

Road Traffic Noise Policy in Vietnam

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Over the past decade, Vietnam has experienced a period of market liberalization, and tremendous changes occurring in its economy and industry on one hand, enhanced developmental opportunities, but on the other hand have made it more vulnerable to environmental deterioration. Noise emitted from road traffic is an increasingly noticeable and serious problem in large cities like Hanoi (northern Vietnam) and Ho Chi Minh City (southern Vietnam). The current situation of noise pollution in these cities has not been resolved despite the fact that a Vietnam noise standard was built assigning the maximum permitted noise levels in public and residential areas. The execution of appropriate measures is therefore critical to coping with the current situation. Yet, there has been no reliable data source on community response to noise and an appropriate approach regarding the establishment of a practical noise policy for Vietnam. The main purposes of this paper are firstly investigating the validity of the current Vietnam noise standard, and secondly to propose a practical approach to the establishment of a noise policy in Vietnam based on precedent available knowledge on road traffic noise policies around the world.

Key words: road traffic noise, policy, Vietnam

1. INTRODUCTION

Vietnam is a developing country in Southeast Asia, and its environment has been seriously affected by industrialization and urbanization. Over the past decade, this country has experienced a period of market liberalization, and tremendous changes have occurred in its economy and industry—changes that have, on one hand, enhanced developmental opportunities, but on the other hand have made it more vulnerable to environmental deterioration. Among the pressing environmental concerns, noise emitted from road traffic is an increasingly noticeable and serious problem in large cities like Hanoi (capital city) and Ho Chi Minh City (largest southern city of Vietnam). The current situation of noise pollution in these cities has not been resolved despite the fact that several noise standards are present here specifying the maximum permitted noise emission level for road vehicles and for public and residential areas. The execution of appropriate measures is therefore critical to coping with the current situation. Yet, there has been limited approach regarding the establishment of a practical noise policy for Vietnam.

The main purposes of this paper are firstly to investigate the validity of the current Vietnam noise standard, and secondly to propose a practical approach to establish a noise policy for Vietnam based on precedent available knowledge on road traffic noise policies around the world.

2. ROAD TRAFFIC NOISE SITUATION IN VIETNAM

Road traffic is the most important source of community noise [1]. Recognizing the urgent need to achieve a reliable data source on community response to road traffic noise in Vietnam, an extended group of the present authors have conducted two large-scale social surveys and noise measurements in Hanoi and Ho Chi Minh City. This process, in the mean time, will also allow researchers and noise authorities to collaborate and come up with a feasible solution to protect the community's environment from road traffic noise pollution in Vietnam.

2.1 Social surveys in Hanoi and Ho Chi Minh City

A large number of residential houses in Hanoi and Ho Chi Minh City are located along the main road, which intensifies the frequent exposure to high noise levels not only during the day but also in the evening and night of the residents. In 2005 and 2007, the two surveys were conducted focusing on the investigation of human reactions to road traffic noise in two largest cities of Vietnam. The sample sizes were 1,503 people in Hanoi and 1,471 in Ho Chi Minh City. The noise exposure levels (L_{den}) were 70–83 dB in Hanoi and 75–83 dB in Ho Chi Minh City. Table 1 is presented with

noise immission levels (by day, evening and night) measured at all sites in Hanoi and Ho Chi Minh City.

The results of the social surveys were previously reported [2] in which the road traffic noise in both cities was found to have an impulsive characteristic and is further characterized by a large number of motorcycles, high noise exposure levels, and frequent horn sounds. Fig. 1 demonstrates the dose-response relationship established between the L_{den} and the percentage of highly annoyed respondents. It is deducible that the Vietnamese respondents are exposed to very high noise exposure levels, yet the annoyance response is rather scattered and low compared to the European trend [3].

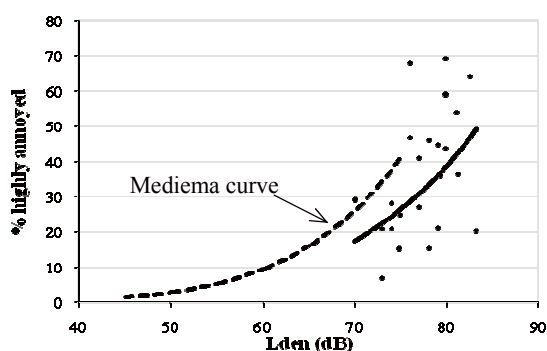


Fig. 1. Dose-response curve based on combined data of Hanoi and Ho Chi Minh City on Miedema curve.

2.2 Validity of Vietnam noise standard

In 1995, the Directorate for Standards, Metrology and Quality (STAMEQ) belonging to the Ministry of Science and Technology of Vietnam issued two standards, TCVN 5948-1995 and TCVN 5949-1995, specifying the maximum permitted noise levels for road motor vehicles and in public/residential areas, respectively. TCVN 5948-1995 was replaced by TCVN 5948-1999 revising the maximum permitted noise emission level for accelerating road vehicles. TCVN 5949-1995 was also revised and replaced by TCVN 5949-1998, stating the compulsory application to control noise emission level of any source or activity that may affect the public environment and residential areas. There is, however, no information on the noise immission levels that were considered acceptable at a receiver location, typically near the façade of a residence or near specified infrastructures such as alongside a road or highway. Table 2 summarizes the content of TCVN 5949-1998.

Since a large number of residential houses in Hanoi and Ho Chi Minh City are located along the main road, the

maximum permitted noise emission levels for mixed residential and commercial areas should be strictly followed. Compared to the noise level limits assigned in TCVN 5949-1998, noise levels measured in Hanoi and Ho Chi Minh City exceeded about 5 dB in the day and evening time and but up to 26 dB at night. Moreover, the maximum permitted noise level for these areas is 75 dB in the morning and 70 dB in the evening but 50 dB at night. It is almost impossible to reduce noise levels by 20 dB from evening to nighttime.

Table 1. Noise immission levels in Hanoi and Ho Chi Minh City

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8
Hanoi								
$L_{Aeq,day}$	78	74	76	73	71	72	77	74
$L_{Aeq,evening}$	76	73	75	72	71	71	77	74
$L_{Aeq,night}$	73	67	71	68	67	66	76	73
Ho Chi Minh City								
$L_{Aeq,day}$	75	77	80	74	76	77	77	77
$L_{Aeq,evening}$	76	76	80	76	75	75	77	76
$L_{Aeq,night}$	70	71	75	70	72	71	74	76

Table 2. Maximum permitted noise emission levels in public and residential area

Area	Index	Time	Noise level limits
Areas require quiet (hospital, kindergarten, school, church, temple)			50 dB (day) 45 dB (evening) 40 dB (night)
Residential areas, hotels, offices	$L_{Aeq,T}$	Day (06-22)	60 dB (day)
		Evening (18-22)	55 dB (evening)
		Night (22-06)	50 dB (night)
Mixed residential and commercial areas			75 dB (day) 70 dB (evening) 50 dB (night)

The validity of the current Vietnam noise standard is, therefore, in question for its efficient application on the permitted nighttime noise exposure limit. Moreover, the standard was constructed in 1998 when there were much fewer motorcycles. Up to 2008, the number of motorcycles in Vietnam was 20 million. As the number of motorcycles increases at the rate of 15–18% yearly (see Fig. 2), in order to protect the community's environment from the worsening noise pollution especially in the big cities, it is necessary to renew the standard to meet with the current situation.

3. AN APPROACH TO VIETNAM NOISE POLICY AND NOISE POLICIES WORLD WIDE

Assisting the development of global noise policies on noise control, the International Institute of Noise Control Engineering (I-INCE) has cataloged the community noise regulations and guidelines in many countries (mainly developed countries). The report [4] provides detailed information describing the current status of community noise legislation in a number of countries. Even though the report gathered information mainly from the developed world, in learning from its information it would bring forth valuable understanding and knowledge on legal systems to implement and enforce the difference approaches to national control of community noise. Table 3 introduces road traffic regulations and guidelines of countries around the world deprived from the I-INCE report.

The majority of countries used a version of time-averaged, A-weighted sound level. However, differences were found in many aspects of the national approaches, for example, category of each legislative document (regulation or guidelines), nature of each document (emission or immission), assessment time interval, etc. Most national concern lays on noise affecting mixed residential and commercial area. The control of noise at the source through limits on noise emission was considered to be the most economic and technically feasible approach to controlling noise in a community.

Considering the nature of the cities of Vietnam where respondents tend to live along the street in order to benefit from various commercial activities, noise control for mixed areas is highly important. Based on the dose-response curve obtained from the social survey (see Fig. 1), $L_{den} = 70$ dB should be set as a limit for less than 20 % of highly annoyed population.

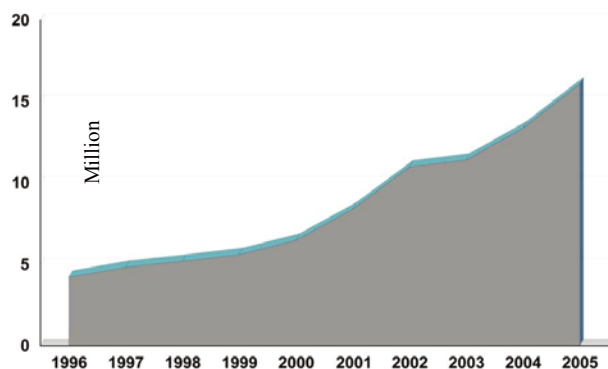


Fig. 2. Yearly growth of motorcycle number in Vietnam

4. CONCLUSIONS

This paper has provided a general view on the current situation of road traffic noise pollution in Vietnam. The community's health in cities like Hanoi and Ho Chi Minh City is still at high risk of being affected by road traffic noise every day. The Vietnam noise standard has been constructed since 1998, and it needs revision in order to be updated with the current situation of road traffic noise pollution in Vietnam, especially for areas of with mixed residential and commercial activities. Noise policies obtained in many countries around the world have brought about an appropriate understanding of a possible approach to enforce national control of road traffic noise. It is obtained that noise control at the source through limits on noise emission was considered to be the most economic and technically feasible approach to controlling noise in a community. Further collaboration from researchers and noise authorities is greatly needed for a healthier environment without noise in Vietnam.

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Table 3: Road traffic noise regulations and guidelines for mixed residential and commercial areas organized alphabetically by country

Country	Regulation	Guidelines	Statutory	Emission	Immission	Time (day (06-22), night (22-06) except if specified	Index	Noise level limits
Australia		*			*	Day-night	$L_{Aeq,T}$	65dB for day 40dB for night
Austria		*			*	Day-night	$L_{Aeq,T}$	65dB for day 55dB for night
Denmark		*			*	Day-evening-night	L_{den}	58dB
France	*				*	Day-night	$L_{Aeq,T}$	60dB for day 55dB for night
Germany	*				*	Day-night	$L_{Aeq,T}$	59-64dB for day 49-54dB for night
Greece		*			*	Day	$L_{Aeq,T}$ $L_{A10,T}$	67dB (08-20) 70dB (06-24)
Ireland	*				*	Day	$L_{A10,T}$	65-68dB (06-24)
Italy	*				*	Day-night	$L_{Aeq,T}$	70dB for day 60dB for night
Japan	*				*	Day-night	$L_{Aeq,T}$	65dB for day 55dB for night
Korea		*			*	Day-night	$L_{Aeq,T}$	65dB for day 55dB for night
	*			*		Day-night	$L_{Aeq,T}$	68dB for day 58dB for night
Netherlands			*	*	*	Day-evening-night	L_{den}	45-70dB
New Zealand		*			*	All day	$L_{Aeq,24h}$	55-62dB
Portugal			*		*	Day (07-20), evening (20-23), night (23-07) Night (20-07)	L_{den} L_n	<65dB <55dB
Slovenia	*				*	Day-evening-night Night	L_{den} L_n	60dB 50dB
Spain	*				*	Day-night	$L_{Aeq,T}$	65dB for day 55dB for night
Sweden		*			*	All day	$L_{Aeq,24h}$	55dB outdoors 30dB indoors
Switzerland	*				*	Day-night	$L_{Aeq,T}$	65dB for day 55dB for night
Turkey	*				*	Day (07-19), evening (19-23), night (23-07)	$L_{Aeq,T}$	70dB for day 65dB for evening 60dB for night
UK		*			*	Day (06-24), night (00-06)	$L_{Aeq,T}$	63-72dB for day 57-66dB for night
USA	*				*	Hourly	L_{A10} $L_{Aeq,1h}$	70dB 67dB