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主論文審査の要旨

Noise pollution due to road traffic is a major global concern because of its negative impact on the quality of life in communities. Vietnam is a developing country in Southeast Asia, and its environment has been seriously affected by industrialization and urbanization. In large cities like Hanoi and Ho Chi Minh City, noise emission from road traffic has been found to be a serious concern among general public. Nevertheless, Vietnam has not yet developed a practical noise policy and countermeasures to cope with the situation. Two large-scale socio-acoustic surveys of community response to road traffic noise were conducted in order to investigate people's reactions to road traffic noise in Hanoi and Ho Chi Minh City in 2005 and 2007, respectively. One of the main objectives of this study was to accumulate noise and social survey data for Vietnam and to investigate the dose-effect relationship for community noise annoyance. This study also enriches the global discussion on noise and its effects on humans.

My dissertation consists of six chapters. In Chapter 1, research background was reviewed, and the general information of the present study is presented. In Chapter 2, characteristic of road traffic noise in Vietnam is investigated in terms of traffic volume, noise exposures, octave band frequency and horn sounds. The outcome of Chapter 2 revealed that in cities of a developing country, environmental noise levels due to traffic are notably higher than those in developed countries. Road traffic noise in the two cities is characterized by high noise exposure and frequent, impulsive horn sounds. Moreover, while cars are the common form of transportation in developed countries, motorbikes are by far the dominant vehicle in the traffic in Vietnam. In general, high noise levels are the result of frequent horn sounds, especially in Hanoi. From our overall site monitoring, the daily average noise levels $L_{Aeq,day}$ were >69 dB. In Chapter 3, dose-response relationships for general annoyance are investigated. The first dose-response relationship between L_{den} and % highly annoyed respondents was established in Vietnam. Findings emphasize the potential large-scale effects of noise on the people's well-being in Hanoi and Ho Chi Minh City. Compared to Europeans, Vietnamese respondents are exposed to much higher noise levels. Conversation and sleep disturbances in both cities were also found to be not as severe as expected. Both conversation and sleep disturbances seem to be more pronounced in Hanoi than in Ho Chi Minh City; therefore, it is possible that the higher levels of conversation and sleep disturbance yielded higher annoyance levels in Hanoi. Effects of non-acoustical factors on road traffic noise annoyance are studied in Chapter 4. Noise sensitivity is an important factor which has a large impact on noise annoyance. The effect of noise sensitivity on annoyance is reduced very little if age is also taken into account. Attitude

to noise source also emerges to have certain influence on noise annoyance. Nevertheless, the difference in noise annoyance response between respondents with “negative” and “positive” attitude to noise source was not clear. Demographic factors are much less important than noise sensitivity. In Chapter 5, the current Vietnam noise standard was reviewed. The current Vietnam noise standard has been constructed since 1998. A detailed revision based on real time observations and research study may be useful for the development of more effective policy against noise, especially in areas of with mixed residential and commercial activities. Dose-response relationships that predict the level of noise annoyance at a given level of noise exposure can be used in noise abatement policy to find the best practical ways of reducing noise annoyance through the reduction of the exposure. Finally, chapter 6 summarizes and concludes on the present study.

The outcomes of the social surveys in Hanoi and Ho Chi Minh City have brought about interesting findings that emphasize the potential large-scale effects of noise on the people’s well-being in Hanoi and Ho Chi Minh City. Noise and social survey data were accumulated, and the very first goal was achieved in which the first dose-effect curve was drawn for Vietnam.

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