

Noise Level Survey inside the Inter Provincial Buses in Sri Lanka

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ABSTRACT

A detailed study was carried out to determine the noise level inside inter province buses in Sri Lanka. Special attention was given to determine the noise level with the operation of sound system installed in the buses. Passengers, drivers and conductors were interviewed with simple questionnaire to obtain the perception of the passengers about the existing noise level inside the buses during traveling.

Several noise level descriptors including L_{Aeq} , L_{AFMax} , $L_{AF Min}$, $L_{AF 90}$, $L_{AF 50}$ and L_{AF10} were used and measured simultaneously during the noise level survey. Noise levels were measured in the front and back of a buses for time period of not less than 5 min.

Noise level and questioner survey was carried out in 152 buses. Buses were selected from 6 bus routes including Colombo- Kandy , Kandy –Anuradapura, Anuradapura-Colombo, Colombo- Matara , Matara- Abilipitiya, and Ebilipitiya –Colombo. The same 152 buses were considered for the questionnaire survey and 991 number of respondents responded for the questionnaire.

The results of the survey revealed that inside noise level of more than 11% of buses exceed 90 dB(A) and more than 50 % buses exceeds 85 dB(A) .More than 55% passengers were unsatisfied about the sound system installed in the buses and more than 92% indicated the need of legislation to control the sound level inside buses.

1. INTRODUCTION

Noise level survey inside inter province buses was carried out with the collaboration of National Transport Commission (NTS). The main objective of the study was to collect the existing noise level data and perception of passengers in order to stipulate suitable legislation to control noise levels inside inter province buses. More than 150 buses and 6 main bus routes were selected for the study.

Noise level measurements were carried out at the front and the back of each bus for a time duration of not less than 5 min. All the measurement were carried out using two sound level analyzers having facility to record the data and post analysis of recorded data with sound analysis software. Data collection for questionnaire study was carried out by trained staff members and collect data was analyzed by using a standard statistical package.

The draft legislation on “Noise control inside inter province buses” was prepared using the results of this study and submitted to the National Transport Commission.

2. METHODOLOGY

2.1 Noise level measurement

Noise level measurement were carried out at the front and the back of each bus for a time duration not less than 5 min. Microphone of the sound level meter was held at the head position of the passenger. All the noise level data was saved during the measurement and saved data was analyzed by sound analysis software, Bural & Kajur BZ 7202

2.2. Noise Level Descriptors

Following noise level descriptors were used for simultaneous measurements.

- L_{Aeq} - Equivalent continuous sound pressure level at set time interval.
- L_{max} - Minimum sound pressure level at set time interval.
- L_{min} - Minimum sound pressure level at set time interval.
- L_{90} -User defined percentile level where exceeded for 90% of the elapsed time
- L_{50} - User defined percentile level where exceeded for 50% of the elapsed time
- L_{10} - User defined percentile level where exceeded for 10% of the elapsed time

2.3. Data Collection for the Questionnaire

Data collection was also carried out simultaneously with the noise measurement by trained personals. Response from respondents for the questions given in Table 1 was to find out the followings.

- The necessity of the rules to control the sound level in the bus.
- Whether the people suffer from the sound level in the bus.
- Whether the people need a cassette or radio to the bus
- The need of a rule to control the sound level in the busses.

Table 1 Descriptors and variables for Questionnaire Survey

Variable	Responses
Is radio or Cassette switched on for your needs in the bus? (If the respondents are Drivers)	<i>Yes / No</i>
Is a radio or cassette necessary for the busses?	<i>Yes / No</i>
Which do you prefer to listen among radio and cassette?	<i>Radio / Cassette /Both</i>
Are you satisfied with the current sound level in the bus?	<i>Satisfied / Over / should be lower / should be louder</i>
Should it make a rule to control the sound level in the bus?	<i>Yes / No</i>

Table 2 shows the details of the monitoring programme.

Table 02: Detail monitoring programme for six days of measurement programme

Date	Bus Root	No of Buses	No of persons interviewed		
			Passengers	Drivers	Conductors
13.10.2005	Colombo –Kandy	24	95	22	19
14.10.2005	Kandy -Anuradhapura	32	145	29	23
15.10.2005	Anuradhapura-Colombo	20	101	11	18
30.10.2005	Colombo –Matara	31	160	27	30
31.10.2005	Matara/Hambanthota-Embilipitiya	33	177	30	30
01.11.2005	Embilipitiya- Colombo	12	57	05	12
Total		152	735	124	132

3.0 RESULTS

3.1: Noise Level Measurement

According to the results of the noise level measurement in side buses at the front 64 % exceed the 85 dB (A) noise level with the sound system on condition. The noise level at the back of the buses 47% exceed the 85 dB (A) noise level (Table 03)

However 38 % measurement at the front and 6 % measurement at the back exceed the 85dB(A) noise level during the sound system off condition (Table04).The results also shows that the highest percentage lies in between 85-80 dB(A) range at the front of buses during the sound system off condition

Table 03: Measured noise level at the front & the back of buses (Sound system on condition)

Noise Level dB(A)	Front		Back	
	Frequency	%	Frequency	%
>90	14	11.6	6	5.2
90-85	63	52.1	48	41.4
85-80	36	29.8	45	38.8
80-75	5	4.1	15	12.9
75<	3	2.5	2	1.7
Total	121	100.0	116	100.0

Table 04: Measured noise level at the front & the back of buses (Sound system off condition)

Noise Level dB(A)	Front		Back	
	Frequency	%	Frequency	%
>90	3	2.9	1	1.0
90-85	36	35.3	5	5.2
85-80	53	52.0	66	68.0
80-75	7	6.9	24	24.7
75<	3	2.9	1	1.0
Total	102	100.0	97	100.0

The measurement results revealed that the 76 % Laylend buses exceeds the 85 dB (A) noise level at the front and 54 % at the back during the sound system on condition (Table 05). 28% TATA buses exceed the 85 dB (A) noise level at the front and 11% at the back during the sound system on condition. (Table 06). However 10.0% of air condition buses exceeds the 85 dB (A) noise level during sound system on condition. (Table 07).

Table 05: Measured noise level at the front & the back of the Laylend buses (Sound system on condition)

Noise Level dB(A)	Front		Back	
	Frequency	%	Frequency	%
>90	14	15.2	6	6
90-85	56	60.9	46	46
85-80	51	22.8	37	37
80-75			6	6
75<	1	1.1	1	1
Total	92	100.0	96	96

Table 06: Measured noise level at the front side of the Tata buses (Sound system on condition)

Noise Level dB(A)	Front		Back	
	Frequency	%	Frequency	%
90-85	5	27.8	2	11.1
85-80	13	72.2	7	38.9
80-75			9	50.0
Total	18	100.0	18	100.0

Table 07: Measured noise level at the front side of the Air Condition buses
 (Sound system on condition)

	Frequency	Percent
Valid 90-85	1	10.0
85-80	2	20.0
80-75	5	50.0
75<	2	20.0
Total	10	100.0

3.2: Statistical Analysis and Descriptive Statistic

152 numbers of buses were considered for the survey and 991 number of respondents responded for the questionnaire. Respondents are drivers, conductors and Passengers. In same analysis drivers and conductors are considered as one group. According to results of the survey 54% of the passengers were unsatisfied with the current sound system available in buses. However 45% of drivers were satisfied with the current sound systems. More than 93% of respondents emphasis the need of regulation to current noise level inside buses. However more than 85% respondents indicated the need of cassette / Radio for buses (see Figures 1, 2 and 3)

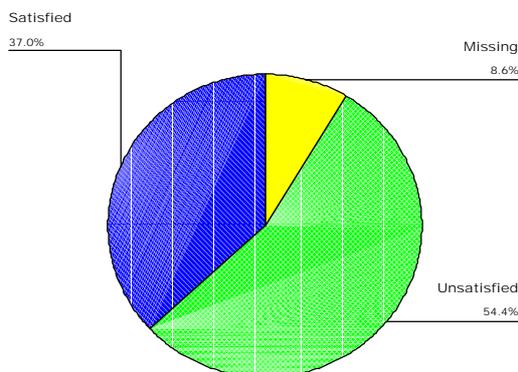


Figure 1: Satisfaction of the passengers with the current sound system

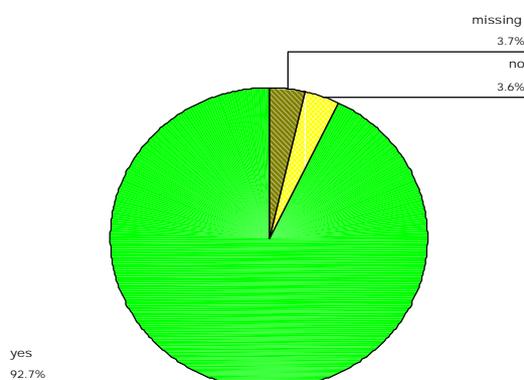


Figure 2: Need of a rule to control the sound level (For all respondents)

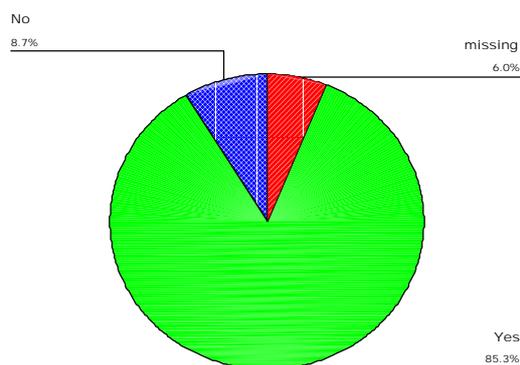


Figure 3: Need of radio or cassette for busses (For all respondents)

4.0 DISCUSSION

Measured noise levels inside the buses with the operation of sound system revealed that more than 11% exceed 90 dB (A) and more than 50 % exceed 85 dB (A). A very high range of noise level was observed inside the buses even without operation of the sound system. The result revealed that more than 3% exceed the 90dB(A) and more than 35% exceed 85 dB (A) .The predominant noise generating sources inside the buses are engine, silencer and air horn.

One of the main aims of this study was to find out the necessity of the regulation to control sound level inside buses. Among all respondent 92% justified the need of a regulation to control the sound system in side the buses. Among all respondents 43% people were not satisfied with the current sound system and 39% people were satisfied. More than 85% were indicated the need of cassette or radio for a bus.

Good awareness programme should be given to the bus owner and bus importers on requirement of noise control inside buses. It is strongly recommended to implement legislations to control noise levels inside the inter province buses.

ACKNOWLEDGMENTS

Authors wish to thank the Chairman, National Transport Commission for funding and the Bus Inspectors who were involved in this study programme.