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ANALYSIS OF NOISE LEVEL DUE TO VEHICLE TRAFFIC ACTIVITIES ON THE KAMIZAUN ROAD SECTION, MERAUKE

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ABSTRACT

Noisy is a sound that disturbs the comfort of the community. Variable sources of noise can come from humans, household appliances, machinery, other activities both inside and outside the room, land, sea and air transportation vehicles. Noisy originating from land transportation activities, one of which comes from motorized vehicles that cross the road. Noise is generated by the sound of a vehicle engine, friction between the wheel and the road surface, horn sound, vehicle speed and driver behavior. Communities are sometimes less aware of the impact caused by noise due to traffic activities. Health can be disrupted, one of them is hearing loss. It is not realized that in fact other than residential areas there are public facilities around the road which are harmed by the noise source, namely the education area. Kamizaun Road is a road that is in the use of educational land. Traffic activity on Jalan Kamizaun certainly has an influence on students and students who are undergoing the learning process. When the teaching and learning process takes place students, students, teachers and lecturers need peace. Kamizaun Street is also not far from Merauke Mopah Airport. When air traffic activities start operating in the morning, the sound produced by airplanes is quite disturbing in the classroom. This type of research is quantitative descriptive. This study measures how much noise levels occur as a result of traffic activities of motorbikes, light vehicles and heavy vehicles. In addition it also measures the speed of the vehicle which affects the noise level. The results showed that the traffic volume on Jalan Kamizaun during the morning, afternoon and evening peak hours was 1356 vehicles, 1308 vehicles and 1602 vehicles, respectively. The highest vehicle speed is 30.3 km / h and the lowest is 18 km / hr. The highest noise level is 78.3dB and the lowest is 65dB. The noise level value has exceeded the threshold value for the school area which is 55dB.

Keywords: traffic volume, noise level, Kamizaun road

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1. INTRODUCTION

Traffic activity on the highway involves motorized vehicles and drivers. When motorized vehicles operate on the road produce varying noise. Varied noise is generated by the sound of the vehicle engine for each type, friction between the wheels with the road surface, horn sound, vehicle speed and driver behavior. The sound produced due to activities on the highway is already considered normal for road users and the public in general. It is not realized that there are actually public facilities around the road that are harmed by the noisy sources.

Noisy is an unwanted sound from a business or activity at a certain level and time that can cause disruption of human health and comfort of the environment (Kusumaatmadja, 1996; Samudro and Mangkoedihardjo, 2006; Santoso and Mangkoedihardjo, 2013). Motorized vehicle traffic is the main source of noise causes beyond the tolerance limit (Tanvir and Rahman, 2011).

Kamizaun Road is a road that is in the use of educational land. This road is the access road to Musamus University, Merauke State High School 3, Merauke State Vocational School 2 and Merauke State Vocational School 3. Traffic activity on Jalan Kamizaun certainly has an influence on students and students who are undergoing the learning process. When the teaching and learning process takes place students, students, teachers and lecturers need peace. Kamizaun Street is also not far from Merauke Mopah Airport. When air traffic activities start operating in the morning, the sound produced by airplanes is quite disturbing in the classroom. Not only has an impact on the calmness of the disrupted teaching and learning process, the continuous noise that has an impact on health, one of them is hearing loss. So research is conducted to find out how much noise is generated due to traffic activities on Jalan Kamizaun so that proper handling can be done to reduce the inconvenience of the teaching and learning process.

2. METHODS

2.1. Type of research

This type of research is quantitative research with the presentation of data using descriptive analysis. This study explains the situation in the field in the form of numbers. The aim is to describe the real situation.

2.2. Research location

The data collection survey was conducted at Jalan Kamizaun Merauke Regency. This Kamizaun Road is access to Musamus University, Merauke State High School 3, Merauke State Vocational School 2 and Merauke State Vocational Schoo

Figure 1. Research Site

2.3. Research time

Noise level measurements are carried out during sunny weather and are carried out for 1 day from 6:00 a.m. to 7:00 p.m., but measurements are only carried out for 10 minutes per hour. Measurement of vehicle traffic volume is carried out together with the measurement of noise level, as well as the speed of the vehicle.

2.4. Data collection

This survey was conducted to determine the noise level that occurred on Kamizaun Road as a result of the influence of the traffic volume of vehicles passing and the speed of the vehicles. So that the data collected are: (1) noise level (2) traffic volume for motorbike vehicles, light vehicles and heavy vehicles (3) vehicle speed. The survey was conducted involving 5 surveyors.

The noise level measurement is done using a simple Sound Level Meter (SLM) Tenmars TM-103 that has not used a pointer number so that the data generated is only the noise level data (L). In the implementation of measurements, SLM is placed a distance of 1 m from the edge of the road at a height of 1.2 m (Nababan, 2015). Measurement of noise level is carried out when the weather is clear and traffic is normal. The measurement of traffic volume is carried out by surveyors using traffic counters. Speed measurement is carried out simultaneously with the measurement of noise level and vehicle traffic volume where the measured speed is instantaneous speed using speed gun (Setiawan, 2014). The number of vehicles considered represents a minimum of 20 vehicles for each type of vehicle.

2.5. Data analysis

The value of the noise level of the measurement results is compared to the Noise Limit Criteria according to the Decree of the Minister of Environment No. KEP.48 / MENLH / 11/1996. Then the traffic volume and vehicle speed are connected to the noise level so that it can be known how much the vehicle traffic volume and speed affect the noise level.

3. RESULTS AND DISCUSSION

3.1. Traffic volume

The results of measurement of vehicle traffic volume for each type of vehicle are shown in Figure 2, Figure 3 and Figure 4. While Figure 5 shows the overall vehicle volume for all types of vehicles.

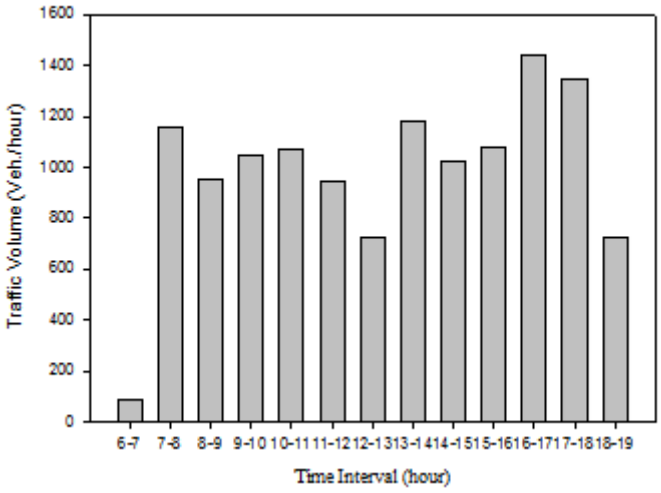

Figure 2. Traffic Volume for Motorcycle

From the results of the calculation of the number of motorbikes a lot between 16.00-17.00 EIT which is equal to 1440 vehicles / hour. If compared EITh other types of vehicles, motorcycle composition is 86.9%. For light vehicles based on the calculation of the highest number of light vehicles occurring between 08.00-09.00 EIT, there are 216 vehicles / hour. Then followed at 17.00-18.00 EIT as many as 210 vehicles / hour. When compared EITh other types of vehicles, the composition of light vehicles is 11.6%. Shown in Figure 3. From the calculation of the highest number of heavy vehicles between 12.00-13.00 EIT, which is 42 vehicles / hour. When compared EITh other types of vehicles, the composition of heavy vehicles is 1.47%.

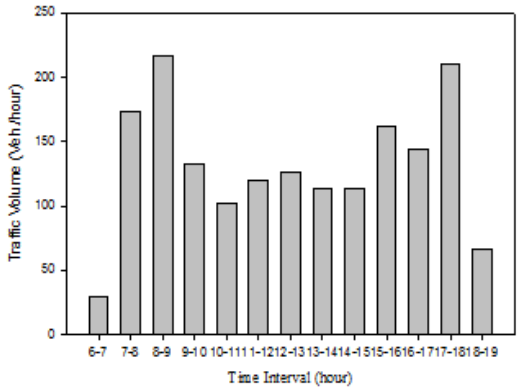

Figure 3. Traffic Volume for Light Vehicle

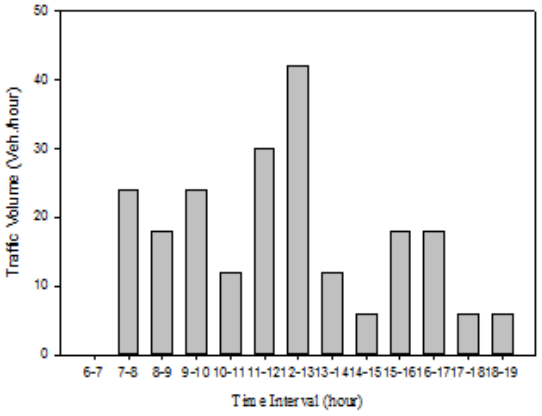

Figure 4. Traffic Volume for Heavy Vehicle

Figure 5 shows the number of combined vehicles. The number of vehicles is quite high at 07.00-08.00 EIT, 13.00-14.00 EIT and 16.00-17.00 EIT. This happened because at that time students and student schedules departed for School and University, the schedule of students and teachers going home from school, the schedule of staff and lecturers taking a break, and the schedule of students, lecturers and staff returning from the Campus. At 08.00-11.00 EIT and at 14.00-16.00 EIT the number of vehicles did not look much different as a form of daily activities of students adjusted to the lecture schedule.

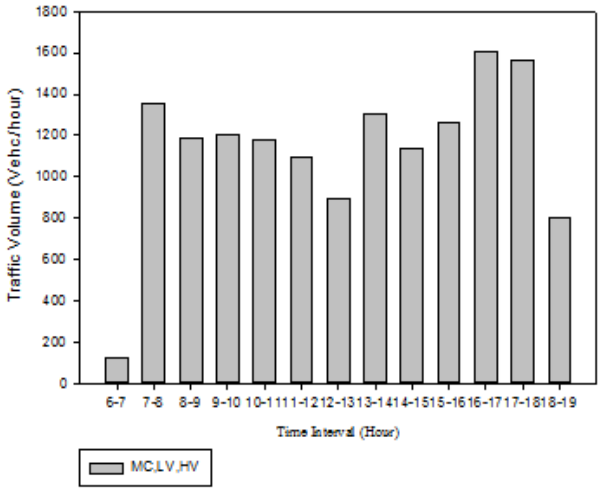

Figure 5. Traffic Volume for All Type of Vehicle

3.2. Vehicle speed

The results of vehicle speed measurements for each type of vehicle are shown in Figure 6, Figure 7 and Figure 8.

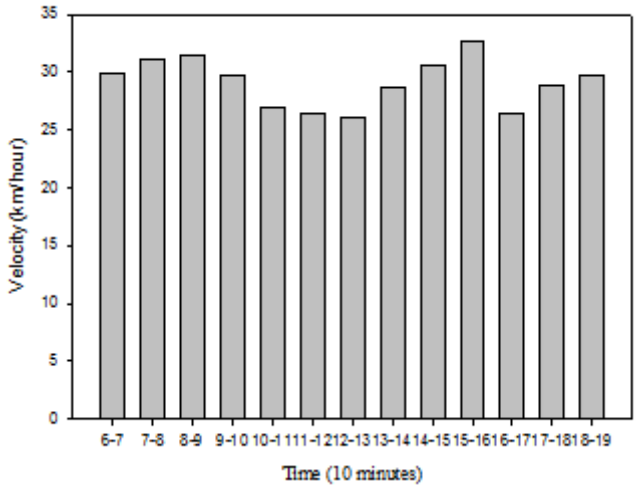

Figure 6. Velocity for Motorcycle

From the results of the velocity measurements obtained the highest average speed of motorcycles at 32.6 km / hour occurred at 15.00-16.00 EIT. At morning rush hour motorcycle speed is 29.9 km / hr up to 31.4 km / hr.

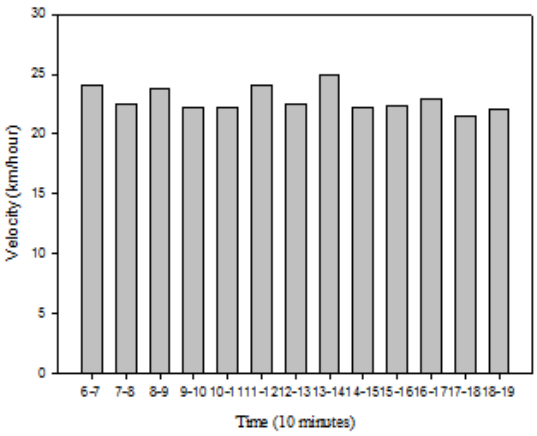

Figure 7. Velocity for Light Vehicle

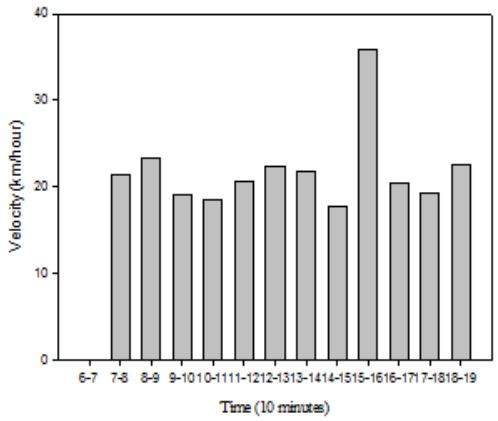

Figure 8. Velocity for Heavy Vehicle

For light vehicles in Figure 7, vehicle speeds tend to be uniform throughout the day, ranging between 21.4 km / hr to 24.9 km / hr. This is because the dimensions of the 7m wide road for two lanes make light vehicles unable to travel at high speeds. From the results of the speed measurements obtained the highest average speed for heavy vehicles of 35.8 km / h occurred at 15.00-16.00 WIT. Heavy vehicles can travel at this speed because 15.00-16.00 WIT is not the vehicle's rush hour. The average speed for all types of vehicles passing on Jalan Kamizaun is 33 km / hour.

3.3. Noise level

Measuring the noise level using a tool that has not used pointing numbers and the data generated is only the noise level data (L), then a further analysis is performed to calculate L1, L50 until the Leq value is obtained using the equation L1 + 0.43 (L50 - L1) (Mediastika, 2005). The noise level measured for one day for a 10-minute measurement per hour is obtained in Figure 9. The value of the noise level obtained is then compared with the allowable threshold value. The threshold value according to the designation of the area according to the Decree of the Minister of Environment No. 48 shown in table 1.

Tabel 1. Standar Noise Level[1][6]

Designation Area/Activity Environment		Noise Level dB (A)
Designation Area		
1	Housing and settlement	55
2	Trading and services	70
3	Office and trading	65
4	Green area	50
5	Industry	70
6	Goverment and Public Facilities	60
7	Recreation area	70
Activity Environment		
1	Hospital	55
2	School	55
3	Place of worship	55

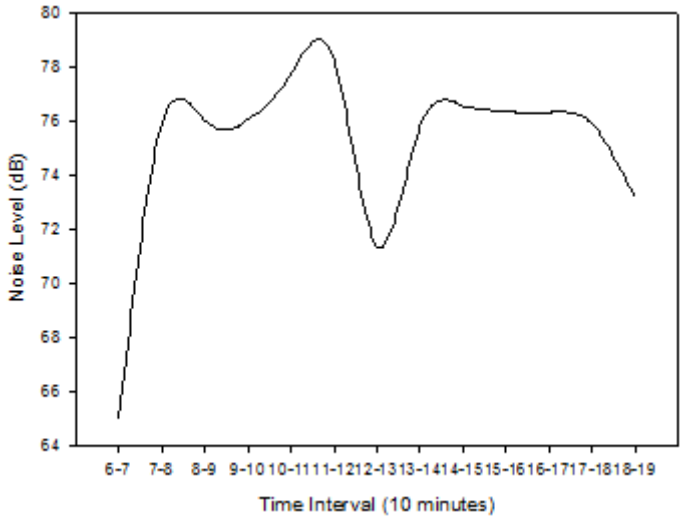

Figure 9. Noise Level Leq

From Figure 9, there is a noise level at 07.00-08.00 EIT at 75.9 dB, at 13.00-14.00 EIT 75.8 dB, and at 16.00-17.00 EIT 76.3 dB. The highest noise level occurred at 11.00-12.00 EIT at 78.3 dB. The value of the noise level that occurs is above the threshold for the environmental area of school activities or the like that is 55 dB. If seen according to the zone of the region, the value of the noise level on Jalan Kamizaun has exceeded the limit for the education zone, which is 45 dB - 55 dB (Trixy et al., 2018). The recapitulation of measurements of vehicle traffic volume, vehicle speed and noise level is shown in Table 2.

Tabel 2. Data Collection for Traffic Volume, Velocity and Noise Level

No.	Time	Traffic Volume (Vehc.)	Velocity (km/hour)	Noise Level (dB)
1	06:00 - 07:00	120	18,0	65,0
2	07:00 - 08:00	1356	25,0	75,9
3	08:00 - 09:00	1188	26,2	76,0
4	09:00 - 10:00	1206	23,7	76,1
5	10:00 - 11:00	1182	22,6	77,7
6	11:00 - 12:00	1092	23,7	78,3
7	12:00 - 13:00	894	23,6	71,3
8	13:00 - 14:00	1308	25,1	75,8
9	14:00 - 15:00	1140	23,5	76,5
10	15:00 - 16:00	1260	30,3	76,4
11	16:00 - 17:00	1602	23,3	76,3
12	17:00 - 18:00	1560	23,2	75,9
13	18:00 - 19:00	798	24,8	73,2

4. CONCLUSION

The traffic volume of vehicles measured at busy times is at 07.00-08.00 EIT, 13.00-14.00 EIT and 16.00-17.00 EIT each of 1356 vehicles, 1308 vehicles and 1602 vehicles. The highest vehicle speed is 30.3 km / h and the lowest is 18 km / hour. The highest noise level is 78.3dB and the lowest is 65dB. The value of the noise level that occurred on Jalan Kamizaun has

exceeded the threshold value for the school area which is 55dB. Therefore, efforts need to be made to reduce noise levels in the Musamus University area, Merauke 3 Public High School, Merauke State Vocational High School 2 and Merauke State Vocational School 3, such as planting protective plants on the left and right side of the road and within the education area. The plants are fringed wide, have a lot of leaf mass, above 1 meter high

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