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Analysis of soundscape complexity perception in Faculty of engineering canteen, KMITL

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Abstract

The study presents a variable analysis of the perceived soundscape complexity in a semi-open public canteen with a large number of people daily. The study included measuring the mean loudness of the canteen, analysis of results from questionnaires on the topic of The perception of loudness and complexity of the noise caused by the human noise and the noise from the objects in the canteen and the convenience of talking in the canteen for objective studies of sound complexity with entropy dynamics to determine compliance with subjective studies. Results from the questionnaire were able to see a wide range of trends in perception of the volume and complexity of the sound over time. The survey results of the level of the annoyance of human noise and objects tend to be annoyed are related to higher numbers of people using the canteen. But the perceived soundscape complexity, the focus on noise levels, and the ease of discussion in the canteen did not show a clear correlation with the number of people visiting the canteen. Objective and subjective studies results are interpreted taking into account the reflection of sound, masking effect, and the Lombard effect when the number of people changes during different times of the day.

Introduction

Through the decades Urban society has developed and grown rapidly. As a result, the sound ecosystem has changed dramatically as well. The study of acoustic ecological awareness analysis is of great interest to room acoustics researchers and urban sound designers. This study is the only one conducted in the university canteen. It is only a starting point to develop and improve for use in places where there is a problem in the field of environmental noise. This study will demonstrate an analysis and interpretation of soundscape perceptions of sound in semi-open public canteen. That shows the changing of the soundscape at different times of the day. Measurements and data collection are performed for interpretation and to determine trends, conclusions, of the perception of complexity and the level of a soundscape by using entropy, PDF, and questionnaires. In order to find out how much people perceive cafeteria noise By questionnaires to compare with entropy and PDF conclusion of this study.

Methodology

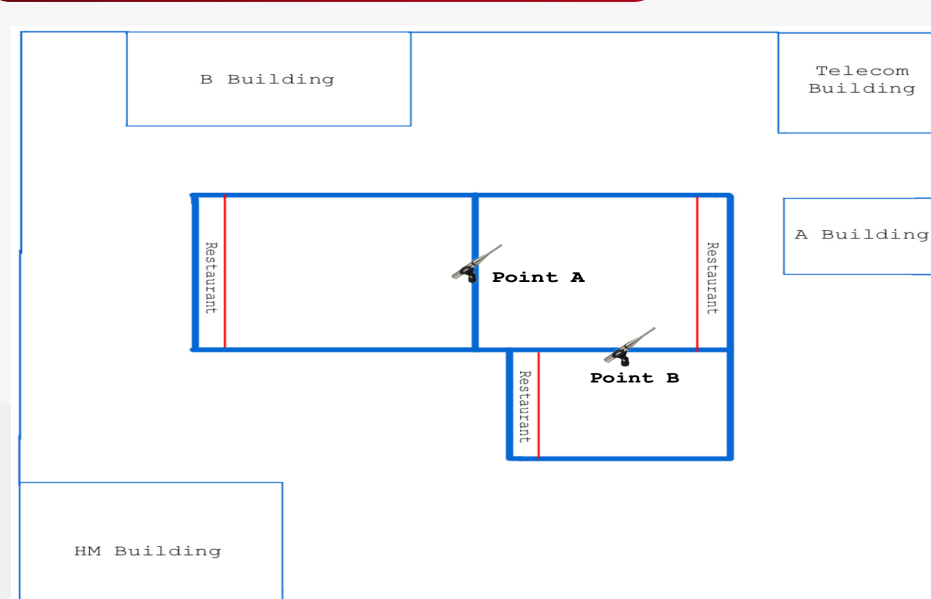


Fig.1 Map of canteen

Equipment :
- RTA Microphone -
- Microphone Calibrator
- Audio Interface
- Laptop
-DAW (Digital Audio workstation)
- Smaart V8 program

To measure the sound this time we Divide the points we measure into 2 points to cover the canteen area, each point we will have to calibrate the microphone before the actual measurement time to ensure the accuracy of the data. And when it's time to record, we use RTA microphone to the audio interface to the SMAART program to read the SPL. At the same time, we use DAW to record the sound from the same microphone and Bring data into MATLAB to calculate PDF and Shannon's Entropy values.

Results

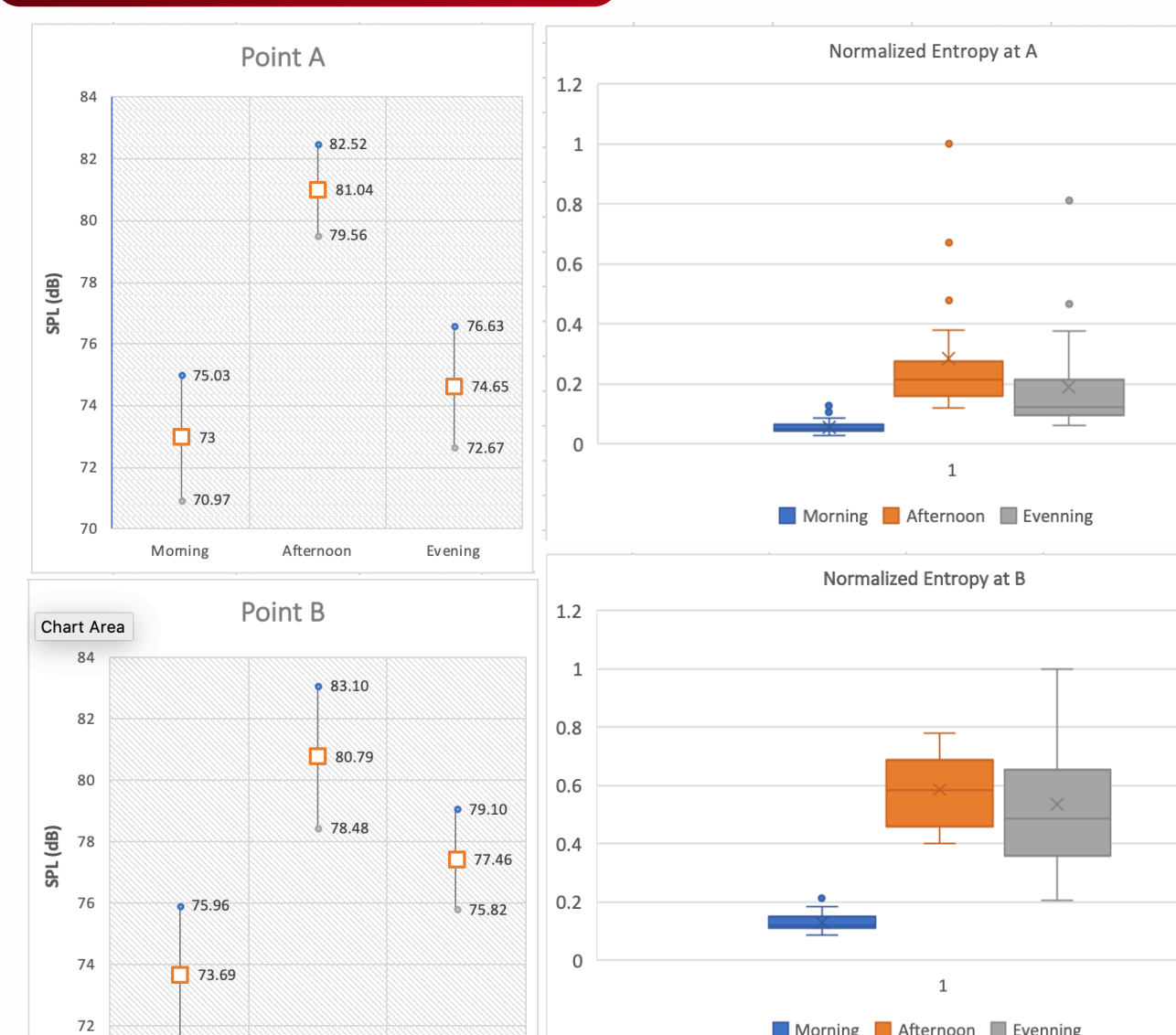


Fig 2. SPL graph

Fig 3. Normalized Entropy

Time	Morning (Low)	Evening (Medium)	Afternoon (High)
Q1 Human sounds	13.33	24.00	46.31
Q2 Object sounds	3.33	20.00	29.47
Q3 Complexity	30.00	24.00	42.11
Q4 Attention	6.67	4.00	15.79
Q5 Diff discuss	26.67	8.00	14.74
Q6 Less noise wanted	56.67	84.00	69.47

Table 2. Percentages of highly rated response.

Occupancy	Point A			Point B		
	Low	Medium	High	Low	Medium	High
dBSPL mean	73	74.65	81.04	73.69	77.46	80.79
H mean	0.0561	0.1890	0.2859	0.1301	0.5346	0.5854

Table 3. Average values of dB SPL and the auditory complexity indicator for Low, Medium, High occupancies at Point A and B.

All results show that H_{mean} has It is most closely related to the question of sound perception caused by people and the sound of things. And also corresponds to the higher average dB SPL While the perceived complexity of noise and its focus on noise can be seen prominently, only the highest number of people using the service is likely to correlate with the average H_{mean} and dB SPL. Because in the smaller number of people the questionnaire results were not clearly consistent with H_{mean} and average dB SPL. And in terms of the convenience of talking and the need for a quieter noise. It did not have any correlation with H_{mean} and average dB SPL. Here we can conclude that the results differ as to the number of people changes. This has no effect on the convenience of talking and the need for a noticeably lower noise since the indoor noise level is still at the right volume for access without causing any probability. Very annoyed, Therefore, the results of the questionnaire were likely to correlate with the objective.

Conclusion

This project presents the results of a complex study of the perception of sound and displays the results in a more understandable format. The calculated data of PDF, Channon's Entropy, and SPL were analyzed in conjunction with the results from the survey. The opinions of the people in the cafeteria were divided into three periods: morning, afternoon, and evening. Then all the data that differ from time to time are compared with the number of people to determine how they affect the complexity of the sounds, how they look, numbers, and graphs. Results from this study were specific to the case of public canteens in the Faculty of Engineering. The conclusions of the results are combined to draw clear conclusions. If there is more research in Thailand on the complexity of sound, it will further increase the usefulness of the results of the information in this project. Data and results can be referenced and compared with other projects.

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