

## STRATEGIES FOR COMMUNITY NOISE AND DISTURBANCE IN GREEN OPEN SPACE AREAS CASE STUDY OF ASTINA FIELD, CITY OF GIANYAR

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**ABSTRACT:** Noise in the Gianyar Astina Field shows a range of 60 dB (A) to 70 dB (A) which exceeds the noise quality standard for Green Open Spaces of 50 dB (A), noise generated from several factors including vehicle engines, vehicle exhaust sounds and noise too noisy around. Meanwhile, from interviews with visitors related to the perception of distraction, visitors stated that they felt disturbed by the sound generated from motorized vehicles. This noise will have a negative impact on public perception in the form of people who feel disturbed and even more seriously it can have psychological impacts such as emotional disturbances and lifestyle disturbances. The purpose of this study is to analyze the relationship between noise levels, traffic volume and public perceptions of communication disturbances, interaction, concentration, and comfort as well as developing strategies for dealing with noise. This research uses a quantitative approach in the form of analysis of noise levels, traffic volumes, correlations, and formulating strategies to reduce noise at the study site. The results of the study reveal that there is a very strong relationship between noise, traffic volume, and people's perceptions with a correlation value ranging from 0.80 to 0.93 with the category of "very strong relationship". So that a good strategy is needed from the side of the government and also the community as a visitor to the Astina Gianyar Field. and formulating strategies to reduce noise in study locations. The results of the study reveal that there is a very strong relationship between noise, traffic volume, and people's perceptions with a correlation value ranging from 0.80 to 0.93 with the category of "very strong relationship". So that a good strategy is needed from the side of the government and also the community as a visitor to the Astina Gianyar Field. and formulating strategies to reduce noise in study locations. The results of the study reveal that there is a very strong relationship between noise, traffic volume, and people's perceptions with a correlation value ranging from 0.80 to 0.93 with the category of "very strong relationship". So that a good strategy is needed from the side of the government and also the community as a visitor to the Astina Gianyar Field.

**KEYWORDS :** *Noise, Public Perception, Strategy, Traffic Volume*

### I. INTRODUCTION

Noise surveys are usually carried out in places exposed to noise (Abo-Qudais and Alhiary, 2004). Available evidence indicates that traffic noise is a major source of environmental disturbance; researchers found a positive correlation between noise levels and distraction levels (Li et al, 2008). The simplest and most widespread measurement is to use a scale of the level of social annoyance. This scale was used to arrange the various choices (very disturbed, disturbed, moderate, slightly disturbed and not at all disturbed) that all respondents used to indicate how disturbed they were by traffic noise. Preliminary survey results on noise in the Astina Gianyar Field show a range of 60 dB (A) to 70 dB (A) which exceeds the noise quality standard for Green Open Spaces by 50 dB (A), noise generated from several factors including vehicle engines, the sound of vehicle exhaust and ambient noise that is too noisy. Meanwhile, from interviews with visitors related to perceptions of distraction, visitors stated that they felt disturbed by the sound generated from motorized vehicles (Semadi, 2022).

The data flow of traffic has led to high levels of noise-pollution in this area. Disturbance caused by noise depends on the level of sound intensity, how often it occurs and the frequency generated. Noise in motorized vehicles is mainly generated by the vehicle's engine during combustion, exhaust, horn, braking and due to the interaction between the wheels and the road in the form of friction which produces sound. Noise is a form of unwanted sound or a form of sound that is not in accordance with the place and time. This sound is undesirable because it interferes with human speech and ears, which can damage human hearing or comfort

(Bairante et al., 2020). A survey that was conducted in England indicated that as many as 45 percent of residents who live in areas affected by noise due to transportation activities experience hearing loss. Sounds with an intensity ranging from 50-55 dBA are called noises which can cause disturbances in sleep so that when you wake up you feel tired and tired, while sounds with an intensity of 90 dBA can disturb the autonomic nervous system.(Arlan, 2021). Noise with an intensity of 140 dBA can cause vibrations in the head, severe pain in the ears, balance disturbances and vomiting. Sudden loud noises can cause blood pressure to rise, pulse vibrations to increase and gastric lymph production to decrease and the digestive process to stop (American Academy of Ophthalmology and Otolaryngology).

The disturbance that occurs due to the emergence of public perception that what is received by the five senses in this case is hearing because it is related to the noise level is a benchmark whether in an area that has a noise level it is necessary to do it, the higher the noise level, the higher the public's perception that he is disturbed by the noise. Perception is a response from an individual or group to input from the human senses, in the form of sound, light, and color. In this case noise becomes something that is received by the five senses and if it exceeds what is desired it will cause people's perceptions to become negative about the sound.

In previous studies discussing several problems related to the effect of noise on public perceptions regarding noise disturbance, research conducted by(Kurniawan & Ratni, 2022) get the result that noise caused by motorized vehicles with noise levels exceeding the standard value causes residents to feel quite noisy and quite disturbed by the noise. Research conducted by(Mulyono et al., 2018)with the Kartasura Market case study the results show that traffic volume has a relationship to the existing noise level, the denser the volume of vehicles on a road section will have an impact on increasing noise in the area, and it is found that there is a negative relationship between noise due to traffic flow and the convenience of the local community. This research is of course different from previous research which only analyzed the relationship and influence of noise on disturbances experienced by the community, but it is also related to the strategies needed, both the role of the government and related stakeholders in overcoming these problems.

PeThis study aims to analyze the relationship between traffic noise levels and disturbance to the community, especially visitors at Astina Field, Gianyar City. Community perception is used to find out whether the noise caused by motorbikes has an impact on disturbing visitors to Astina Field, Gianyar City due to the noise. This field is one of the green open spaces in the public urban area in Gianyar City which is quite dense with visitors. The noise level in this area has also increased due to the large number of private vehicles and motorbikes passing by, especially during rush hours, around 16.00-18.00 WITA.This research will examine the condition of the noise level in the Astina Field, Gianyar City, which is caused by vehicle traffic and the perception of public disturbance. Thus, strategic efforts can be made to manage noise levels in the Astina Field so as not to disturb the surrounding community.

## II. LITERATURE REVIEW

### Noise

Bbased on a decision issued by the Ministry of Environment in KepmenLH No. 48 of 1996 concerning Noise Level Standards states that noise is unwanted sound from business or human activity at a certain level and time which can cause disturbance to human health and environmental comfort. Even though noise is unwanted sound, sometimes noise can be beneficial. Useful in the sense that noise can be used to attract attention or expect a response from someone. For example, a baby cries and someone screams for help. While the impact caused by noise is a physical and psychological disturbance. Currently noise is one of the causes of environmental disease (Slamet, 2006).

Noise intensity levels are measured and expressed in decibel units (dBA). Whereas what is meant by noise level quality standard is the maximum limit of noise level that is permissible to be discharged into the environment from a business or activity so that it does not cause disturbance to human health and environmental comfort.

### Mockup Due to Traffic

The noise generated from transportation activities is a sound that is not constant. Disturbance caused by noise depends on the level of sound intensity, how often it occurs and the frequency generated. Noise in motorized vehicles is mainly generated by the vehicle's engine during combustion, exhaust, horn, braking and due to the interaction between the wheels and the road in the form of friction which produces sound. Most motorized vehicles in 2nd or 3rd gear generate a noise of 75 dBA with a frequency of 100–7000Hz.

VehicleHeavy vehicles (trucks and buses) are the main noise sources on the road(Pristianto, 2019). Private cars tend not to make too much noise. But because of the large number, the noise generated is quite large. When the engine is turned on and is about to make maximum acceleration, noise is generated by the sound of the engine, whereas when the vehicle is traveling at high speed the main source of noise is the sound of wheel friction and road pavement. For this type of truck, which has a diesel engine and the power produced by the engine is greater, it produces a noise level that is 15 dBA greater than private vehicles.

The sound of combustion that occurs in the engine makes a large contribution to the cause of noise, especially when the truck reaches a speed of 80 km/hour. Traffic noise is in the frequency range of 100 – 4000 Hz. Noise due to motor vehicle exhaust occurs above a frequency of 250 Hz (AASHTO, 1993).

## 2.1 Sound Level Meter

*Sound Level Meters* is a tool used to measure the level of frequency/weight of sound that will be displayed on the dB-SPL. Sound level meter (SLM) is a measuring instrument based on an electronic measurement system. Although measurements can be made directly by mechanical means, electronic measurement systems provide many advantages for several measurements, including the speed of the system in retrieving, sending, processing and storing data.

Methods for designing hardware and software measurement systems, as well as testing tools at the final stage. Hardware design includes sensor system design, signal conditioning circuits, analog to digital signal converter (ADC) circuits, processing and controller circuits (microcontrollers), and display circuits (displays). By varying the frequency of the signal generator, the sound intensity level is measured with a reference SLM (made in Taiwan). At the same time and distance, the sensor output voltage is also measured. Here the relationship between the sound intensity level and the sensor output voltage is obtained (Wildian, 2009).

In determining the source of noise in an area, noise mapping techniques are generally used with a sound level meter. Along with the rapid developments in the fields of technology and mathematics, this is where an alternative technique was developed to determine the source of noise in an area by beamforming using an array microphone sensor. One of the most important functions of an array microphone is to separate the desired sound source from noise, echo and other sounds (Lieberika, 2013).

## Impact Due to Noise

Noise is excessive unwanted sound and is often referred to as invisible pollution which causes physical and physiological effects on humans. The physical effects relate to the transmission of sound waves through the air and the psychological effects relate to the human response to sound.

Noise impacts can be divided into the categories of impacts on human health, impacts on human comfort and impacts on animals and ecology (Sinha, 1988). A survey that was conducted in England indicated that as many as 45 percent of residents who live in areas affected by noise due to transportation activities experience hearing loss. Some of the symptoms detected from exposure to high-intensity sound are affecting the tachycardia cardiovascular system, heart rate and blood pressure becoming faster followed by blood muscle contractions, besides that the rhythm of breathing also becomes abnormal and affects the digestive system. The same investigations carried out by several doctors indicated that noise affects the work of the central nervous system by being the cause of one of the three causes of neurosis. In addition, noise is also a reason why someone gets a headache from the five people studied (Sungging, 2010).

Sounds with an intensity ranging from 50 – 55 dBA are referred to as noises which can disrupt sleep so that when you wake up you become tired and tired, while sounds with an intensity of 90 dBA can disturb the autonomic nervous system. Noise with an intensity of 140 dBA can cause vibrations in the head, severe pain in the ears, balance disturbances and vomiting. Sudden loud noises can cause blood pressure to rise, pulse vibrations to increase and gastric lymph production to decrease and the digestive process to stop (American Academy of Ophthalmology and Otolaryngology).

## Community Perception

Perception is a process that arises as a result of sensation, where sensation is the activity of feeling or the cause of an emotional state. Sensation can also be defined as the rapid response of our receiving senses to basic simulations such as light, color and sound. With all that, perception will arise.

According to Mutoharoh, 2018 that perception is a process that is preceded by sensing, which is the process of receiving a stimulus by the individual through the senses or also called the sensory process. The process does not just stop, but the stimulus is continued and the next process is the process of perception.

According to "(Gustina, 2016)" That perception involves the entry of messages or information into the human brain which is continuously in contact with its environment.

Meanwhile according to (Tree and Coal, 2014)", that perception is the experience of objects, events or relationships obtained by concluding information and interpreting messages.

Based on research (Putra et al., 2016) Previously, perceptions could be negative or positive about what was received by the community. In this study, it was explained that perceptions were in the form of public disturbance. It could be concluded that there was a significant negative effect of noise on people's perceptions.

Based on some of the definitions above, it can be concluded that perception is a response from a person to the stimulus he receives and will be processed through the brain from the presence of color, light, and sound.

In this study, people's perceptions arise from the sound of vehicles, so that then the community's perceptions are of course different because people's perceptions of noise are disturbing or not.

### III. RESEARCH METHODOLOGY

The author conducted a preliminary survey of noise in the AstinaGianyar Field, where the results of the preliminary survey showed that the noise level ranged from 60 dBA - 70 dBA A, which means that it exceeds the established quality standard of 50 dBA A. This situation made the author want to research in the GianyarAstina Field, besides that population growth is in line with the increase in motorized vehicles operating in Gianyar, causing noise from traffic. In this study the main issues studied were the level of traffic noise, Trafficvolumesand perceptions of societal disruption. Data collection was in the form of data obtained from field noise data collection, traffic volume data and distributing questionnaires to people who were carrying out activities at the Astina Gianyar Field, while secondary data was obtained from Minister of Environment Decree number 48 of 1996 concerning noise level quality standards. Traffic noise data is analyzed and correlated with the volume of vehicles and the level of public disturbance.

### IV. RESULTS AND DISCUSSION

#### Traffic Noise Level

Table 1 presents the level of traffic noise on the north side of the AstinaGianyar Field. On weekdays, the highest 10-minute equivalent noise level value occurs in the afternoon at 17.00 - 17.10 WITA, which is 82.53 dB(A). This is due to the high number of people returning home from work and people heading to the research location to exercise in the afternoon or other activities. The Leq result for 24 hours is 63.55 dB(A) this means that the noise level due to traffic has exceeded the noise quality standard for Green Open Space areas, which is 50 dB(A).

On weekends, the highest 10-minute equivalent noise level (Leq) occurs in the afternoon at 17.00 - 17.10 WITA, which is 89.65 dB(A). This is because the interest of the people of Gianyar and its surroundings to visit the Astina Gianyar Field is quite high, they take advantage of the weekend off by exercising, gathering with friends and family at the Astina Gianyar Field. The Leq result for 24 hours was 68.09 dB(A) this means that the noise level produced has exceeded the noise quality standard for green open space areas of 50 dB(A).

From research conducted on weekdays and holidays it was found that there was an increase in noise on weekends, where on weekdays it had a noise level of 63.55 dB(A) but on weekends it increased to 68.09 dB(A) or an increase of 7.14 %.

Table1. The results of noise level calculations on weekdays and holidays at the AstinaGiayar Field

GREEN OPEN SPACE AREA					
No	Measurement Time		Symbol	Noise Intensity Level (dB)	
	Time Intervals (WITA)	Measurement Time 10 minutes (WITA)		Day 1 (working day)	2nd day (weekends)
1	06.00 - 10.00	07.00 - 07.10	L1	80,09	87,42
2	10.00 - 14.00	10.00 - 10.10	L2	78,41	81,07
3	14.00 - 17.00	16.00 - 16.10	L3	80,36	87,16
4	17.00 - 22.00	17.00 - 17.10	L4	82,53	89,65
5	22.00 - 24.00	22.00 - 22.10	L5	80,38	76,89
6	24.00 - 03.00	03.00 - 03.10	L6	76,73	75,24
7	03.00 - 06.00	05.00 - 05.10	L7	76,92	79,76
Afternoon Time (06.00-22.00)			LS	74,58	81,23
Night Time (22.00-06.00)			LM	74,1	73,45
Day and Night Time (24 hours)			NGO	63,55	68,09

Note:

- LS : Daytime Noise Level
- LM : Night Time Noise Level
- NGO : Day and Night Noise Levels

### Questionnaire Validity and Reliability Test

The results of the Pearson correlation test showed that all questionnaire items were valid, as were all question items reliable because they had a Cronbach's Alpha value greater than 0.6 (Table 2).

Table2. Validity and Reliability Test

Question	Pearson Correlation	Sig.	Cronbach's Alpha
Traffic Noise Level with communication breakdown	0.511	0.000	0.856
Traffic noise level with interaction disturbance	0.419	0.002	0.741
Traffic noise level with distraction	0.532	0.000	0.711
Traffic noise level with disturbance of comfort	0.496	0.000	0.611

### Noise Level

The results showed that the traffic noise level in the northern AstinaGiyar Field affected all respondents in terms of communication due to traffic noise levels, most of the respondents answered "Quite Disturbed" with a percentage of 50%, in terms of interaction disturbance most of the respondents answered "Disturbed " with a percentage of 40%, then in terms of concentration most of the respondents answered "Quite Disturbed" with a percentage of 50%, and in terms of comfort most of the respondents answered "Quite Disturbed" with a percentage of 48%

### The Relationship Between Public Perceptions and Noise Levels

Table 3 shows the majority felt "quite disturbed" with the number of respondents answering 25 respondents, noise disturbance to interactions, most of them felt "disturbed" by the number of respondents who answered 20 respondents, noise disturbance to concentration, most answered "quite disturbed" by the number of respondents answered "quite disturbed" with 25 respondents who answered, and noise disturbance to comfort "quite disturbed" with the number of respondents who answered as many as 24 respondents.

Table3. Frequency Relationship of Noise Disturbance to Community Perception

		Community Perception				Total
		Not disturbed	Annoyed enough	Disturbed	Very Disturbed	
Interference Relationship Variable	Noise Interference with Communications	5	25	19	1	50
	Noise Interference Against Interaction	12	16	20	2	50
	Noise Interference Against Concentration	15	25	10	0	50
	Noise Interference Against Comfort	16	24	10	0	50

The results of the Pearson chi square test ( $X^2 = 39.875$ ;  $P = 0.000$ ) show that there is a relationship between noise levels and public perceptions at the Astina Gianyar Field in 2023. This means that the higher the noise level, the more disturbed the community will be, so a reduction in noise levels is needed. so that there is no disturbance to the community as visitors to the AstinaGianyar Field.

From interviews and questionnaires distributed to visitors to the Astina Gianyar Field as respondents in this study divided into indicators of communication disturbances, interaction disturbances, concentration disturbances and comfort disturbances, it was found that the noise that occurs at the Astina Gianyar Field generally has a "disturbed" impact with the most impacting on the Interaction Disturbance indicator the respondents answered "disturbed" by 40%, while on other indicators the respondents only answered "quite disturbed". The noise level that has exceeded the standard limit of the Ministry of Environment in green open spaces has a proven disturbing impact on the community, because the correlation test using chi-square through the SPSS application found a significant relationship with the Sig value.  $< 0.05$ ,

### Noise Management Strategy

Based on the determination of the scale obtained from the researcher's interview with the manager above, it was found that in handling noise at the source, it has a very high priority on the speed setting indicator with a priority scale of 5, which means it is very important because there are no signs that regulate the speed limits of vehicles passing on it. research sites. Followed by shrubs with a priority scale of 3 which means it is quite important because there are not enough types of shrubs in the research location. For dampers in the form of trees, mounds and artificial barriers, each with a priority scale of 1 means that this type of damper is not a priority because it is not in accordance with the characteristics of Astina Field, Gianyar City as a Green Open Space that emphasizes beauty and beauty.

With the results of the questionnaire above, several strategies can be determined in dealing with noise in the Astina Field, Gianyar City based on the priority scale as follows:

#### 1. Speed Limit Installation

Installation of speed limits at green open space locations is carried out so that vehicles passing through these locations do not create noise that can cause noise, because higher vehicle speeds will result in vehicles creating louder sounds, in accordance with Highways guidelines regarding Road Traffic Noise Handling Mitigation provides suggestion to provide a speed limit of 30 km/hour because it will reduce noise 1 to 5dB (A). At speeds above 80 km/h, replacing solid concrete asphalt pavements (non-uniform grained) with open asphalt pavements (uniform grained) can reduce traffic noise levels to 4 dB(A). Correction of noise levels due to the use of various other types of pavement relative to asphalt concrete pavement layers.

#### 2. Addition of Shrub Plants.

Plants used for noise barrier must have enough leaf density and density and be evenly distributed from the ground surface to the expected height. For this reason, it is necessary to arrange a combination of ground cover plants, shrubs, and trees or a combination with other materials so that the barrier effect becomes optimum. In general, barriers with plants are applied when no excessive noise reduction is required or in combination with other barriers when a high degree of effective noise reduction is required.

## V. CONCLUSION

### Conclusion

Based on the results and discussion above, the conclusions obtained in this study include:

1. The traffic noise level at Astina Gianyar Field has exceeded the quality standard, both on weekends and weekdays. Leq results for 24 hours carried out on weekdays are 63.55 dB(A) and on holidays are 68.09 dB(A) this means that the noise level due to traffic has exceeded the noise quality standard for the Space area. Green Open is 50 dB(A).
2. There is a significant relationship between noise levels and people's perceptions of disturbances in terms of communication, interaction, concentration and comfort.
3. The strategy that can be implemented in the Gianyar Astina Field area, in particular according to the priority scale recommended by the Department of Transportation and the PUPR Office of the Gianyar Regency, is to limit the maximum speed of 30 km/hour and plant several types of shrubs such as naughty children, likuan-yu to reduce noise. due to traffic.

### Suggestion

From the conclusions above, the research has obtained the results of the research objectives, then the researchers provide suggestions related to this case, including:

1. The Government Provides persuasive information/appeals about the impacts that can be caused by noise as outlined in the form of information boards placed in several areas of the AstinaGianyar Field and electronic media (facebook, Instagram, twitter, and so on).
2. Chi Universities to conduct further studies or research related to noise that covers the entire area in the Astina Field, Gianyar City.

### Implications

The implications of the research results include two things, namely theoretical and practical implications. Theoretical implications relate to the contribution to the development of noise theories and their impact on human physical and psychological. While the practical implications relate to the contribution of research to improving the quality of green open spaces, especially the AstinaGianyar Field

1. PeThis research proves that noise is everywhere and annoyance is one of the most common reactions to noise(Pristianto, 2019). Traffic noise is the dominant source of environmental noise in urban areas, random noise fluctuations caused by periodic changes in traffic flow

2. It is hoped that the Gianyar Regency Environmental Service can make regulations regarding the threshold for the sound of engines and horns that are permitted to pass through green open space areas in Gianyar Regency
3. The Gianyar Regency Environmental Service cooperates with the Gianyar Regency Health Office to examine more deeply the physical impacts caused in the short and long term as a result of exposure to noise.
4. SeAll relevant stakeholders actively conduct outreach regarding the impact that can be caused by regular exposure to noise.

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