Visualization of the Impact of the Noise caused by Bus Stops on the Surrounding

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1. Introduction

A bus is the main public transport way in life. The distance to the bus stops always plays a key factor in evaluating accessibility to choosing a living location. We only known the convenience of travel near the station but ignored the impact of the noise pollution on human hearing around the station. In this study, we took a case study of visualization of the impact of noise caused by bus stops.

In the University of Tuskuba, the mainly travel way for students is the campus circulation bus. When students decided the location of living place, near the bus stop is a very import factor. However, the noise pollution caused by the bus station will also affect the quality of life. How to balance these two and find a suitable housing location is very important.

2. Study Area

The fieldwork has carried out around the [Oikoshi shukusha higashi] bus stop in the University of Tsukuba to collect the decibel(dB) of a bus arrived/left station and passing.

4. Data and Methodology

A free application called [dB meter] was used in the field survey was downloaded from the APP store. In addition, we measured the noise value caused by a bus and got the location points due to it collect the data more stable and accurate compare other free application. The data used in this study consisted of ZENRIN data including buildings and roads. If there are other sources of noise when measuring, the data is invalid. We successfully collected ten points' data. Figure1 shows the methodology adopted for the study. First, we conducted a regression analysis of distance and dB value. Then calculate the corresponding distance of the noise level and create the noise level's buffer area in the map. Finally, overlapped both to find the serious noisy area.
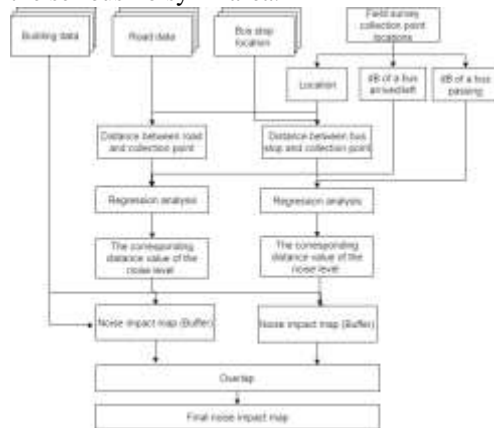

Fig.1 Methodology flow chart

5. Results and Discussion

Figure2 shows the relationship with the distance to the bus stop and the noise value by a bus arrived/left to a bus stop. Figure3 shows the regression model of the distance to the road and noise value by a bus passing. Obviously, they both have a strong correlation, especially the latter one. Table 1 shows the dB value interval of noise level and the corresponding distance calculated by the previous regression models. Figure 4 shows the visualization of the impact of the noise on the surrounding. Figure4(c) is the result combines two kinds of noise area caused by a bus. The red part is the two very noisy areas overlap, which includes one new apartment and lunchbox shop. The pink area is the noisy area overlap the very noisy area, which covers two buildings.

Interestingly, I found the dB value of a bus passing is higher than a car through the field survey. It means near the road with a bus station is noisier than without. A bus passing and arrived/left station are the main noise pollution near the bus station. We should avoid choosing these areas affected by the noise pollution of the bus.
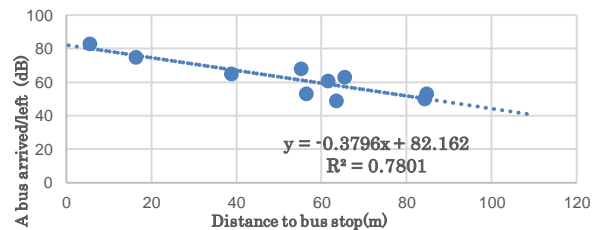

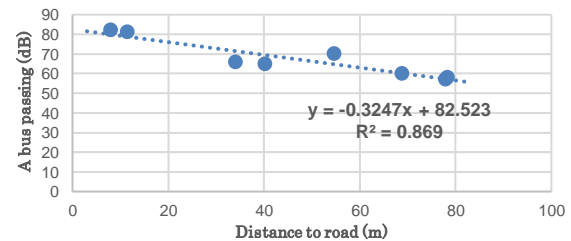Fig.2 Regression model of distance to the station and a bus arrived/left dB value

$$y = -0.3796x + 82.162$$
$$R^2 = 0.7801$$

Fig.3 Regression model of distance to the road and a bus passing dB value

$$y = -0.3247x + 82.523$$
$$R^2 = 0.869$$

Level	dB value	Distance to the station(m)	Distance to the road(m)
Quiet	0-40	>111	>131
Normal	40-60	58<dB<111	69<dB<131
Noisy	60-70	32<dB<58	39<dB<69
Very noisy	70-90	<32	<39

Table1. The corresponding distance of the noise level

Fig.4 visualization of the impact of (a)bus stop/start(b)bus passing (c)both