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Article / Book Information

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Title(English)	A STUDY ON AIRCRAFT NOISE ACCEPTABILITY CONSIDERING SITUATIONS OF OTHER PEOPLE USING PROSPECT THEORY
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論 文 要 旨

THESIS SUMMARY

専攻： Department of	**Built Environment** 専攻		申請学位（専攻分野）： Academic Degree Requested	博士 Doctor of **(Engineering)**
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要旨（英文 800 語程度）

Thesis Summary（approx.800 English Words ）

Aircraft noise remains serious social and ecological problems. It is a major cause of complaints and a main barrier to airport growth. Since demand for air transport services has increased, airlines often schedule additional flights. Consequently the problems become even more serious. To balance the air traffic growth against both local and global environmental concerns, several aircraft noise mitigation strategies have been proposed and improved. Among all, this thesis focuses on the aircraft noise management strategy at an airport. Current problems in term of noise management include, for example, the noise situations at Haneda airport, the end of Crandford Agreement at London Heathrow airport, and the noise-sharing program at Sydney airport.

In the literatures, a number of previous studies have attempted to understand people's subjective impression of aircraft noise effects, including nighttime sleep disturbance, percentage of highly annoyed people, and other psychological effects. But, there are only few studies took into account, in addition to the noise exposure level, the importance of number and frequency characteristics of noisy events. With this gap, understanding individual maximum acceptable flight frequency (MAFF) to some typical aircraft noise levels would help aviation authorities to easily investigate on individual noise reaction as well as to wisely manage the noise near airport. On the other hand, I have introduced in this thesis a new idea of incorporating the effects of other people's characteristics into the analysis of noise acceptability. The effects of other people are unobservable in general and usually ignored by researchers. To this end, I hypothesize that individual MAFF is affected by changes in other people's noise-situations. Moreover, the idea has been developed and the effects of other people can be investigated under a framework of Prospect Theory (PT).

Given no similar existing researches, this thesis addresses the five objectives as follows: 1) to confirm the existence of reference-dependence in analysis of noise sensitivity, 2) to seek for the effects of other people's noise-situations on individual noise acceptability, 3) to design a comprehensive methodology that is allowed to capture the effects of other people on individual flight acceptability, 4) to develop an influential flight acceptability model based on PT under the effects of other people, and 5) to illustrate on usefulness of the developed model into aircraft noise management and policy at an airport. With these objectives, the thesis is structured into seven chapters, starting with the background & motivations in Chapter 1 and a brief but detail reviews on relevant literatures in Chapter 2.

The first objective is addressed in Chapter 3 using data from a field survey with 318 Fukuoka airport-area residents, of which 50 were interviewed with headphone system. Various statistical analyses are performed to investigate on individual sensitivity to change in aircraft noise levels. The reference-dependence concept is employed to investigate individual loudness sensitivity in term of gains and losses relative to a reference point (RP) defined based on a neutral annoyance response. Results from different analyses show that participants have gradually got accustomed to change in higher aircraft noise levels. The findings suggest that there exist framing effects in aircraft noise analysis.

In Chapter 4, a pilot study was conducted with 37 Japanese students to seek for the effects of other people's noise-situations. With an assistance from a newly developed headphone interview system, I created two questionnaire scenarios: one without any noise information provision and another with different classes of other noise-affected people. The control variables are then designed and included into MAFF regressions. Results show that subjects' MAFFs are decreased if they could access to aircraft noise information. Further, their MAFFs are to increase (decrease) if they have considered the situations of other higher (lower) noise-impacted people. In sum, there exist the effects of noise information on individual aircraft noise acceptability.

Results from the first and second objectives lead me to conduct a large scale interview survey with 321 Manila airport-area residents in order to concretely confirm the effects of other people, in Chapter 5. Results from the Welch's tests show consistent findings to what were found in Chapter 4. Moreover, the values of MAFFs become higher if participants were informed about more serious situations of other noise-affected people. For those who have considered other people's noise-situations, their MAFFs are significantly higher than those who have not.

The fourth objective is addressed in Chapter 6 using data from Chapter 5. Underlying a framework of PT, I develop a MAFF (specified as RP) model updatable under the effects of other people's noise-situations. Because the model is extremely nonlinear, Genetic Algorithm is developed and employed to jointly estimate the associated parameters of RP and PT's value functions. Results show considerable effects of other people's noise-situations on individual judgment. The PT's loss aversion property is also carefully observed and discussed. After that, the fifth objective is addressed by showing a simple calculation as an example to illustrate the usefulness of the model into aircraft noise management and policy.

Finally, the key findings are summarized and the future recommended works are suggested in Chapter 7. As for the conclusion, I have shown that the PT's reference-dependence concept can be applied into the analysis of aircraft noise acceptability when considering the effects of other people's noise-situations. Considering other people is one of the useful aspects to be discussed in formulating an aircraft noise evaluation criteria or in the future analytical researches. (888 words)