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THE EFFECT OF CHARITY ACTIVITIES ON STREET ONTRAFFIC FLOW CHARACTERISTICS ON THE TRANS KALIMANTAN ROAD SECTION OFBARITO KUALA REGENCY

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ABSTRACT

The location reviewed in this study is on Jalan Trans Kalimantan KM.12 Barito Kuala Regency precisely in front of the entrance direction of GIBS Junior High School, which is influenced by charity activities. This causes increased density and decreased vehicle speed, making the speed of vehicle movement slow. Therefore, it is necessary to conduct research to find out how much influence it causes. What will be analyzed is both directions because they are equally affected by charity activities with conditions when there are charity activities and when there are no charity activities, requiring data in the form of LHR data and the speed taken directly at the research site. To find out these influences used conventional methods (Greenshield, Greenberg, and Underwood). From the results of the analysis, the model selected affected by charity in the direction on Handilbakti and the direction on Marabahan is the Greenshield model, and the model selected when it is not affected by charitable donations in the direction on Handilbakti and the direction of Marabahan is the Greenshield model, In each direction from the calculation results with conditions when there is a charity activities there is a maximum volume decrease of 18.53% from the Handilbakti direction, and from the Marabahan direction by 40.26%. The maximum speed in the Handilbakti and Marabahan directions has decreased by 59.71% and 61.40%, and for maximum density in the Handilbakti and Marabahan directions there has been an increase of 30.11% and 15.07%. LOS got from a degree of saturation > 0.8 when there was a charity activities in the direction at Handilbakti which occurred between 16.00 s.d. 18.00 WITA, and the direction of Marabahan occurs in the range of 15.10 – 16.40 WITA and the range of 16.30 – 18.00 WITA. Meanwhile, LOS when there is no charity in the direction of Handilbakti and Marabahan dominantly shows B level (66%) and C level (79%).

Keywords: Charity Activities on Street, Level of Service, Traffic Characteristics

1. INTRODUCTION

This Trans Kalimantan road is one of the access roads to get in and out of the city and is connected between South Kalimantan and Central Kalimantan. In addition, the Trans Kalimantan Road is also connected to Kapuas City, this is a way of transportation to get to Kapuas City or vice versa. On the Trans Kalimantan KM.12, Sungai Lumbah, Kec. Alalak, Barito Kuala Regency, South Kalimantan, to be

precise infront of the GIBS SMP-SMA entrance, there is a group of people who carry out charitable giving activities to raise funds for the construction of a mosque, divided into several posts. The limitation of the problem to clarify the problem and facilitate analysis, namely the location under review is the Trans Kalimantan KM.12 road section in front of the entrance to the GIBS Middle School-SMA and 200 meters after the location of the charity donation activity. What will be analyzed is both directions because both are affected by charitable giving activities.

2. THEORETICAL STUDY

2.1 Definition of Road

As part of transportation infrastructure, it has an important role in the socio-cultural, economic, environmental, political, and other fields. The road is intended for motorized and non-motorized vehicle traffic. Roads must also have facilities such as zebra crossing, sidewalks, pedestrian bridges, and others, to meet the needs of road users such as pedestrians, bicycles, and others. The road network system is a road section that helps interconnected areas and growth centers that are hierarchical in their services.

2.2 Traffic Characteristics

The characteristics of traffic flow on a road section will change throughout the day. The traffic flow is the number of vehicles that pass a point of observation per unit of time to a certain road location. If the road section value consists of different types of vehicles, it is necessary to convert it into Passenger Car Units (SMP), changing to (SMP) requires using the equivalent value of passenger cars (emp) to classify vehicle types. The following equivalent factors can be seen in Table 1.

Table 1. EMP Factor Urban Roads

No	Jenis Kendaraan	Ekivalen Mobil Penumpang (EMP)
1	Mobil Penumpang	1,0
2	Mikrobus	1,8
3	Bus	2,0
4	Truk Ringan	1,5
5	Truk Sedang *)	2,0
6	Truk Berat	2,5
7	Sepeda Motor	0,33
8	Sepeda (Tergabung) *)	0,5
9	Kendaraan Roda Tiga	1,0

Source: (Radam, 2008)

In general, there are two speeds used in the study of traffic flow speed, namely

Time Mean Speed which means point measurement, and Space Mean Speed which means that the measurement is related to measuring the length of the road. Speed is the distance traveled by the vehicle on the road per unit of time. Traffic density is the number of vehicles occupying the road segment. Density units are expressed in vehicles per kilometer (Vehicles/km), junior high school/kilometer, or vehicles per kilometer per lane (Vehicles/km/LJ).

2.3 Relationship Model of Current, Speed, and Density

The model between current, speed and density has a relationship with one another. In describing the form of this relationship there are three models, namely, model *Greenshield,* model *Greenberg,* and models *Underwood.* Each model gets its equation which is written as the formula.

2.4 Statistic analysis

This analysis is divided into 2 namely, regression analysis and correlation analysis. Interpretation to determine the level of correlation between the independent and dependent variables can be seen in Table 2.

Table 2. Interpretation of R values based on the correlation coefficient

Nilai absolut koefisien korelasi (r)	Interpretasi
0,00 – 0,199	Korelasi sedikit; hubungan yang nyaris diabaikan
0,20 – 0,399	Korelasi rendah; hubungan pasti tapi kecil
0,40 – 0,699	Korelasi sedang; hubungan substansial
0,70 – 0,899	Korelasi kuat; hubungan yang ditandai
0,90 – 1,000	Korelasi yang sangat kuat; hubungan yang bisa diandalkan.

Source: (Radam dkk, 2015)

2.5 Road Service Level

The level of road service is the ratio of the volume and capacity of roads. The service level indicator for city roads is the average speed, the ratio of volume divided bycapacity (V/C*ratio*), traffic density, and traffic accidents. There are several levels of road service and road characteristics in Table 3.

Table 3. Level of road service and road characteristics

Tingkat Pelayanan	Karakteristik-Karakterristik	Batas lingkup V/C
A	Kondisi arus bebas dengan kecepatan tinggi pengemudi dapat memilih kecepatan yang diinginkan tanpa hambatan.	0,00 – 0,20
B	Arus stabil, tetapi kecepatan operasi mulai dibatasi oleh kondisi lalu lintas. Pengemudi dibatasi dalam memilih kecepatan	0,21 – 0,45
C	Arus stabil, tetapi kecepatan dan gerak kendaraan dikendalikan. Pengemudi dibatasi dalam memilih kecepatan.	0,46 – 0,70
D	Arus mendekati tidak stabil, kecepatan masih dikendalikan, V/C masih dapat ditolerir.	0,71 – 0,85
E	Volume lalu lintas mendekati/berada pada kapasitas. Arus tidak stabil, kecepatan terkadang terhenti (tersendat-sendat).	0,86 – 1,00
F	Arus yang dipaksakan atau macet, kecepatan rendah, volume dibawah kapasitas. Antrian panjang dan terjadi hambatan-hambatan yang besar.	> 1,00

Source: (Abubakardkk, 1996 & Permenhub. No. KM 14, 2006)

3. METHOD

The research location is on the Trans Kalimantan Road, Barito Kuala Regency, South Kalimantan, to be precise, in front of the GIBS Middle School entrance and 200 meters from the starting point. The research lasted for 12 hours, from 06.00 WITA to 18.00 WITA. Then, data is taken at intervals of 10 minutes. The survey was conducted on Mondays and Tuesdays, June 13, 2022, and June 14, 2022, with clear weather conditions. The research location has one lane, two lanes, and two directions with four points of collection. With the consideration that it is only the influence of charitable giving activities, there are no other influences. Based on observations, the length of the activities affected by the charity donation was 15 m with the distance between fundraisers in the charity donation activity being 7.5 m, on the left side of the road as many as two people. And the distance in the middle of the road is 3.5 m consisting of one person, on the right side of the road there is one person. The influence of a fundraiser in the middle of the road further slows down the movement of passing road users. The sketch can look like in Figure 1.

Figure 1. Research Location Sketch

Calculation of this data using the conventional method, namely the model *Greenshield*, model *Greenberg*, and models *Underwood*. By selecting the relevant model from the three models, the characteristic relationship value of each is obtained condition. Based on the value of the characteristic relationship obtained, the results of the comparison of the values of each condition will be obtained, then the service quality of the road section is measured with the Level of Service (LOS) for each condition under review.

4. DATA ANALYSIS & DISCUSSION

4.1 Road Geometric Data

It is known that the geometric measurements of the roads that are affected by charitable giving activities and those that are not affected have a road width of 7 m. Lane width 3.5 m. Road geometric data can be seen in Figure 2.

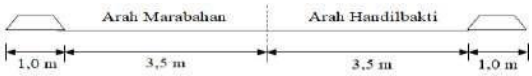

Figure 2. Cross Sections of Research Locations

4.2 Traffic Volume Data

To get the traffic volume in passenger car units (PCU), then each type of vehicle is multiplied by the PCU equivalent factor every 10 minutes, and the data on the number of vehicles passing during the survey and the results are added up to get the traffic volume. Graphs of traffic volume when there are obstacles to charity and not present in each direction can be seen in Figure 3 and Figure 4.

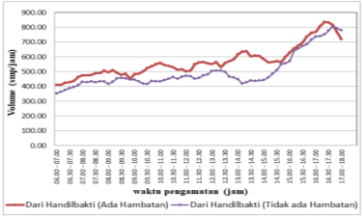

Figure 3. When Conditions There Are Obstacles and No Direction Handilbakti

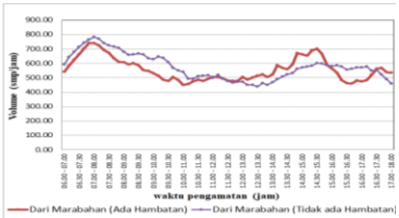

Figure 4. When Conditions There Are Obstacles and No Direction Marabahan

From Figure 3, it is found that the highest traffic volume with a charity donation from the direction of Handilbakti occurs at 16.30-17.30 WITA at 833.07 PCU/hour. Meanwhile, no charitable donations, obtained from the direction of Handilbakti occurred at 16.40-17.40 WITA at 808.08 PCU/hour. From Figure 4, the highest traffic volume is obtained with charitable donations from the direction of Marabahan occurring at 06.50-07.50 WITA at 738.91 PCU/hour. Then, when there is no charity donation from the direction of Marabahan, it occurs at 07.00-08.00 WITA at 780.64 PCU/hour.

The calculated speed is the speed of the car moving straight. Graphs of traffic speed when there are obstacles to charity and not in each direction can be seen in Figure 5 and Figure 6.

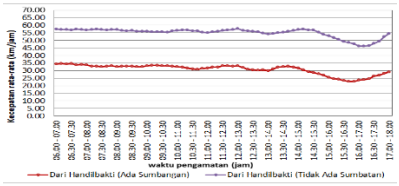

Figure 5. When Conditions There Are Obstacles and No Direction Handilbakti

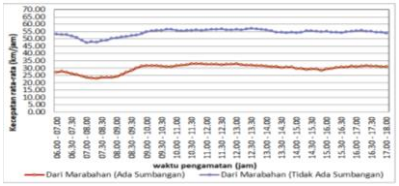

Figure 6. When Conditions There Are Obstacles and No Direction Marabahan

From Figure 5, it can be seen that the highest average speed when there is a condition of giving charity from the direction of Handilbakti occurs at 06.10-07.10 WITA at 34.78 PCU/hour. Meanwhile, the highest average speed when there is no charitable donation from the direction of Handilbakti occurs at 06.00-07.00 WITA at 57.44 PCU/hour. Furthermore, in Figure 6, the highest value obtained for the condition of charitable giving from the direction of Marabahan occurred at 16.20-17.20 WITA at 31.67 PCU/hour. Meanwhile, when there was no charitable giving from the direction of Marabahan, it occurred at 11.30-12.30 WITA at 56.44 PCU/hour.

4.3 The Relationship between Traffic Characteristics Existence of Charity Activities

The step used to obtain the relationship between traffic flow characteristics is to determine the density value by the quotient of volume and speed. Next, create a basic equation for the relationship between speed (S) and density (D) along with the correlation value. If a strong correlation value (0.7) is obtained and has an independent variable (x) that is realistic and by the 2/2 UD road type, then it will be a consideration in determining which model to choose. It can be seen in Figure 7 and Figure 8, for the results of the equation for the S-D relationship and the correlation of the road segment with the condition that there is a charitable contribution in each direction.

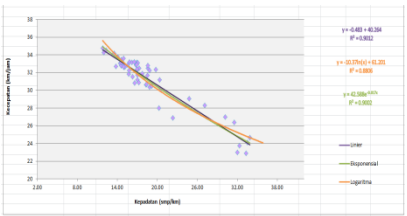

Figure 7. When Conditions There Are Obstacles Direction of Handilbakti

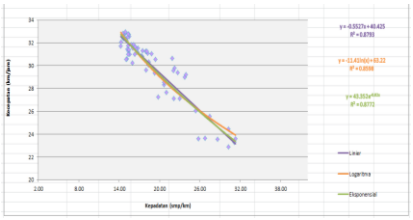

Figure 8. When Conditions There Are Obstacles Direction of Handilbakti

The recapitulation of the equation forms and the correlation interpretation of the three model equations can be seen in Table 4 for the Handilbakti direction and Table 5 for the Marabahan direction.

Table 4. Equation of the Handilbakti Direction Relationship Model

Hubungan	Model Persamaan	r^2	r	x	Keterangan
Greenshields	y = 40,624 - 0,483.x	0,9012	0,9493	83,36	Sangat Kuat
Greenberg	y = 61,201 – 10,37ln(x)	0,8806	0,9384	365,67	Sangat Kuat
Underwood	$y = 42,588e^{-0,017x}$	0,9002	0,9488	2505,17	Sangat Kuat

Table 5. Equation of the Marabahan Direction Relationship Model

Hubungan	Model Persamaan	r^2	r	x	Keterangan
Greenshields	y = 40,425 - 0,5527.x	0,8793	0,9377	73,14	Sangat Kuat
Greenberg	y = 63,22 – 11,41ln(x)	0,8598	0,9273	254,87	Sangat Kuat
Underwood	$y = 43,352e^{-0,020x}$	0,8772	0,9366	2185,15	Sangat Kuat

The equation of the relationship between traffic characteristics can be described in the form of a graph of the relationship between characteristics which can be seen in Figure 9 and Figure 10.

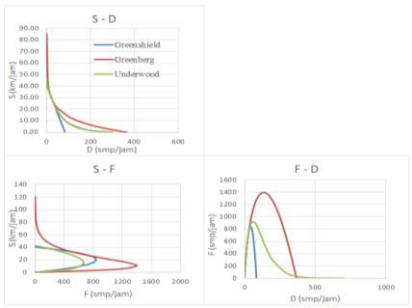

Figure 9 Characteristic Relationship Chart the direction of Handilbakti

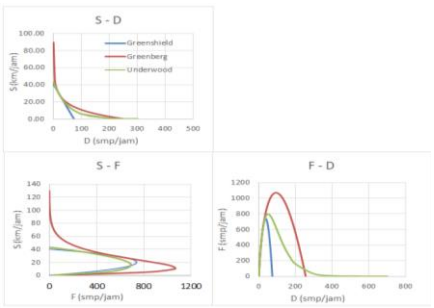

Figure10 Characteristic Relationship Chart the direction of Marabahan

4.4 Relationship of Traffic Characteristics Without Charity Activities

It can be seen in Figure 11 and Figure 12, for the results of the equation for the S-D relationship and the correlation of the roads with the condition that there is no charitable contribution in each direction.

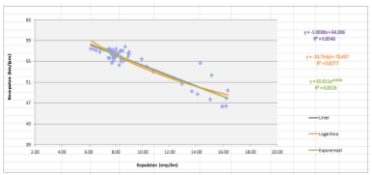

Figure 11. When Conditions There Are No Obstacles Direction of Handilbakti

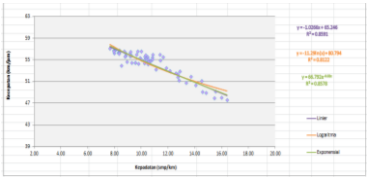

Figure 12. When Conditions There Are No Obstacles Direction of Marabahan

The recapitulation of the equation forms and the correlation interpretation of the three model equations can be seen in Table 6 for the Handilbakti direction and Table 7 for the Marabahan direction.

Table 4. Equation of the Handilbakti Direction Relationship Model

Hubungan	Model Persamaan	r^2	r	x	Keterangan
Greenshields	y = 64,306 – 1,0038.x	0,8546	0,9244	64,06	Sangat Kuat
Greenberg	y = 78,437 – 10,7n(x)	0,8277	0,9098	1526,23	Sangat Kuat
Underwood	$y = 66,611e^{-0,019x}$	0,8526	0,9234	3453,21	Sangat Kuat

Table 5. Equation of the Marabahan Direction Relationship Model

Hubungan	Model Persamaan	r^2	r	x	Keterangan
Greenshields	y = 65,246 – 1,0266.x	0,8591	0,9269	63,55	Sangat Kuat
Greenberg	y = 80,794 – 11,29ln(x)	0,8122	0,9012	1282,08	Sangat Kuat
Underwood	$y = 66,792e^{-0,020x}$	0,8578	0,9262	3340	Sangat Kuat

The equation of the relationship between traffic characteristics can be described in the form of a graph of the relationship between characteristics which can be seen in Figure 13 and Figure 14.

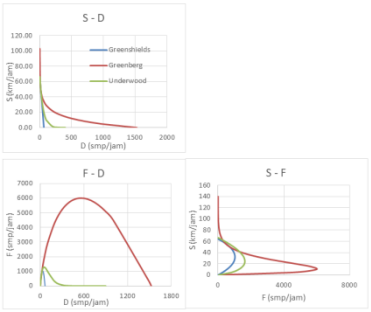

Figure 13 Characteristic Relationship Chart the direction of Handilbakti

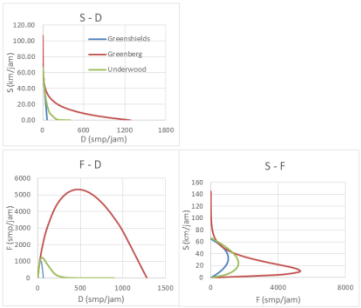

Figure 14 Characteristic Relationship Chart the direction of Marabahan

4.5 Comparison of Conditions Without Charity Activities and Charity Activities

From the results of the analysis, it is found that the relevant selected model is the Greenshields model with the regression analysis technique modeling the relationship between traffic speed (S) - Traffic density (D) so that a Volume value (F) was obtained. obtained the results of road performance in each direction at speeds decreased by 59.71% and 61.40%. Then for the volume when there was a charity donation there was also a decrease of 18.53% and 40.26%. There was an increase in density of 30.11% and 15.07% after being affected by charitable donations. The correlation coefficient shows a very strong relationship.

4.6 Service Level Index

The distribution of ITPs who are affected by charitable donations and those who are not affected by charitable donations can be seen in Figure 15 and Figure 16.

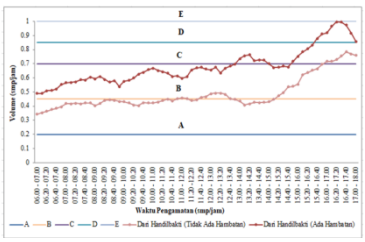

Figure 15. When Conditions There Are Obstacles and No Direction Handilbakti

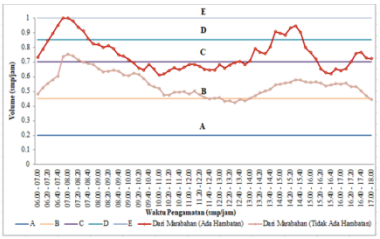

Figure 16. When Conditions There Are Obstacles and No Direction Marabahan

Figure 15, in the condition that there is a charitable contribution from the dominant Handilbakti direction, shows ITP E (15%). The current is nearly unstable in

the time range from 16.00 to 16.00 s.d. 18.00 WITA. Meanwhile, in conditions not affected by charitable donations from the dominant Handilbakti direction, it shows ITP B (66%). Stable current in the time range 06.00 to.d. 11.30 WITA and 12.40 s.d. 15.10 WITA. Then, Figure 16, in the condition of being affected by charitable donations from the dominant direction of Marabahan shows ITP E (21%). The current is nearly unstable in the time range of 06.30 s.d. 08.40 WITA and 13.50 s.d. 15.40 WITA. And in conditions not affected by charitable donations from the direction of Marabahan dominantly shows ITP C (79%). Stable currents in the time range 07.30 s.d. 12.30 WITA and 13.10 s.d. 17.50 WITA.

5. CONCLUSION

From the results of the study it can be concluded as follows:

1. The condition of the existence of charitable contributions in both directions obtained the selected characteristic relationship model is the model *Greenshields* with a very strong correlation coefficient value, the value of is obtained S*f* of 40.2637 km/hour, and F*c* of 839.06 PCU/hour. Whereas, from the direction of Marabahan, obtained S*f* of 40.4249 km/hour, and F*c* of 739.1618 PCU/hour.
2. If there is no charitable contribution in both directions, the selected characteristic relationship model is the model *Greenshields* with a very strong correlation coefficient value, the value of is obtained S*f* of 64.3064 km/hour, and F*c* of 1029.9385 PCU/hour. Whereas, from the direction of Marabahan, the value of is obtained S*f* at 65.2463 km/hour, and F*c* of 1036.7405 PCU/hour.
3. The comparison results obtained from the condition that there is charity donation and no charity donation, there is a decrease in volume by 18.53% from the Handilbakti direction and the Marabahan direction by 40.26%, then the speed in the Handilbakti direction and the Marabahan direction has decreased by 59.71% and 61.40%, and for the maximum density in the Handilbakti and Marabahan directions, there is an increase of 30.11% and 15.07%.

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