COMPARATIVE ANALYSIS OF EFFECTIVENESS OF "YELLOW BOX JUNCTION" IN THE CITY OF JAKARTA AND DENPASAR

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ABSTRACT

One way to solve the problem in reducing congestion, especially at intersections, is to apply the yellow box junction rules. The objective of installation of yellow box at the intersection is for vehicles not to pile up at one point. The order is that vehicle should not be in the yellow box as long as the vehicle in front of it has not fully passed the yellow box. This method is used so that the opposite direction vehicle can pass through the intersection without being blocked by the vehicle from the other opposite direction. This condition will cause the vehicles at the intersection flow smoothly, and do not experience delays due to accumulation of vehicles from opposite directions.This study will evaluate the application of yellow box junction rules at intersections in the City of Denpasar, and then compare it with the similar study in the City of Jakarta. Data analysis technique used in this research is using quantitative descriptive analysis technique. This analysis will be directed to a description of how this road marker can have a positive impact on transportation conditions in the City of Denpasar, in terms of resolving congestion. Rules in the Indonesian Road Capacity Manual (MKJI) is used to calculate the volume of traffic flow. While the results of the interviews were analyzed by comparing the ratio between the person/s who understood about the yellow box to all the samples interviewed.The result of the data analized in the City of Denpasar between traffic volume and the number of yellow box violation obtain the mean of percentage of violation is 1,132%. While the average person that understood about the yellow boxjunction is 60%. Meanwhile in the City of Jakarta, the mean of percentage of violation is 27%. While the average person that understood about the yellow boxjunction is 20%.

Keywords: comparative; effectiveness;yellow box junction

A. INTRODUCTION

The congestion that arises in traffic is a common phenomenon in an economically rapidly developing city. Anticipation using "predict then provide" is difficult because of the limited city space that can be developed to accommodate the rapidly growing traffic. In addition, a limited government budget requires anticipation to be done by "predict then prevent" ways so that the government can still meet the needs of a fast-growing community.

How the government can do to reduce congestion in addition to the program of fulfillment of mass transit vehicles that have been done with Trans Sarbagita Bus Program, is with better traffic management. Adjustment of traffic flow, upgrading of pedestrian facilities, the addition of signs or road marks are another way that can be used to manage traffic to avoid severe congestion. Traffic jams usually occur at the junction. This happens because the accumulation of vehicles at one point from the opposite direction. Although in some intersections, traffic light has been made to prevent the buildup of

vehicles, but at certain times, especially during peak-hour, traffic jams are still common.

One of the road markers that can be used to reduce congestion occurring at intersections, either signaled or unmarked, is to create a yellow box junction at the intersection. Installation of yellow box at the intersection aimed at the vehicle does not accumulate at one point by arranging for the vehicle should not be in the yellow box as long as the vehicle in front of it has not fully passed the yellow box. This method is used so that the opposite direction vehicle can pass through the intersection without being blocked by the vehicle's current from the opposite direction. This condition will cause the flow of traffic at the intersection is still flowing and does not experience delays due to accumulation of vehicles from opposite directions.

In this paper, the authors want to evaluate the effectiveness of the application of the new yellow box junction installed in 2016 by the Local Government of Denpasar City and then compare it with the application of yellow box junction in the City of Jakarta. Evaluation is done by observing the traffic flow at crossroads that have been installed

yellow box junction. In addition, interviews will also be conducted with road users on the socialization of new rules and the effectiveness of the installation. The research will be conducted in areas with jointed yellow box at the junction of Kamboja-Kapten Japa, Kamboja-Lely and Udayana-Sugianyar.

B. LITERATURE STUDY

Yellow Box Junction is a yellow square-shaped road marker placed at the junction of the road (Minister of Transportation Regulation No. 34 of 2014 on Road Mark). This yellow box line has a purpose so that when there is a queue at the intersection, the vehicle must pay attention to the condition of the intersection whether it is safe or not. Vehicles are not allowed to stop on yellow lines even though the green light is still on. If a vehicle stops inside the Yellow Box Junction area, then it will be subject to sanctions. Other countries that have applied Yellow Box Junction include Malaysia, Singapore, Australia and the UK. The application of Yellow Box Junction in Indonesia has not been evenly distributed. Several major cities are still testing the road marker.

In "Traffic sign manual chapter 5 road marking London" explained the yellow box junction placement requirements are:

1. has 4 sides
2. are at an intersection that has at least two ways
3. placed at the intersection which is controlled or not controlled by traffic signal
4. lies in heavy or busy traffic flow in both directions of the road arm
5. the internal yellow line should go towards at least two corners of the box
6. two or four corner boxes lead to the curb
7. the yellow box should be clearly visible and not easily faded
8. at the intersection T covers only half of the crossroads
9. there is only one yellow mark at the crossroads

Tjahjani (2013) describes Yellow Box Junction is used to keep the flow of traffic flow. Yellow Box Junction is often used at crossroads that have high traffic jams, controlled or not controlled by traffic lights, and have crossed lines that are painted on the road.
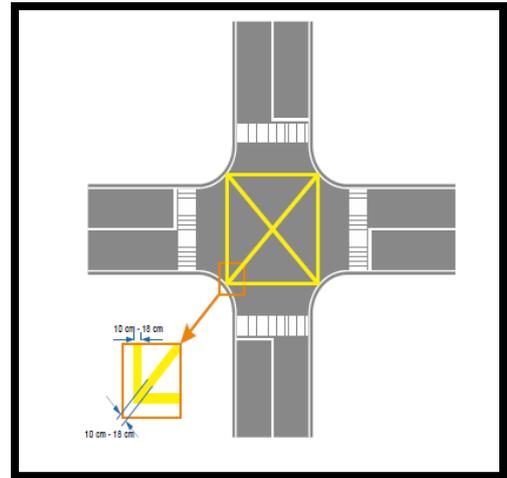

Figure 1.
Yellow MarkSize Shape
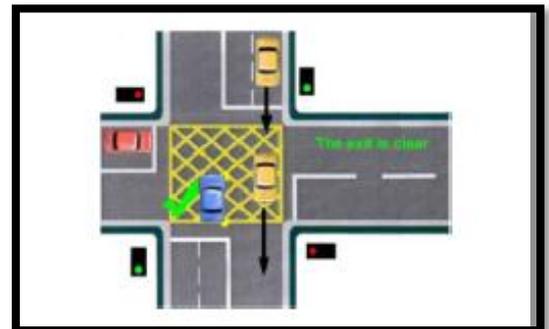Source: Regulation of the Minister of Transportation No. 34 of 2014 about the Road Mark

Figure 2.
Correct Vehicle Movement
Source: Tjahjani, Indra A.R., Hutapea, Pratama, N. 2013

Figure 3.
Incorrect Vehicle Movement
Source: Tjahjani, Indra A.R., Hutapea, Pratama,N. 2013

C. METHODOLOGY

The study was conducted at the Kamboja-Kapten Japa, Kamboja-Lely and Udayana-Sugianyar intersections
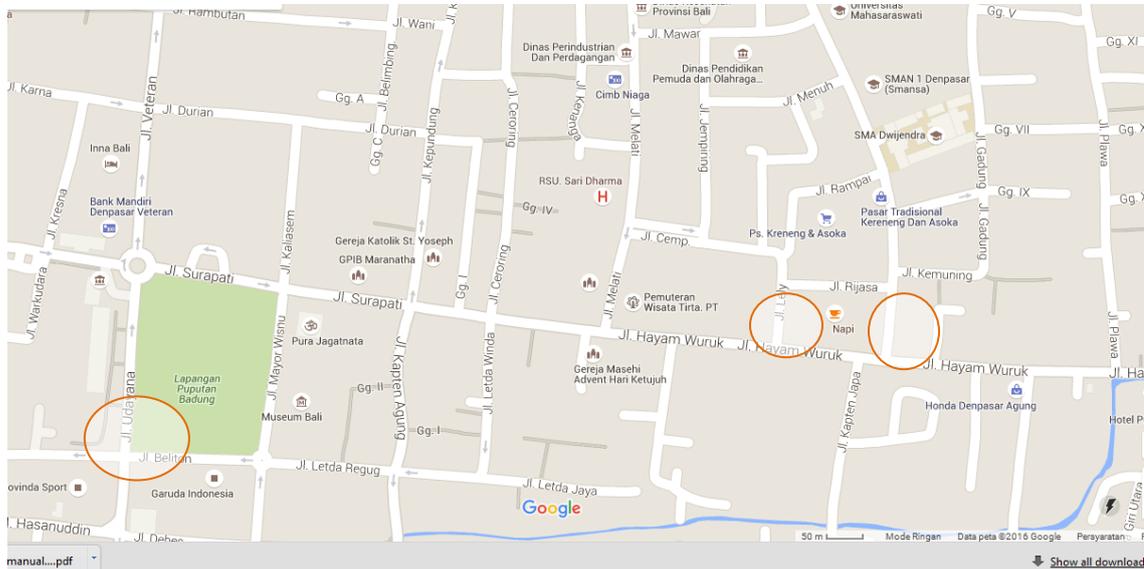

Figure 4. Research Sites
Source: Google Map with modifications. 2017

Table 1. Types and Data Sources

Data	Methodology	Data Source	
		Primary	Secondary
Overview of Research and Geographic Areas	Qualitative	-	Literature
Physical and Non-Physical Research Areas	Qualitative	Observation and Interview	Literature
The foundation of theory and concept - Definition and Function Yellow box junction - Regulations related to traffic engineering	Qualitative		Literature
Problem Formulation 1			
Data on the Effectiveness of Yellow Box Junction Usage on Congestion	Qualitative and Quantitative	Observation	Literature
Problem Formulation 2			
Community Understanding Data	Qualitative and Quantitative	Interviews and Questionnaires	

Source: Author, 2017

Data analysis technique used in this research is using qualitative descriptive analysis technique. This analysis will be directed to a descriptive description of how this road marking could have a positive impact on transportation conditions in the City of Denpasarin terms of resolving congestion. Qualitative data analysis has been conducted since the beginning, in the sense that from the beginning the data collection process begins, the researcher has begun to understand what is the meaning of the things encountered by recording the rules, the patterns, the statements, the possible configuration, consequences and prepositions. All of this is still possible to change until it is considered to have a strong foundation. A new conclusion will appear after the data collection process ends so that the foundation is considered adequate. Analysis of data in the field using Miles and Huberman model analysis consisting of data reduction, display data and conclutions or verification (Sugiyono, 2011).

The analysis to calculate the capacity of road and the volume of traffic flow is by using the rules in the Indonesian Road Capacity Manual (MKJI). While the interview results in the form of a question guide which is then analyzed.

D. RESULTS AND DISCUSSIONS

Traffic Flow Survey

Traffic flow data observed in this study is traffic volume data and vehicle composition that passes the intersection at peak hour. The survey was conducted on Monday, May 29, 2017; Friday, June 2, 2017 and Sunday, June 4, 2017. The survey was conducted on each intersection, namely Kamboja-Kapten JapaIntersection, Kamboja-LelyIntersection and Udayana-SugianyarIntersection.
The results of the traffic volume survey can be recapitulated as follows:
A. Kamboja-Kapten JapaIntersection
The day with the largest vehicle volume is Friday
a.   Morning hours 07.00-08.00 WITA
       = 8898 vehicles
b.   Afternoon time 12.00-13.00 WITA
       = 8899 vehicles
c.   Afternoon hours 17.00-18.00 WITA
        = 8557 vehicles
B. Kambojan-LelyIntersection
The day with the largest vehicle volume is Friday
a.   Morning hours 07.00-08.00 WITA

= 5826 vehicles
b.   Afternoon at 12.00-13.00 WITA
       = 4985 vehicles
c.   Afternoon hours 17.00-18.00 WITA
       = 5770 vehicles
C. Udayana-Sugianyar Intersection
The day with the largest vehicle volume is Monday
a.   Morning hours 07.00-08.00 WITA
       = 7373 vehicles
b.   Afternoon at 12.00-13.00 WITA
       = 6592 vehicles
c.   Afternoon hours 17.00-18.00 WITA
       = 8917 vehicles

Road User Violation Survey against Yellow box Junction

The violation of road users against the yellow box junction marker observed is a violation by the road user whose vehicle position is in the yellow box area when the vehicle in front of him has not fully crossed the area. So the condition causes the vehicle from the opposite direction of the intersection not to pass through the intersection.

The survey was conducted on Monday, May 29, 2017; Friday, June 2, 2017 and Sunday, June 4, 2017. The survey was conducted on each intersection.

The results of the Yellow Box Junction mark violations can be recapitulated as follows:
A. Kamboja-Kapten Japa Intersection
The day with the largest vehicle volume is Friday
a. Morning hours 07.00-08.00 WITA = 29 vehicles
b. Afternoon time 12.00-13.00 WITA = 0 vehicles
c. Afternoon hours 17.00-18.00 WITA = 0 vehicles
B. Kamboja-Lely Intersection
The day with the largest vehicle volume is Friday
a. Morning hours 07.00-08.00 WITA = 24 vehicles
b. Afternoon time 12.00-13.00 WITA = 45 vehicles
c.Afternoon hours 17.00-18.00 WITA = 32 vehicles
C. Udayana-Sugianyar Intersection
The day with the largest vehicle volume is Monday
a.   Morning hours 07.00-08.00 WITA = 229 vehicles
b. Afternoon at 12.00-13.00 WITA = 210 vehicles
c.   Afternoon hours 17.00-18.00 WITA = 152 vehicles

Percentage of Road User Violation against Yellow Box Junction Mark

Percentage of road user offenses against yellow box junction mark is calculated by comparing the number of violations that occurred with the number

of vehicles passing through the intersection at any given time.

Percentage offense = (Number of violations / Volume of vehicle) x 100%.

The result of calculation of percentage violation of Yellow Box Junction mark is as follows:

A. Kamboja-Kapten Japa Intersection
a. Morning hours 07.00-08.00 WITA = (29/8898) x 100% = 0.326%
b. Afternoon at 12.00-13.00 WITA = (0/8899) x 100% = 0%
c. Afternoon hours 17.00-18.00 WITA = (0/8557) x 100% = 0%

Average percentage violation =
((0.326 + 0 + 0) / 3) x 100% = 0.109%

B. Kamboja-Lely Intersection
a. Morning hours 07.00-08.00 WITA = (24/5826) x 100% = 0.412%
b. Afternoon at 12.00-13.00 WITA = (45/4985) x 100% = 0.903%
c. Afternoon hours 17.00-18.00 WITA = (32/5770) x 100% = 0.554%

Average percentage violation =
((0,412 + 0,903 + 0,554) / 3) x 100% = 0.623%

C. Udayana-Sugianyar Intersection
a. Morning hours 07.00-08.00 WITA = (229/7373) x 100% = 3.106%
b. Afternoon at 12.00-13.00 WITA = (210/6592) x 100% = 3.186%
c. Afternoon at 17:00 to 18:00 WITA = (152/8917) x 100% = 1.705%

Average percentage offense
= ((3.106 + 3.186 + 1.705) / 3) x 100% = 2.666%

From the calculationabove, it can be calculated that the average of violations that occur are:
((0.326% + 0 + 0 + 0.412% + 0.903% + 0.554% + 3.106% + 3.186% + 1.705%) / 9) is 1.132%

Survey on Community Knowledge aboutYellow Box Junction

The survey to find out the people's understanding of Yellow Box Junction rules is done by questionnaire survey method. Respondents surveyed asmany as 20 people in each intersection, are the people who are around the intersection with a yellow box mark. The community's knowledge of yellow box junction mark is calculated by comparing the people who understand with the number of respondents in each intersection.

Percentage of community understanding = (Number of respondents who understand / Number of respondents) x 100%.

A. Kamboja-Kapten JapaIntersection
Number of respondents who understand = 13 people
Number of respondents = 20 people

Percentage of community understanding
= (13/20) x 100% = 65%

B. Kamboja-LelyIntersection
Number of respondents who understand = 13 people
Number of respondents = 20 people
Percentage of community understanding
= (13/20) x 100% = 65%

C. Udayana-Sugianyar Intersection
Number of respondents who understand = 10 people
Number of respondents = 20 people
Percentage of community understanding
= (10/20) x 100% = 50%

From the calculationabove, it can be calculated that the average respondents who understand are:
(65% + 65% + 50%) / 3 = 60%

Performance Analysis of Yellow Box Junction Mark (Case Study:Intersectionat Jalan Mayor Jendral Sutoyo, Jakarta)

Performance Analysis of Yellow Box Junction Mark (Case Study:Intersection at Jalan Mayor Jendral Sutoyo, Jakarta) by Tjahjani, Indra A.R., Hutapea, Pratama. N (2013) states that Yellow Box Junction is a new road marker in Indonesia. The research was conducted on Jendral Sudirman- M.H. Thamrin-MayorJendral Sutoyo intersection. The study was conducted on the road segments because the segment is an intersection area in Jakarta which has heavy activities, because this section is an access to the center of community activities from residential areas to other economic center activity area. Based on the result of analysis based on Manual of Capacity of Road Indonesia (MKJI) 1997, the intersection has the capacity of intersection 8936 smp / hour, average delay 42detik / smp and degree of saturation> 0,8. So it can be said that the intersection has the level of service E. Based on information obtained in the field, the data that can be presented is the magnitude of violations of motorists against the placement of markers is about 27%. Only 20% of people know about Yellow Box Junction use. So it can be concluded

that the use of Yellow Box Junction can not be used as a tool to break down congestion.Because there are still many people who have not known the mark, as well as the function of the yellow box is not fully known by motorists.

The similarity of the research conducted by Tjahjani, Indra A.R. and Hutapea, Pratama N with research that conducted by this articleauthors lies in the research subjects which is theYellow Box Junction.This road marker is currently can be said still in the test phase.And this research also examines the level of effectiveness of the use of this road marker to overcome congestion in certain areas .

E. CONCLUSION

From the results of data analysis can be concluded several things:

1. The average percentage of violation against the yellow box junction mark of the three intersections is 1.132%. With the details of each intersection are:
   A. Kamboja-Kapten Japa = 0.109%
   B. Kamboja-Lely = 0.623%
   C. Udayana-Sugianyar = 2,666%
2. The average public understanding of yellow box junction mark is 60%. With the details of each intersection are:
   A. Kamboja-Kapten Japa = 65%
   B. Kamboja-Lely = 65%
   C. Udayana-Sugianyar = 50%
3. Performance Analysis of Yellow Box Junction in Jakarta is the percentage of violations by 27% and public understanding of 20%

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