The discussion in this study is the performance of the national road network infrastructure services the city of Ambon and formulate strategies for increasing the performance of road network infrastructure services in Ambon city, expected to be useful within the framework of the national road network development in general, especially in group seventh (VII) Trans Maluku islands. Descriptive and quantitative method, supported by field data, literature reviews and NSPK as an analytical tool. Primary and secondary data using interviews. Volume of traffic surveys carried out for 12 hours ie from hours 06:00 to 18:00 on Monday and Saturday.

REVIEW REFERENCES

Capacity is defined as the maximum current that can be maintained through unity at a point on the road under existing conditions (MKJI; 1997). The formula to calculate the capacity (smp / hour) of a road in urban areas is shown by the equation based on Indonesia Road Capacity Manual:

\[ C = C_0 \cdot FC_W \cdot FC_{SP} \cdot FC_{SF} \cdot FC_{CS} \]  

(1)

According Morlok (1995) and O.Z. Tamin, (2002), the level of service specified in an interval scale consisting of six levels,
namely A, B, C, D, E and F. The level of “A” is the highest service levels. If the volume increases, the level of service to decline as a result of traffic flow worse.

In realizing the implementation of effective and efficient transport requires performance indicators, namely accessibility, integrated, capacity, safe and efficient. Forecasting the growth of vehicle ownership by Hobbs (1995: 77) analogy with the population growth rate and can be formulated as follows;

\[ Q_n = Q_0 (1 + i)^n \]  

(2)

where:

- \( Q_n \) = flow of traffic in year to \( n \) (vehicles per hour)
- \( Q_0 \) = flow of traffic at the moment (vehicles per hour)
- \( i \) = traffic growth (%)
- \( n \) = time (years).

\[ Q_i' = [(I'/I) \times (M'/M) \times (U'/U)] \times Q_i \]  

(3)

where:

- \( Q_i' \) = The volume of traffic in the future (smp / hour)
- \( Q_i \) = volume of traffic now (smp / hour)
- \( F_i \) = The growth factor
  - \((I'/I) \times (M'/M) \times (U'/U)\)
- \( I'/I \) = ratio of number of residents in the future and now
- \( M'/M \) = ratio of the density of vehicles in the future and now
- \( U'/U \) = ratio of vehicles in the future and now

Determination of strategies and actions on the future use of SWOT analysis. Realization of a SWOT analysis, especially in the identification of activities, assessing, selecting seed factors, determine our strengths, array strategies and action plans implemented analytical models such as matrix models, Check Sheet, stratification and the scale of values.

RESULTS AND DISCUSSION
1. Road Network Performance
   a. Safety Indicators

Congratulations, in the sense of avoiding the operation of the risk of accidents during the transportation of traffic caused by humans, vehicles, roads and/or the environment. Data traffic accident four years (2006-2010) shows the accident rate and risk seen in Figure 2.

Based on Figure 2, the highest crash rate occurred on national roads in the amount of Passo-Galala (62.24%), road of the Latuhalat-Batu Gantong (33.57%) and on the road of Waihaong-Batu Merah with an accident rate of (4.20%). The average number of accidents that occur on the road network is quite high by 95 accidents. The impact of the risk of injury seen in the risk of death (9.09%) and severe injuries by (21.33%), as well as a huge risk of his presentation was slightly injured. It is caused by drivers who do not discipline in driving. Material losses due to significant accidents every year.

b. Accessibility indicators

Accessibility means that the network transport services to reach the widest possible national territory in order to realize the insight archipelago and national defense, measured by the ratio between the length of the road network and wide area served.

<table>
<thead>
<tr>
<th>Segment Name / District</th>
<th>Index</th>
<th>SPM Index</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passo-Galala (Ambon Bay District)</td>
<td>1.34</td>
<td>4.08</td>
<td>Accessibility: &gt;0.5 Mobility: &gt;2</td>
</tr>
<tr>
<td>Latuhalat-Batu Gantong (Nusaniwe District)</td>
<td>0.56</td>
<td>0.58</td>
<td>Accessibility: &gt;0.5 Mobility: &gt;0.5</td>
</tr>
<tr>
<td>Waihaong-Batu Merah Sirimau District</td>
<td>1.24</td>
<td>1.00</td>
<td>Accessibility: &gt;0.5 Mobility: &gt;1</td>
</tr>
</tbody>
</table>

Source: Result of the Analysis
c. Integrity Indicators Integrated, in the sense of realization of integration with other modes of transportation infrastructure network. National road network which has hierarchy in the city of Ambon as a whole, the third of this road network is a network path that unity is the main link area to another in groups seventh (VII) in Ambon island. The integration of road networks with other transport infrastructure can be seen in the following table.

<table>
<thead>
<tr>
<th>Networks</th>
<th>Mode of Transportation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passo-Galala</td>
<td>Maritime</td>
</tr>
<tr>
<td>Latuhalat-Batu Gantong</td>
<td>Ferry Pier</td>
</tr>
<tr>
<td>Waihaong-Batu Merah</td>
<td>-</td>
</tr>
</tbody>
</table>

Traffic volume collector road network of Latuhalat-Batu Gantong at the peak hour is 1320 smp/hour, capacity of approximately 2,500 smp/hour to accommodate the existing traffic flow. Degree of saturation value of 0.531 (the level of service B). Volume of traffic on the local road network of Waihaong-Batu Merah at the peak hours is 1450 smp/hour with a capacity of about 2950 smp/hour classified service B.

<table>
<thead>
<tr>
<th>Name Street</th>
<th>Volume (smp/hour)</th>
<th>Capacity (smp/hour)</th>
<th>DS Traffic</th>
<th>Speed km/hour</th>
<th>Level of Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passo-Galala</td>
<td>1.400</td>
<td>2.800</td>
<td>0.501</td>
<td>33.75</td>
<td>B</td>
</tr>
<tr>
<td>Latuhalat-Batu Gantong</td>
<td>1.320</td>
<td>2.500</td>
<td>0.531</td>
<td>32.22</td>
<td>B</td>
</tr>
<tr>
<td>Waihaong-Batu Merah</td>
<td>1.450</td>
<td>2.950</td>
<td>0.489</td>
<td>47.94</td>
<td>B</td>
</tr>
</tbody>
</table>

Source: Result of the Analysis

e. efficient
Efficient use of the national road network Passo-Galala during peak hours of 12:00 to 13:00 (50.1%), Latuhalat-Batu Gantong Street at the peak hours of 07:00 to 08:00 a.m. (53.1%), and efficient use of Waihaong-Batu Merah Street at the peak hours of 07:00 to 8:00 a.m. (48.9%). Realization of the road network utilization can still accommodate the traffic flow up to the critical limit around which the VCR = 0.80 as in Figure 2.

2. The degree of saturation (DS)
National arterial road of Passo-Galala with a capacity of about 2,800 smp/hour, the ability of the road in anticipation of the passing traffic seen in Figure 4. If the assumption that the road capacity remains, then the vehicle growth of 2% was seen in 2012 the degree of saturation values as big as 0.76, included in the category of level of service C, where traffic flow is in stable boundaries, began operating speed of vehicles is limited and barriers other increases. According MKJI (1997) that the urban street plan should have the highest degree of saturation does not exceed 0.75, then in 2012 the condition of the service level has reached the threshold.

![Fig. 3. Efficiency of Use of Road Network](image)

![Fig. 4. Predicted degree of saturation (DS)](image)
On the condition of the vehicle growth rate of 4% is seen that in 2012 the degree of saturation of 0.79. This means that by 2012 the level of service is included in the category of level of service D, where the condition of traffic flow on approach is not stable, relatively fast operating speed decreases due to obstacles that arise, and freedom of movement is relatively small. Conditions of growth of 6% to 10% in 2010, the road network has decreased the level of service from B to C is the flow of traffic at the border is still stable, began limited operation speed of other vehicles and obstacles greater. Critical conditions for the use of the road network occurred in 2012 and 2013 as shown in Figure 4.

With a capacity of 2480 smp/hour, then the ability of Latuhalat-Batu Gantong Street in anticipation of traffic flows through it with a growth rate of 2%, 4%, 6%, 8% and 10% in 2012 up to 2015 as shown in the Picture 4. If the capacity of the road fixed, then the vehicle growth rate of 2% is seen that in 2013 the degree of saturation of 0.81, means that in 2012 the level of service including service level category D, where conditions approaching unstable flow. Relatively fast operating speed decreases due to obstacles that arise, and freedom of movement is relatively small. In 2011 the condition of the road service level Latuhalat-Batu Gantong has reached the threshold.

In the vehicle growth rate of 4% is seen that in 2011 the degree of saturation of 0.84. Means, in 2013 the level of service is included in the category of level of service D, where the traffic flow conditions close to instability. Relatively fast operating speed decreases due to constraints arising and freedom of movement is relatively small. Conditions of growth of 6% to 10% in 2011, the road network has decreased the level of service from B to C is the flow of traffic is still within the stable, began limited operation speed of other vehicles and obstacles greater.

With a capacity of 2950 smp/hour, then Waihaong-Batu Merah road capability in anticipation traffic flow through it can be seen in Figure 5. If the capacity of the road constantly, with a growth rate of 2% of vehicles, it appears that in 2011 the degree of saturation of 0.75, means that in 2011 the level of service is included in the category of level of service C, where traffic flow is still stable in the limit, the speed of operation began to be restricted and the resistance of the other larger vehicles.

In the vehicle growth rate of 4% is seen that in 2011 the degree of saturation of 0.78, the level of service is included in the category of level of service D, which the approaching traffic flow conditions are not stable, relatively fast operating speed decreases due to obstacles that arise, and freedom of movement is relatively small. Conditions of growth of 6% to 10% in 2010, the road network has decreased the level of service from B to C is the flow of traffic on the road Waihaong-Batu Merah still within the stable, began limited operation speed of other vehicles and obstacles greater. Critical conditions for the use of the road network in 2011 and 2012 as shown in Figure 6.

3. Road Network Development Strategy

Preparation of the road network development strategy with a SWOT analysis of the map is obtained by the third power of the road network, Passo-Galala, Latuhalat-Batu- Gantong and Waihaong-Batu Merah. Position of strength shows that strategies based on the improvement of road network has been established indicators and strategies that need to be developed is located in quadrant IV in the ST’s area as shown in Figure 1 attached. Some strategies that can be done to do with the third performance improvement of road network as follows.

- Increase the budget needs an increase in road network
- Construction of road user safety fittings
- Construction of support facilities for the security of road users
C. CONCLUSIONS AND ADVICE

Conclusion: The performance of the national road network Passo-Galala, Latuhalat-Batu Gantong Street and Waihaong-Batu Merah, based on indicators for the accessibility of transport services and integration, was considered quite effective. Volume and capacity ratio (VCR-Ratio) quite efficiently and road safety indicators are still low. The degree of saturation (DS) are among the network path (0.489 to 0.531), vehicle speed 32-41 km / hours and the level of service roads classified as B. Strategy development is the construction of the road network and road safety completeness of supporting facilities for the security of road users, as well as the increasing needs of the budget in order to improve the road network.

Advice: The road network Passo-Galala the main route to the other districts in the province of Maluku, should receive main priority to the development and management by developing the road network and increase the budget for road upgrading. Traffic and parking management efforts needed to improve the road network.

REFERENCE

[7]. Government regulation number 34 of 2006. On Highway.