

Urban Noise Pollution Due to Transportation: A Case Study in Rajkot City

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Abstract— Traffic related noise pollution accounts for nearly two-third of the total noise pollution in an urban area. Vehicular traffic noise problem is contributed by various kinds of vehicles like heavy-medium trucks/buses, automobiles and two-three wheelers. Traffic noise on existing urban roadways lowers the quality of life and property values of persons residing near urban corridors. The main objective of report is to evaluate the noise pollution in the Rajkot city and its effect on surroundings. In this report noise pollution is measured in different zones like commercial, residential etc. Comparison of data with standard CPCB noise level.

Key words: Noise, Traffic, Transportation, Pollution

I. INTRODUCTION

The word noise which is derived from the Latin word 'nausea', has been defined in different ways. In law, noise may be defined as an excessive, offensive, tent or startling sound. In short, the best definition of noise is 'sound which is undesirable-by the recipient'. This subjective definition of noise differs from the scientific description of noise. An objective definition of noise coupled with measure and assessment techniques is yet to be drawn up by the law.

A legally significant objective definition of noise is a complex and difficult to discern, for noise is not purely a matter of acoustics but of psychology. Subjective factors such as mental attitude, environment, time and place, etc., are important in the determination of actionable noise, which differ and are hard to quantify. The law cannot take into account every unwanted noise. On the other hand, any sound, which becomes excessive, unnecessary or unreasonable, has to be put under regulation in order to shield public against unbearable and harmful noise or for its cessation. Scientific methods to that extent may be useful in determining situations where noise steps out from its background and becomes actionable.

Noise becomes a pollutant when it contaminates the environment, which becomes a nuisance and affects the health of persons their activities and mental abilities. In other words, noise pollution is unwanted sound which is dumped into the atmosphere without regarding to the adverse effects it may be having

The effects of noise pollution are multifaceted and interrelated. Noise pollution has ill effects not only on the human beings but also on other living and non- Living things, which will be discussed broadly as follows.-

1) Effects of noise interference with peoples life.

It may be classified under the following topics:

- 1) Repeated interference with sleep of Human beings.
- 2) Effect on hearing or Deafness
- 3) Effect on communication or speech interference.
- 4) Mental or Physiological Effects

- 5) Effects on physical health and working efficiency or psychological.
- 2) Effects on other animals and other living things.
- 3) Effects on Non-Living things.

Sr. No.	Location	Acceptable outdoor noise level in residential area dB(A)
1	Rural	25-30
2	Suburban	30-40
3	Residential	35-45
4	Urban (residential & business)	40-50
5	City	45-50
6	Industrial area	50-60

Table 1: Noise level under different situations

Sr. No	Area Category	Limit in Db	
		Day Time	Night Time
1	Industrial	75	70
2	Commercial	65	55
3	Residential	55	45
4	Silence area	50	40

Table 2: The Noise Permissible Limits For Different Areas, As Per Indian Standards

II. OBJECTIVE

To analyse noise pollution at different location of Rajkot city.

III. SCOPE

To achieve the objective of the thesis, scope of the study is presented as follows:

- 1) Study is carried out to determine the scale of problem of traffic noise by conducting questionnaire survey.
- 2) Collection of traffic noise and atmospheric data.
- 3) Generation of traffic prediction model.
- 4) Determination of different parameter affecting traffic noise.

IV. METHODOLOGY

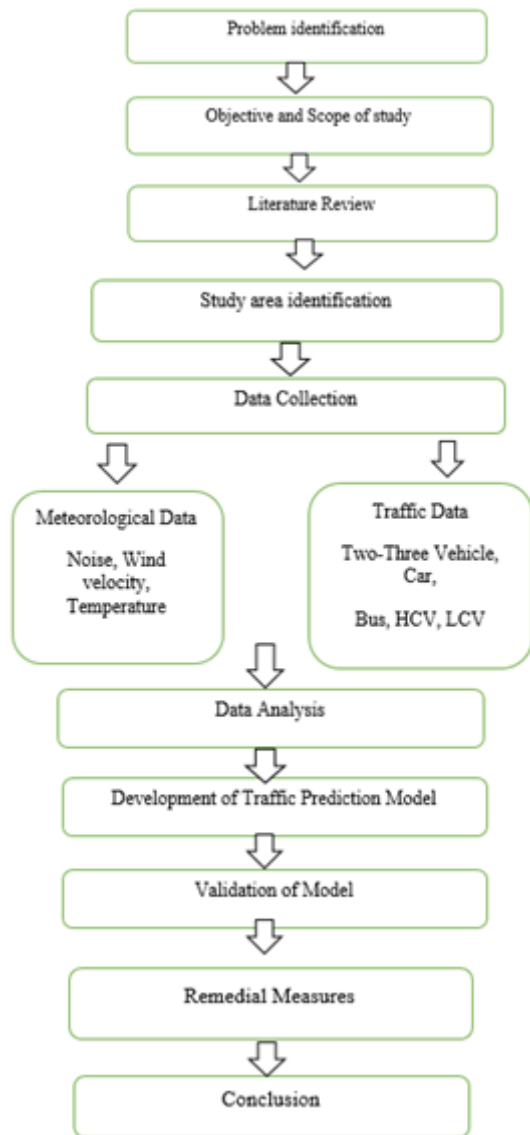


Fig. 1: Methodology

V. STUDY AREA

Rajkot is an important urban centre, centrally located in Saurashtra region, in the State of Gujarat. Located at latitude 20° 43' North and Longitude 70° 51' East the city is the centre for social, cultural, commercial, educational, political and economic activities of Saurashtra region. Transportation is the backbone to the development of urban areas. As of the 2011 India census, Rajkot recorded a total population of 1,286,995.

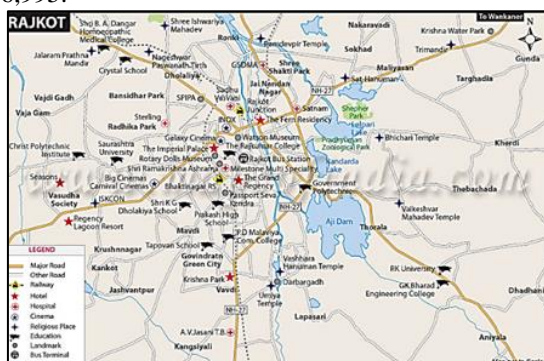


Fig. 2: Rajkot city map

VI. SELECTED LOCATION:

Selected locations for noise pollution study as follows

1) *Trikon baug*

It is a commercial centre. Located at centre of the city.

2) *Bhaktinagar station plot*

It is an industrial centre. Located near Bhaktinagar railway station.

3) *Laxmiwadi*

It is a residential area. Located near central bus station of Rajkot city.

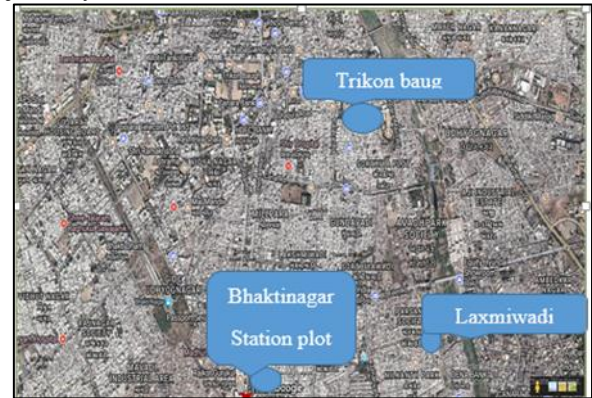


Fig. 3: BRTS corridor in Rajkot

VII. DATA COLLECTION

A. Questioner Survey:

In order to know the opinion of the citizens from the area about how the noise levels have been affecting their daily life, interview was carried out at each site by questionnaire survey of persons on the periphery of road doing business and residents residing nearby.

Rajkot city is by all accounts developing at speedier rate and with it develops the quantity of vehicles, capacities, number of roads, extension of town, populace and so on which may prompt the expansion in noise sources. the result of 150 opinion form.

B. Collection of Traffic Data

For the collection of traffic data classified volume count and speed measurement are carried out for the time period of 9:00AM to 12:00PM and 5:00P.M to 8:00P.M. on both side of the road. Volume count and speed measurement are carried out by videography. Vehicles are classified into five categories that are are Two wheelers, Three wheelers, Car and Bus, Truck (LCV and HCV). Average speed of all vehicles is calculated.



Fig. 4: Digital thermo-anemometer

C. Collection of Atmospheric Data:

For the collection of atmospheric data the wind velocity and atmospheric temperature is measured at the time of traffic data measurement. Digital thermo- Anemometer is used for the measurement of the atmospheric temperature and wind velocity.

D. Collection of Noise Data:

For traffic noise problems, it is useful to know the equivalent continuous sound level Leq , Such information can be obtained using a sound level meter. Noise level are recorded during the traffic data measurement. Noise data is recorded for 6 hours at each location and both the side of the road and at an interval of 5 minutes

1) Sound level meter:

A sound level meter is used for acoustic (sound that travels through air) measurements. It is commonly a hand-held instrument with a microphone. The diaphragm of the microphone responds to changes in air pressure caused by sound waves. That is why the instrument is sometimes referred to as a Sound Pressure Level (SPL) Meter. This movement of the diaphragm, i.e. the sound pressure deviation, is converted into an electrical signal.



Fig. 5: Sound level meter

2) Classified volume count (CVC) survey:

This survey is conducted to understand the traffic characteristics in term of average daily traffic, traffic composition, peak hour traffic and directional split at individual survey locations. This survey is carried out result for many types of Highways projects to understand the variety of vehicles that passes.

There is variety of vehicles are in existence in urban areas of India. There are major two types of transport vehicles visible on Indian roads which are

- 1) Motorized vehicles
- 2) Non-motorized vehicles

E. Data Analysis

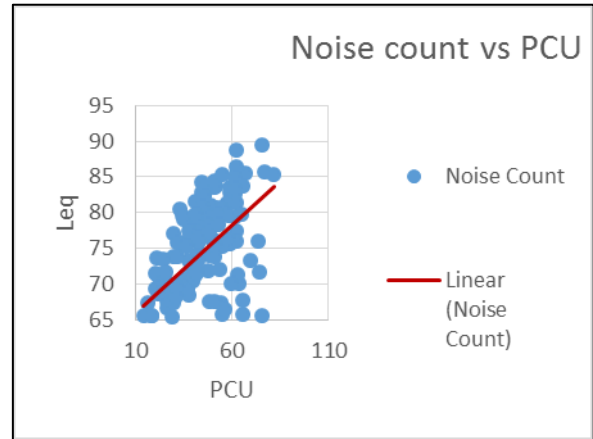


Fig. 6: Leq vs PCU at Laxmiwadi

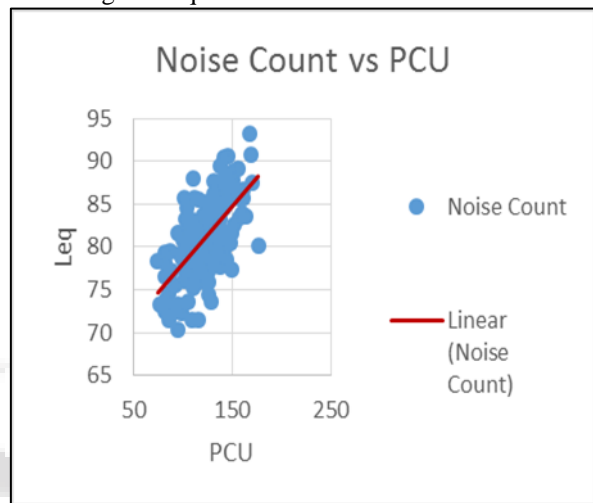


Fig. 7: Leq vs PCU at Bhaktinagar station plot

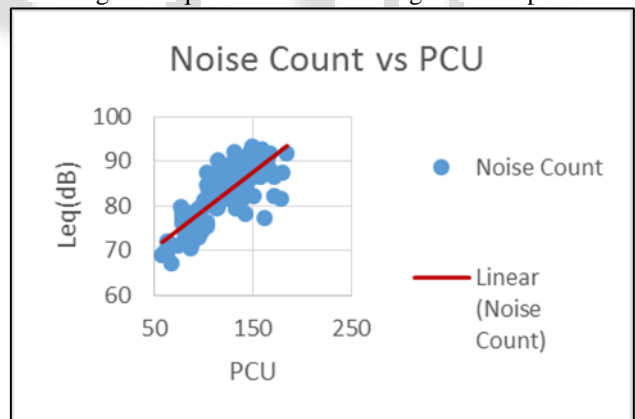


Fig. 8: Leq vs PCU at Trikon baug

VIII. CONCLUSION

The noise level at all three locations under study have exceeded the acceptable limit as laid down by Central Pollution Control Board. Therefore suitable control measures need to be adopted in the city before it is too late. Higher the volume of traffic, higher are the value of the traffic noise parameters. Heavy loaded vehicles, tempo, auto-riksha, trolley, chhakdo riksha are main reason of highly intolerable noise level. Road side trees and road divider with shrubs considerably reduce noise pollution.

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