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ANALYSIS OF MOTORCYCLE TRAFFIC SPEED WHICH CREATES NOISE IN FRONT OF WIYATA MANDALA JUNIOR HIGH SCHOOL DURING THE COVID-19 PANDEMIC

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ABSTRACT

The development of transportation is increasing rapidly from year to year in accordance with existing technological developments, currently transportation plays an important role in human life, roads are the means of transportation that play the most role in this, along with the increasing volume of passing vehicles as well as road widening of course. Produces a new problem that may still be underestimated, that problem is noise. One of them is a place of education or a school that is right next to the main road, namely Wiyata Mandala Junior High School, Bogor Regency. The speed of private vehicles has a significant effect on noise. From all analysis calculations, the biggest equation is found in the first day of the third point of research (Sound Level Meter 3), with a contribution of 28.95%. The calculation below shows, y = 61.62 + 0.004x1 at a distance of 15.25m SLM. This equation means that if there is no decrease in motorbike speed, the noise level on the SLM3 is 61.62 dB_A. The second largest equation was obtained in the first day of research at the second point (Sound Level Meter 2) with a contribution of 27.14% based on the calculation of the equation below, y = 64.23 + 0.007x1 with a distance of 3.44m SLM. The purpose of the above equation is that if there is an increase in motorbike speed, private vehicle speed and public vehicle speed, then the noise on the SLM2 is 64.23 dB_A. During the Covid-19 pandemic, motorcycles at moderate speed often passed this school area. So based on the results of observations and calculations, it was found that the decrease in motorcycles was 45% which crossed the Wiyata Mandala Junior High School Bogor.

Key words: traffic speed; noise; motorcycle; SLM; Covid-19.

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INTRODUCTION

The number of motorized vehicles is growing from year to year in accordance with existing technological developments, currently transportation plays an important role in human life, roads are the means of transportation that play the most role in this, along with the increasing volume of vehicles that pass as well as widening the road, of course, resulting in a new problem that may still be underestimated, the problem is noise. Geographically, the city and district of Bogor are very strategic considering that apart from being close to DKI Jakarta, Bogor also acts as a buffer zone for the city of Jakarta-Banten, considering its role as a buffer zone for the cities of Jakarta and Banten, causing the main roads in the city and district of Bogor to be always crowded with vehicles, either by local residents or passing vehicles (Syaiful, S, Mudjanarko, SW, 2019; Syaiful S, Akbar L, 2015; Syaiful S, 2015). So that the noise generated by these vehicles is considered normal for road users and local residents, but actually there are public facilities around the highway that are harmed by noise which will greatly disturb the school students such as students who need peace in the learning process (Syaiful S, Wahid N, 2020). Each motor vehicle produces a variety of noise. This noise has a considerable impact on the tranquility of the area that is directly in contact with the highway.

Therefore, setting the distance between the main school building and the road must be taken into account, for the sake of realizing the comfort of the school students (Syaiful S, Thamrin T, 2016; Karimah H, Akbardin J, 2019; Ganda SF, Moetriono H, Mudjanarko SW, 2019). One of them is a place of education or school which is right next to the highway, namely Wiyata Mandala Junior High School, Bogor Regency. The purpose of this study was to obtain the noise level caused by the volume of motorcycle traffic on the road in front of the Wiyata Mandala Junior High School, Bogor district. The noise disturbance studied and observed is limited to noise source level disturbances which are not disturbances of air pollution levels or waste pollution. The samples used were road users in front of the Wiyata Mandala Junior High School, Bogor Regency. Namely Wiyata Mandala Junior High School teachers, students, student introductions and people who passed in front of the Wiyata Mandala Junior High School, Bogor Regency. The sample studied can represent daily activities carried out at 06.00 - 18.00 BBWI. The day that represents every educational activity for four days, namely Saturday, Sunday, Monday and Tuesday, means a day that represents every activity and activity of citizens and school activities, but during the Covid-19 pandemic, residents' activities decreased quite drastically.

Regional Development is very influential in forming a concentration of economic area development. Congestion also affects the development of economic zones that are supported in the formation of areas that support new activity centers guided by the development of an integrated area. This development is also supported by the participation of the surrounding community in improving the surrounding economy. The development in this activity is very much supported by a fairly strong analytical experience. Regional development is conveying a very influential point form, namely to increase integrated areas. Including area development at each intersection including city development (Pratam.AHS.et.al, 2018; Rizki.DA, et.al.2017; Mangiri.D,et.al, 2020; Minesa.P,et.al, 2014; Oktavia .RCD, et.al, 2020; Ernan.R, 2001; Ernan.R, Junaidi.J, 2011).

In traffic regulation, including congestion, it affects the number of vehicles passing through the intersection. Smooth traffic conditions are influenced by good road surfaces. Smooth road surface with a mixture of concrete and asphalt in the completion of the pavement will greatly support the strength of the road. Roads traversed by motorized vehicles are always a top priority in handling the field. So that the road will be smooth and comfortable for motorized vehicles to pass for the long term. The strength of the road in supporting motorized vehicle traffic can reduce the noise caused by friction of the vehicle wheels with the road surface (Aji.AHF, et.al, 2015; Fauzi.I, Hariyadi.ES, 2018; Saputro.S, Hariyadi.ES, 2015; Syaiful.S, 2021).

Traffic

Traffic is the movement of vehicles and people in the road traffic space, while what is meant by road traffic space is the infrastructure intended for the movement of vehicles, people, and/or goods in the form of roads and supporting facilities (Anonymous, 1997).

Traffic parameters related to noise level analysis are: traffic volume and speed. Volume is the number of vehicles that pass one observation point at a time, while speed is the rate of travel in distance per unit time (Hobs, FD, 1995).
Based on the speed calculation guide from the Highways Department of the Ministry of Public Works of the Republic of Indonesia, data collection using speed uses the following formula below.

U = d/t kkm/hour]

With:

U = speed (km/hour)
d = distance (km)
t = time (hour) (Tamim OZ, 2000)

Noise

Noise is an unwanted sound from a business or activity at a certain level and time which can cause disturbance to human health and environmental comfort (Source: Menteri Lingkungan Hidup, 1996).

RESEARCH METHODS

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Working procedure
Research time

Field data collection was carried out for 4 days, namely:

1. Saturday, September 12, 2020 at 06.00-18.00,
2. Sunday, September 13, 2020, 06.00-18.00,
3. Monday, September 14, 2020 at 06.00-18.00,
4. Tuesday, September 15, 2020 at 06.00-18.00.

Consider these days because:

1. Traffic flow on Saturday at that date and time is a weekend traffic flow and is always crowded due to weekend holiday activities.
2. The traffic flow on Sunday at that date and time is the traffic flow for work holidays and school holidays, the traffic is not as dense as other days,
3. The traffic flow on Monday at that date and time is the traffic flow at the beginning of the working day and the average traffic is always denser than other days.
4. Traffic flow on Tuesday at that date and time is a weekday traffic flow and the average traffic is not as dense as other days.

Research Place

The place and location of this research is in front of the Wiyata Mandala Junior High School, at Salabenda Street-Parung Street highway Km 4, Salabenda Bogor, West Java (16629) This is a national road.

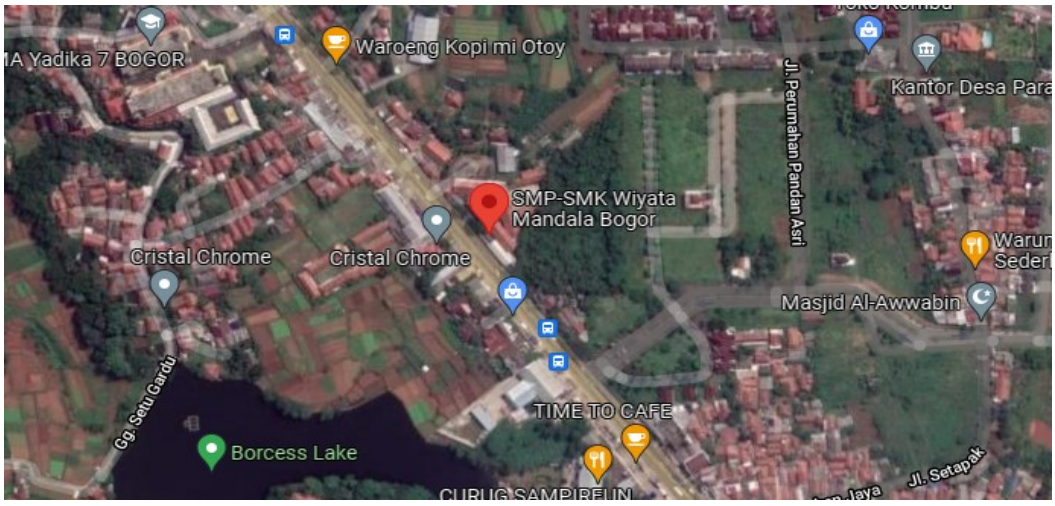

Figure 1. Map of research location Source: Google Maps

Figure 2. Research location in front of Wiyata Mandala Junior High School Source: Personal documentation

The research method is presented in Figure 2 the following flow chart:

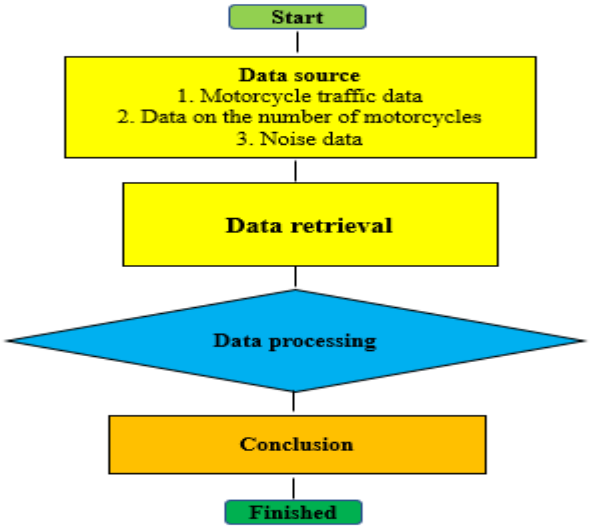

Figure 3. Research flow chart

How to Retrieve Data
Noise data

SLM1 is installed on the edge of the highway 0.00m, SLM2 is installed behind the school's main fence 3.44 m, and SLM3 is installed on the wall closest to the highway which functions as an important school room of 15.25m. From the day and hour at the time of the study, just before data collection began, the SLM3 Automatic was paired with a laptop and ensured that it was running well, while SLM1 and SLM2 were turned on every 15 minutes to collect noise level data and recorded it on the form provided until the end of data collection, that's when the SLM3 that is connected to the laptop is directly saved so that it is stored.

Vehicle speed data

Video footage of the vehicle is taken when the vehicles pass from one observation point to the next point as far as 75m which will be seen by the vehicle in how many seconds it takes to walk 75m.

Results and Discussion
Results Data

The results of the calculated traffic data are data per 15 minutes for 12 hours a day. Data was taken from 06.00 to 18.00. This data was taken for 4 days, namely on Saturday 12 September 2020, Sunday 13 September 2020, Monday 14 September 2020, and Tuesday 15 September 2020.

This traffic data is obtained from the calculation of the Passenger Car Equivalence (EMP). The use of this calculation is intended to make traffic analysis easy to carry out the passenger car unit factor (SMP) for each motor vehicle according to the Indonesian Road Capacity Manual (Anonymous, 1997), for urban roads as follows:

1. Heavy Vehicle (HV) = 1.30
2. Light Vehicle (LV) = 1.00
3. Motorcycle (MC) = 0.40
4. Non-motorized vehicles = 1.00 (Anonymous, 1997)

In practice, the grouping is divided into two groups, namely motorcycles and light vehicles, where motorcycles (MC) have a value of 0.40 and light vehicles (private cars, public transportation and freight transport) with an EMP of 1.00.

Processing Results Speed

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The results of processing speed on data on Saturday 12 September 2020 are as follows:

Based on the speed calculation guide from the Highways Department of the Ministry of Public Works of the Republic of Indonesia, data collection using speed uses the speed formula. The distance required is 75m.
Example calculation:
Is known :
The time data required in the 75 m range is

Time (t)	= 9.12 seconds
Distance (d)	= 75.00 m
Number of vehicles(s)	= 915.00 vehicles
So, Velocity (U)	= d/t
	= (75/1000)
	(9.12/3600)
	= 29.61 km/hour

Processing of Vehicle Speed Data and Noise Caused by Motor Vehicles

The results of data processing motor vehicles and noise using the SPSS version 22 program.

Correlation Test

Correlation testing is used to find the relationship between two or more independent variables which are jointly associated with the dependent variable, so that it is known that the contribution of the independent variable which is the object of research to the dependent variable.

RESULTS AND DISCUSSION

Analysis with Statistical data processing
The First Day

Data statistical of analysis on Saturday, September 12, 2020, a distance of 00.00m with SLM1. Analysis and data processing using SPSS version 22 obtained noise level (y), motorcycle speed (SPM/x1), based on 95% confidence level. The results of the equation using the data above are presented in the form of the equation below, which represents a distance of 0.00m using SLM1. Shown in the form of table 2 and figure 4 below:

Table 2. Statistical analysis of distance data 0.00m

Y= Noise	X1 = Motorcycle Speed
69,52	0,042
69,62	0,043
69,72	0,044
69,82	0,045

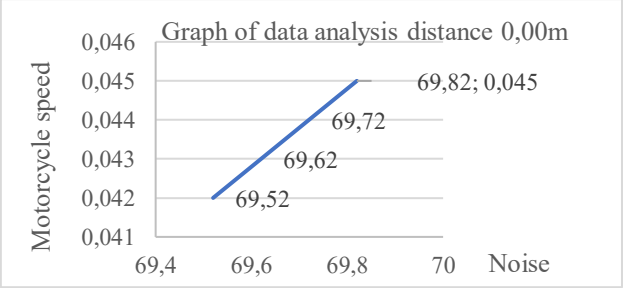

Figure 4. Graph of data analysis distance 0.00m

Data statistical of analysis on Saturday, September 12, 2020, a distance of 3.44m with SLM2. Shown in the form of table 3 and figure 5 below:

Table 3. Statistical analysis of distance data 3.44m

Y= Noise	X1 = Motorcycle Speed
64,23	0,007
64,43	0,008
64,63	0,009
64,83	0,0100

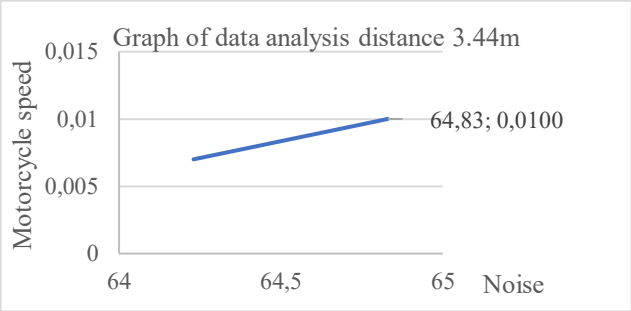

Figure 5. Graph of data analysis distance 3.44m

Data statistical of analysis on Saturday, September 12, 2020, a distance of 15.25m with SLM3. Shown in the form of table 4 and figure 6 below:

Table 4. Statistical analysis of distance data 15.25m

Y= Noise	X1 = Motorcycle speed
61,62	0,004
61,77	0,005
61,92	0,006
62,07	0,007

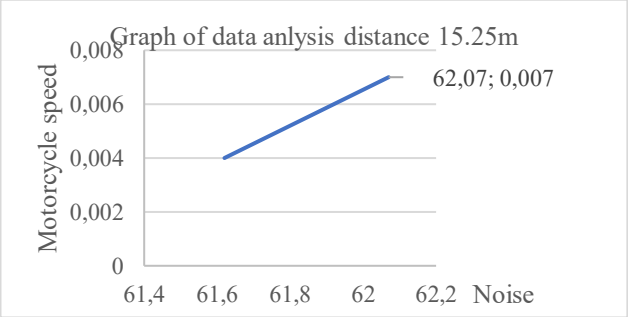

Figure 6. Graph of data analysis distance 15,25m

The Second Day

Data statistical of analysis on Sunday, September 13, 2020, a distance of 0.00m with SLM1. Shown in the form of table 5 and figure 7 below:

Table 5. Statistical analysis of distance data 0.00m

Y= Noise	X1 = Motorcycle speed
71,176	0,409
71,186	0,410
71,196	0,411
71,206	0,412

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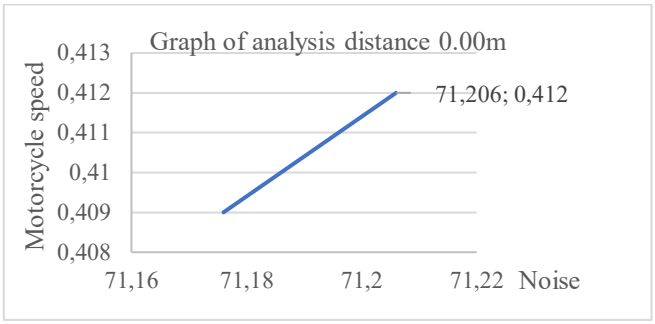

Figure 7. Graph of data analysis distance 0.00m

Data statistical analysis on Sunday, September 13, 2020, a distance of 3.44m with SLM2. Shown in the form of table 6 and image 8 below:

Table 6. Statistical analysis of distance data 3.44m

Y= Noise	X1 = Motorcycle speed
70,933	0,302
70,943	0,303
70,953	0,304
70,963	0,305

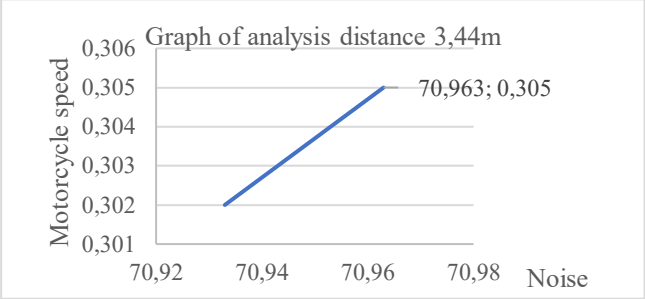

Figure 8. Graph of data analysis distance 3.44m

Data statistical of analysis on Sunday, September 13, 2020, a distance of 15.25 m with SLM3. Shown in the form of table 7 and figure 9 below:

Table 7. Statistical analysis of distance data 15.25m

Y= Noise	X1 = Motorcycle speed
65,15	0,244
65,35	0,245
65,55	0,246
65,75	0,247

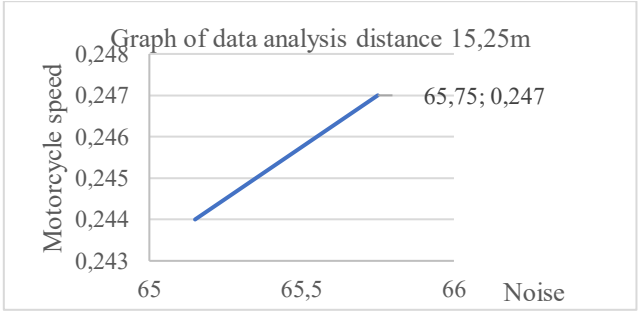

Figure 9. Graph of data analysis distance 15.25m

The Third Day

Data statistical of analysis on Monday, September 14, 2020, a distance of 0.00m with SLM1. Shown in the form of table 8 and figure 10 below:

Table 8. Statistical analysis of distance data 0.00m

Y= Noise	X1 = Motorcycle speed
72,47	0,105
72,57	0,106
72,67	0,107
72,77	0,108

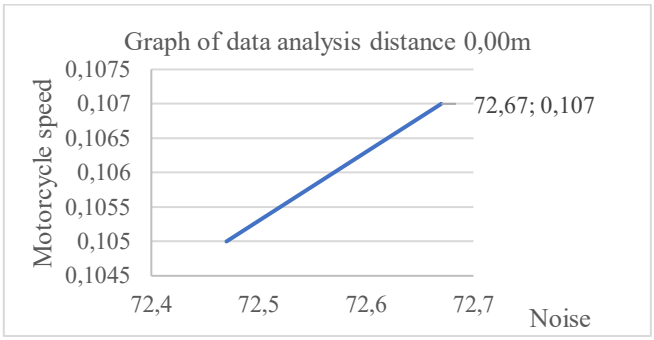

Figure 10. Graph of data analysis distance 0.00m

Data statistical of analysis on Monday, September 14, 2020, a distance of 3.44m with SLM2. Shown in the form of table 9 and figure 11 below:

Table 9. Statistical analysis of distance data 3.44m

Y= Noise	X1 = Motorcycle speed
71,10	0,085
71,25	0,086
71,40	0,087
71,55	0,088

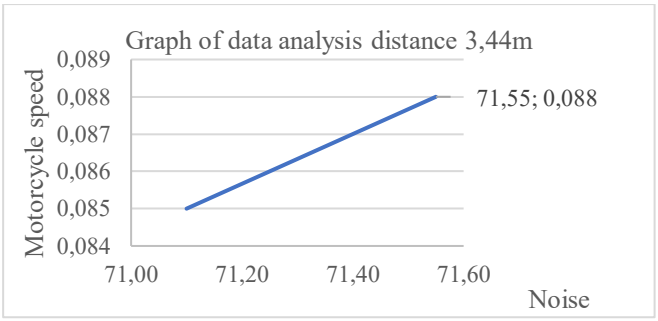

Figure 11. Graph of Data Analysis Distance 3.44m

Data statistical of analysis on Monday, September 14, 2020, a distance of 15.25 m with SLM3. Shown in the form of table 10 and figure 12 below:

Table 10. Statistical analysis of distance data 15.25m

Y= Noise	X1 = Motorcycle speed
69,05	0,059
69,10	0,060

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69,15	0,061
69,20	0,062

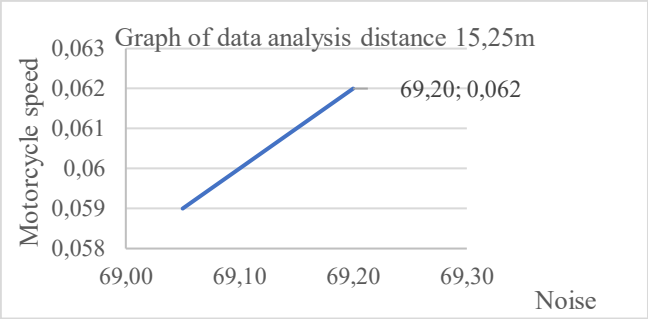

Figure 12. Graph of data analysis distance 15.25m

The Fourth Day

Data statistical of analysis on Tuesday, September 15, 2020, a distance of 0.00m with SLM1. Shown in the form of table 11 and figure 13 below:

Table 11. Statistical analysis of distance data 0.00m

Y= Noise	X1 = Motorcycle speed
74,791	0,0142
74,811	0,0143
74,831	0,0144
74,851	0,0145

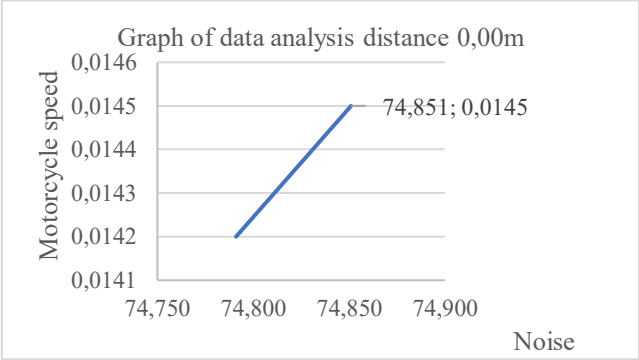

Figure 13. Graph of data analysis distance 0.00m

Data statistical of analysis on Tuesday, September 15, 2020, a distance of 3.44m with SLM2. Shown in the form of table 12 and figure 14 below:

Table 12. Statistical analysis of distance data 3.44m

Y= Noise	X1 = Motorcycle speed
71,22	0,051
71,37	0,052
71,52	0,053
71,67	0,054

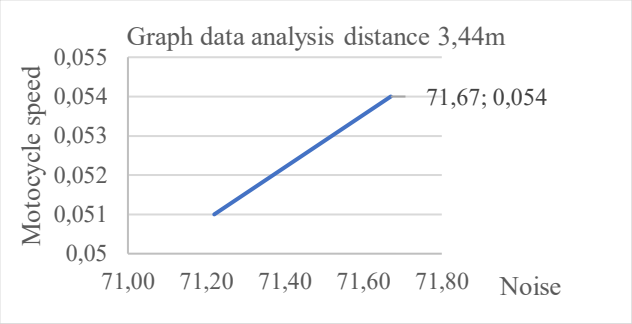

Figure 14. Graph of data analysis distance 3.44m

Data statistical of analysis on Tuesday, September 15, 2020, a distance of 15.25m with SLM3. Shown in the form of table 13 and figure 15 below:

Table 13. Statistical analysis of data distance 15.25m

Y= Noise	X1 = Motorcycle speed
70,11	0,034
70,21	0,035
70,31	0,036
70,41	0,037

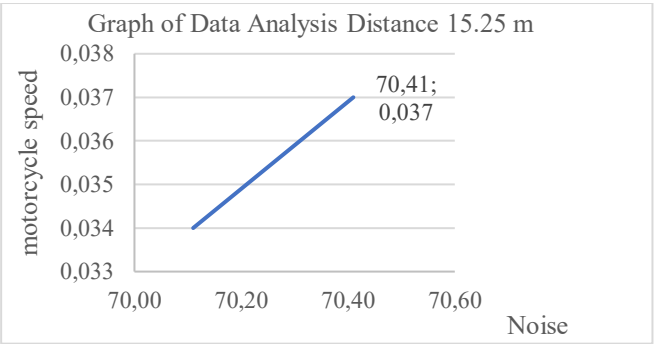

Figure 15. Graph of data analysis distance 15.25m

The discussion shown in the motorcycle speed calculation model in front of the Wiyata Mandala Junior High School got the highest value of 61.62db$_A$ with a distance of 5.25m from the highway. Further 64.23dB$_A$ with a distance of 3.44m from the highway. During the pandemic period the school is closed so that the influence of the participating voices from school students is NOTHING. This makes it easier to retrieve data without any noise effect around it.

CONCLUSION

Based on the results and discussion above, it can be concluded from the research that: the speed of the motorcycle on the first day of research has a significant effect on noise, the third point (Sound Level Meter 3), with a contribution of 28.95% with a distance of 15.25m and a calculation of y = 61.62 + 0.004x1. The purpose of this equation is if there is no decrease in the speed of the motorcycle, the noise level in SLM3 is 61.62 dB$_A$. If there is a motorcycle speed will have a significant effect on noise. In the second largest equation in this study also occurred on the first day at the point (Sound Level Meter 2) a distance of 3.44m from the highway with a contribution of 27.14% based on the calculation of the equation below, y = 64.23 + 0.007x1, the purpose of this equation is if there is no increase in the speed of the motorcycle then the noise in SLM2 is 64.23 dB$_A$. During the Covid-19 pandemic, motorcycles at medium speed often pass through this school area. So based on the results of observations and calculations, it was found that there was a 45% decrease in motorcycles crossing the Wiyata Mandala Junior High School Bogor.

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