Effect of Road Width on Driver Behaviour Studied Using Acceleration Noise-A Case Study

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1. PROBLEM STATEMENT

In addition to loudness, the health impacts of noise depend on duration, predictability, pitch and context (Robertson et al. 1998). Sudden or sharp noise peaks can be as or more annoying than overall noise levels, especially at night when they disturb sleep. Therefore traffic noise impacts should be measured not just in terms of overall levels (dB(A)Leq), but also peaks (dB(A)Lmax). The frequency, or pitch, should also be measured [1].

• A 10 decibel (dB) decrease is perceived as a halving of noise. A 10 dB increase corresponds to a doubling of noise.

• For a single vehicle, a 1dB change in loudness is normally only perceptible under laboratory conditions. But on a busy road, with a mix of traffic, a reduction of 1dB can be noticeable because it signals a reduction in the number of disturbing noise events.

• A 3 dB change in loudness is very noticeable.

• The World Health Organisation has found that during the day people start to get moderately annoyed by noise at 50dB (A) Leq and seriously at 55 dB(A) Leq (den Boer and Schroten 2007).

• There is a measureable link between traffic noise and speed

2. LITERATURE REVIEW

Phan Hai Yen Thi et al. (2010) established dose-response relationships between Leq (day evening night noise levels) and the percentage of highly annoyed respondents of Hanoi and Ho Chi Minh city. It was observed that the Hanoi respondents seemed to be more annoyed by road traffic noise than Ho Chi Minh City respondents. Compared to annoyance responses of European people, Vietnamese (Hanoi and Ho Chi Minh City) were less annoyed by road traffic noise by about 5 dB.

Jakovljevic Branko et al. (2009) determined principal factors for high noise annoyance in an adult urban population and to assess their predictive value. A cross-sectional study was performed on 3097 adult residents of a downtown municipality in Belgrade (1217 men and 1880 women), aged 18–96 years. Equivalent noise levels [Leq (dBA)] were measured during day,
evening and night at all streets of the municipality. Noise annoyance was estimated using self-reported annoyance scale. Noise annoyance showed strong correlation with noise levels, personal characteristics and some housing conditions. Logistic regression model identified increased risk for a high level of noise annoyance with regard to orientation of living room/bedroom toward the street, duration of stay at apartment during the day, noise sensitivity and night time road-traffic noise level.

- Lam Kin-Che et al. (2009)[2] conducted a study in Hong Kong to appreciate mixed transportation noise annoyance response. The results of the study showed that annoyance was largely determined by noise disturbance and perceived noisiness. Personal noise sensitivity, attitudes towards different means of transport and perceived quality of the living environment were the secondary contributing factors[2].

- Paunović Katarina et al. (2009) conducted a study to assess the predictive value of various factors on noise annoyance in noisy and quiet urban streets. Equivalent noise levels \( L_{eq}(\text{dBA}) \) were measured during day, evening and night times at all of the streets of a central Belgrade municipality. Based on 24-hour noise levels, the streets were denoted as noisy (24-hour \( L_{eq} \) over 65 dBA), or quiet (24-hour \( L_{eq} \) under 55 dBA). A cross-sectional study was performed on 1954 adult residents (768 men and 1186 women), aged 18–80 years. Noise annoyance was estimated using a self-report five-graded scale. In noisy streets, the relevant predictors of high annoyance were the orientation of living room/bedroom toward the street, noise annoyance at workplace, and noise sensitivity. Significant acoustical factors for high noise annoyance as reported were as under: Night time noise level and night time heavy traffic. Day-evening-night noise level \( L_{den} \).

In quiet streets, the significant predictors were noise sensitivity[3].

- Ryu Jong Kwan et al. (2011) conducted laboratory experiments to investigate the influence of noise sensitivity on the annoyance caused by indoor residential noises and outdoor traffic noise. The results revealed that noise sensitivity significantly influenced the annoyance level caused by both indoor and outdoor noise.

- Li H.N. et al. (2010) in his research work identified annoyance as the most important psychological impact arising from noise. Besides socioeconomic status, residing neighborhood characteristics such as greenery had been shown to be able to reduce noise annoyance. The results indicated that greenery perception exerts considerable influence on noise annoyance rated at home. Wetland parks and garden parks were shown to be able to reduce noise annoyance to a greater degree than grassy hills.

3. OBJECTIVES

- Calculate the speeding up commotion by utilizing accelerometer gadget at that specific intersection[4].
- The qualities are determined in Decibels (db(A)).
- To know the Maximum noise generated at the intersection which effects the driver behaviour[7].
- To determine the maximum and minimum noise generated at the intersection at different traffic flow conditions[7].
- To Modify the road geometry so that the acceleration noise will be reduced to minimize the Accident rates[5]

4. METHODOLOGY

- Selection of study Area
- Performing the Volume count
- Determining the queue length
- Determination of acceleration noise
- Determination of Acceleration and deceleration rate
- Results and discussion

5. STUDY AREA

5.1. Benz’s circle

The area of study considered for traffic congestion and speed delays at Benz circle one of the rotary intersection. This area is considered as it serves and important intersection for the local as well highway traffic. As the importance of junction for networking increases, all other phenomenon like traffic congestion which lead to congestion, speed delays, longer trip timing etc Based on the fact that demand for the traffic flow is increased then that of the supplied capacity of lanes there is a need for the
upcoming of a solution to meet the demand in the possible best way. By considering various factors like the limited area so extension cannot be taken into account, based on the commercial construction near the intersection and various other factors construction of flyover is proposed as best alternative as a counter measure for traffic congestion. In the mean-time traffic is diverted to other alternative routes, as the construction activities have to be done. So during the construction period traffic congestion will be increased much more than the present.

At the present situation there is a lot of traffic congestion at Benz circle due to the following factors:

Due to the construction activities of flyover. The process of digging and excavation is taking place.

The capacity of intersection is decreased due to the decrease in lane width.

Diversion of traffic is not up to the level and hence the increase in traffic with decrease of capacity leads to the traffic congestion [3].

5.2. Traffic Volume Studies
The manual count method is usually used to conduct an intersection count. A single observer can complete an intersection count only in very light traffic conditions. The intersection count classification scheme must be understood by all observers before the count can begin. Each intersection has 12 possible movements.

From the above survey it was found that during the following hours namely from 8 A.M. to 9 A.M. from 12 to 1 P.M. and from 5 P.M. to 6 P.M. the flow is more than the other period of times due to various activities of a day take place particularly at that hours so by which they got the name peak hours.

From the above survey it is clear that the traffic is increased during the weekends as Vijayawada is considered as the most residential colleges zone and during these days traffic will be much effected due to outing of the students and transportation means demand will be increased [3].

5.3. Speed studies
The separation between the Ntr circle and Benz circle is roughly in one kilometer. In the event that the vehicle is gone at a structure speed of 30kmph it requires a normal investment of 2 minutes to 3 minutes to venture to an every part of the separation, yet at the current the circumstance it has a taken at least at 10 min to venture to every part of the separation is because of increment of the traffic [3].

5.4. Determination of Acceleration Noise
A sound level meter is used to measure the acceleration noise.

Calculate the acceleration noise by using sound level meter at the particular junction by keeping the instrument at every 10m interval on either side of the road for 100m stretch of an Intersection.
The present most extreme decibel esteem at that convergence is 64.59. But really as indicated by the code book traffic of commotion the executives volume-2 the decibel esteem ought to be underneath 50. So the driver mental conditions will change because of this crash of vehicles in will happens. The present street width is 10.5mts so we need to put the accelerometer at each 1mts interim on each side until the decibel esteem will reach beneath 50 decibel.

In order to reduce the noise Spot the accelerometer gadget at various focuses i.e in each 0.5mts from the edge of the street [4].

6. RESULTS AND DISCUSSION

Demonstrates the hypothetical upper and lower limits of the produced commotion (sound power level (dB(A)), ) and its spread (sound weight level (dB(A)), ) considering separation from the source position in each rush hour gridlock condition. Having evaluated the clamor transmitted by running vehicles in various rush hour gridlock conditions, ( ), the commotion level at a collector thinking about the distance, ( ), is determined dependent on . The hypothetical connection between speed range sand sound weight level in various rush hour gridlock conditions were contrasted with one another thinking about a similar number of vehicles (1600 vehicles) in every situation. By investigating one can essentially discover that the vehicles in free stream condition have transmitted sound weight level higher extents contrasted with the other traffic conditions.

The greatest and least estimations of decibels are taken from accelerometer at that crossing point in daytime and evening time. At intersection in the morning time the decibel value exceeds 64 the driver behaviour will be change.

7. CONCLUSION

• The fast urbanization all through the world expands the clamor contamination, particularly those actuated by street traffic in an urban areas. In Ecological commotion presentation is related with the inconvenience, rest unsettling influence, intellectual capacity in schoolchildren, and wellbeing impacts, particularly in cardio vascular conditions.
• So as to handle these issues brought about by street traffic, distinctive traffic and transportation approaches may be connected that would create diverse traffic conditions. Thus, the impacts of various traffic conditions on urban street traffic clamor have been hypothetically thought about in this paper.
• The territory which we are chose has a street width of 10.5m. So the quickening clamor at that intersection is max 64.59db(A).
• The speeding up which we found is off blended traffic so it is truly has horrable to an populate who are living in and around it. Because of this driver conduct will likewise change which may result to the crash of mishaps.
• The present road width at the intersection is 10.5m and the maximum decibel value is 64.59, if road width is extended for 1m at that the particular area the decibel value will be below 50
• According to code book ,50 decibel value is safe for diver.So the road width should be extended for 1m if possible .
• Since Benzs Circle is a commercial area hence it is not possible to increase the road width. So to stay away from the mishaps we need to give fly-over to it since street expansion is preposterous around there and to redirect the thruway traffic, the speeding up the clamor will diminish to underneath 50db(A).

8. REFERENCES


