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Strategies for Overcoming Environmental Noise in Recreational Area (Case Study in Tibubeneng Village, Kuta Utara District, Badung Regency)

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ABSTRACT: This researcha ims to analyze noise due to traffic volume what happened in the village of Tibubeneng. Quantitative data collection was obtained by calculating the noise level due to traffic volume which is measured for 1 (one) hour and calculating the noise level due to human activity Which dB(A) sound pressure level measurement for 10 minutes for each measurement and readings are taken every 5 seconds. The results are set forth in a traffic volume, noise and road geometry survey form.Traffic Noise Level Prediction Method (CoRTN). The research results show that Noise levels due to human activities at the study site on weekdays and holidays have exceeded the noise quality standards listed in KMLH no 48 of 1996 concerning Noise Level Standards, where the noise level in recreational areas is 70 dB (A). The strategy for noise sources from human activities is to regulate the operating hours of recreational areas, arrange the implementation of activities that cause higher noise levels such as launching fireworks, adding silencers and planting trees in recreation areas. While the strategy for noise sources from traffic activities is to carry out traffic engineering, regulate traffic speed and add noise reduction from natural materials such as planting trees.

KEYWORDS: Strategy, Noise, Human Activity, Traffic

INTRODUCTION

Transportation is a movement or movement of both people and goods from a place of origin to a destination. Transportation has an important role in growth and development in all aspects. The need for transportation equipment in Indonesia continues to increase along with the increase in population every year. Based on data from the Central Statistics Agency for 2022, the population in Indonesia reaches 275.77 million people spread across 37 provinces in Indonesia. Transportation is one of the important means of driving life and cannot be separated from life. Where without transportation, human life will be sluggish and difficult to develop. The most widely owned means of transportation in Indonesia are motorized vehicles. Almost everyone has a motorized vehicle because it can help save time in moving from one place to another. This causes increased mobility and movement which is characterized by the demand for transportation needs. Each of these mobility and movements use means of transportation in the form of vehicles which in operation generate sounds, where at a certain level these sounds can still be tolerated so that the consequences they cause are not a nuisance. However, if the noise generated by vehicles is at a higher level, it is already a disturbance or pollution called noise. This causes increased mobility and movement which is characterized by the demand for transportation needs. Each of these mobility and movements use means of transportation in the form of vehicles which in operation generate sounds, where at a certain level these sounds can still be tolerated so that the consequences they cause are not a disturbance. However, if the sound generated by vehicles is at a higher level, it is already a disturbance or pollution called noise. This causes increased mobility and movement which is characterized by the demand for transportation needs. Each of these mobility and movements use means of transportation in the form of vehicles which in operation generate sounds, where at a certain level these sounds can still be tolerated so that the consequences they cause are not a nuisance. However, if the noise generated by vehicles is at a higher level, it is already a disturbance or pollution called noise. where at a certain level these sounds can still be tolerated so that the consequences they cause are not a nuisance. However, if the noise generated by vehicles is at a higher level, it is already a disturbance or pollution called noise. where at a certain level these sounds can still be tolerated so that the consequences they cause are not a nuisance. However, if the noise generated by vehicles is at a higher level, it is already a disturbance or pollution called noise.

Strategies for Overcoming Environmental Noise in Recreational Area (Case Study in Tibubeneng Village, Kuta Utara District, Badung Regency)

Tibubeneng is a village in North Kuta sub-district, Badung regency, Bali, Indonesia. Tibubeneng is one of the famous areas in Bali, which is visited by many tourists, both domestic and foreign. The location is easy to reach by any transportation. Tibubeneng can be famous, because there are many tourist destinations and also interesting activities that can be done.

The attraction of the Tibubeneng Bali area is that there are beautiful beaches. Some of the beaches are also often used as favorite places to do water sports and are suitable for relaxing. If the sea water conditions are calm, people swim on the beach, sunbathe, or just take pictures. Several beaches in the Tibubeneng area also have quite large waves, because they are still on the same coastline as Kuta, making them suitable surfing spots for tourists. Even though it is now filled with shops, bars, and so on, Tibubeneng is still synonymous with views of rice fields. Many rice fields can still be found on the outskirts of Jalan Tibubeneng. Apart from enjoying the green scenery, the moment can also be captured by taking pictures. Villas are one of the targets for tourist lodging, when visiting Tibubeneng. Many villas in Tibubeneng offer this because the atmosphere is natural, comfortable and serene, making it perfect for relaxing.

Currently, the attractiveness of Tibubeneng Bali does not only rely on natural beauty. Tibubeneng is now surrounded by many entertainment venues, such as bars, restaurants and beach clubs. So, the atmosphere of the night is the main attraction for the area. One of them is Atlas Beach Fest. Atlas Beach Fest is a new beach club in Bali which was opened in the Berawa area, Tibubeneng, North Kuta, Badung which was just inaugurated on July 18, 2022.

The attraction that Tibubeneng has causes tourists to glance at beach resorts. This has resulted in the rapid development of tourism facilities, especially hotel accommodations of various types, restaurants, bars and restaurants. In addition, tourism facilities such as surfing board rentals and other tourist equipment for tourists to use for activities on the beach and sea are starting to appear. Then, souvenir shops developed, rental of sea transportation equipment such as boats or traditional jukung and land transportation such as taxis, rental cars, motorbike rental, bicycles and other tourism facilities.

The rapid development of tourism support facilities is also directly proportional to the growth in the number of immigrants to the region. Of course, this is also offset by the rapid development of new settlements, including the rapid growth of boarding house rentals and the result is that the flow of transportation in the area's routes is increasingly congested and there are even frequent traffic jams to the west towards the Tanah Lot tourist attraction (source: travel.detik.com). This is the map of the shift in the location of tourism. Entrepreneurs are starting to look at places that are comfortable and new, including in Tibubeneng. The current atmosphere of Tibubeneng does not only rely on the beach, but has many bars, beach clubs and night clubs. Noisy sounds until the early hours of the morning emerged from the entertainment venues that night.

If left continuously, it can cause hearing loss in the community. This is supported by the Naek Silitonga Journal, Adlin Adnan, Ikhwansyah Isranuri, T. Siti Hajar Haryuna, Fotarisman entitled The Relationship between Noise and the Hearing of Workers (Case Study of Discotheques A, B, C in Medan City) states that from the results of the investigation regarding the level of sound hazard loud disco music (between 100 - 110 dB), loud music can damage the hearing of someone who is there every day. Especially if the sound of the music exceeds the normal threshold that can be tolerated by the ear. The magnitude of the effect of sound on the ear depends a lot on the intensity and duration of hearing, the amount of time heard and the sensitivity of each, including the age of the listener. The existing discotheque entertainment employs a workforce consisting of Disc Jokeys, Bartenders, and Waiters who throughout their work shift are continuously exposed to loud music from loudspeakers. These workers are prone to hearing loss. Research conducted by the Ministry of Manpower of Singapore in 1996 proved that amplifier music played in discotheques can cause hearing loss in workers. Based on the journal I Made Cahyadi Dwi Putra and Ketut Tirtayasa, states that work in areas with high noise levels is a risk factor for hearing loss. Workers in nightclubs are exposed to high levels of sound. The sound level on the dance floor exceeds 100 dB(A). Meanwhile, sound exposure for disc jockeys (dj) is 95-100 dB(A) and sound exposure for service staff is 90-95 dB(A). Even though the working time is less than 20 hours per week, the daily exposure of 96 dB(A) for djs and 92 dB(A) for service staff still affects hearing acuity.

Based on these problems, the authors try to raise these problems in a proposed thesis proposal entitled: "Strategy To Overcome Environmental Noise In Recreational Area (Case Study In Tibubeneng Village, Kuta Utara District, Badung Regency"

LITERATURE REVIEW

Noise Caused by Human Activities

As the five senses that function to capture sound, our ears have a maximum limit of sound that can be tolerated so that ear health is maintained. The various sounds that enter our ears every day unconsciously have the potential to reduce the quality of hearing. However, this decreases in the quality or ability to hear often goes unnoticed because the process occurs gradually. In addition, we are very used to hearing loud noises around us because we consider them to be part of our daily activities. In fact, the sound of motorized vehicles on the highway, the sound of machines in the surrounding environment, even the sound of a baby crying can damage hearing if the ears are exposed to these sounds for more than the recommended time. So, so that our sense of hearing is always maintained,

Handling Of Noise Caused by Human Activities

Handling noise caused by human activities, namely by: There are rules when visiting recreational areas; Barrier with plant type 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. The plants that can be used are:

1. ground cover (cover crops); grass; leguminosae.
2. shrub; pringgodani bamboo (Bambusa Sp); likuan-yu (Vermenia Obtusifolia);

a. bad boy (Durante Repens); soka (Ixora Sp); kakaretan (Ficus Pumila); sebe (Heliconia Sp); teas (Durante);

3. Tree; acacia (Acacia Mangium); johar (Casia Siamea); lush trees with low branches

Handling Of Noise Due to Traffic Volume

a. Noise handling at noise sources

Handling of noise sources can be done in several ways, including Traffic regulation; The arrangement is intended to reduce the volume of passing vehicle traffic. This can be done by carrying out traffic engineering, building ring roads to reduce the burden on the urban road network, etc. Good traffic management can reduce noise levels between 2 to 5 dB(A). Heavy vehicle restrictions; Heavy vehicles have a large influence on noise levels due to road traffic. By limiting the types of heavy vehicles, it can reduce the impact of noise on existing sensitive areas. A 10% vehicle weight restriction can reduce noise levels by up to 3.5 dB(A). Speed settings; Road slope improvement; The slope of the road directly affects the noise level. Reducing the slope every 1% can reduce the noise level by 0.3 dB(A). Selection of the type of pavement. 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).

Handling noise on the propagation path.Handling noise on the path of sound propagation is generally done by installing Noise Absorbers (PB). PB can be a natural barrier and an artificial barrier. Natural barriers usually use various combinations of plants and berms, while artificial barriers can be made of various materials, such as brickwork, glass, wood, aluminum, and other materials. To achieve adequate performance, the material used as a barrier should have a minimum weight-area ratio of 20 kg/m2.

Noise mitigation in the form of PB installation must consider the following factors: Road user safety related to visibility and construction resistance to collisions; Ease of maintenance, including the surrounding buildings, such as drainage channels; Construction stability and service life reach 15 to 20 years; Construction costs which depend on the type of foundation required and the construction method used; The beauty or aesthetics of the surrounding environment.

Handling noise at the point of reception.The noise level at the reception point can be reduced by changing the orientation of the building which was originally facing the noise source to sideways to the noise source or turning its back to the noise source. To be able to apply this method, planners need to pay attention to the flexibility of space, building access, and the beauty of the building's architecture. If the available land is sufficient, a garage, warehouse, or building facility can be built adjacent to the noise source which is also a barrier to sound propagation. In addition to changing the orientation of the building, noise handling at the reception point can also be done with insulation on the building facade. The use of this insulation is done if other efforts to reduce noise are not possible. This method is applied to areas with high density, such as the city center, both for residential buildings and office buildings. Mitigation methods for the impact of noise originating from an increase in traffic volume along the existing road include several works, including: Replacement of windows, for example with double panes; Installation of damper walls; Installation of a special ventilation system.

RESEARCH METHODOLOGY

The research location will be carried out on Jalan Pantai Brawa, Tibubeneng, North Kuta District, Badung Regency, to be exact100 meters from the source of the noise, namely Atlas Beach Fest, at a point near the residential area to be precise. The location of the research point is in a flat location. This research uses quantitative methods. Quantitative data collection is obtained by calculating the noise level due to traffic volume which is measured for 1 (one) hour and calculating the noise level due to human activity WhichdB(A) sound pressure level measurement for 10 minutes for each measurement and readings are taken every 5 seconds. The results are set forth in a traffic volume, noise and road geometry survey form, then the data is processed according to the Decree of the State Minister for the Environment Number Kep 48/MENLH/11/1996 of 1996 concerning Noise Level

Standards and Traffic Noise Level Prediction Method (CoRTN).The data analysis technique used in this study is using a qualitative descriptive analysis.This analysis relates to techniques for recording, organizing, and summarizing information from numerical data. Where later the results of measurements in the field will be compared with the Traffic Noise Quality Standards and Traffic Noise Level Prediction Methods Lintas (CORTN). To determine the strategy to reduce noise levels, using a Qualitative Descriptive Analysis.

RESULTS AND DISCUSSION

Traffic Characteristics Analysis

Traffic Volume

Traffic volume data was obtained from a survey of the volume of vehicles passing the observation point at 07.00-22.00, and 22.00-06.00 WITA, with a sample of 7 (seven) measurements. The survey was conducted for 2 days, namely Monday representing weekdays and Saturday representing holidays. The research location was at a point near the residential areas on Jalan Pantai Berawa near Atlas Beach Fest. Types of traffic volume that are calculated are motorcycles (MC) and light vehicles (LV). From the results of the calculation for 7 hours, the traffic volume on weekdays is 5,867 vehicles / 7 hours and on weekends there are 6,003 vehicles / 7 hours. Calculation details can be seen in Table 1 and Table 2.

Table 1. Results of the Recapitulation of Traffic Volume Calculations on Working Days

NO	TIME	MC (veh/hour)	LV (veh/hour)	TOTALS PER HOUR
1	07.00 - 08.00	909	102	1011
2	12.00 - 13.00	896	201	1097
3	16.00 - 17.00	1190	232	1422
4	20.00 - 21.00	519	150	669
5	23.00 - 24.00	471	187	658
6	01.00 - 02.00	653	143	796
7	04.00 - 05.00	194	20	214
Total Per Vehicle Type		4,832	1035	
Average Hourly Traffic Volume				838
Total				5,867

Table 2. Results of Recapitulation of Traffic Volume Calculations on Holidays

NO	TIME	MC (veh/hour)	LV (veh/hour)	TOTALS PER HOUR
1	07.00 - 08.00	523	228	751
2	12.00 - 13.00	825	152	977
3	16.00 - 17.00	1401	236	1637
4	20.00 - 21.00	626	193	819
5	23.00 - 24.00	494	124	618
6	01.00 - 02.00	581	240	821
7	04.00 - 05.00	277	103	380
Total Per Vehicle Type		4,727	1,276	
Average Hourly Traffic Volume				858
Total				6003

In Tables 1 and 2, traffic volume data at the research location are presented on weekdays and holidays with the highest traffic volume occurring at 16.00 - 17.00 WITA with a total of 1,422 vehicles/hour on weekdays and on holidays. with the number of vehicles as many as 1,637 vehicles / hour. This is because in the afternoon it coincides with office hours which causes an increase in traffic volume compared to other hours and strategic research locations close to recreational areas such as bars and cafes and near the beach, namely Berawa Beach, so that it attracts tourists visiting cafes and bars. This causes an increase in traffic volume in the afternoon both on weekdays and holidays. This is in line with research (Gea.2018) in the Journal of Geography Education, Volume 18, Number 1, April 2018 that the noise level is high during the busy time of the afternoon (16.00-18.00) because many road users pass it for their activities.

In addition, in table 5.1 related to Recapitulation of Traffic Volume Calculations on Working Days, high traffic volume also occurs at 07.00-08.00 as many as 1,011 vehicles/hour and at 12.00-13.00 as many as 1,097 vehicles/hour. This is because during morning peak hours, road users generally catch up with office hours, which is the rush hour for people going to school or work and during the day rest hours for employees. Whereas in table 5.2 related to Recapitulation Traffic Volume Calculation During holidays, traffic volume is relatively even and fluctuates slightly.

Vehicle Composition

The composition of the vehicles in this study aims to see what percentage of each type of vehicle is in the volume of traffic that occurs at the study site. The composition of vehicles in the study locations can be seen in Tables 3 and 4.

Table 3.Composition of Vehicles on the Road During Workdays

NO	TIME	MC PERCENTAGE (%)	LV PERCENTAGE (%)
1	07.00 - 08.00	89,91	10.09
2	12.00 - 13.00	88.63	18,32
3	16.00 - 17.00	117.71	16,32
4	20.00 - 21.00	51,34	22,42
5	23.00 - 24.00	46,59	28,42
6	01.00 - 02.00	64,59	17.96
7	04.00 - 05.00	19,19	9.35
Average Percentage Per Vehicle Type		68,28	17.55

Table 4.Composition of Vehicles on the Road on Holidays

NO	TIME	MC PERCENTAGE (%)	LV PERCENTAGE (%)
1	07.00 - 08.00	69,64	30,36
2	12.00 - 13.00	84,44	15.56
3	16.00 - 17.00	85.58	14,42
4	20.00 - 21.00	76,43	23.57
5	23.00 - 24.00	79.94	20.06
6	01.00 - 02.00	70,77	29,23
7	04.00 - 05.00	72,89	27,11
Average Percentage Per Vehicle Type		77,10	22.90

In Tables 3 and 4 it can be seen that at the study location, the composition of vehicles passing through the study location was dominated by motorcycles (MC). This is in line with statistical data on the number of motorized vehicle ownership in Bali, where motorbikes are the largest number owned by Balinese people. The percentage of vehicle types is used in calculating noise level predictions using the CoRTN method.

Vehicle Space Average Speed

The results of the survey of the average space speed of vehicles can be seen in Tables 5 and 6.

Table 5. Survey Results of Vehicle Space Average Speed during Workdays

No	Time	The results of the calculation of the average space velocity (MPH)			The result of the calculation of the average speed of space (km/h)			Average speed per hour (km/h)
		Kend I	Kend II	Kend III	Kend I	Kend II	Kend III	
1	07.00 - 08.00	26	28	27	42	45	43	43,44
2	10.00 - 11.00	28	25	29	45	40	47	43.98
3	16.00 - 17.00	27	29	23	43	47	37	42.37
4	20.00 - 21.00	33	32	30	53	51	48	50.95
5	23.00 - 24.00	34	33	29	55	53	47	51,49
6	01.00 - 02.00	32	30	31	51	48	50	49.88
7	04.00 - 05.00	42	36	40	68	58	64	63,29
Average vehicle speed								49,34

In Table 5 it can be seen that the lowest average speed of vehicle space in the research location on weekdays occurs at 16.00 - 17.00 WITA, which is 42.37 km/hour.This is in line with the results of a traffic volume survey where this hour is the hour with the highest traffic volume compared to other hours, resulting in lower vehicle speeds. This is in line with related research (Tamin, 2008). Speed and volume relationship where The basic relationship between speed and volume is that by increasing the traffic volume, the average speed of the space will decrease until the critical density (maximum volume) is reached. After the critical density is reached, the average velocity of space and volume will decrease. The low speed during this hour is caused by the large number of motorists who visit the beach in the afternoon as well as places to relax around it, either bars or cafes. In addition, pedestrians heading to the beach also seem to increase and many walk right up to the road which causes high side barriers. Wh ile the highest average speed of vehicle space occurs at 04.00 - 05.00 WITA, which is 63.29 km/hour, this is in line with the results of a traffic volume survey where the lowest traffic volume also occurs at that hour and allows vehicles to go faster compared to other hours.

Table 6. Survey Results of Vehicle Space Average Speed on Holidays

No	Time	The results of the calculation of the average space velocity (MPH)			The result of the calculation of the average speed of space (km/h)			Average speed per hour (km/h)
		Kend I	Kend II	Kend III	Kend I	Kend II	Kend III	
1	07.00 - 08.00	30	28	35	48	45	56	49.88
2	10.00 - 11.00	26	28	29	42	45	47	44,52
3	16.00 - 17.00	23	25	26	37	40	42	39,69
4	20.00 - 21.00	29	32	28	47	51	45	47,73
5	23.00 - 24.00	33	32	31	53	51	50	51,49
6	01.00 - 02.00	33	25	30	53	40	48	47,20
7	04.00 - 05.00	25	45	42	40	72	68	60.07
Average vehicle speed								48,56

In Table 6 it can be seen that the lowest average vehicle speed at the study site during holidays also occurs at 16.00 - 17.00 WITA, which is 39.69 km/hour.This is in line with the results of a traffic volume survey where this hour is the hour with the highest traffic volume compared to other hours, resulting in lower vehicle speeds. This is in line with related research (Tamin, 2008).Speed and volume relationship where The basic relationship between speed and volume is that by increasing the traffic volume, the avera ge speed of the space will decrease until the critical density (maximum volume) is reached. After the critical density is reached, the average velocity of space and volume will decrease.The low speed during this hour is caused by the large number of motorists who visit the beach in the afternoon as well as places to relax around it, either bars or cafes. In addition, pedestrians heading to the beach also seem to increase and many walk right up to the road which causes high side barriers.While the highest average vehicle speed occurs at 04.00 - 05.00 WITA, which is 60.07 km/hour,this is in line with the results of a traffic volume survey where the lowest traffic volume also occurs at that hour and allows vehicles to go faster than at other hours. The highest speed at that hour is because at that hour around the research location which is a recreational area has not yet been operating so that one of the traffic side barriers is reduced and the speed achieved can be higher.

Traffic Density

Traffic density is obtained from the data processing of traffic volume and average speed of space. Details of traffic density calculations can be seen in Table 7.

Table 7. Traffic Density Calculation Results on Working Days

NO	TIME	Traffic Volume (veh/hour)	Average Speed Per Hour (km/h)	Vehicle Density (veh/km)
1	07.00 - 08.00	1011	43,44	23,27
2	10.00 - 11.00	1097	43.98	24.94
3	16.00 - 17.00	1422	42.37	33,56
4	20.00 - 21.00	669	50.95	13,13
5	23.00 - 24.00	658	51,49	12.78
6	01.00 - 02.00	796	49.88	15.96
7	04.00 - 05.00	214	63,29	3.38

In Table 7 it can be seen that the heaviest traffic density occurs at 16.00 - 17.00 WITA, traffic density has a very close relationship with traffic volume and vehicle speed. This is supported by research (Tamin, 2008) showing that the density will increase if the volume also increases. When the maximum volume is reached, the roadway capacity has been reached. After reaching this point the volume will decrease even though the density increases until congestion occurs. At that hour is the hour for tourists to surf on the beach and relax in bars and cafes so that this affects traffic volume and vehicle speed at that hour.

Table8. Traffic Density Calculation Results During Holidays

NO	TIME	Traffic Volume (veh/hour)	Average Speed Per Hour (km/h)	Vehicle Density (veh/km)
1	07.00 - 08.00	751	49.88	15.06
2	10.00 - 11.00	977	44,52	21.95
3	16.00 - 17.00	1637	39,69	43,60
4	20.00 - 21.00	819	47,73	17,16
2	23.00 - 24.00	618	51,49	12.00
3	01.00 - 02.00	821	47,20	17.40
4	04.00 - 05.00	380	60.07	6,33

In Table 8 it can be seen that the heaviest traffic density occurs at 16.00 - 17.00 WITA, traffic density has a very close relationship with traffic volume and vehicle speed. At that hour is the hour for tourists to surf on the beach so this affects the traffic volume and vehicle speed at that hour.

Traffic Noise Level

Traffic Noise Level Results Of Field Measurement Based On Kmlh Method

Calculation of traffic noise levels using the method set out in KepMenLH No. 48 of 1996 concerning Noise Level Quality Standards is carried out in a simple way with an ordinary SLM and the sound pressure level is measured dB (A) for 10 (ten) minutes for each measurement. Noise level readings are carried out every 5 (five) seconds so that 120 data are obtained. The results of calculating traffic noise levels at the two study locations can be seen in Tables 9 and 10.

Table 9. Noise Level Calculation Results During Weekdays

RECREATION AREA					
No	Measurement Time			Noise Intensity Level (dB)	
	Time Intervals (WITA)	Measurement Time 10 minutes (WITA)	Symbol	Day 1 (working day)	Ket
1	06.00 - 10.00	07.00 - 07.10	L1	86,83	Appendix 26
2	10.00 - 14.00	12.00 - 12.10	L2	87,74	Appendix 27
3	14.00 - 17.00	16.00 - 16.10	L3	89,68	Appendix 28
4	17.00 - 22.00	20.00 - 20.10	L4	82.53	Appendix 29
5	22.00 - 24.00	23.00 - 23.10	L5	86.98	Appendix 30
6	24.00 - 03.00	01.00 - 01.10	L6	84,61	Appendix 31
7	03.00 - 06.00	04.00 - 04.10	L7	76,73	Appendix 32
Noon			LS	81.35	Appendix 33
Night time			LM	80,19	Appendix 33
Day and Night time			NGO	70.02	Appendix 33

Table 9 shows that the highest 10-minute equivalent noise level (Leq) occurs in the afternoon at 16.00 - 16.10 WITA, which is 89.68 dB(A). This is due to human activities in the research location where tthe noise level shown in table 6in line with the relatively high traffic volume and traffic density as well as the low average speed on Jalan Berawa. Sso it can be concluded that the higher the number of motorized vehicles affects the level of noise intensity, or it can be said to be directly proportional between the number of vehicles and the noise level (Triwinarti, 2015). High density results in low speed and causes congestion which eventually collects many vehicles in the study area (high traffic volume). The traffic volume has an impact on the noise that occurs because it contributes to the noise generated from the exhaust sound, engine sound and the sound of tires rubbing against the road.

Table 10. Noise Level Calculation Results During Holidays

RECREATION AREA					
No	Measurement Time			Noise Intensity Level (dB)	
	Time Intervals (WITA)	Measurement Time 10 minutes (WITA)	Symbol	2nd day (holiday)	Ket
1	06.00 - 10.00	07.00 - 07.10	L1	79,76	Appendix 34
2	10.00 - 14.00	12.00 - 12.10	L2	81.73	Appendix 35
3	14.00 - 17.00	16.00 - 16.10	L3	87,16	Appendix 36
4	17.00 - 22.00	20.00 - 20.10	L4	88.02	Appendix 37
5	22.00 - 24.00	23.00 - 23.10	L5	89.32	Appendix 38
6	24.00 - 03.00	01.00 - 01.10	L6	85,84	Appendix 39
7	03.00 - 06.00	04.00 - 04.10	L7	75,24	Appendix 40
Noon			LS	79,41	Appendix 41
Night time			LM	82.01	Appendix 41
Day and Night time			NGO	72,11	Appendix 41

In Table10, it can be seen that the highest 10-minute equivalent noise level (Leq) occurs during the day at 23.00 – 23.10 WITA, which is 89.32 dB(A). This is due to human activity at the beach club which causes the sounds of music from those on Jalan Berawa, as well as the sound of firecrackers or fireworks being launched which increases the noise at that hour. This shows that the noise that occurs is dominantly generated by human activities around the research location such as bars, cafes, beach clubs, etc., not from traffic activity. This is in line with the results of a traffic volume survey at this time which is quite low compared to other hours.Supported by Ansusanto's research (2006) which states that reducing traffic speeds to 20 km/hour will reduce noise levels.

Prediction Of Traffic Noise Levels Based on The Cortn Method

Calculation of noise level predictions using the Calculation of Road Traffic Noise (CoRTN) method takes into account several influential factors such as vehicle volume, speed, gradient, pavement type, receiving distance and height, and the presence of damper buildings. Details can be seen in Tables 11 and 12.

Table 11. Calculation of Predicted Noise Levels on Weekdays

STAGE	DESCRIPTION	PARAMETER	DATABASE		NOISE LEVEL dB(A)
1	Segment Distribution	-	-		-
2	Basic noise level	- 1 hour traffic volume	1422	vehicle	73,73
		- Vehicle speed	75	kms/hour	
		- Percent of heavy vehicles	0		
		- Gradient	0		
	BASIC NOISE LEVEL				73,73
3	Correct Traffic characteristics, geometric and road surface types	- Percent of heavy vehicles	0.00	%	-3.66
		- Vehicle speed	42.37	kms/hour	
		- Gradient	1.5	%	0.45
		- Type of road surface	air conditioning		1.00
	NOISE LEVEL AT SOURCE				71.52
	Propagation	- The distance of the receiver to the sound source	100	m	-1.49
		- Recipient height	2,5	m	
		- Average height of propagation	0		0
		- Type of ground cover	0		0
		- Damper building height	0		0
		- The distance of the silencer building to the sound source	0		0
	Reflection	continuous wall			1
	Viewpoint	- North direction	0	degrees	0.00
		- Southbound	0	degrees	0.00
North direction noise level					70.03
South direction noise level					70.03
4	Combined noise level predictions for all segments	- North direction	70.03	dB(A)	73.04
		- Southbound	70.03	dB(A)	
PREDICTION NOISE LEVEL, L10 1 HOUR					73.04
CONVERSION OF 1 HOUR L10 TO 1 HOUR LEQ					-3
1 HOUR LEQ PREDICTION NOISE LEVEL					70.04

Information:

*The 1 hour traffic volume used is the highest traffic volume from 07.00 – 22.00 and 22.00 – 06.00, namely the traffic volume at 16.00 – 17.00, the speed and percent of heavy vehicles used follow the data for the highest 1 hour traffic volume .

Based on Table 11, it is found that the predicted traffic noise level that occurs on Jalan Berawa, to be precise at the research location, is calculated by the CoRTN method, which is 70.04 dB(A). Predicted traffic noise levels generated at the study site have exceeded the noise quality standard for recreational areas, namely 70 dB(A). The results of the traffic noise level that occurs are influenced by several parameters as shown in table 11, where if these parameters change, the resulting traffic noise value will also change. The parameters that change most often in this method are traffic volume and speed, so that the high traffic volume will also be directly proportional to the increased traffic noise generated. In accordance with the results of research conducted by Mediastika (2003) states that traffic noise is mainly the noise of motorbikes which is the largest supplier of traffic noise. This is also in accordance with the results of a study by the Department of Transport, UK London (1988) which states that the noise generated by motorbikes is usually higher than that of passenger vehicles.At the research location, from the traffic survey, the volume of traffic that occurred was high enough to cause high traffic noise, besides that the absence of dampers also resulted in unreduced traffic noise and eventually reached the surrounding residents. QNoise level can also be reduced by having a natural barrier. For natural barriers can reduce noise by 6 dBA (Krisindarto, 2006).

Table 12. Calculation of Predicted Noise Levels on Holidays

STAGE	DESCRIPTION	PARAMETER	DATABASE		NOISE LEVEL dB(A)
1	Segment Distribution	-	-		-
2	Basic noise level	- 1 hour traffic volume	1637	vehicle	74,34
		- Vehicle speed	75	kms/hour	
		- Percent of heavy vehicles	0		
		- Gradient	0		
	BASIC NOISE LEVEL				74,34
3	Correct	- Percent of heavy vehicles	0.00	%	-3.95
	Traffic characteristics, geometric and road surface types	- Vehicle speed	39,69	kms/hour	
		- Gradient	1.5	%	0.45
		- Type of road surface	air conditioning		1.00
SOURCE	NOISE LEVEL AT				71,84
	Propagation	- The distance of the receiver to the sound source	100	m	-1.49
		- Recipient height	2,5	m	
		- Average height of propagation	0		0
		- Type of ground cover	0		0
		- Damper building height	0		0
		- The distance of the silencer building to the sound source	0		0
	Reflection	continuous wall			1
	Viewpoint	- North direction	0	degrees	0.00
		- Southbound	0	degrees	0.00
North direction noise level					70.35
South direction noise level					70.35
4	Combined noise level predictions for all segments	- North direction - Southbound	70.35 70.35	dB(A) dB(A)	73,13
PREDICTION NOISE LEVEL, L10 1 HOUR					73,36
CONVERSION OF 1 HOUR L10 TO 1 HOUR LEQ					-3
1 HOUR LEQ PREDICTION NOISE LEVEL					70,36

Information:
* The 1 hour traffic volume used is the highest traffic volume from 07.00 – 22.00 and 22.00 – 05.00, namely the traffic volume at 16.00 – 17.00, the speed and percent of heavy vehicles used follow the data for the highest 1 hour traffic volume .

Based on Table 12, it is found that the predicted traffic noise level that occurs on Jalan Berawa, to be precise in one of the residential areas near Atlas Beach Fest which is calculated by the CoRTN method is 70.36 dB(A). Predicted traffic noise levels generated at the study site have exceeded the noise quality standard for recreational areas, namely 70 dB(A). In line with the noise results using the CoRTN method on weekdays, table 11, the high traffic volume will also be directly proportional to the increased traffic noise generated. At the research location, from a traffic survey on holidays, the traffic volume that occurs is quite high, causing high traffic noise. Besides that, the absence of silencer buildings also results in unreduced traffic noise and eventually reaches the surrounding residents. What distinguishes the level of traffic noise on weekdays and holidays calculated using the CoRTN method is the level of traffic volume. Overall, the level of traffic volume is higher on holidays, so that the traffic noise that occurs is also higher on holidays.

Noise Level Reduce Strategy

Noise control in general must refer to sound arrangement which according to Satwiiko (2004) will involve four elements, namely sound source, media, sound reception and sound waves. Noise reduction according to Egan, MD, (1998), noise reduction can be carried out in three aspects, namely the source, media and receiver. There are several ways to control noise, namely by reducing the vibration of the noise source means reducing the level of noise emitted by the source. With the media aspect covering the source of the sound, attenuating noise with sound absorbing or sound absorbing materials and with the receiving aspect blocking the propagation of sound, protecting the space where humans or other creatures receive sound and protecting the ear from sound. According to Zikri (2015) said efforts to deal with noise can be in the form of: Countermeasures for direct noise to the source of noise, countermeasures can be carried out in buildings, namely by making a barrier in the form of a higher fence or wall so that noise can survive and be reflected. Countermeasures by using green belts, namely by planting trees around residential areas. Trees can muffle sound by absorbing sound waves by leaves, branches and twigs. The most effective plant species for muffling sound are those with thick crowns with shady leaves. Plant leaves can absorb noise up to 95%. By planting various types of plants with various strata consisting of trees and shrubs or 10 shrubs that are quite dense and tall will be able to reduce noise. namely by making a barrier in the form of a higher fence or wall so that noise can persist and be reflected. Countermeasures by using green belts, namely by planting trees around residential areas. Trees can muffle sound by absorbing sound waves by leaves, branches and twigs. The most effective plant species for muffling sound are those with thick crowns with shady leaves. Plant leaves can absorb noise up to 95%. By planting various types of plants with various strata consisting of trees and shrubs or 10 shrubs that are quite dense and tall will be able to reduce noise. namely by making a barrier in the form of a higher fence or wall so that noise can persist and be reflected. Countermeasures by using green belts, namely by planting trees around residential areas. Trees can muffle sound by absorbing sound waves by leaves, branches and twigs. The most effective plant species for muffling sound are those with thick crowns with shady leaves. Plant leaves can absorb noise up to 95%. By planting various types of plants with various strata consisting of trees and shrubs or 10 shrubs that are quite dense and tall will be able to reduce noise. namely by planting trees around residential areas. Trees can muffle sound by absorbing sound waves by leaves, branches and twigs. The most effective plant species for muffling sound are those with thick crowns with shady leaves. Plant leaves can absorb noise up to 95%. By planting various types of plants with various strata consisting of trees and shrubs or 10 shrubs that are quite dense and tall will be able to reduce noise. namely by planting trees around residential areas. Trees can muffle sound by absorbing sound waves by leaves, branches and twigs. The most effective plant species for muffling sound are those with thick crowns with shady leaves. Plant leaves can absorb noise up to 95%. By planting various types of plants with various strata consisting of trees and shrubs or 10 shrubs that are quite dense and tall will be able to reduce noise.

In addition, based on the Forum Group Dissusion (FGD) with several Tibubeneng Village staff which was held at the Tibubeng Village Office on Friday, 10 February 2023, it was concluded that the strategy that needs to be achieved to reduce noise levels on Jalan Berawa is to regulate the hours of operation for recreation areas so that there is no disturbing the local community.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

Based on the results of the study it can be concludedthat: The total noise level (Leq day and night) at the study site on weekdays was 70.04 dB(A) while on holidays the intensity of the total noise level (Leq day and night) was 72.11 dB(A). So it can be concluded that the noise level due to human activity at the study site on weekdays and holidays has exceeded the noise quality standards listed in KMLH no 48 of 1996 concerning Noise Level Standards, where the noise level in recreational areas is 70 dB(A) .

The level of traffic noise at the research locationcalculated using the CoRTN method is 70.04 dB(A) on weekdays while on holidays it is 70.36 dB(A).So it can be concluded that the noise level due to traffic activities at the research location on weekdays and holidays has exceeded the noise quality standards listed in KMLH no 48 of 1996 concerning Noise Level Standards, where the noise level in recreational areas is 70 dB(A).

The strategies used to reduce noise levels are divided based on the source of the noise, namely strategies for noise originating from human activities and strategies for noise originating from traffic activities. The strategy for noise sources from human activities is to regulate the operating hours of recreational areas, arrange the implementation of activities that cause higher noise levels such as launching fireworks, adding silencers and planting trees in recreation areas. While the strategy for noise sources from traffic activities is to carry out traffic engineering, regulate traffic speed and add noise reduction from natural materials such as planting trees.

SUGGESTION

From the results of this study, the researcher recommends: From the results of the analysis of traffic characteristics at the study site, it was found that the highest traffic volume, the lowest speed and the highest density so that it is better to carry out traffic engineering management in these hours so as to reduce the generated traffic noise. Another thing that can be done is by the use of barriers such as by making living barriers / trees.

From the results of the analysis of traffic noise levels based on the results of field measurements and CoRTN predictions, it was found that the traffic noise level at the study site had exceeded the noise quality standards, so it was suggested that recreational areas at the study location be equipped with noise dampening rooms while still paying attention to indoor air conditioning system so that the sounds of music are not heard outside the recreation area.

From the results of modeling traffic noise levels, traffic characteristics have a significant influence on the noise that occurs, so it is suggested to the Denpasar City Government to pay more attention to land use by placing recreation areas not close to residential areas.

A study that has been carried out at the research location, the conclusions drawn certainly have implications for recreational activities and traffic activities. In this regard, the implications based on the results of the research above are that human activities and traffic activities contribute greatly to the noise level that occurs at the study site, therefore it is necessary to make efforts to reduce noise levels so as not to disturb the surrounding population. These efforts are: Conduct traffic engineering so as to reduce density levels which will also have an impact on reducing noise levels. Adding noise dampers such as planting trees that can reduce noise, one of the trees that can be used is an acacia tree.Adding noise dampers in recreational locations so that the sounds generated can be restrained and do not come out of recreational locations. In the long term, the government must pay more attention to the regulation of land use according to its designation.

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