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Analysis of Continuous Traffic Flow of Commercial Zones

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Abstract
Bandar Lampung city is an activity center that functions as a service, production, and distribution of goods as well as the entrance or knot of transportation for the surrounding area. The urban transportation system needed is a transportation system that can facilitate people's mobility and/or goods to go in and out of urban areas as well as serve community activities in their own cities. The analysis of the road congestion causes in the city center of Bandar Lampung, especially Jalan Raden Intan Tanjung Karang Bandar Lampung will carry out good traffic flow planning in accordance with the wishes of the community by looking at the impact of vehicle performance on peak hours when density covers roads and identify traffic on Jalan Raden Intan Bandar Lampung. Based on the results of the analysis that has been carried out, it can be concluded that the percentage comparison between continuous flows and sampling barriers that affect the surrounding, among other vehicles exiting and/or entering on weekdays is 12% and weekend ratio is 13.8%.
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1. Introduction

Traffic congestion is caused by an imbalance between the increase of vehicle ownership and the growth of available road infrastructure and effective capacity of existing road segments which are smaller than the planned road capacity due to roadside obstacles. Roadside barriers are often associated with social and economic activities, namely on-street parking, because there are shops on the road, public transportation facilities that drop passengers in any place and people crossing the street which cause road capacity to decrease. In line with this, transportation activities on Jl. Raden Intan Bandar Lampung are also increasing. This street is one of the roads that is quite heavy in traffic. When many sellers and buyers, as well as vehicles pass or stop to park on these roads, it will really disturb the flow of the traffic. Roads that are supposed to be used for traffic are now seized for parking. In addition, there are many street vendors who sell on the pedestrian sidewalk, and a lot of access in and out of the store along the road. Especially on Jalan Raden Intan Bandar Lampung. The highest number of trips generally occurs in the morning and in the evening when many people carry out activities at like going to school or to their work place and vice versa. In general, everyone wants to arrive at his/her destination on time in the morning. However, the result of the trips that are simultaneously carried out, there is a heavy flow of traffic. Therefore, the writer wants to analyze what causes the congestion. Munawar (2011) argues that to determine the optimal points that cause congestion is by dividing them into several segments to find out the distance (s) and time (t). Congestion can be due to the irregularity of the vehicle traffic; therefore, a traffic lane arrangement such as roads, traffic regulations from related parties regarding vehicles, optimization of good crossing bridges by the community is needed, so that everything can go well. A good traffic management will provide security, comfort and ease of pedestrians' mobility, bicycles, motorists, cars and other modes of public transportation. The influence of these side barriers also occurs on national roads. National road itself is a system of primary road networks that connect between provincial capitals. Thus, the required road segment should be in accordance with the existing road section without being disturbed by side obstacles. For instance, Jalan Raden Intan segment to Tugu Adipura which has been designated as a national non-toll road network. On the contrary, in fact, the side resistance level actually makes the road segment not maximally used with the road conditions that do not change.

2. Research Methods

According to Tamin (2008) research related to road performance is divided into 4 stages, namely planning, preparation, implementation, and data processing.

a. Planning

To get data that support the survey, the criteria can be divided into the types of surveys, technically the data obtained must be appropriate (can measure the desired variable) and with high validity. Economically the survey

must be cheap (cost, labor and time). On the other hand, the survey must fulfill environmental requirements. Thus disturbance to the environment must be minimized. This environment can be in form of humans (and other living things), or roads (and other inanimate objects). As far as possible we avoid surveys that involve and disturb the community.

b. Preparation

This stage is carried out so that the survey can be carried out properly. The activities carried out include preparing various research permit files, determining the location of the observer at a point on the road, determining the survey time and observation period, preparing research tools and testing the operation of the tools.

c. Implementation

Traffic flows always change throughout the day. The number of vehicles passing at a place or a point in the afternoon will be different from that at midnight or in the morning. This difference in traffic flow is called a fluctuation in traffic flow.

1) Records of vehicle traffic flows are carried out during peak hours in the morning and in the evening. From the results of the recording, the pattern of daily traffic flows that occur is further grouped. The recorded LHR data obtained is used for calculating the approach of the region average condition at a moment. The research time was carried out from 06.00 to 18.00 West-Indonesian standard time (first day) and from 09.00 to 21.00 West-Indonesian standard time (second day). LHR data retrieval for 2 days was carried out on Monday and on Saturday due to the fact that the flow of vehicles during working days on Jalan Raden Intan Tanjung Karang was considered having a stable flow in normal weather conditions.
2) Data retrieval of space mean speed is taken during peak hours in the morning, afternoon and evening.

d. Data processing

Data processing is a series of operational calculations of roads and intersections that refer to the Indonesian Road Capacity Manual (MKJI) February 1997. Processing and presentation of data is adjusted to the performed analytical techniques. Data processing and analysis of traffic characteristics are displayed in the form of tables or graphs. Average vehicle daily traffic data (LHR), free flow volume, size of side barriers are displayed in table form so as to facilitate analysis of traffic characteristics. Roads segments include: 1) Traffic flow. 2) Vehicle capacity. 3) Travel speed

In this study the form of road segment performance is measured from the value of saturation degree (DS) or V/C ratio. The presentation of the data used is by analyzing the results of the calculation of the road performance parameters and then the points chosen are determined to be handled.

3. Results and Discussion

This section discusses the results of data processing using the Indonesian Road Capacity Manual (MKJI) method (1997) to produce the performance of Jalan Radin Intan.

a. Traffic flow volume data taken in 12 hours time (Morning, Afternoon, Afternoon) with 15 minutes time classifying vehicle types according to the Indonesian Road Capacity Manual, 1997 (MKJI, 1997), namely Light Vehicle (LV, Heavy Vehicle (HV), and Motor Cycle (MC): For more details, data collection and processing of data volume can be seen as follows:

1) Traffic Flow Volume (Q) on Weekday (Monday).
a) Morning peak hours (08.00-08.15) are 4982.8 pcu/hour.
b) Daytime peak hours (12.45-13.00) are 4031.6 pcu/hour.
c) Evening peak hours (17.15-17.30) are 3717.2 pcu/hour.
2) Traffic Flow Volume (Q) at weekends (Saturday).
a) Morning peak hours (09.00-10.15) are 3520 pcu/hour.
b) The afternoon peak hours (14.15 - 14.30) are 4273.2 pcu/hour.
c) The peak night hours (20.00-20.15) are 4621.2 pcu/hour.
3) Capacity

Calculation of the road capacity is using a formula

$c = co \times fcw \times fcsp \times fcsf \times fccs$

Then the following capacity is obtained:

a) Monday
   i. Morning peak hours are 5575.7 pcu/hour.
   ii. The afternoon peak hours are 6019.2 pcu/hour.
   iii. The afternoon peak hours are 6019.2 pcu/hour.
b) Saturday
   i. Morning peak hours are 6019.2 pcu/hour.
   ii. The afternoon peak hours are 6019.2 pcu/hour.
   iii. Night peak hours are 5575.7 pcu/hour.

4) Degree of Saturation

a) Monday

i. The peak hours in the morning (08.00-08.15)
DS = 4982.8 / 5575.7 = 0.89> 0.75 including
LOS D (level of service = D), so it can be interpreted that the performance of the road has an unstable starting speed, low and various speed, and the volume approaches capacity.

ii. The peak hours in the afternoon (12:45-13.00)
DS = 4031,6 / 6019,2 = 0.67 <0.75 including LOS B, so it can be interpreted that the performance of the road has a steady flow, the speed is slightly limited by traffic, the driver can still be free in choosing the speed.

iii. The peak hours in the afternoon (at 5:15 a.m. - 5:30 a.m.)
DS = 3717,2 / 6019,2 = 0.62 <0.75 including LOS B, so it can be interpreted that the performance of the road has a steady flow, the speed is limited by traffic, the driver can free in choosing the speed.

b) Saturday

i) Morning peak hours (11.00-11.15) DS = 3520 / 6019.2 = 0.58 <0.75 including LOS A can be interpreted as the performance of the road experiences free flow at high speed, the driver can choose the desired speed without obstacles.

ii. The peak hours in the afternoon (16.00-16.15) DS = 4273.2 / 6019.2 = 0.71> 0.75 including LOS C, so it can be interpreted that the performance of the road has a steady flow, and the speed can be controlled by traffic.

c) The peak night hours (20.00-20.15) DS = 4621.2 / 5575.7 = 0.83> 0.75 including LOS D can be interpreted as the performance of the road experiences unstable start, low speed and different volume close to capacity.

4. Conclusions and Suggestions

a. Conclusion

Based on the results of data processing that has been done, then, the conclusions from the study with the title "Analysis of Continuous Traffic Flow of Commercial Zones" are as follows:

1) The volume of traffic flow on weekday (Monday) is at peak afternoon hours (12.45-13.00) of 4031.6 pcu/hour and traffic flow volume at weekends (Saturday) which is at peak night hours (20.00-20.15) amounting to 4621.2 pcu / hour.

2). The biggest capacity of Jalan Radin Intan on weekday (Monday) is 6019.2 pcu/hour during the day and at the weekend (Saturday) is 5575.7 pcu/hour at night.

3) The degree of saturation that occurs on Jalan Radin Intan which is the highest at noon on weekday (Monday) is 0.67 and on weekends (Saturdays) is 0.83

4). Comparison of continuous flow with side obstacles on Jalan Radin Intan on Monday is 12% and on Saturday is 13.8%

b. Suggestion

1) It is necessary to control vehicles that are parked carelessly on the road.

2) Street vendor optimization on the outskirts of Jl. Raden Intan is compulsory.

3) The government should give strict punishment to users of vehicles parked on the body to provide a deterrent effect.

4) Construction of crossing bridges is held so that pedestrians passing by can get easier access.

5. Reference

Andriyani, F. and Ariyanto, D. 2004. Evaluation of Public Transport Performance Route Jogja - Kaliurang (Case Study of Baker and Transport Colt Buses). Final Task. (not published). Indonesian Islamic University, Yogyakarta

Asusanto et al. 2014. Characteristics of Travel Patterns in the City of Yogyakarta. Journal of Transportation Vol. 14. No 1: 61 - 68. FTSPT

Black, A. 1995. Urban Mass Transportation Planning. New York. The 2010 Population Census Data, accessed via the internet with the site http://yogyakarta.bps.go.id/kabupaten-sleman.html, accessed on November 28, 2015

Directorate General of Highways. 1997. Indonesian Road Capacity Manual (MKJI). Work Development. Jakarta

Herman et al.2009. Development of Public Transportation in the Suburban Area of Semarang City Based on Geography Information Systems. Journal of Transportation Vol. 9. No 1: 36 - 47. FTSPT

Herman et al. 2011. Potential of Informal Transport Users in the City of Bandung. Journal of Transportation Vol. 11. No 3: 209 - 218. FTSPT

Juwita, L. 2011. Evaluation of Reformation of Urban Public Transportation in Indonesia (Case Study: Comparing Levels of Trans Bus Services in Yogyakarta City and Pekanbaru. Thesis. (Unpublished. Master of Systems and Transportation Engineering, UGM. Yogyakarta

Decree of the Minister of Transportation. 2003. No. 35 of 2003 concerning "Implementation of Road Transportation on Public Vehicles" Directorate General of Land Transportation, Jakarta

Kerlinger, F.N. and Elazar, J.P. 1973.Multiple Regression in Behavgioral Research. Rinehaert and Winstion, Inc.New York :,

Miro, F. 2005. Transportation Planning. Erlangga, Jakarta.

Morlok, E.K. 1988. Conductor of Engineering and Transportation Planning (Interpretation: Ir. John Kenlana Putra Hainim). Erlangga. Jakarta

Munawar, Ahmad. 2011. Basics of Transportation Engineering. Offsest Beta. Yogyakarta

Nugroho, H. 2008. Feasibility of Reforming the Urban Public Transportation Transportation System in the Special Province of Yogyakarta. Thesis. (not published). Masters in Systems and Transportation Engineering, UGM. Yogyakarta

Prayitno, E. 2008. Analysis of Willingness for Aircraft Passengers to Use TransJogja Buses. Thesis. (not published). Masters in Systems and Transportation Engineering, UGM. Yogyakarta

Purnomo, H.E. 2014. Selection of Modes of Economic Railway AC and Economy Bus AC Majors of Yogyakarta - Madiun. Thesis. (not published). Master of Systems and Transportation Engineering, UGM. Yogyakarta

Profile of Sleman Sub-District, accessed via the internet with the site www.slemankab.go.id, accessed on January 21, 2016

Racmanto, A. and Sulistiawan, I. 2001. Analysis of Rural Angkuran Routes in Purwokert City. Final Task. (not published). Indonesian Islamic University, Yogyakarta

Supriyatno, D. and Widayanti, A. 2010. City Bus Service Performance in the City of Surabaya. Journal of Transportation Vol. 14. No 1: 69-78. FTSPT

Decree of the Director General of Land Transportation. 1996. No. 271 / Hk.105 / DRJD concerning Foundation Technical Guidelines for Public Passenger Vehicle Terminals

Decree of the Director General of Land Transportation. 2002. No. 687 concerning Public Transport Service Standards in Indonesia

Sugiyono.2011. Qualitative Quantitative Research Methods and R & D. CV Alfabeta. Bandung

Sugiyanto, G. and Malkhamah, S. 2009. Model Selection of Modes Between Private Cars and Trans Jogja Buses Due to Application of Congestion Costs. Journal of Transportation Vol. 9. No 2: 97 - 106. FTSPT

Supriyatno, D. and Widayanti, A. 2010. City Bus Service Performance in the City of Surabaya. Journal of Transportation Vol. 14. No 1: 69-78. FTSPT

Tamin.ffyar. Z, 2008, Planning, Modeling & Transportation Engineering, ITB Publisher, Bandung

Widyanti et al. 2014. Problems and Development of Public Transportation in the City of Surabaya. Journal of Transportation Vol. 14. No 1: 53 - 60. FTSPT