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EFFECT OF TRAFFIC SPEED ON NOISE GENERATED BY VEHICLES MOTORIZED IN FRONT OF THE KARYA BHAKTI PRATIWI DRAMAGA BOGOR HOSPITAL

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ABSTRACT

Noise is one of the environmental health problems in big cities. The 1988 WHO report as submitted by the Indonesian Health Service (1995), states that 8% - 12% of the world's population has suffered from the effects of noise. The activity of residents of the city of Bogor a suburb of the capital city of Jakarta in Indonesia is relatively high. Along with the economic development in the city of Bogor, the number of motorized vehicles operating both private and public vehicles has also increased. The purpose of this study was to determine the average speed of motorized vehicles that pass through the Dramaga highway, especially in front of the Karya Baki Pratiwi Hospital, and also to determine the level of noise generated due to the speed of motorized vehicles. The method used in this study is a quantitative method by calculating the number of vehicles and the average speed of vehicles and data analysis. The data taken is vehicle speed data every 15 minutes and noise levels using a Sound Level Meter (SLM). In this study, three SLMs were used which would be placed at three points. The results showed that the speed of the vehicle affects the noise level which is quite significant. The results of data analysis show that the effect of speed on noise is 24%, where the equation is as follows, y=69.505 – 0.395x1 +0, 148x2 + 0.535x3. This equation means that if there is no decrease in motorcycle speed, light vehicle speed, and heavy vehicle speed, the noise level in SLM1 is 69.505 dBA. However, if there is an increase in the number of light vehicles by 0.148, a decrease in the number of motorcycles and large vehicles is obtained by 0.14, the noise level will increase by 0.395 dBA.

Keywords: speed, noise, sound level meter, motorized, vehicles, added noise.

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INTRODUCTION

Noise is one of the environmental health problems in big cities. The 1988 WHO report as presented in [1], stated that 8% - 12% of the world's population had suffered from the effects of noise. The activity of residents of the city of Bogor, a city on the outskirts of the capital city of Jakarta in Indonesia, is relatively high. Along with economic development in the city of Bogor, the number of motorized vehicles operating, both private and public transportation, has also increased. Road traffic is the main source of noise that disturbs most urban communities. According to [2], road noise levels can reach 70-80 dBA. One source of road traffic noise, among others, comes from motorized vehicles, both two-wheeled, three-wheeled, and four-wheeled, with sources that cause noise including the sound of horns and exhaust sounds [3]. Research on vehicle speed versus noise concludes that the greater the vehicle speed, the lower it is, resulting in high noise levels. Likewise, if the vehicle speed is low, the noise level it will cause will be lower. Vehicle volume is directly proportional to the noise level, while vehicle speed is inversely proportional to the noise level. The vehicle speed factor also influences the level of noise generated [3], [4], [5]. Karya Bhakti Pratiwi Dramaga Hospital, located on the Dramaga main road, is the object of the author's research to determine how much influence sound caused by the speed of motorized vehicles has on activities that take place around the Karya Bhakti Pratiwi Dramaga Hospital. The condition of the environment around the Karya Bhakti Pratiwi Dramaga Hospital is something that must be paid attention to so that it is free from noise resulting from the sound of motorized vehicles passing on the Dramaga highway. Based on the problem formulation above, the objectives of this research are:

- To determine the noise level due to vehicle speed in front of Karya Bhakti Pratiwi Hospital.
- Determine the relationship between vehicle speed and the noise generated.

This study aims to find out how much the speed of passenger cars is related to the noise generated in the city of Bogor. From this goal, it is hoped that it can provide alternative solutions for related agencies in the city of Bogor to minimize noise levels in the city of Bogor.

Definition of Noise

Noise has become such an influential aspect of work environments and community life that we often refer to it as noise pollution and can often be a health hazard. Noise is usually defined as sound at a certain amplitude that can cause irritation or interfere with communication.

Sound can be measured objectively while noise is a subjective phenomenon [6], [7], [8]. Physically there is no difference between sound and noise. Sound is a sensory perception and complex patterns of sound vibrations are labeled as unequal. Sound pressure is a basic measurement of the air vibrations that produce sound. Because the range of sound pressure that human hearing can detect is very wide, as a result, the sound pressure cannot be added or averaged arithmetically. In addition, the sound level of most noise varies over time, and when sound pressure is calculated, sudden pressure fluctuations must be integrated into units of time intervals [9], [10], [11], [12], 13].

According to the Decree of the State Minister for the Environment [14] concerning Noise Level Standards in Article 1 paragraph 1, what is meant by noise is unwanted sound from businesses or activities at a certain level and time which can cause problems with human health and environmental comfort.

Based on the nature and spectrum of sound, noise can be divided into [15].

- Continuous noise with a wide frequency spectrum, this noise remains relatively constant within the limits of approximately 5 dBA for 0.5 consecutive seconds.
- Continuous noise with a narrow frequency spectrum, this noise is also relatively constant but only has certain frequencies (at frequencies 500, 1000, and 4000 Hz) for example secular saws, and gas valves.
- Intermittent noise. This noise does not occur continuously, but rather there are periods of relative calm, for example, traffic noise, and noise at the airport.
- Impulsive Noisy. This noise has a change in sound pressure exceeding 40 dBA in a very short time and usually shocks the hearing. For example, the sound of exploding firecrackers, and cannons.
- Repetitive Impulsive Noise. The same as impulsive noise, only here it occurs repeatedly, for example forging machines [15].

Causes of Noise

The increase in private motorized vehicles due to the lack of public transportation modes that can accommodate people's needs, creates traffic congestion which causes delays and even traffic jams. Another impact that is felt due to traffic flow on roads if we pay closer attention is that it also causes noise pollution due to motorized vehicles in the form of noise [13].

The increase in traffic flow on roads apart from causing congestion also has an impact on air and noise pollution. The noise generated is not only due to the exhaust sound of passing motor vehicles but can also be caused by friction between the road and vehicle tires and the sound of vehicle horns [12], [13].

Noise caused by traffic is one of the sounds that cannot be avoided in modern life and is also one of the undesirable sounds. Factors that influence noise caused by traffic include: (Wardika, 2012)

- Effect of Traffic Volume (Q) Traffic volume (Q) has a very influential effect on noise. This can be understood because the traffic noise level is the total price of several noise levels where each type of vehicle has a different noise level.
- Effect of Average Vehicle Speed (V) The results of the study show that the average speed of motorized vehicles affects noise levels.
- Effect of Longitudinal Slope of the Road The research results show that a longitudinal slope of greater than 2% will result in a correction to the noise level.
- Effect of Observer Distance (D) The research results show that if the noise source is a point (point source), then by doubling the distance to the source, the noise level value will decrease by ± 6 dB and will decrease by approximately 3 dB if the source is noisy a line (line source).
- Influence of the type of road surface. Friction between the vehicle's wheels and the road surface on which it is traveling will cause a correction to the noise from the vehicle. The amount of correction depends on the type of road surface being traversed.
- Influence of Traffic Composition Traffic flow on the road generally consists of various types of vehicles including motorcycles, passenger cars, taxis, minibusses, pick-ups, buses, light trucks, and heavy vehicles which have their noise levels resulting in traffic noise influenced by the type of vehicle plying the road. The traffic noise level is the total value of the noise level of each vehicle.
- Surrounding environment the environmental conditions around the road can also influence the level of traffic noise that occurs, such as the presence of trees on the side of the road or bushes. Based on research, it was found that trees and bushes can reduce the noise that occurs in the environment by 2 dBA [14].

Noise Threshold

Noise is usually defined as a sound or sound at a certain amplitude that can cause irritation or interfere with communication. Sound can be measured objectively while noise is a subjective phenomenon. Based on the Decree of the Minister of the Environment [14], concerning Noise Quality Standards, noise is unwanted sound from businesses or activities at a certain level and time which can cause problems with human health and environmental comfort. The following Table-1 is the standard value of noise level

Table-1. Standard noise level values [14].

Allocation of Activity Areas/Environments	Noise Level (dBA)
Area Allocation	
Housing and Settlements	55
Trade and Services	70
Offices and Commerce	65
Green open space	50
Industry	70
Government and Public Facilities	60
Recreation	
Special	
Airport*	
Train Station*	
Sea Port	70
Activity Environment	
Hospital or similar	55
School or something similar	55
Place of worship or similar	55

The trend of increasing the number of motorized vehicles operating will increase the traffic burden and cause various problems that can disturb most urban communities. One example is the increasing intensity of sound pollution in the form of noise for the environment around the road. Sources of road traffic noise include motorized vehicles, both two-wheeled, four-wheeled, and heavy vehicles, the sources that cause the noise include the sound of vehicle horns, exhaust sound due to excessive pressing of the gas pedal, and the use of racing exhausts. Each vehicle produces noise. However, the source and magnitude of the noise can vary greatly depending on the type of vehicle [12], [14]. Noise is unwanted excessive sound and is often referred to as invisible pollution that causes physical and physiological effects on humans. Noise can disrupt sleep so that when you wake up the body becomes tired, while sounds with an intensity of 90 dBA can disrupt the autonomic nervous system. Noise with an intensity of 140 dBA can cause vibrations in the head, severe pain in the ears, impaired balance, and vomiting. Apart from having an impact on health factors, noise also has a psychological impact on individuals who are exposed to it. The impacts include emotional disturbances such as irritation and confusion, loss of concentration at work, and so on [15].

Sound Level Measurement Scale

Noise levels can be measured using a sound level meter. Sound level meters provide responses that are more or less the same as those of the human ear. After that, the sound level meter can provide measurement results in noise units, namely deciBel (dB). Sound level meters usually have several sound pressure units which are divided into scales A, B, and C. Noise level measurements use sound pressure scale A (dbA) because it corresponds to the characteristics of the normal human ear. Before taking noise measurements, the sound level meter needs to be calibrated first.

In addition, according to the Decree of the state minister for the Environment [14], noise sampling is divided into two methods according to the sound level meter used,

A simple way is to measure noise with an ordinary sound level meter, with readings taken every 5 seconds for 10 minutes, for one measurement. Noise measurements are simple, and carried out by at least 2 people. One person to watch the time and give a noise reading signal every 5 seconds. Then another person is tasked with reading and recording the results of noise measurements by the sound level meter.

The direct method is noise measurement using an integrating sound level meter which has a data logger and LTM5 measurement facilities. LTM5 is the average of measurement results every 5 seconds in 10 minutes. This direct noise measurement can be done by just 1 person because the integrating sound level meter does not require reading every 5 seconds. The data from noise measurements is in the form of a soft file, making it easier to analyze the measurement results. An example of a sound level meter with a data logger can be seen in Figure-1.

Figure-1. Sound levels.

Then noise measurements were carried out for 24 hours (LSM), which were divided into activities during the day and night. Activities during the day are determined for 16 hours (Ls) in the time interval 06.00 – 22.00. Then at night, it is determined for 8 hours (Lm) in the interval 22.00 - 06.00. Each measurement must represent the highest activity at a certain time interval, by establishing at least 4 measurement times during the day and 3 measurement times at night.

Before carrying out noise measurements, it is necessary to map the noise sampling location first. Several things that need to be considered include:

- Location of noise sources

- Noise source measurement location
- Location of noise receptors
- Location of noise sample measurement at the receptor.

Noise Research Variables

The research variables that will be observed in this study are the noise level variable and its effect on changes in blood pressure, while the characteristic variables are not observed because they are confounding variables. Confounding variables are variables that are not studied but can influence research results because they are related to the independent variable and dependent variable and are not intermediate variables.

- Dependent Variable A dependent variable is a variable that is influenced or is a result of the existence of a free variable. The dependent variable is traffic noise (y).
- Independent Variables Independent variables are variables that influence or cause changes or emergence of the dependent variable. In this research, what is meant by independent variables are vehicle volume and vehicle speed (x).

Noise Control

Noise control efforts are carried out by reducing and controlling the source noise level, attenuating the intensity by taking into account natural factors (distance, nature of the media, propagation mechanisms, and vegetation) as well as engineering efforts (reduction or isolation of source vibrations, installation of barriers, structural design and selection of dampening materials). Technically, noise control is divided into 3 aspects, namely noise control at the noise source, noise control at the propagation medium, and noise control at humans.

The effect of noise on humans has a fairly wide range, from the mildest effects (dissatisfaction = discomfort) to the dangerous ones (hearing damage = hearing damage) depending on the intensity of the noise that occurs conceptually. Noise control can be done in 3 (three) important sectors, namely:

- Controlling noise sources, namely making efforts so that the level of noise produced by the source can be reduced or eliminated. Some efforts that are often made include creating machines with low noise levels, placing noise sources far from recipients (humans or residential areas), and covering noise sources (acoustic enclosure).
- Controlling the medium, namely making efforts to block noise in its traces or propagation paths. In this section, 2 (two) noise propagation routes are known, namely propagation through the air (airborne noise) and through building structures (structure-borne noise). The symptoms that occur in structure-borne noise are more complex compared to airborne noise because there are vibration propagation symptoms other than sound. Some efforts to control noise in this propagation trail include designing acoustic barriers, insulating walls, or breaking the vibration path through the structure by installing vibration absorbers.
- Controlling the Receiver, namely making efforts to protect listeners (humans) who are exposed to noise (noise exposure) with high intensity and for quite a long time. Usually, noise control is needed in industrial or factory environments for workers who deal with machines. Noise control here is intended to protect workers from possible hearing damage as a result of the noise dose they receive every working day. To Occupational Safety and Health regulations in Indonesia, it is required that for workplaces with noise levels ≥ 85 dBA, workers are required to wear ear protectors such as ear plugs, ear muffs, or a combination of both, in addition to managing working time to reduce the dose of noise he receives every day.

Regression Analysis

Regression analysis is an analysis that is widely used. Regression analysis is used to make predictions and forecasts. Regression analysis can also be used to understand which independent variables can be related to the dependent variable, as well as to determine the form of this relationship. To find out the relationship between variable x and variable y, the variable x can be used on the abscissa and the variable y on the ordinal to obtain a scatter diagram of the x and y values. If a straight line is drawn that is the sum of the squares of the vertical distances from each point, then this line is called a regression line. The benefit of the regression line is to estimate the value of the dependent variable from the independent variable if the independent variable is already known. Regression analysis is used to study and measure the statistical relationship that occurs between two or more variables. In simple regression, two variables are studied, whereas in multiple or compound regression there are more than two variables.

Traffic Noise

Noise is a sound that can interfere with human hearing. The number of sound sources increases regularly in the surrounding environment, and when the sound becomes undesirable it is called noise. Noise is an undesirable sound and its measurement poses great difficulties because it varies between individuals in different situations. Noise in cities with dense traffic is no longer a new problem, but an old problem that needs to be solved together [13].

Traffic noise is one of the unwanted noises. However, there is some traffic noise that is needed, for example, the sound of vehicle horns or the sound of trains when crossing the highway to warn road users. However, this exception is only for special situations, and in general, the noise generated by the transportation system is unwanted [14].

Correlation Coefficient

The correlation coefficient is a value that shows whether or not the linear relationship between two variables is strong. This correlation is usually denoted by the letter r, whose value is in the range of -1 to +1.

To determine whether a variable has a level of correlation or degree of relationship with other variables, a correlation test is used. If Y tends to increase and X increases, then the correlation is called positive correlation or direct correlation. On the other hand, if Y tends to decrease while X increases, then the correlation is called negative correlation or inverse correlation. If there is no visible relationship between the variables, it is said that there is no correlation between the two variables.

Transportation Type

A vehicle is a transportation machine for transporting people or cargo. Vehicles include carriages, bicycles, motor vehicles, rail vehicles, boats, amphibious vehicles, aircraft and spacecraft.

Types of vehicles are differentiated according to their classification, consisting of:

- Light vehicles;
- Heavy vehicles;
- Motorcycles (motorcycles);
- Non-motorized vehicles [16].

According to the Central Bureau of Statistics [17], a passenger car is any motorized vehicle equipped with seating for a maximum of eight people, excluding the driver's seat, whether equipped with or without luggage.

Vehicle Speed

Measuring traffic speed is not as easy as one might imagine, we can measure the speed of a vehicle based on time or based on space, the results of which can differ slightly from each other. Traffic speed is the average speed (km/hour) of traffic flow calculated from the length of the road divided by the average travel time of vehicles passing through the road segment based on the Geometric Planning Procedure for Inter-City Roads it is formulated as follows:

$$V = \frac{L}{TT} \quad \text{.....} \quad (1)$$

with:

V = Average speed (km/h)
L = Segment length (km)
TT = Average travel time along the segment (hours) [18].

Road Type

According to the Indonesian Road Capacity Manual [16], the type of road determines the number of lanes and direction on a road segment viz.

- 2-lane 1-way road (2/1);
- 2-lane 2-way undivided road (2/2 UD);
- 4-lane 2-way undivided road (4/2 UD);
- 4-lane 2-way divided road (4/2 UD);
- 6-lane 2-way divided road (6/2 D)

Traffic

Traffic flow is the number of motorized vehicles passing a point on the road per unit of time, expressed in veh/h (Qveh), pcu/h (Qpcu), or AADT (average annual traffic). Traffic flow is the number of motorized vehicles passing a certain point per unit of time, expressed in vehicles per hour or pcu/hour.

Traffic flow is described by 3 main parameters:

- Speed (speed)
- Volume or rate of flow
- Density [18].

Road and Traffic Conditions

If a vehicle is traveling on a good road, the surface is flat, visibility is not obstructed, and the driver will drive the vehicle comfortably. The ideal vehicle speed on urban roads is 40km/hour-70km/hour [2], [21], 22], [23]. So a good environment will create good driving patterns too. So it will create an ideal shape for driving more freely [24], [25]. A vehicle that has good specifications will determine the vehicle's performance on the road. Vehicle speed will be maximum if there are no obstacles when driving, visibility is free, travel time is maximum and field conditions are appropriate [26], [27], [28]. These conditions make it possible to drive well and correctly. Good travel time will determine good vehicle speed. Vehicle traffic is needed to assist drivers in traveling to their destination. So travel planning must be made in such a way that the trip is safe and comfortable [29], [30], [31], [32].

Motor vehicle traffic will experience a saturation point if there is congestion. The vehicle cannot move by increasing its speed. So a solution is needed for this improvement. A good increase in speed is the vehicle traveling at a stable speed. So engine performance, road conditions, and environmental conditions will greatly influence [33], [34], [35].

Data Analysis

Analysis of observation data on noise pollution levels on straight roads with the type of hospital research object. In this case, it is assumed that the increase in the level of noise pollution (Y) is the dependent variable. The dependent variable is placed at three points SLM 1 on the sidewalk as the 0meter point, SLM 2 is located 3 meters from the sidewalk, and SLM 3 is located 24 meters from the sidewalk to the entrance to the Karya Bakti Pratii Dramaga Hospital building. This dependent variable will be influenced by several independent variables, namely:

X1 is the first independent variable/speed of Public Transport Cars (MAU)
X2 is the second independent variable/motorcycle speed (SMR)
X3 is the third independent variable/Private Car speed (MPR)

Based on the data above, a linear regression model approach is obtained, namely: Y = ao + a1.X1 +

a2.X2 + a3.X3. The respective coefficients ao, a1, a2, and a3 are coefficients determined based on research data.

RESEARCH METHODOLOGY

Research Flow Diagram

The flow diagram in this research is as follows:

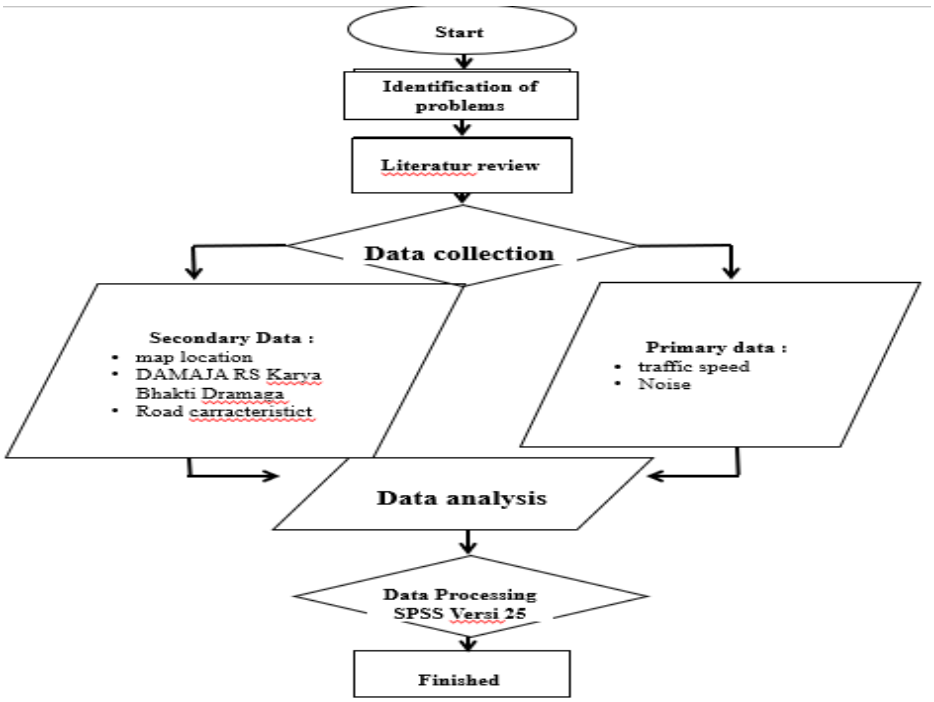

Figure-2. Research Flow Diagram (Source: Analysis Results).

Research Sites

In conducting this research, researchers chose the Dramaga sub-district, Bogor district. The location for calculating vehicle speed and measuring noise intensity levels was chosen on Jalan Raya Dramaga, in front of Karya Bakti Pratiwi Hospital. The choice of location for the measurement point represents the number of vehicles passing along Jalan Raya Dramaga Figure-3.

Figure-3. Research location (Source: Geospatial Information Agency).

Vehicle Speed Calculation Method

In calculating the speed of a motorized vehicle, is calculated using a stopwatch when the vehicle passes from one observation point to the next observation point with a distance of 100 meters, which will then analyze the time needed for the vehicle to travel 100 meters.

Data Collection and Noise Measurement

To be able to determine the relationship between vehicle speed and the level of noise intensity produced, research was conducted from 06.00 to 18.00. From the results of measurements carried out over four days, the relationship between vehicle speed and noise intensity level was known, so the effect was then analyzed.

Based on research on the relationship between vehicle speed and noise intensity levels, it is known that times with high noise intensity levels. Next, noise samples are taken at each test point at a predetermined time. The selection of sampling time is based on the intensity level of the sound produced which is in the lowest to highest level range.

Data Processing Methods

Data processing in this research uses statistical methods, especially regression analysis which is used for modeling and investigating the magnitude of the relationship between independent and dependent variables. The computer programs used are Microsoft Excel and SPSS [19]. Creating a multiple regression analysis model was carried out by creating 2 noise level model scenarios from the data obtained. The processing is carried out as follows.

- Data obtained from field survey results is entered into a table which becomes basic data / raw data that is ready to be processed.
- The raw data is reprocessed to obtain average speed, traffic flow, and noise levels.
- Regression analysis is carried out based on processed data and also testing of the model parameters. An important thing that must also be tested is the degree of relationship between the variables.

Analysis of Data from Field Survey Results

Calculations of noise intensity levels carried out for 1 minute every 15 minutes are considered to represent the noise sample during that hour. Noise level measurement results.

From these results, the noise intensity level values obtained at certain hours will be included in the table in the attachment. From the data calculating vehicle speed and measuring noise intensity levels, the relationship between vehicle speed and noise intensity level is known.

The strength of the relationship between the two variables is based on the following criteria:

R = 0	: there is no correlation between the two variables
0< R<0.25	: very weak correlation
0.25< R <0.5	: quite strong correlation
0.5< R<0.75	: strong correlation
0.75< R<0.99	: very strong correlation
R = 1	: perfect correlation

This stage is to determine the level of noise that occurs due to traffic flow on Jalan Salabenda, as well as analyzing and determine a mathematical model to estimate noise due to traffic. The results of this research can also be used by the government as a policy maker to regulate the distance of activity centers from the roadside and as information to the public about the dangers of noise that has exceeded the threshold on Jalan Raya Dramaga in Bogor district.

RESULTS AND DISCUSSIONS

Data Results

The results of the traffic data calculated 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 Monday 27 February 2023, Tuesday 28 February 2023, Wednesday 1 March 2023, and Saturday 11 March 2023.

This traffic data is obtained from the calculation of the Equivalence of Passenger Cars (EMP). The use of this calculation is intended to make traffic analysis easy to carry out. The passenger car unit factor (SMP) for each motorized vehicle according to the Indonesian Road Capacity Manual [16], for urban roads is as follows:

Heavy Vehicle (HV)	= 1.30
Light Vehicles (LV)	= 1.00
Motorcycle (MC)	= 0.40
Non-motorized vehicles	= 1.00 [16], [18].

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

The results of data collection carried out over four days are presented in consecutive table form as in the image below.

Number of motorcycles, light vehicles, and heavy vehicles on Monday

Data on the number of motorcycles, light vehicles, and heavy vehicles from the two Bogor-Ciampea routes

Results Processing Speed

The results of speed processing on data for Monday, March 27 2023 are as follows:

Based on the speed calculation guide from the Highways Service, Department of Public Works of the Republic of Indonesia, data collection using speed uses the speed formula. The required distance is 100m.

Calculation example:

Is known:

The time data required in the 100 m range is

Time (t)	= 9.65 seconds
Distance (d)	= 100.00m
Number of vehicles (s)	= 970.00 vehicles
So, Speed (U)	= d/t
	= (100/1000) (9.65/3600)
	= 38.46 km/h

Results of SLM Data Collection on Monday

Results of data collection for SLM1, SLM2, and SLM3 on Monday 27 February 2023, Sound Level Meter results at distances 00.00, 05.00, and 15.00 from the main road.

Data Processing of Vehicle Speed and Noise Caused by Motor Vehicles

The results of motor vehicle and noise data processing using the SPSS [19]. Data selection was carried out in the field and the processing results were obtained according to the attached page. To show that the recommended data is for the respective speeds of motorcycles, light vehicles, and heavy vehicles.

Correlation Test

Correlation testing is used to look for the relationship between two or more independent variables that are jointly linked to the dependent variable so that the contribution of the independent variable which is the object of research to the dependent variable is known.

Table-2. Interpretation of the r value.

No	r	Interpretation of r Values
1	0	Not correlated
2	0,01 – 0,20	Very low
3	0,21 – 0,40	Low
4	0,41 – 0,60	A bit low
5	0,61 – 0,80	High enough
6	0,81 – 0,99	Tall
7	1	Very high

Source: [7].

Hypothesis

Ha = There is a significant influence between motorcycle speed, private vehicle speed, and public transportation speed and noise

Ho = There is no significant influence between motorcycle speed, light vehicle speed, and heavy vehicle speed and noise

α = 5.00%

STATISTICAL ANALYSIS OF DATA

Statistical Analysis of Data for Monday 27 February 2023, Distance 00.00 m with SLM1.

Data analysis and processing using SPSS version 25 obtained noise level (y), motorcycle speed (SPM/x1), light vehicle speed (KR/x2), and heavy vehicle speed (KB/x3), based on a 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 0.00 m using SLM1. The equation is y = 69.505 – 0.395x1 +0, 148x2 + 0.535x3.

- Test criteria

The results of testing the summary model obtained a value of RSquare = 241, which means that x1, x2, and x3 have an effect of 24.1% on y.

The results of the ANOVA test obtained an F-count value = 4.667 with a probability value (sig) = 0.006. From the input data we get the F-Table value = 2.816 so F-Calculate>F-Table, then Ha is accepted and Ho is rejected. The results of the coefficients test, motorcycle speed, light vehicle speed, and heavy vehicle speed have constant values (ao) = 69.505, (a1) = 0.395, (a2) = 0.148, and (a3) = 0.535. The t-count value = 27.799 and the value (sig) = 0.000, from the data the t-table value = 2.015, then the t-table value > t-table, then Ha is accepted and Ho is rejected.

- Hypothetical decisions

From the results of the statistical tests above, a hypothesis can be drawn about the influence of motorcycle vehicle speed, light vehicle speed, and heavy vehicle speed, that there is a significant influence between motorcycle vehicle speed, light vehicle speed, and heavy vehicle speed on the noise that occurs at SLM1 on Monday with a distance of 00.00 m from the edge of the highway.

Table-3. ANOVA test results for SLM1 with the speed of motorcycles, light vehicles, and heavy vehicles.

ANOVA[b]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	48.877	3	16.292	4.667	.006[b]
	Residual	153.596	44	3.491		
	Total	202.473	47			

a. Dependent Variable: SLM1
b. Predictors: (Constant), Heavy Vehicle Speed, Motorcycle Speed, Light Vehicle Speed

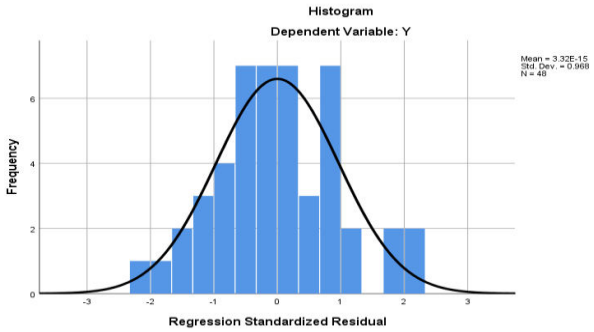

Figure-4. SLM1 histogram for speed of motorcycles, light vehicles and heavy vehicles.

Statistical Analysis of Data for Monday 27 February 2023, Distance 05.00 m with SLM2.

Data analysis and processing using SPSS version 25 obtained noise level (y), motorcycle speed (SPM/x1), light vehicle speed (KR/x2), and heavy vehicle speed (KB/x3), based on a 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 05.00 m using SLM2. The equation is y = 64.649 - 0.177x1 - 0.057x2 + 0.437x3.

- Test criteria

The results of testing the summary model obtained a value of RSquare = 0.96, which means that x1, x2, and x3 have an effect of 9.6% on y.

The results of the ANOVA test obtained an F-Calculation value = 1.559 with a probability value (sig) = 0.213. From the input data we get the F-Table value = 2.816 so F-Calculate < F-Table, then Ha is rejected and Ho is accepted.

The results of the coefficients test, motorcycle speed, light vehicle speed, and heavy vehicle speed have constant values (ao) = 64.649, (a1) = 0.177, (a2) = 0.057, and (a3) = 0.437. The t-count value = 26.112 and the value (sig) = 0.000, from the data the t-table value = 2.015, then

the t-table value > t-table, then Ha is accepted and Ho is rejected.

- Hypothetical decisions

From the results of the statistical tests above, a hypothesis can be drawn regarding the influence of motorcycle vehicle speed, light vehicle speed and heavy vehicle speed, that there is no significant influence between motorcycle vehicle speed, light vehicle speed and heavy vehicle speed on the noise that occurs at SLM2 on Monday with a distance of 05.00 m from the edge of the highway.

Table-4. ANOVA test results for SLM2 with the speed of motorcycles, light vehicles and heavy vehicles.

ANOVAa						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	15.918	3	5.306	1.559	.213[b]
	Residual	149.775	44	3.404		
	Total	165.693	47			

a. Dependent Variable: SLM2
b. Predictors: (Constant), Heavy Vehicle Speed, Motorcycle Speed,
Light Vehicle Speed

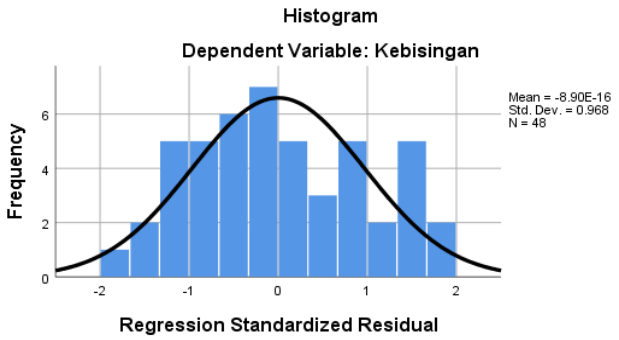

Figure-5. SLM2 histogram for speed of motorcycles, light vehicles and heavy vehicles.

Statistical Analysis of Data for Monday 27 February, Distance 15.00 m with SLM3.

Data analysis and processing using SPSS version 25 obtained noise level (y), motorcycle speed (SPM/x1), light vehicle speed (KR/x2), and heavy vehicle speed (KB/x3), based on a 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 15.00 m using SLM3. The equation is y = 62.240 - 0.383x1 - 0.116x2 +0.654x3.

- Test criteria

The results of testing the summary model obtained a value of RSquare = 130, which means that x1, x2, and x3 have an effect of 13.0% on y.

The results of the ANOVA test obtained an F-Calculation value = 2.194 with a probability value (sig) = 0.102. From the input data we get the F-Table value = 2.816 so F-Calculate < F-Table, then Ho is accepted and Ha is rejected.

The results of the coefficients test, motorcycle speed, light vehicle speed, and heavy vehicle speed have constant values (ao) = 62.240, (a1) = -0.383, (a2) = 0.116, and (a3) = -0.654. The t-count value = 16.030 and the value (sig) = 0.000, from the data the t-table value = 2.015, then the t-table value > t-table, then Ha is accepted and Ho is rejected.

- Hypothetical decisions

From the results of the statistical tests above, a hypothesis can be drawn regarding the influence of motorcycle vehicle speed, light vehicle speed and heavy vehicle speed, that there is no significant influence between motorcycle vehicle speed, light vehicle speed and heavy vehicle speed on the noise that occurs at SLM3 on Monday with a distance of 15.00 m from the edge of the highway.

Table-5. ANOVA test results for SLM3 with the speed of motorcycles, light vehicles and heavy vehicles.

ANOVA[b]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	55.404	3	18.468	2.194	.102[b]
	Residual	370.415	44	8.419		
	Total	425.819	47			

a. Dependent Variable: SLM3
b. Predictors: (Constant), Heavy Vehicle Speed, Motorcycle Speed, Light Vehicle Speed

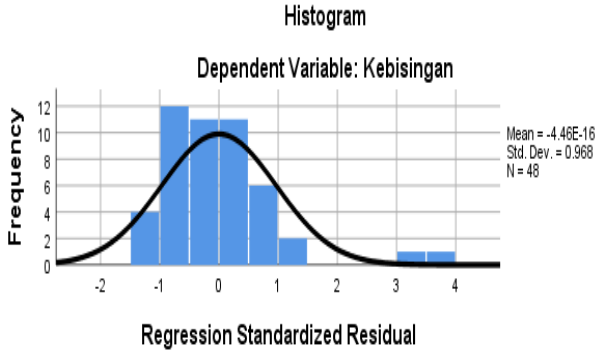

Figure-6. SLM3 histogram for speed of motorcycles, light vehicles and heavy vehicles.

Statistical Analysis of Data for Tuesday 28 February 2023, Distance 0.00 m with SLM1.

Data analysis and processing using SPSS version 25 obtained noise level (y), motorcycle speed (SPM/x1),

light vehicle speed (KR/x2), and heavy vehicle speed (KB/x3), based on a 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 0.00 m using SLM1. The equation is y = 75.255 - 0.226 x1 - 0.220x2 + 0.369x3.

- Test criteria

The results of testing the summary model obtained a value of RSquare = 0.46, which means that x1, x2, and x3 have an effect of 4.6% on y.

The results of the ANOVA test obtained an F-Calculation value = 0.700 with a probability value (sig) = 0.557. From the input data we get the F-Table value = 2.816 so F-Calculate < F-Table, then Ha is rejected and Ho is accepted.

The results of the coefficients test, motorcycle speed, light vehicle speed, and heavy vehicle speed have constant values (ao) = 75.255, (a1) = 0.226, (a2) = 0.220, and (a3) = 0.369. The t-count value = 20.747 and the value (sig) = 0.000, from the data the t-table value = 2.015, then the t-table value > t-table, then Ha is accepted and Ho is rejected.

- Hypothetical decisions

From the results of the statistical tests above, a hypothesis can be drawn about the influence of motorcycle vehicle speed, light vehicle speed and heavy vehicle speed, that there is no significant influence between motorcycle vehicle speed, light vehicle speed and heavy vehicle speed on the noise that occurs in SLM1 on Tuesday with a distance of 0.00 m from the edge of the highway.

Table-6. ANOVA test results for SLM1 with the speed of motorcycles, light vehicles and heavy vehicles.

ANOVA[b]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	11.470	3	3.823	.700	.557[b]
	Residual	240.180	44	5.459		
	Total	251.650	47			

a. Dependent Variable: SLM1
b. Predictors: (Constant), Heavy Vehicle Speed, Motorcycle Speed, Light Vehicle Speed

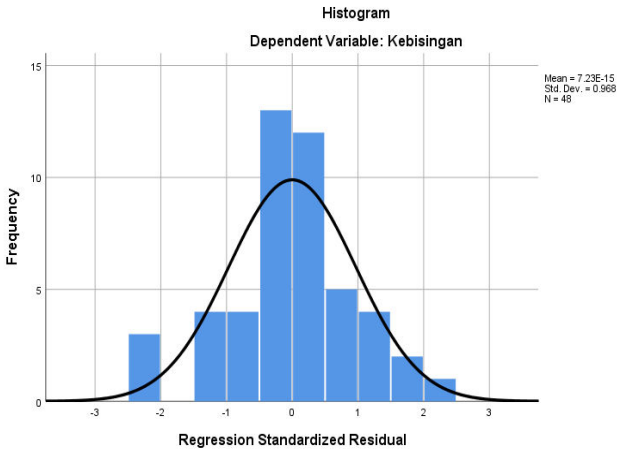

Figure-7. SLM1 histogram for speed of motorcycles, light vehicles and heavy vehicles.

Statistical Analysis of Data for Tuesday 28 February 2023, Distance 5.00 m with SLM2.

Data analysis and processing using SPSS version 25 obtained noise level (y), motorcycle speed (SPM/x1), light vehicle speed (KR/x2), and heavy vehicle speed (KB/x3), based on a 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 05.00 m using SLM2. The equation is y = 68.326 - 0.1723x1 + 0.025x2 + 0.146x3.

- Test criteria

The results of testing the summary model obtained a value of RSquare = 0.022, which means that x1, x2, and x3 have an effect of 2.20% on y.

The results of the ANOVA test obtained an F-Calculation value = 0.334 with a probability value (sig) = 0.801. From the input data we get the F-Table value = 2.816 so F-Calculate < F-Table, then Ha is rejected and Ho is accepted.

The results of the coefficients test, motorcycle speed, light vehicle speed, and heavy vehicle speed have constant values (ao) = 68.326, (a1) = -0.1723, (a2) = 0.025, and (a3) = 0.146. The t-count value = 20.147 and the value (sig) = 0.000, from the data the t-table value = 2.015, then the t-table value > t-table, then Ha is accepted and Ho is rejected.

- Hypothetical decisions

From the results of the statistical tests above, a hypothesis can be drawn regarding the influence of motorcycle vehicle speed, light vehicle speed and heavy vehicle speed, that there is no significant influence between motorcycle vehicle speed, light vehicle speed and heavy vehicle speed on the noise that occurred at SLM2 on Tuesday with a distance of 05.00 m from the edge of the highway.

Table-7. ANOVA test results for SLM2 with the speed of motorcycles, light vehicles and heavy vehicles.

ANOVA[b]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.782	3	1.594	.334	.801[b]
	Residual	209.968	44	4.772		
	Total	214.750	47			

a. Dependent Variable: SLM2
b. Predictors: (Constant), Heavy Vehicle Speed, Motorcycle Speed, Light Vehicle Speed

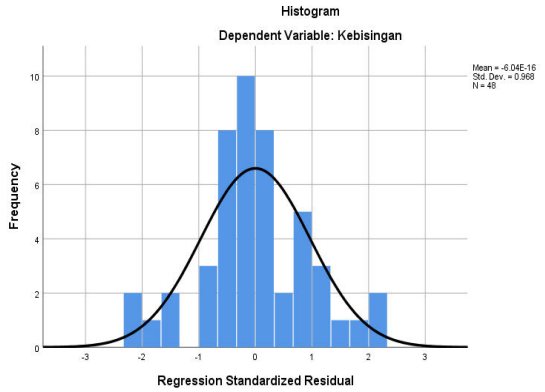

Figure-8. SLM2 histogram for speed of motorcycles, light vehicles and heavy vehicles.

Statistical Analysis of Data for Tuesday 28 February 2023, Distance 15.00 m with SLM3.

Data analysis and processing using SPSS version 25 obtained noise level (y), motorcycle speed (SPM/x1), light vehicle speed (KR/x2), and heavy vehicle speed (KB/x3), based on a 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 15.00 m using SLM3. The equation is y = 68.239 - 0.227x1 - 0.306x2 + 0.274x3.

- Test criteria

The results of testing the summary model obtained a value of RSquare = 0.168, which means that x1, x2, and x3 have an effect of 16.80% on y.

The results of the ANOVA test obtained an F-Calculation value = 2.954 with a probability value (sig) = 0.043. From the input data we get the F-Table value = 2.816 so F-Calculate> F-Table, then Ha is accepted and Ho is rejected.

The results of the coefficients test, motorcycle speed, private vehicle speed, and public vehicle speed have constant values (ao) = 68.239, (a1) = -0.227, (a2) =-0.306, and (a3) = 0.274. Obtained t-count = 25.574 and value (sig) = 0.000, from the data obtained t-table value = 2.015, then t-count > t-table, then Ha is accepted and Ho is rejected

- Hypothetical decisions

From the results of the statistical tests above, a hypothesis can be drawn about the influence of motorcycle vehicle speed, light vehicle speed and heavy vehicle speed, that there is a significant influence between motorcycle vehicle speed, light vehicle speed and heavy vehicle speed on the noise that occurs at SLM3 on Tuesday with a distance of 15.00 m from the edge of the highway.

Table-8. ANOVA test results for SLM3 with the speed of motorcycles, light vehicles and heavy vehicles.

ANOVA[b]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	26.179	3	8.726	2.954	.043[b]
	Residual	129.974	44	2.954		
	Total	156.153	47			156.153

a. Dependent Variable: SLM3
b. Predictors: (Constant), Heavy Vehicle Speed, Motorcycle Speed, Light Vehicle Speed

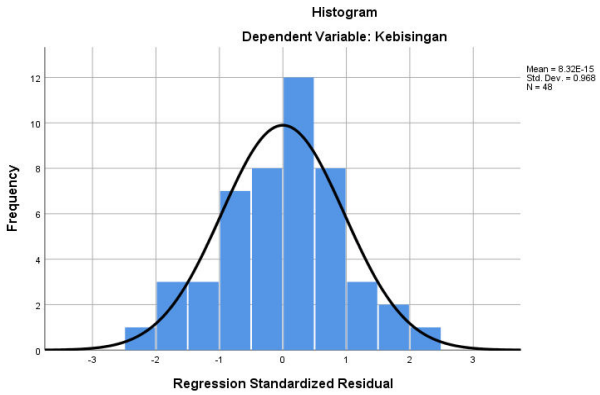

Figure-9. SLM3 histogram for speed of motorcycles, light vehicles and heavy vehicles.

Statistical Analysis of Data for Wednesday 01 March 2023, Distance 0.00 m with SLM1.

Data analysis and processing using SPSS version 25 obtained noise level (y), motorcycle speed (SPM/x1), light vehicle speed (KR/x2), and heavy vehicle speed (KB/x3), based on a 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 0.00 m using SLM1. The equation is y = 69.568 - 0.189x1 + 0.410x2 - 0.0 15x3.

- Test criteria

The results of testing the summary model obtained a value of RSquare = 0.088, which means that x1, x2, and x3 have an effect of 8.80% on y.

The results of the ANOVA test obtained an F-Calculation value = 1.422 with a probability value (sig) = 0.249. From the input data we get the F-Table value = 2.816 so F-Calculate < F-Table, then Ha is rejected and Ho is accepted.

The results of the coefficients test, motorcycle speed, light vehicle speed, and heavy vehicle speed have constant values (ao) = 69.568, (a1) = -0.189, (a2) = 0.410, and (a3) = -0.015. The t-count value was 29.300 and the value (sig) = 0.000, from the data the t-table value was obtained = 2.015, then t-count > t-table, then Ha was accepted and Ho was rejected.

- Hypothetical decisions

From the results of the statistical tests above, a hypothesis can be drawn about the influence of motorcycle vehicle speed, light vehicle speed and heavy vehicle speed, that there is no significant influence between motorcycle vehicle speed, light vehicle speed and heavy vehicle speed on the noise that occurred at SLM1 on Wednesday with a distance of 0.00 m from the edge of the highway.

Table-9. ANOVA test results for SLM1 with the speed of motorcycles, light vehicles and heavy vehicles.

ANOVA[b]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	16.660	3	5.553	1.422	.249[b]
	Residual	171.877	44	3.906		
	Total	188.537	47			

a. Dependent Variable: SLM1
b. Predictors: (Constant), Heavy Vehicle Speed, Motorcycle Speed, Light Vehicle Speed

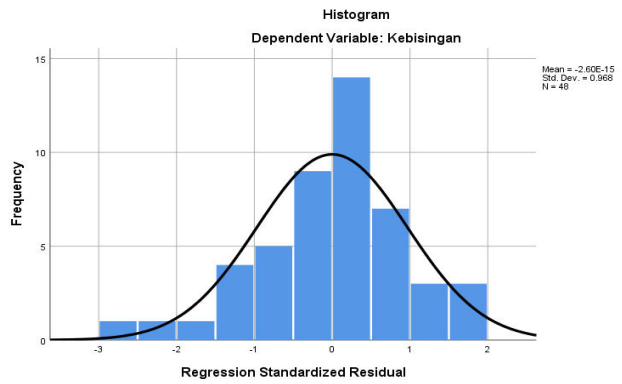

Figure-10. SLM1 histogram for motorcycle speed of light vehicles and heavy vehicles.

Statistical Analysis of Data for Wednesday 01 March 2023, Distance 05.00 m with SLM2.

Data analysis and processing using SPSS version 25 obtained noise level (y), motorcycle speed (SPM/x1), light vehicle speed (KR/x2), and heavy vehicle speed (KB/x3), based on a 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 05.00 m using SLM2. The equation is y = 66.202 -0.299x1 + 0.436x2 - 0.019x3.

- Test criteria

The results of testing the summary model obtained a value of RSquare = 0.157, which means that x1, x2 and x3 have an effect of 15.7% on y.

The results of the ANOVA test obtained an F-Calculation value = 2.729 with a probability value (sig) = 0.055. From the input data we get the F-Table value = 2.816 so F-Calculate < F-Table, then Ha is rejected and Ho is accepted.

The results of the coefficients test, motorcycle speed, light vehicle speed, and heavy vehicle speed have constant values (ao) = 66.202, (a1) = -0.299, (a2) = 0.436, and (a3) = -0.019. The t-count value = 32.732 and the value (sig) = 0.000, from the data the t-table value = 2.015, then the t-table value > t-table, then Ha is accepted and Ho is rejected.

- Hypothetical decisions

From the results of the statistical tests above, a hypothesis can be drawn about the influence of motorcycle vehicle speed, light vehicle speed and heavy vehicle speed, that there is a significant influence between motorcycle vehicle speed, light vehicle speed and heavy vehicle speed on the noise that occurs at SLM2 on Wednesday with a distance of 05.00 m from the edge of the highway.

Table-10. ANOVA test results for SLM2 with the speed of motorcycles, light vehicles and heavy vehicles.

ANOVA[b]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	23.208	3	7.736	2.729	.055[b]
	Residual	124.717	44	2.834		
	Total	147.925	47			

a. Dependent Variable: SLM2
b. Predictors: (Constant), Heavy Vehicle Speed, Motorcycle Speed, Light Vehicle Speed

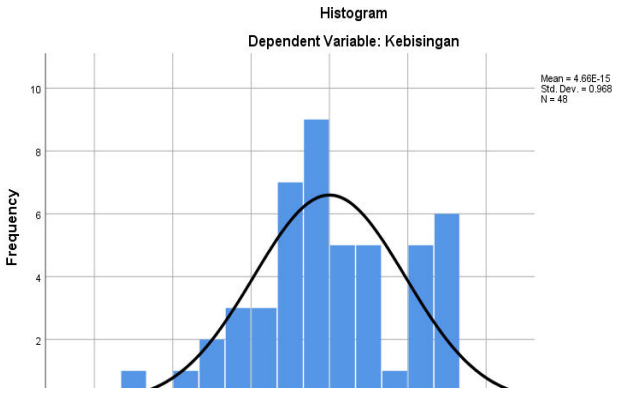

Figure-11. SLM2 histogram for speed of motorcycles, light vehicles and heavy vehicles.

Statistical Analysis of Data for Wednesday 01 March 2023, Distance 15.00 m with SLM3.

Data analysis and processing using SPSS version 25 obtained noise level (y), motorcycle speed (SPM/x1), light vehicle speed (KR/x2), and heavy vehicle speed (KB/x3), based on a 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 15.00 m using SLM3. The equation is y = 63.963 - 0.341x1 + 0.379x2 - 0.041x3.

- Test criteria

The results of testing the summary model obtained a value of RSquare = 0.197, which means that x1, x2 and x3 have an effect of 19.7% on y.

The results of the ANOVA test obtained an F-Calculation value = 3.590 with a probability value (sig) = 0.021. From the input data we get the F-Table value = 2.816 so F-Calculate> F-Table, then Ha is accepted and Ho is rejected.

The results of the coefficients test, motorcycle speed, light vehicle speed, and heavy vehicle speed have constant values (ao) = 63,963, (a1) = - 0.341, (a2) = 0.379, and (a3) = - 0.04. The t-count value = 31.732 and the value (sig) = 0.000, from the data the t-table value = 2.015, then the t-table value > t-table, then Ha is accepted and Ho is rejected.

- Hypothetical decisions

From the results of the statistical tests above, a hypothesis can be drawn about the influence of motorcycle vehicle speed, light vehicle speed and heavy vehicle speed, that there is a significant influence between motorcycle vehicle speed, light vehicle speed and heavy vehicle speed on the noise that occurs at SLM3 on Wednesday with a distance of 15.00 m from the edge of the highway.

Table-11. ANOVA test results for SLM3 with the speed of motorcycles, light vehicles and heavy vehicles.

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	30.324	10.108	3.590	.021[b]	30.324
	Residual	123.875	44	2.815		
	Total	154.199	47		154.199	47

a. Dependent Variable: SLM3
b. Predictors: (Constant), Heavy Vehicle Speed, Motorcycle Speed, Light Vehicle Speed

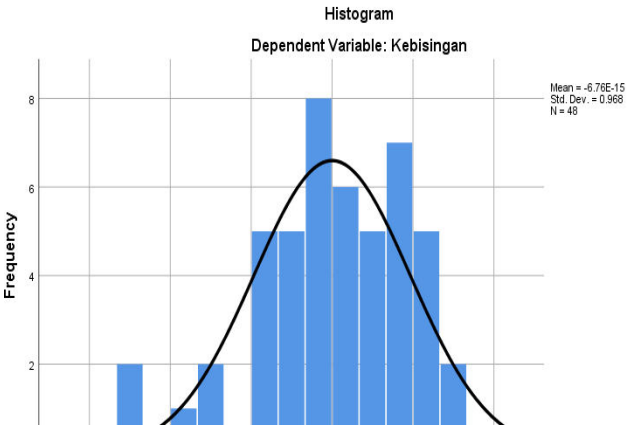

Figure-12. SLM3 histogram for speed of motorcycles, light vehicles and heavy vehicles.

Statistical Analysis of Data from Saturday 11 March 2023, Distance 0.00 m from SLM1.

Data analysis and processing using SPSS version 25 obtained noise level (y), motorcycle speed (SPM/x1), light vehicle speed (KR/x2), and heavy vehicle speed (KB/x3), based on a 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 0.00 m using SLM1. The equation is y = 70.519 - 0.208x1 + 0.404x2 + 0.029x3.

- Test criteria

The results of testing the summary model obtained a value of RSquare = 0.104, which means that x1, x2 and x3 have an effect of 10.4% on y.

The results of the ANOVA test obtained an F-Calculation value = 1.699 with a probability value (sig) = 0.181. From the input data we get the F-Table value = 2.816 so F-Calculate < F-Table, then Ha is rejected and Ho is accepted.

The results of the coefficients test, motorcycle speed, light vehicle speed, and heavy vehicle speed have constant values (ao) = 70.519, (a1) = -0.208, (a2) = 0.404, and (a3) = 0.029. The t-count value = 29.687 and the value (sig) = 0.000, from the data the t-table value = 2.015, then

the t-table value > t-table, then Ha is accepted and Ho is rejected.

- Hypothetical decisions

From the results of the statistical tests above, a hypothesis can be drawn about the influence of motorcycle vehicle speed, light vehicle speed and heavy vehicle speed, that there is a significant influence between motorcycle vehicle speed, light vehicle speed and heavy vehicle speed on the noise that occurs at SLM1 on Saturday with a distance of 0.00 m from the edge of the highway.

Table-12. ANOVA test results for SLM1 with the speed of motorcycles, light vehicles and heavy vehicles.

ANOVA[b]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	20.534	3	6.845	1.699	.181[b]
	Residual	177.310	44	4.030		
	Total	197.845	47			

a. Dependent Variable: SLM1
b. Predictors: (Constant), Heavy Vehicle Speed, Motorcycle Speed, Light Vehicle Speed

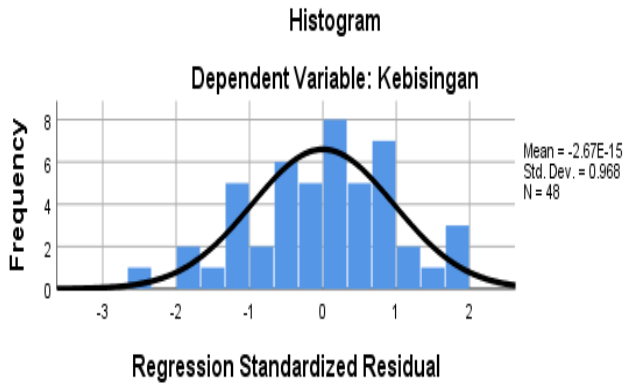

Figure-13. SLM1 histogram for speed of motorcycles, light vehicles and heavy vehicles.

Statistical Analysis of Data for Saturday 11 March 2023, Distance 05.00 m with SLM2.

Data analysis and processing using SPSS version 25 obtained noise level (y), motorcycle speed (SPM/x1), light vehicle speed (KR/x2), and heavy vehicle speed (KB/x3), based on a 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 05.00 m using SLM2. The equation is y = 67.037 - 0.284x1 + 0.395x2 + 0.019x3.

- Test criteria

The results of testing the summary model obtained a value of RSquare = 0.146, which means that x1, x2 and x3 have an effect of 14.6% on y.

The results of the ANOVA test obtained an F-Calculation value = 2.516 with a probability value (sig) = 0.071. From the input data we get the F-Table value = 2.816 so F-Calculate < F-Table, then Ha is rejected and Ho is accepted.

The results of the coefficients test, motorcycle speed, light vehicle speed, and heavy vehicle speed have constant values (ao) = 67.037, (a1) = -0.284, (a2) = 0.395, and (a3) = 0.019. The t-count value = 33.541 and the value (sig) = 0.000, from the data the t-table value = 2.015, then the t-table value > t-table, then Ha is accepted and Ho is rejected.

- Hypothetical decisions

From the results of the statistical tests above, a hypothesis can be drawn about the influence of motorcycle vehicle speed, light vehicle speed and heavy vehicle speed, that there is a significant influence between motorcycle vehicle speed, light vehicle speed and heavy vehicle speed on the noise that occurs at SLM2 on Saturday with a distance of 05.00 m from the edge of the highway.

Table-13. ANOVA test results for SLM2 with the speed of motorcycles, light vehicles and heavy vehicles.

ANOVA[b]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	21.532	3	7.177	2.516	.071[b]
	Residual	125.525	44	2.853		
	Total	147.057	47	147.057		

a. Dependent Variable: SLM2
b. Predictors: (Constant), Kecepatan Kendaraan Berat, Kecepatan Sepeda Motor

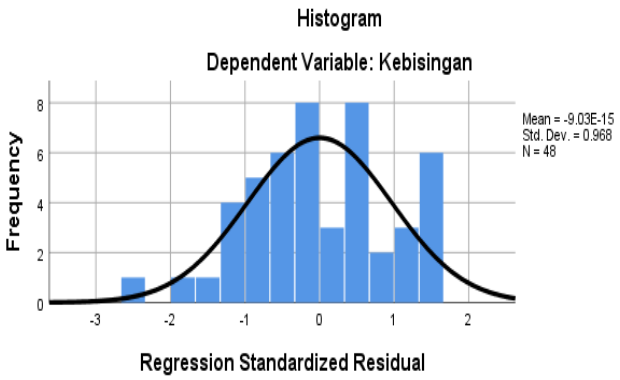

Figure-14. SLM2 histogram for speed of motorcycles, light vehicles and heavy vehicles.

Statistical Analysis of Data for Saturday 11 March 2023, Distance 15.00 m with SLM3.

Data analysis and processing using SPSS version 25 obtained noise level (y), motorcycle speed (SPM/x1), light vehicle speed (KR/x2), and heavy vehicle speed (KB/x3), based on a 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 15.00 m using SLM3. The equation is y = 63.889 - 0.310x1 + 0.310x2 + 0.054x3.

- Test criteria

The results of testing the summary model obtained a value of RSquare = 0.231, which means that x1, x2 and x3 have an effect of 23.10% on y.

The results of the ANOVA test obtained an F-Calculation value = 4.404 with a probability value (sig) = 0.009. From the input data we get the F-Table value = 2.816 so F-Calculate> F-Table, then Ha is accepted and Ho is rejected.

The results of the coefficients test, motorcycle speed, light vehicle speed, and heavy vehicle speed have constant values (ao) = 63.889, (a1) = -0.310, (a2) = 0.310, and (a3) = 0.054. The t-count value = 36.293 and the value (sig) = 0.000, from the data the t-table value = 2.015, then the t-table value > t-table, then Ha is accepted and Ho is rejected.

- Hypothetical decisions

From the results of the statistical tests above, a hypothesis can be drawn about the influence of motorcycle vehicle speed, light vehicle speed and heavy vehicle speed, that there is a significant influence between motorcycle vehicle speed, light vehicle speed and heavy vehicle speed on the noise that occurs at SLM3 on Saturday with a distance of 15.00 m from the edge of the highway.

Table-14. ANOVA test results for SLM3 with the speed of motorcycles, light vehicles and heavy vehicles.

ANOVA[b]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	29.238	3	9.746	4.404	.009[b]
	Residual	97.381	44	2.213		
	Total	126.619	47			

a. Dependent Variable: SLM3
b. Predictors: (Constant), Kecepatan Kendaraan Berat, Kecepatan Sepeda Motor, Kecepatan Kendaraan Ringan

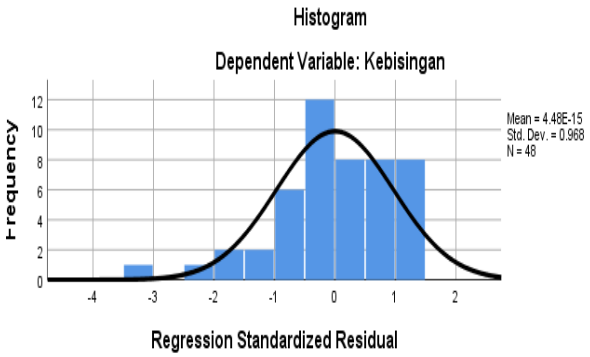

Figure-15. SLM3 histogram for speed of motorcycles, light vehicles and heavy vehicles.

DISCUSSIONS

Based on the results displayed above, the effect of noise on the speed of motorized vehicles is as in Table-15 below.

Table-15. Equations during the 4 day study.

No	Description	Equality	Distance
1	Monday/27-2-2023	y = 69.505 – 0.395x1 +0, 148x2 + 0.535x3..	0,00m
2	Monday/27-2-2023	y = 64.649 - 0.177x1 - 0.057x2 + 0.437x3.	0,50m
3	Monday/27-2-2023	y = 62.240 - 0.383x1 - 0.116x2 +0.654x3.	15,00m
4	Tuesday/28-2-2023	y = 75.255 - 0.226 x1 - 0.220x2 + 0.369x3.	0,00m
5	Tuesday/28-2-2023	y = 68.326 - 0.1723x1 + 0.025x2 + 0.146x3.	0,50m
6	Tuesday/28-2-2023	y = 68.239 - 0.227x1 - 0.306x2 + 0.274x3.	15,00m
7	Wednesday/01-3-2023	y = 69.568 - 0.189x1 + 0.410x2 - 0.0 15x3.	0,00m
8	Wednesday/01-3-2023	y = 66.202 -0.299x1 + 0.436x2 - 0.019x3.	0,50m
9	Wednesday/01-3-2023	y = 63.963 - 0.341x1 + 0.379x2 - 0.041x3.	15,00m
10	Saturday/11-3-2023	y = 70.519 - 0.208x1 + 0.404x2 + 0.029x3.	0,00m
11	Saturday/11-3-2023	y = 67.037 - 0.284x1 + 0.395x2 + 0.019x3.	0,50m
12	**Saturday/11-3-2023**	y = 63.889 - 0.310x1 + 0.310x2 + 0.054x3.	**15,00m**

The contribution of the largest equation was obtained on the first day of research at the point (Sound Level Meter 2) at 17.4% based on the equation calculation below, y = 63.889 - 0.310x1 + 0.310x2 + 0.054x3. The meaning of the equation above is that if there is an increase in motorcycle speed, light vehicle speed, and heavy vehicle speed, then the noise in SLM2 is 63,889 dBA. There is an increase in the number of vehicles of 0.310 and a decrease in the number of motorcycles and heavy vehicles of -0.256, so there will be an increase in noise of 0.310 dBA at SLM2.

CONCLUSIONS

The speed of motorcycles and the speed of light vehicles and heavy vehicles have a significant influence on noise. From all analytical calculations, the greatest similarity was found on the first day of research at the third point (Sound Level Meter 1), with a contribution of 24.1%. The calculation below is obtained, y = 69.505 - 0.395x1 +0, 148x2 + 0.535x3. The equation means that if there is no decrease in the speed of motorcycles, light vehicles and heavy vehicles, the noise level at SLM1 is 69.505 dBA. However, if there is an increase in the number of light vehicles by 0.148, there will be a decrease in the number of motorcycles and heavy vehicles by 0.14, then the noise level will increase by 0.395 dBA. If there is a speed of motorcycles, light vehicles and heavy vehicles also have a significant influence on noise. The second largest equation was obtained on the first day of research at the point (Sound Level Meter 2) with a contribution of 17.4% based on the equation calculation below, y = 63.889 - 0.310x1 + 0.310x2 + 0.054x3. The meaning of the equation above is that if there is an increase in motorcycle speed, light vehicle speed, and heavy vehicle speed, then the noise in SLM2 is 63,889 dBA. So there is an increase in the number of vehicles of 0.310 and a decrease in the number of motorcycles and heavy vehicles of -0.256, so there will be an increase in noise of 0.310 dBA at SLM2.

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