



# Factors affecting the harmonious coexistence of the airport and local communities

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## ABSTRACT

This paper describes result of a preliminary opinion survey toward the co-existence of the airport and local communities. The relationship between the airport and local communities has been improved by the advancement of noise mitigation at source and by the implementation of countermeasures such as soundproofing of houses around the airport. Nevertheless, impact of aircraft noise still continues to be a matter of serious concern for residents in the neighborhood of the airport due to the continuing increase in aircraft movements. An effective solution we believe is that the airport must grow into an invaluable resource to local communities, out of a subject of complaints, i.e., one of NIMBY facilities. To search for the coexistence of the airport with local communities, we performed a trial perspective survey about compatibility between life convenience and environment protection, using two methods of questionnaire survey and Picture-Frustration Study. Subjects were university students. The result of a questionnaire survey suggests that subjects give priority to avoiding negative burdens for their life environment and they may have some hesitation in accepting inconvenience of living and/or few opportunities of employment in case of country life, although they have no objection to the preservation of the natural environment. The result of a PF study also suggests that subjects tend to have a negative attitude toward country life without convenience, at the same time they tend to clearly go negative against obvious noise damages. We can conclude that they are strongly aware of the importance of the natural environment, but at the same time they wish life convenience would be compatible with the natural environment.

## INTRODUCTION

Preservation of the natural environment is very important, but it is provable not to be put into practice if it strongly restricts the freedom of daily life. Facilities such as dust processing plants, nuclear power plants and airports are indispensable for modern life, but communities and residents always oppose construction of such facilities in their neighbourhood, because they have negative images on such facilities. If we focus on airport and weigh its convenience against nuisance, we can easily imagine that the greater part of local residents who rarely use air transportation dislike the airport, because it must be one of "Not In My Back Yard" (NIMBY) facilities.

There are, however, good practices successful in solving such antinomic propositions such as simultaneous realization of controlling noise radiation from a piece of machinery with improving the operating efficiency and reduction of noise radiation by 20dB or more together with improvement of fuel efficiency (or low gas emission) by the development of aircraft turbo-fan engine with a high bypass ratio. Home electrical appliances are also good practices; functional improvement, power saving and noise reduction are achieved at the same time.

Recently, there is a movement of public opinion aiming at harmonious coexistence of the airport and local communities in Japan; e.g., the council of Itami City carried a motion of a proclamation for harmonious coexistence of the city with Osaka International Airport in March 2007. The motivation is expected to be an activation of regional economy, which comes from a prospect that the way to co-existence of the airport with local communities has been opened by the advancement of noise reduction at source and the implementation of measures such as soundproofing of houses around the airport. Such a co-existence based on economical grounds, however, might be unacceptable to local communities and residents who cannot take enjoyment of the economical benefit and continuously suffer from severe impact of aircraft noise. It may become a matter of serious concern and a subject of complaints. An effective solution we believe is that the airport must grow into an invaluable resource to local communities, out of one of NIMBY facilities. Here, we performed a trial perspective survey about the compatibility between life convenience and environment protection, using two methods of questionnaire survey and Picture-Frustration Study (PF Study) in order to search for the true coexistence of the airport with local communities.

## QUESTIONNAIRE SURVEY

### Procedure

The questionnaire was prepared on the basis of the questionnaire for social survey on noise problems recommended by the Acoustical Society of Japan [1] by adding a question concerning the coexistence of environmental preservation and convenience of living. It consisted of 20 items, as shown in the left columns in Table 1. Also PF study was included as shown in Figures 1-3. The respondents for the survey were 75 students of Osaka University (14 males and 61 females). The survey was carried out to all members at the same time in a classroom.

In this paper, the results of the question concerning the coexistence of environmental preservation and convenience of living and PF study are introduced.

### Results

Result of the survey is shown in the right columns in Table 1. A significance test on the difference in numbers of answers among "agree", "neither/nor" and "disagree" for each item was performed by the  $\chi^2$  authorization at a significance level of 5%. There were significant differences except items 5 and 9.

There were a lot of positive answers for questionnaire items asking whether respondents can endure the inconvenience of living if necessary to preserve the natural environment such as in item 1. On the other hand, when they were asked about life in a natural environment with inconvenience of living such as in item 10, the number of positive and negative answers was almost the same and the number of neutral answer was the highest. Moreover, many respondents showed the agreement to live in an urban area from a viewpoint of opportunities for employment and seemed to consider it more important than that of rich natural environment. We can identify a big difference between a stated principle and private intention; in other words, there is alienation between ideal and reality.

When they were asked about impact on the familiar regional environment such as in items 6 and 16, respondents regarded environmental preservation as more important than convenience of living and economical situation. However, when environmental impact was not severe, positive answers tended to exceed negative answers, as shown in item 3 and 11.

In addition, respondents regarded a quiet environment as more important than regional revitalization by an airport (item 15), whereas positive answers exceeded negative answers concerning an opinion that the existence of an airport can be acceptable if mitigation measures for environmental impact are introduced or if facilities are installed to promote comfortable regional environment around the airport (item 5). This suggests that the existence of an airport is not always refused, but it may possibly be accepted if appropriate measures are taken.

Restriction on emission of CO<sub>2</sub> was promoted for prevention of global warming as a recent example of environment preservation. Especially, the railroad transportation was overwhelmingly supported as a way of the countermeasures (item 18). On the other hand, the tendency to avoid the nuclear power plant was emphasized (item 2). The result of a survey indicates that the number of people who support nuclear power plant tended to increase significantly by providing information of merits or benefits of nuclear power plant [2]. After all, the power plant in the neighbourhood of residence has tendency to be avoided. Also, there were a lot of the

numbers of neutral answer when energy saving and the fulfilling welfare were compared (item 19).

**Table 1. Result of a questionnaire survey**

**Please answer whether you agree with each opinion, or not. A: agree B: neither agree nor disagree C: disagree**

No	Statements	A (%)	B (%)	C (%)
1	We should endure inconvenience of life to preserve natural environment, e.g., green and water.	61.3	33.3	5.3
2	I hate the construction of a nuclear power plant in the neighbourhood, even if needed to solve issues of global warming and energy situation.	73.3	20.0	6.7
3	I accept road construction as far as traffic convenience is improved unless noise impact reaches me.	41.3	38.7	20.0
4	I would like to live in an apartment house where the privacy is protected and I can live in comfort.	64.0	25.3	10.7
5	I can endure building facilities such as airport that affect the environment significantly, as far as green belts and parks are also constructed.	42.7	34.7	22.7
6	It is unavoidable to sacrifice personal convenience a bit in order to protect global environment from public nuisance.	78.8	16.0	5.3
7	The public safety should take precedence over the personal convenience of life.	48.0	48.0	4.0
8	I want to live in an urban area with varieties of jobs and rich opportunity of employment rather than a countryside.	46.7	37.3	16.0
9	I oppose building a large-scale super market in the neighbourhood because of noisiness even if measures are taken for preventing traffic congestion.	37.3	36.0	26.7
10	I want to live in a good natural environment even if it is inconvenient of life.	25.3	46.7	28.0
11	It is beneficial to citizens to invite manufacturing companies and large shopping malls if environmental impact is small.	49.3	44.0	6.7
12	We should stop building facilities that spoil comfortable life even if it contributes to local economy.	62.7	36.0	1.3
13	It has no need to construct express roads and high speed railways, even if necessary, when it destroys the natural environment.	46.7	44.0	9.3
14	I want to live in a flourishing and warm-hearted area such as downtown.	60.0	33.3	6.7
15	I prefer keeping a quiet environment to regional vitalization by inviting airport.	58.7	37.3	4.0
16	We should avoid building public facilities, even if necessary for regional requirement, as far as it deteriorates living environment.	62.7	29.3	8.0
17	I want to live in an area with convenience stores and shopping malls even if a bit noisy.	48.0	37.3	14.7
18	We should reinforce rail transport that emits low level carbon dioxide in place of trucking.	82.7	17.3	0.0
19	Public investment for energy saving should take precedence over that for well-being.	12.0	60.0	28.0
20	Road construction meeting public needs such as easing traffic congestion must be done at the cost of modifying natural environment	16.0	56.0	28.0

In general, there was a tendency that positive answers increase when the respondents are asked in a questionnaire survey. For this reason, it is necessary to ask the question of the same purpose from the opposite side [3]. In the item 4, there were a lot of the numbers of positive answer to live in an apartment house where the privacy is protected and they can live in a comfort environment. At the same time, there were a lot of desires to enjoy closeness with other people such as in downtown life (item 14). These two were incompatible, but there was a tendency that both were desired. There was a tendency that an attitude and/or behaviour conflicted in a living environment. It seemed that the contradiction was not unusual. However, if the stated principle does not agree with a private intention, the environment preservation would not be advanced. Therefore, PF study was tried in order to approach to the private intention.

## PICTURE FRUSTRATION STUDY

### Procedure

The PF study is a personality test which was designed by S. Rosenzweig [4]. It is known as a projective method, in which a respondent is requested to answer what a person in a cartoon may tell in a frustrative situation [5]. It is considered that the answers of the respondents are projected to the answers in the cartoon. This method was used in the former investigation of neighbourhood noise [6, 7]. The cartoons used in this study are shown in Fig.1 ~ Fig.3. Case-1 is a scene of traffic congestion with an aircraft flying (Figure 1), where disturbance of a quiet environment is confronted by the convenience of access to traffic facilities. Case-2 is a scene of a rural place (Figure 2), where quality of natural environment is confronted by daily life inconvenience. Case-3 is a scene of refuelling at a rural place (Figure 3), where enjoying a natural environment is confronted by gas consumption. Note that several questions included in the question with 20 items correspond to situations used in the PF study.

### Result

Results of PF-Study using the three situations of Case-1~3 are shown in Table 2. The results are expressed in percent rates of answers for six categories classified as “ $C_i, i=1\sim6$ .”

In Case-1 (Fig.1), an overwhelming majority of respondents of 61 people (81.3%) answered negative on account of various reasons of  $C_1 \sim C_4$  against the speaker's remark that “It's good! The opening of a nearby airport improved the convenience of living.” The highest rate of answers among  $C_1\text{-}C_6$  was 44.0% (33 people) for  $C_1$ , which expressed personal annoyance, and of which a typical answer was “I don't think so. I am quite troubled by the increase of aircraft noise.” On the other, the rate of positive answers was only 16% (12 people) for  $C_6$  on account of convenience. It suggests that mitigation of noise impact due to aircraft flyover is the most important for the co-existence of the airport with local community, although the size and position of the aircraft drawing in the cartoon affect answers.

In Case-2 (Fig.2), more than half of the respondents (46 people: 61.3%) answered negative for  $C_1$  and  $C_2$  against the speaker's remark of “Let's decide to live here because of rich nature though there is an inconvenience of living!” The rate for  $C_2$  was 57% (43 people), superior to  $C_1$ . These respondents took priority of life convenience like shopping and traffic, etc. over life in rich nature. However, 27 answers (36%) agreed to life in rich nature. There were certain rate of answers longing for a charm of rich nature, classified to  $C_6$ ,

“It's good. The opening of a nearby airport improved the convenience of living!”



Figure 1. Case-1 PF study.

“Let's decide to live here because of rich nature though there is an inconvenience of”



Figure 2. Case-2 PF study.

“It was so good that we enjoyed the nature, although we consumed a lot of gas!”



Figure 3. Case-3 PF study.

such as “It’s wonderful if it’s possible to live in a place with full green.”

In Case-3 (Fig.3), positive answers were only 18 people (24%) for the speaker’s remark of “It was so good that we enjoyed the nature, although we consumed a lot of gas!” On the other hand, there were so many negative answers from 56 people (74.7%) against the remark because of various reasons such as worry about refueling fee (C2), worry about influence on natural environment and ecosystem (C3), reactions thinking about replacement toward low pollution transport like public transportation (C4) and so on.

**Table 2.** Rates of answers classified to 6 categories.

Case-1: Figure 1

	Attitude	Reasons for answers	%
1	Negative	Negative attitude on account of suffering personal environmental impact, etc.	44.0
2	↑↑	Negative attitude on account of a poor personal life-convenience	9.3
3	↑	Negative, although understanding convenience of urban life	12.0
4	↓	Attitude worrying about people’s noise annoyance in the region generally	16.0
5	↓↓	Attitude that is not going to take sides	2.7
6	Positive	Positive attitude that agrees to and accepts life-convenience, etc.	16.0

Case-2: Figure 2

	Attitude	Reasons for answers	%
1	Negative	Negative without any excuse	4.0
2	↑↑	Negative on account of inconvenient access to shopping & traffic facilities, i.e., affirmative for convenience of urban life	57.3
3	↑	Difficult to reply frankly because of guilty feelings for environmental impact	2.7
4	↓	Nature-affirmative, but anxious about convenience of life and job opportunity	6.7
5	↓↓	Positive attitude that caters to the opinion of the person company	5.3
6	Positive	Positive for a rich nature and calm life	24.0

Case-3: Figure 3

	Attitude	Reasons for answers	%
1	Negative	Negative without any excuse	1.3
2	↑↑	Negative due to fuel cost	16.0
3	↑	Guilty for impact on nature & ecosystem	32.0
4	↓	Positive for use of public transport & LEV from concern about environmental impact	25.3
5	↓↓	Difficult to reply frankly because of guilty feelings for environmental impact	1.3
6	Positive	Positive attitude for a trip or keeping in touch with nature	24.0

**CONCLUSIONS**

This paper made a report of a preliminary investigation on the co-existence of the airport and local communities. Result of an opinion survey suggests as follows: 1) the respondents have no objection to the preservation of natural environment, but they have some hesitation about life in natural environment due to inconveniences and few opportunities for employment. 2) The respondents seem to accept NIMBY facilities as far as those have little influence on their daily lives and environment or those improve their comfortable envi-

ronment. 3) On the other, they never accept such facilities as far as environmental load is very large, even when those advance life convenience and local economy. Result of a PF study also suggests as follows: 1) The respondents tend to have a negative attitude toward a scene, shown in Fig.1, where it is clearly anticipated to suffer noise damage. 2) On the other, they tend to have a negative attitude to a rural life with neglecting convenience of life, shown in Fig.2. 3) They also tend to show a different attitude on energy-saving and resource-saving, shown in Fig.3. We can conclude that they are strongly aware of the importance of nature environment, but at the same time they wish that life convenience would be compatible with nature environment.

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**REFERENCES**

- 1 S.Namba et al. “Proposal of format for social survey on noise problem” *The Journal of The Acoustical Society of Japan.* 62 (4), 351-356(2006).
- 2 S.Oiso “The Effective Communication Methodology and Influence of Merit Information on Nuclear Power” *INSS Journal*, 14, 16-27, (2007).
- 3 S.Yasuda “Planning and Analysis for Social Survey” *Tokyo Univ. Press.* (1980).
- 4 Rosenzweig, S. “Guide to Reserch on the Rosenzweig Picture Frustration(P-F) Study, 1934-1974” *Journal of Personality Assessment*, 40,6,599-606, Dec., (1976).
- 5 Y.Ohkuma “PF Study” *Kakiuchi press.* 355-368, (1993)
- 6 S.Namba et al. “A questionnaire survey on community noise” *The Journal of The Acoustical Society of Japan.* 34,592-599 (1978).
- 7 N.Hashimoto et al. “Basic research on response against noise complaint using Picture-Frustration study -Study on noise dispute affair- ” *AIJ J. Technol. Des.* No.22, 335-340, Dec.,(2005).