



Monitoring Environmental Noise Pollution in X8 Building (International Student Dormitory) Wuhan University of Technology

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Introduction

Sound is an important thing our lives such as hearing the birds chirp and the sound of a smoke alarm is a wonderful thing, but the noise is usually referred to unpleasant or unwanted sounds. The industrialization and urbanization have made the world full noise as it is called as noise pollution and a serious environmental issue. Noises like an airplane flying over, train passing through living houses, honking cars, loud music, construction and a barking dog etc. are considered as noise pollution. According to the World Health Organization levels of noise pollution in some cities present danger and are seriously harming human health and activity. Noise pollution can cause several health conditions the two most common among them being hearing loss and tinnitus. Noise pollution and its effect on human health has got great concern specially in modern cities and welfare for this issue is recently considered as an important and vital issue to be solved. Scientists and interested agencies all over the world, such as World Health Organization (WHO) trying to conduct more researches concerning assessment of its levels and harmful effects [1-4]. Levels of environmental noise pollution increase rapidly with the progress of years due to the rapid increase in human activities such as transportation, industrialization, and urbanization [5,6]. Other researches have been conducted in several cities of the world to study the bad effects of environmental noise pollution on the human's health, comfort, and welfare [7-9]. Recently small researches are being conducted for living areas and trying to overcome the solutions. More deep researches are required in every living area. This study was conducted to assess the noise pollution for the International student dormitory. Study was conducted with proper instrument.

So, the most typical reason for measuring noise pollution was in response to a specific nuisance issue, relating to traffic and others near to a residential area. The second reason was to conduct noise monitoring study and to provide data to know how harmful it is to the students and report was sent to teachers to control the conditions.

Study Area

X8 Building is international student dormitory, Students of around the world are living here. This building has 8 floors and almost around 115 international students are living in the building. Within the x8 building, some staggering statistics exist for people affected by various forms of noise. Students/people are exposed to environmental noise causing annoyance and disturbance of sleep. The majority students living in x8 building are exposed today and night-time noise levels exceeding.

Sources of Noise Pollution in X8 Building

Sources of noise pollution in x8 building are numerous but the major source is traffic and construction sites. In particular, predicting noise from construction sites but lists a number of factors which might affect the acceptability of noise and vibration from construction sites. Where construction work continues day and night.

Research Methodology

Equipment

The equipment for data collection was used, namely, Sound level meter (Figure 1). The specification of this equipment (TES

1350A, RANGE : LOW 35-100dB, High 65-130dB, Response: S (slow response for continues stable noise) and F (Fast response for rapid changing noise) Max hold: Maximent , Function : A (A: weight of human feelings), C (C: Machine reading), CAL 94dB (calibration), Usage : RH <90% , 0-40 °C \.



Figure 1: Sound level meter equipment.

Method

The following methods were used for the data collection

- A. Identifying floors with a building and selecting noise measurement and modeled
- B. Receiver data and locations.
- C. Analysis and calculation of the data.
- D. Noise prediction methods.

Table 2: Analysis of noise level.

Time/Day	Location	Weather	Stander Deviation	Equivalent sound level results			Floors	Purpose
				L10	L50	L90		
(4:00- 5:00)	X8 Building	29 °C	1.579	69.796	23.640	15.098	3 rd , 6 th & 8 th	For Report

Data processing

The data processing was followed as monitoring equivalent continuous sound level and Standard deviation. Data collection and processing methods were as follow.

- A. Rearrange that 100 data from the high to low
- B. The 10th data as L10, 50th data L50, 90th data L90.
- C. L10 : Above 90% of data is 69.79633333 the average peak noise

Criteria and degree of the noise impact

According to Noise criterion (Engineering ToolBox, (2004). NC), Noise pollution has different levels (Table 1)

Table 1: Criteria and degree of the noise impact.

Amount by which Noise Criterion is Exceeded dB(A)	Impact
0	None
0 to 3	Slight
3 to 10	Moderate
10 and above	Severe

Calculation

Before starting and calculating equivalent continuous sound level the group was calculated the noise standard deviation according to standard deviation formula. Based to that the below is the standard deviation of study area noise pollution.

$$\sigma = \sqrt{\frac{1}{N-1} \sum_{i=1}^N (L_i - \bar{L})^2}$$

Where: L_i= the number of populations

L = arithmetical average

N= Data size

Results and Discussion

Analysis of data

The noise levels were calculated (Table 2), assessment was done because of noise impacts associated with the construction and traffic around the study area. Results shows that noise levels are above the criteria (Table 1), the degree of the impact can be summarized below in Table 2 (based on Institute of Environmental Management and Assessment and Institute of Acoustics Consultation Draft Guidelines for Noise Impacts Assessment - April 2002).

D. L50 : Above 50% of data is 23.64033333 the average noise

E. L90 : Above 10% of data is 15.09833333 the initial or low noise

Traffic noise pollution

Traffic noise around study area is becoming a bigger issue with the rapid expansion of infrastructure in roadside. Some of the most intrusive noises are associated with major roads during rush hour. However, for any environmental noise survey, traffic noise

is generally less disturbing than industrial or leisure noise as it is typically traffic which defines the background noise for assessing noise pollution.

After calculation of standard deviation according to the formula, based to that, the following results are calculated and it shows that Noise level is exceeding the limits (Figures 2 & 3).

The standard deviation is 1.579

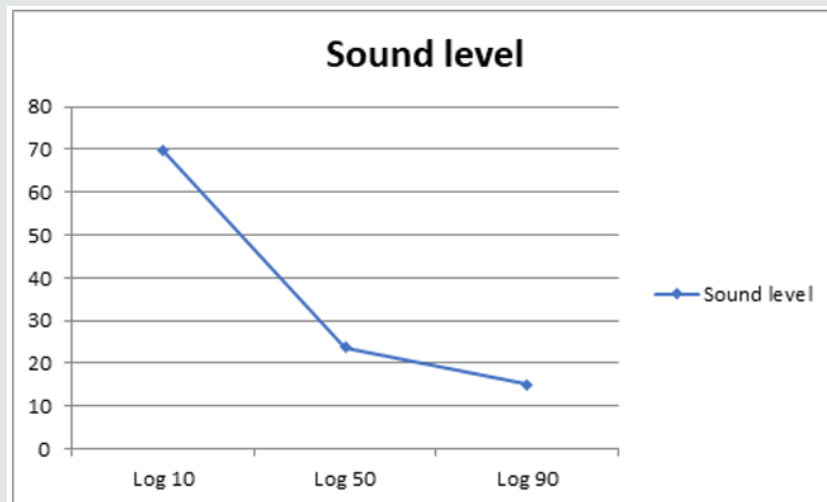


Figure 2: Equivalent of sound level of 10th, 50th and 90th.

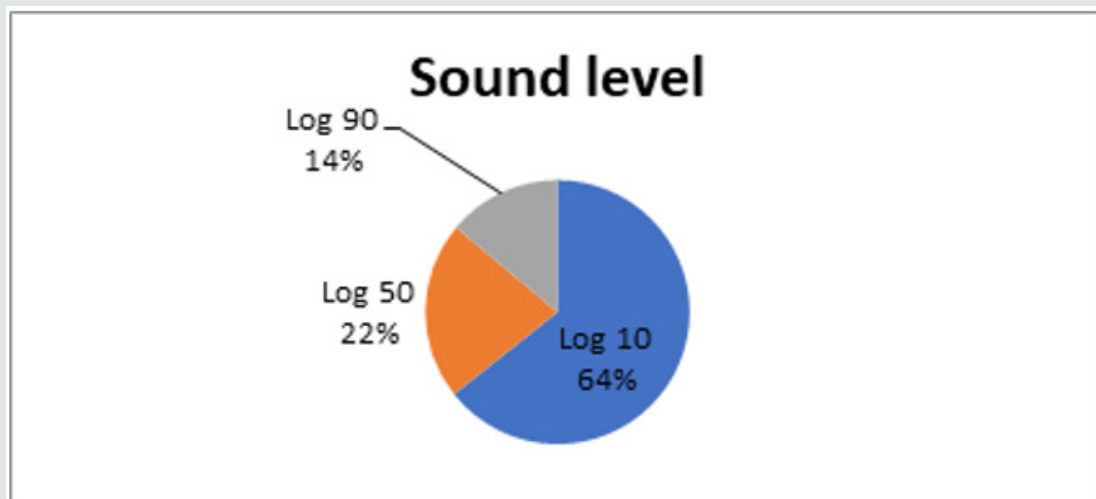


Figure 3: Sound level in different equivalent.

$$L_{eq} = 10 \lg \left(\frac{1}{100} \sum_{i=1}^{100} 10^{\frac{L_i}{10}} \right)$$

Equivalent of 10th sound level is 69.796

$$L_{eq} = 10 \lg \left(\frac{1}{100} \sum_{i=1}^{100} 10^{\frac{L_i}{10}} \right)$$

Equivalent of 50th sound level is 23.607

$$L_{eq} = 10 \lg \left(\frac{1}{100} \sum_{i=1}^{100} 10^{\frac{L_i}{10}} \right)$$

Equivalent of 90th sound level is 15.098

It is also predicted that increase of traffic volume is not necessarily directly correlate to an increase in noise pollution. However, when the road is so busy that traffic begins to slow-down or even stop consequently noise levels will typically go down and vary less [10].

Conclusion and Recommendation

International student’s dormitory named as x8 dormitory was analyzed for noise pollution. The equipment which was used to measure noise pollution was noise meter. Three floors were selected for sampling, (i.e 8th, 6th and 3rd.) According to the above results within a building, the 8th floor is more affected by traffic and construction noise. The group members of this survey

recommended that because of the building is found adjacent to the roadside; the traffic noise is very high especially in the night time, so it affects the residents' life. The building should surround a high wall or something that should stop the traffic noise.

Supplementary Data

Appendix

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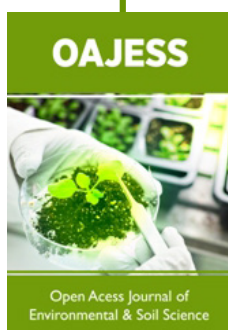


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