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ANALYSIS OF THE EFFECT OF SIDE BARRIERS ON THE PERFORMANCE OF ROAD SECTIONS RIGHT IN FRONT OF THE SIMPLE MARKET ON JALAN SUTOYO S BANJARMASIN

Nella Agustin[1], Dr. Muhammad Arsyad, S.T., M.T. [2]
S-1 Civil Engineering Study Program, Faculty of Engineering, Lambung Mangkurat University
Jalan Jenderal A. Yani Km.36 Banjarbaru
Phone. (0511) 47738568-4781730 Fax. (0511)4781730
Email: 1810811120014@mhs.ulm.ac.id; emarsyad@ulm.ac.id

ABSTRACT

Pasar sederhana is one of the traditional markets in Teluk Dalam and surrounding areas. Tradional market activity is enough to affect traffic performance on the Jalan Sutoyo S. The impact of this simple market activity is an increase in traffic density and a decrease in speed which will cause congestion to occur. The purpose of this research, among others, is to determine the effect of simple market activities on traffic flow on the Jalan Sutoyo S. The field surveys conducted in this study were in the form of looking for data on volume, speed, and side barriers. The survey was carried out under two different conditions, the after-market condition or no obstacles and right in front of the market, the presence of obstacles. the calculation method used using the conventional method and then the best relations model is obtained, the Greenshields model. From the calculation results, it can be derived from the maximum volume as much as 22.21%, the decrease in average speed as much as 10.54%, the decrease in density as much as 13.03%. For the itp DS calculation results are 0.96 with the itp value E.

Keywords: Greenshield, Market Activities, Road Performance, Traffic Characteristics.

1. INTRODUCTION

Nowadays, as we know there have been many advances in science and technology. Developments or advances in the field of transportation for example. However, over time, progress in the world of transportation has had a variety of unexpected problems before. For example, for the problem that we often encounter at this time is the problem with traffic density. Traffic congestion itself is very disturbing for road users and very detrimental.

The Traditional market or what is often called also Wildan market is located on Jalan Sutoyo, west Banjarmasin district, Banjarmasin city. The density of traffic flow is very frequent in this section of Jalan Sutoyo S, precisely during market peak hours. Some of the causes include a large number of pedestrians, parking on the side of the road, sidewalks used as rickshaw bases, the number of people selling on the side of the road, and not to mention the entry and exit of motorcycles to the market. Apart from the market, other factors come from large loaded trucks that have a big influence on traffic activities

on this section of the road. This is because this road is the main road to get to Trisakti Port which causes Jalan Sutoyo S to be included in the ranks of the busiest roads in the city of Banjarmasin after all often trucks carrying goods pass between cities so that they become national roads.

2. LITERATURE REVIEW

The most commonly used models in exposing the relation between traffic flow characteristics include volume, speed, and finally density, including Greenshields models, Greenberg models, and underwood models.

A. *Greenshield* Model

$$S = Sf – (Sf/Dj)\ D$$

The result of the substitution of S = F / D with the above equation has obtained the equation of the volume-density relation, as follows:

$$F = Sf.D – (Sf/Dj)\ D^2$$

The result of substitution D = F / S with the above equation obtained the equation of the relation of volume velocity, as follows:

$$F = Dj.S – (Dj/SF)\ S^2$$

If the relation between velocity and density is linear, then the relation between velocity volume and volume density functions parabolic. The amount of capacity of the road section is obtained from the maximum volume value calculated by differentiating the density speed.

$$Fc= \frac{Dj.Sf}{4}$$

B. Greenberg Model

$$S = Sc.ln\ Dj/D$$

If the equation F = SD, then the volume-density relation is as follows:

$$F = Sc.D.ln\ Dj/D$$

And for the relation between volume-speed, the equation is obtained:

$$F = S.Dj.exp\ (-S)/Sc$$

The capacity of the road segment is obtained from the maximum volume value which is calculated by differentiating density-speed.

$$Fc = (Dj.Sc)/e$$

C. Underwood Model

$$S = Sf.\exp\frac{-D}{Dc}$$

The result of the substitution of F=SD with the above equation is the volume-density relation equation, as follows:

$$F = D.Sf.\exp\frac{D}{Dc}$$

Result substitution of D = F/S with the above equation, the equation for the volume-speed relation is obtained, as follows:

$$F = S.Dc.\ln\frac{Sf}{S}$$

The amount of road segment capacity is obtained from the maximum volume value calculated by differentiating density-speed.

$$Fc = \frac{Dc.Sf}{e}$$

3. RESULT AND DISCUSSION

A. Traffic Volume Data Analysis

- Conditions at the Point After the Market

data taken is used as a comparison in two different conditions, where for the first condition there is no obstacle, after the market, for the second condition is a condition where there are obstacles that are right in front of the market itself. Of the samples obtained as many as 72 of these combinations for those that are almost adjustable, only 34 samples or as much as 51% only.

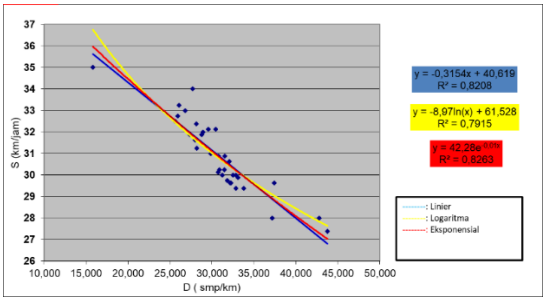

Figure 1. Graph of the relation between the three velocity-density equations after market

the equation model between speed and density is shown in Table 1.

Table 1. Speed-Density Equation Model and Correlation

Model	Equation model	r^2	R	X	Exp.
Greenshield	$y = -0,3154x + 40,619$	*0,8208*	*0,906*	128,79	*Very strong*
Greenberg	$y = -8,97ln(x) + 61,528$	*0,7915*	*0,890*	*952,71*	*Strong*
Underwood	$y = 42,28e^{-0,01x}$	*0,8263*	*0,909*	3744,31	*Very strong*

In two directions two paths are obtained, the assumption is that 1 junior high school is equal to 4 meters, so for 1 km = 2. (1000 m/4 m) = 500 SMP. In table 1. an example of the Greenshield model, the density value is 128.79 SMP/km. then the most realistic and closest to the various models are taken. because the closest approach is the Greenshield model, so the Greenshield equation is used y = (-0.3154x) + 40,619 (Greenshield).

For the model of the equation of the relation between the characteristics of traffic flow in the conditions in after market can be made a graph as in the following figure.

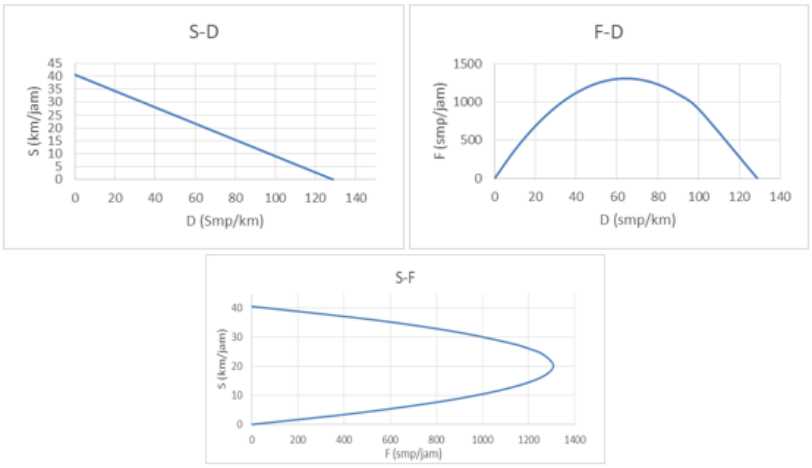

Figure 9. Relation of *Greenshield* Volume, Velocity, and Density to After-Market Conditions

- In conditions at the point right in front of the market,

from the sample obtained as many as 72 of these combinations, for those that are almost adjustable, only 34 samples or as much as 51% only. The results of the SD relation equation model and the correlation at conditions right in front of the market can be seen as shown in Figure 10.

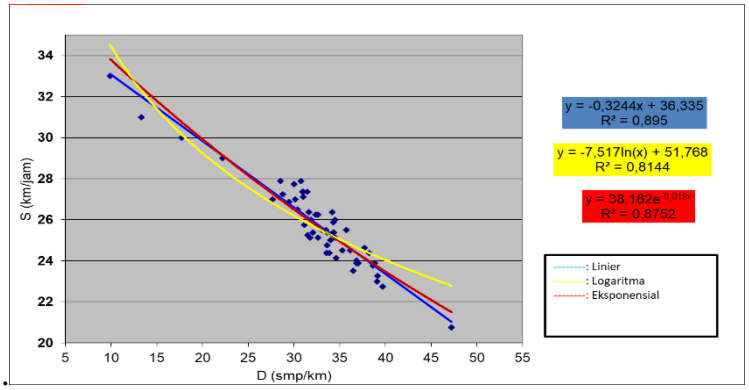

Figure 10. Graph of the Relation of the Three Speed Equations – Density with Obstacles

equation model between speed and density is shown in Table 3

Table 3. Velocity – Density Equation Model and Correlation

Model	Equation	r^2	R	X	Exp.
Greenshield	*y = -0,3244x + 36,335*	*0,895*	*0,9460*	*111,990*	*Very Strong*
Greenberg	*y = -7,517ln(x) + 51,768*	*0,8144*	*0,9024*	*979*	*Very Strong*
Underwood	*$y = 38,162e^{-0,012x}$*	*0,8752*	*0,9355*	*3641,831*	*Very Strong*

In two directions, two lanes are obtained, the assumption is that 1 junior high school is equal to 4 meters, so for 1 km = 2. (1000 m/4 m) = 500 SMP. In table 3. an example of the Greenshield model, the density value is 111.990 SMP/km. then the most realistic and closest to the various models are taken. because the closest one is the Greenshield model, so the Greenshield equation is used y = *-0.3244x + 36,335* (Greenshield)

For the model of the equation of the relation between the characteristics of traffic flow in the conditions in front of the market can be made a graph as in the following figure.

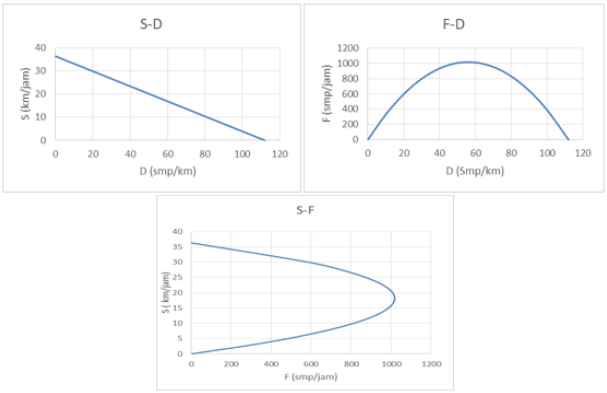

Figure 11. Relation of *Greenshield* Volume, Speed, Density in front of the market

E. Comparison of Conditions right in front of the market and after the market

Table 5. Value of Maximum Volume, Speed, and Density Greenshield Model *Fmax*

Scenario	Smax	Fmax	Dmax
Condition after the market	40,619 km/jam	1307,78 SMP/jam	128,78 SMP/jam
Condition Right in Front of the Market	36,335 km/jam	1017,30 SMP/jam	111,990 SMP/jam
Percentage of Decrease Due to Obstacles	10,54 %	22,21 %	13,03 %

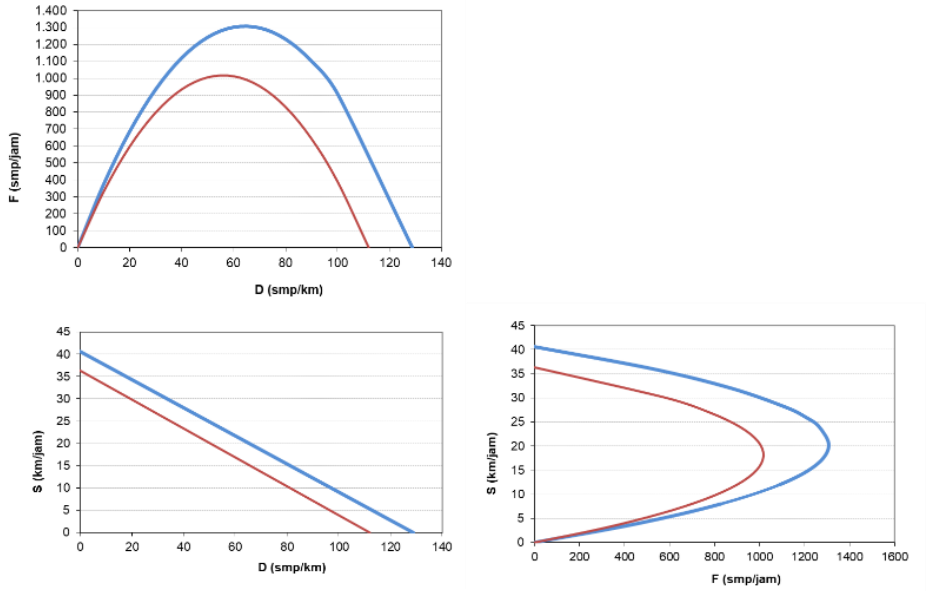

Figure 12. Graph of the Combined Relation between No Barriers and the presence of Barriers

F. Service Level Index

- In front of the market

Traffic Volume at 08.20-09.20 WITA = 979.90

Capacity = 1017.30

Then the value of the degree of saturation (DS) is obtained by:

DS = V/C

= 979.90 /1017.30

= 0.96

results of the calculation of the service level index are E.

- after the market

Traffic Volume at 08.20-09.20 WITA = 1087

Capacity = 1307.30

Then the value of the degree of saturation (DS) is obtained by:

DS = V/C

= 1087/1307.30

= 0.83

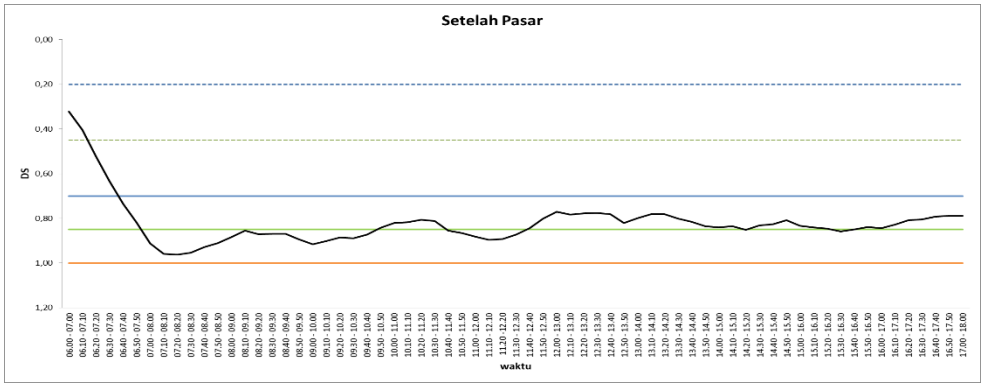

Figure 13. Graph of Service Level Index After Market

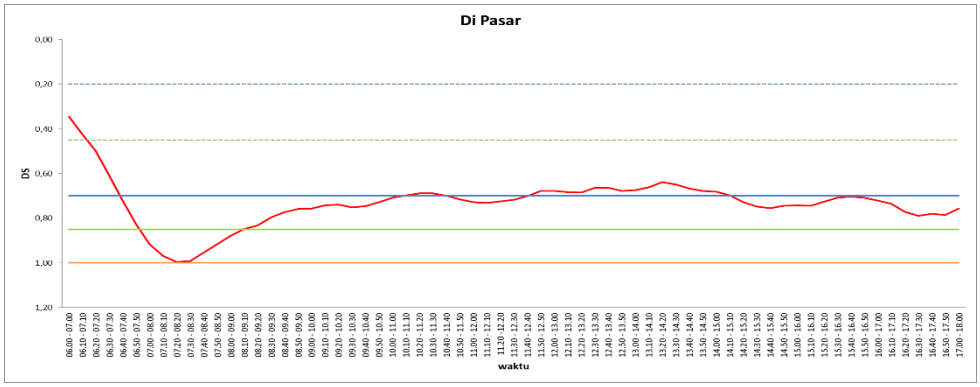

Figure 14. Graph of Service Level Index in the Front Area Market

4.CONCLUSIONS

Based on the results of data processing and work analysis, several conclusions were obtained as follows:

1. Conditioned after the market has obtained a maximum volume of 1307.78 SMP/hour, an average speed of 40.619 km/hour, and a maximum density of 128.78 SMP/hour. Meanwhile, in post-market conditions, the maximum volume decreased by 1017.30 SMP/hour, the average speed decreased by 36.335km/hour, and the maximum density was 111.990 SMP/hour.

2. The traffic characteristics in a simple market are obtained from the results of the relation between Volume (V), Speed (S), and Density (D). The Greenshield model has a coefficient of determination (R) in after-market conditions of 0.8208 and for conditions in front of the market of 0.8208. 0.8144. This analysis was carried out with two different conditions a comparison, namely after market conditions and right in front of the market

3. Market activities on the road or the presence of street vendors on the shoulder of the road or a pedicab base on the road section right in front of the Simple Market have quite an effect on the performance of the road segment. The results of the observations made there was a significant decrease, with a maximum volume of 22.21%, an average speed of 10.54%, and finally a maximum density of 13.03%. This is due to the large number of visitor vehicles that come or stop on the side of the road and there are also many activities that enter and leave on the road, causing unstable flow, traffic volume approaching capacity, and reduced speed so that congestion can occur.

5. SUGGESTIONS

From the results of the analysis that has been done, the suggestions that can be given are as follows:

1. It is necessary to anticipate to reduce the density on Jalan Sutoyo S, where one of the main causes is the large number of visitors who come or stop by the side of the road and the shoulder of the road. This can be done in several ways, namely by providing land for street vendors and pedicab bases in certain areas and also providing a wider parking area around Jalan Sutoyo S and relocating street vendors who cover the road.

2. conduct a review of other causes that have an impact on traffic density on this Jalan Sutoyo S section

REFERENCES

Directorate General of Highways (1997). Indonesian Road Capacity Manual (MKJI). Jakarta: Bina Karya.

Hendra Gunawan, M., Purnawan, M., 1998, Relation of Speed, Volume and Traffic Density Parameters in Padang Municipality. Symposium of Higher Education Transportation Studies Forum, East Hall ITB, 3 December 1998.

Matondang, Ardianshyah Putra. 2019. "The Effect of Side Barriers on Road Performance at Kampung Pon Market, Jalan Medan Tebing Tinggi, Serdang Bedagai Regency". Final Project in Transportation Sector, Faculty of Engineering, Civil Engineering Department, University of Muhammadiyah North Sumatra.

Maulana, Gusti Muhammad Ridho. 2021. "Analysis of the Effect of Side Barriers on the Performance of Jalan Sekumpul Ujung City of Martapura. Final Project in Transportation Sector, Faculty of Engineering Civil Engineering Department, Lambung Mangkurat University, Banjarbaru.

Radam IF, Mulyono AT, Setiadji BH (2015). *Influence of Service Factors in The* Model *of Public Transport Mode: A Banjarmasin-Banjarbaru Route Case Study*. *International Journal for Traffic and Transport Engineering*. Vol 5(2): 111.

Yoga, Aska Ilham Fitra. 2021. "The Influence of Traditional Market Activities on Traffic Flow Performance for the Sekumpul Martapura Road". Final Project in Transportation Sector, Faculty of Engineering, Civil Engineering Department, Lambung Mangkurat University, Banjarbaru.