

## Effect of Information Provision for Encouragement of Use of Bus Service

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**Abstract:** Recently, it is said that introduction of public involved approach into planning of local public transport is very important not only to understand and reflect opinions of local residents but also to make agreements. However, it seems that there are some issues such as information provision, procedures of approach and each role in the public involved activities, in order to realize and maintain the local public transport service.

Therefore, this study focused on effectiveness of the contents and provision methods of information in the public involved activities from aspects of awareness and behavior of local residents.

As a result, it was revealed that providing appropriate information related to conditions of individuals and local area in the future, also information about the importance of public involvement influenced understanding for the necessity of bus service, awareness of collaboration and bus use.

*Keywords:* Bus service, Information provision, Public involved approach, Factor analysis

### 1. INTRODUCTION

Recently, it was clarified that it brings beneficial results by local residents proactively discussing about the service of local public transport with the supply sides, such as local public transport companies and local government, in order to understand and reflect opinions of local residents, make agreements and encourage them to use bus (e.g. Nakamura *et al.*, 1998; Nakagawa, 2003; Kato *et al.*, 2003; Deguchi, 2007).

It is essential to give sufficient consideration to “information provision”, “contents of public involved activities” and “division of roles between each of the parties”.

Among three considerations which mentioned above, Inoi (2007) focused on division of roles and clarified what local residents can do and what they can not do in public involved activities. Kato *et al.* (2009) clarified the role of each local residents, bus companies and local government.

Moreover, support from local residents is important to realize the sustainable bus service. It is also said that to help local residents to feel sense of crisis about local public transport is necessary to have support from local residents (e.g. Okamura *et al.*, 2009). Feeling sense of crisis about local public transport is the same meaning as understanding the necessity of local public transport. However, it has not been clarified which information is

more effective among many information that can be provided, in order to help local residents to understand the necessity of local public transport.

Therefore, this study aimed to clarify some effective contents and provision methods of information for public involved activities in order to realize and maintain the bus service.

## 2. OUTLINE OF CASE STUDY

### 2.1 Target City

Kawachi-nagano city in Japan, as a case study city in this study, put an emphasis on establishment of the sustainable public transport network in 2005. This is because of some problems such as decrement of population, increment of nuclear families and arrival of aging society. In 2006, this city established a project group which includes academic experts of Osaka City University, and some departments in Kawachi-nagano city. Then, the report as a guideline of public transport in Kawachi-nagano city was published. In addition, this report was revised as local transport plan in Kawachi-nagano city (LTP). The introduction of public involved approach into planning of local public transport was showed clearly in LTP.

### 2.2 Target Area

This study focused on Shimosato-Monzen-Nakao area shown in Figure1 and decided to discuss about introducing a new bus service into this area by public involved approach. This is because the necessity of bus service was indicated in LTP, in addition, residents of this area have been requiring bus service.

This area is located in a mountain area of Kawachi-nagano city situated in 4km south-west from the Kawachi-nagano station which is the center of city. The local population is about 900 and the ratio of aged population is around 26% and the farthest house from a bus stop in this area is about 1.1km away.

If the available area for using the bus service is defined within 400m from a bus stop, the ratio of population who can use this bus service is 29.7%. In the case of 200m, the ratio is only 10.6%. In addition to the low level of the bus service, the decreasing trend of the number of bus users in this area is stronger than that of the whole city as shown in Figure 2.

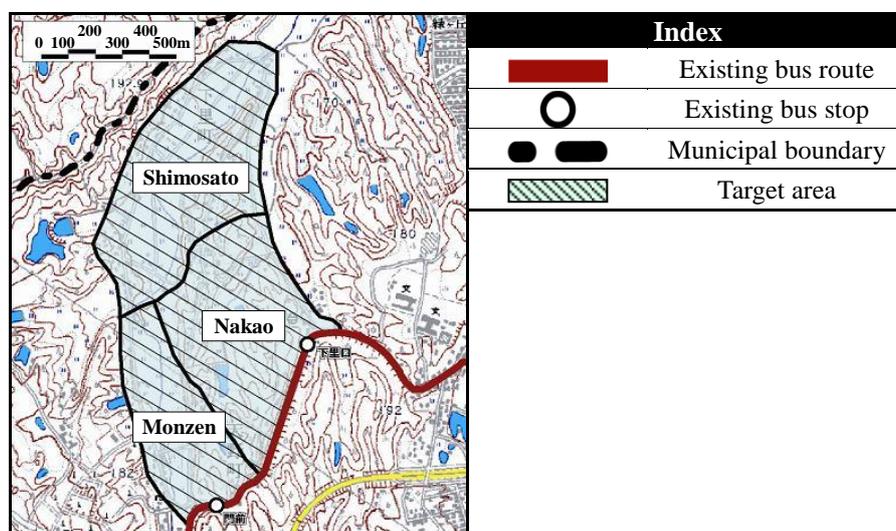


Figure 1. Location of target area

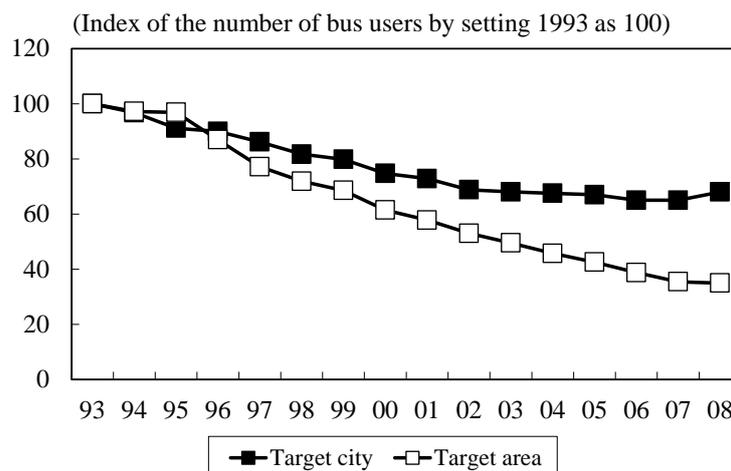


Figure 2. Change in the number of bus users in Kawachi-nagano city

### 3. PUBLIC INVOLVED ACTIVITIES

The public involved process in this case study is shown in Table 1. The organization for public involved activities was consisted of local residents (including members of neighborhood community association), local government, staff of bus company and academic experts of Osaka City University.

Here, some contents concerned within public involved activities in this area are explained as follows.

Table 1. Process of public involved activities to introduce the temporarily bus service

First stage	Details
Start meeting	Discussion of the policy about public involved activities
Reviewing meetings	Consideration of first questionnaire survey
Questionnaire Survey	Investigation of the necessity of bus service in local area
Second stage	Details
Feasibility meeting	Explanation of the results of first questionnaire survey and first proposal of the trial bus service Decision of the trial bus service
Events	Inspection of route and bus stops of the trial bus service Test-riding event of the trial bus service
Final stage	Details
Questionnaire Survey	Investigation of 1) intention to use the trial bus service 2) influence of information provision to the attitude of bus use
Final meeting	Judgement of introducing the trial bus service based on the forecast of the number of bus trips
Follow-up stage	Details
Questionnaire Survey	Investigation of 1) confirming the condition of bus use 2) influence of information provision to actual bus use

### 3.1 First Stage

At the first meeting on October 2008, it reached an agreement that it is necessary to investigate needs for bus service of local residents, in order to consider the feasibility of bus services. Next, to consider survey items and method, three times of meetings were held from November to December 2008. The questionnaire survey for investigating the needs for bus service was conducted from February to March 2009.

The questionnaire survey was conducted for all residents aged 7 and over in the target area, 675 respondents were obtained from distributed 1000 questionnaire sheets.

Figure 3 shows that more than 50% of the respondents in all age groups intend to use the new bus service. Especially, it was clarified that there is a number of needs for not only going to school for who are 19years old and under, but also going to hospital for who are 70 years old and over.

Figure 4 shows that there is a number of residents who intend to go around Kawachi-nagano station, Osaka city and Sakai city. This means, Kawachi-nagano station is the major terminal destination for bus users in this area.

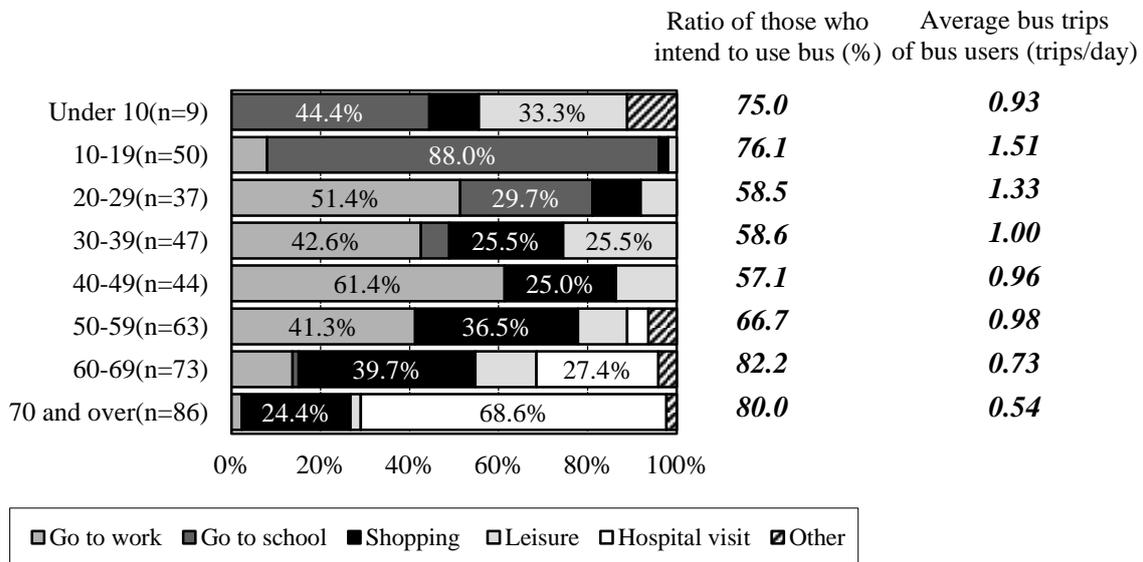


Figure 3. Needs of bus use

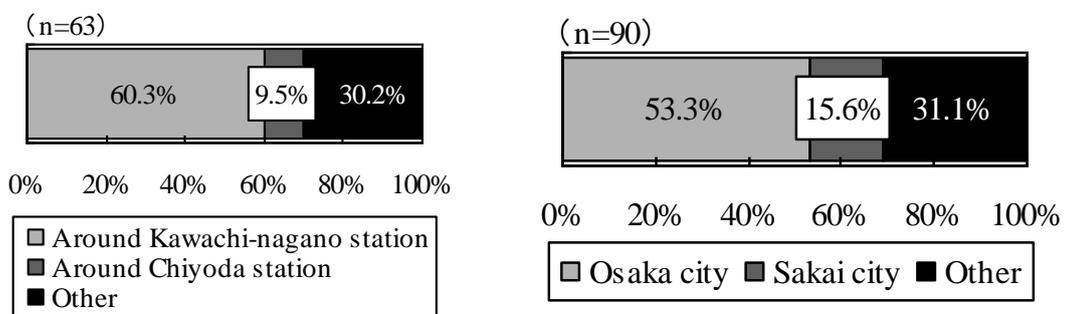


Figure 4. Destination of local residents by using bus service

### 3.2 Second Stage

Based on the results of questionnaire survey, it should be evaluated that the introduction of the new bus service connected to existing bus route will be helpful to improve convenience of the mobility of residents. Therefore, local government proposed the route and bus stops for trial bus operation at the meeting. As a result, the organization modified the first proposal of the trial bus operation as shown in Figure 5, according to major opinions of the meeting.

Afterward, some events such as test-riding, inspecting the trial route and the location of bus stops took place, in order to improve the feasibility of bus service, and also to let more residents know the trial bus service.

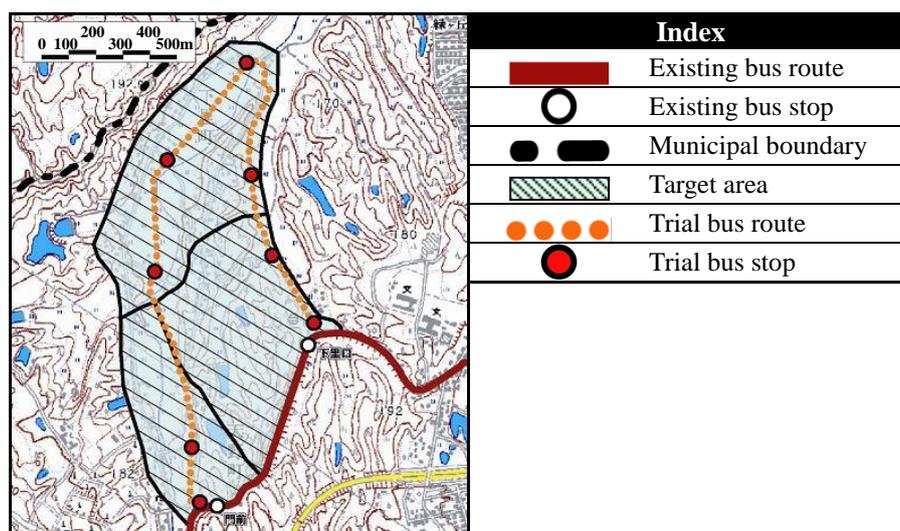


Figure 5. Trial bus route map

### 3.3 Final Stage

As the final stage of judgement of introducing the trial bus service, the second questionnaire survey was conducted for all residents aged 7 and over in this area on December 2009 by using

Table 2. Intention of trial bus use before and after informing a decision about the trial bus service

Age	Present		Before informing the decision		After informing the decision	
	I	II	III	IV	III	IV
Under 10	0.0	0.00	75.0	0.93	80.0	0.72
10-19	27.7	1.71	76.1	1.51	79.3	1.14
20-29	17.2	1.47	58.5	1.33	57.1	1.34
30-39	7.1	1.48	58.6	1.00	69.2	0.75
40-49	2.6	1.36	57.1	0.96	58.1	0.86
50-59	11.1	1.48	66.7	0.98	55.3	0.78
60-69	10.8	0.77	82.2	0.73	72.5	0.30
70 and over	15.3	0.62	80.0	0.54	76.7	0.46
Average	12.4	1.22	69.9	0.93	68.8	0.69

\* Present condition : I: Ratio of bus users (%), II: Average bus trips of bus users (trips/day)

\* Intention to use : III: Ratio of those who intend to use (%),

IV: Expected average bus trips of potential bus users (trips/day)

the method of posting for distributing and collecting. This survey mainly aimed to know the intention of using the trial bus service and also the influence of information provision to the attitude of bus use. Therefore, major questions were consisted of individual attributes, intention of bus use, degree of understanding for each information, necessity of bus service and intention to participate in public involved activities. As a result, 289 respondents were obtained from distributed 880 questionnaire sheets.

As the result of comparison analysis about intention of trial bus use before and after informing a decision about the trial bus service, both ratio of those who intend to use the trial bus service and expected average bus trips of potential bus users decrease slightly, as shown in Table 2. It is considered that the reason is because some people recognize that they can expect little advantage by informing a decision about the trial bus service.

However, the forecasting results of the number of bus use based on the forecast procedure as shown in Figure 6, data of present condition and intention to use bus indicates that it can be expected that the number of bus use grows 3.4 times bigger than at present, as shown in Figure 7. Therefore, it can be said that a decision of the trial bus service is appropriate for local residents in this area.

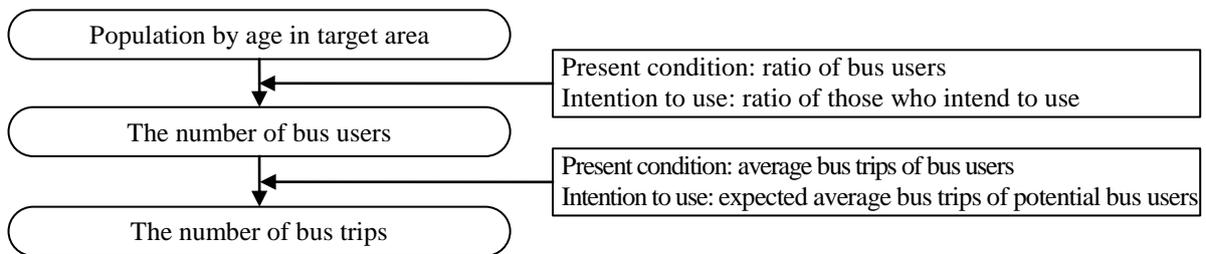


Figure 6. Forecasting flow of the number of bus trips

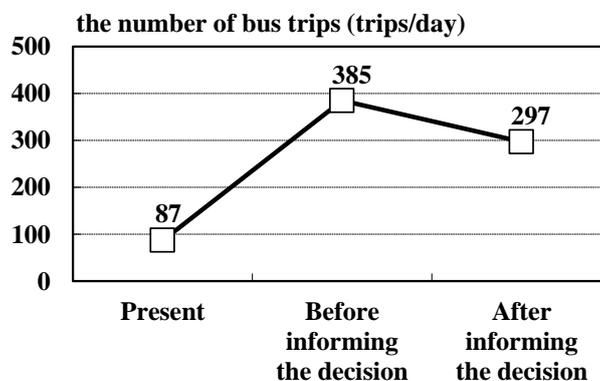


Figure 7. Forecasting result of the number of bus trips

### 3.4 Follow-up Stage

After introducing the trial bus service, the third questionnaire survey was conducted for all residents aged 7 and over in this area on July 2010 by using method of posting for distributing and collecting (642 respondents were obtained from 704 questionnaire sheets distributed), in order to confirm the condition of bus use and the influence of each information to bus use.

Main questionnaire items are consisted of individual attributes, actual condition of trial bus use, change of travel behavior by using the trial bus service, understanding of provided information, participation of public involved activities, and the intention of participation to public involved activities in the future.

## 4. ANALYSIS OF EFFECTS OF INFORMATION PROVISION

### 4.1 Types of Information and Providing Methods in Case Study

Some information as shown in Table 3 were provided in each public involved activity for discussing with local residents about the necessity of bus service and the introduction of the trial bus service. In addition, they were distributed by using some media as shown in Table 4, in order to let all local residents know.

Table 3. Information which are provided through public involved activities

Kind of information
No.1 : Decrement of the number of bus users in target area and target city
No.2 : Increase in the ratio of bus use with aging
No.3 : Difficulty of sustaining bus services
No.4 : Information about the trial bus service such as route and time table etc.
No.5 : Amount of tax paid for bus services (JPY/person)
No.6 : Importance of collaboration
No.7 : Making decision about continuing the trial bus service depending on condition of bus use

Table 4. Media for distributing information

Kind of media
Person : president or board members of neighborhood community association residents who participated in workshops for discussing about the necessity of bus services and introduction of the trial bus service family acquaintance
Tool : newsletter, notice board, circular

### 4.2 Evaluation of Effect of Information Provision from the Aspect of Awareness

In this study, it is assumed that local residents were encouraged to understand the necessity of bus service by understanding some provided information. In addition, understanding for the necessity of bus service would increase the number of local residents who intend to use bus service and participate in public involved activities, as shown in Figure 8.

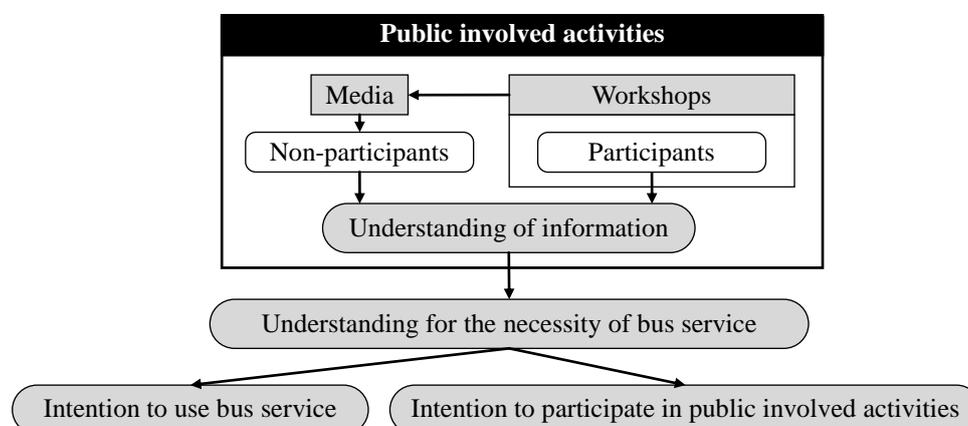


Figure 8. Effect of public involved activities with information

At first, in order to clarify the specified items and categories that encouraged the improvement of the awareness for the necessity of bus service, some factors including information especially concerned with future condition, were analyzed by using quantification theory type II and chi-squared test. Independent variables are individual attributes such as age and occupation, resident area, media and information. Dependent variable is the understanding for the necessity of bus service which classified into two such as “Understand the necessity of bus service” and “Does not understand the necessity of bus service”. In addition, the result of analysis by using quantification theory II shows only independent variables which achieve statistical significance based on chi-squared test and also does not have problem of multicollinearity.

As the result, the information concerned with the future condition and the importance of public involved approach must be helpful to encourage local residents to understand the necessity of bus service, as shown in Figure 9.

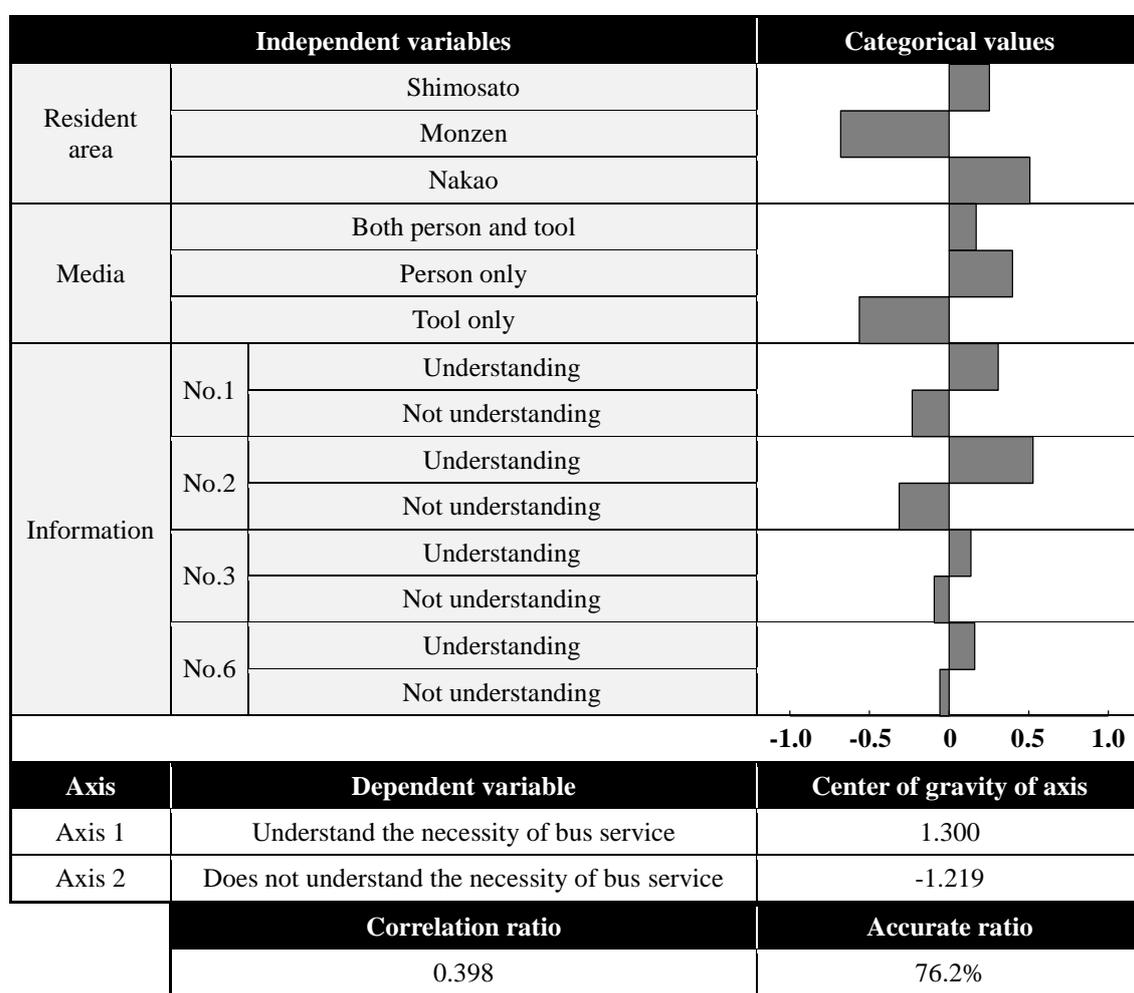


Figure 9. Factor analysis of understanding for the necessity of bus service

Secondly, those who select one from option No.1 to 6 was defined as “high awareness of collaboration”, and those who select option No.7 was defined as “low awareness of collaboration” (Table 5).

Table 5. Options which local residents can contribute to maintain bus service in local area

Kind of option
No.1 : Support elder people to board and exit the bus easily
No.2 : Encourage local residents to use bus service by various methods
No.3 : Increase one’s own use of bus service
No.4 : Participate in workshops which discuss about bus service
No.5 : Improve the comfort of bus service (ex. cleaning around bus stop etc)
No.6 : Make a donation in order to maintain bus service
No.7 : Nothing special

As a result of relative analyses between degree of understanding for the necessity of bus service and other awareness, such as awareness of collaboration and intention to use bus service, those who understand the necessity of bus service have higher awareness of collaboration than those who do not understand the necessity of bus service (Figure 10). It was also proved that those who understand the necessity of bus service have higher intention to use bus service than those who do not understand the necessity of bus service.

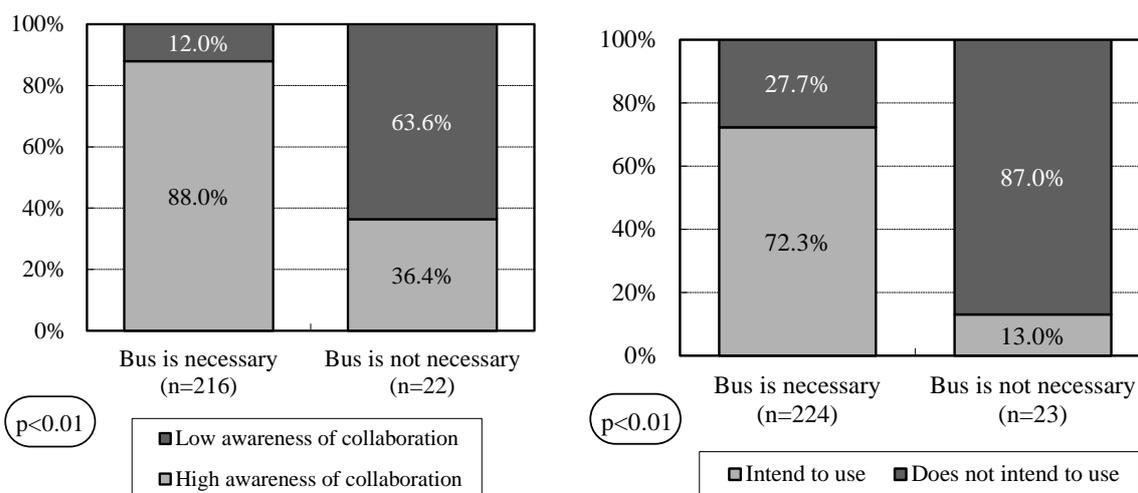


Figure 10. Relativeness between understanding for the necessity of bus service and other awareness

### 4.3 Evaluation of Effect of Information Provision from the Aspect of Behavior

This section aimed to evaluate effect of information provision for encouragement of use of bus service, by using same methods as 4.2. “Both person and tool” and “Person only” were integrated into “Both person and tool / Person only”, because of improvement of analytical precision.

The result of effectiveness analysis was shown as follows (Figure 11).

- 1) Individual attributes and resident area related to convenience and need of the trial bus service greatly affect bus use behavior.
- 2) Information No.1, 3, 5, 6 have comparatively small but a reliable effect to encourage local residents to use bus service.

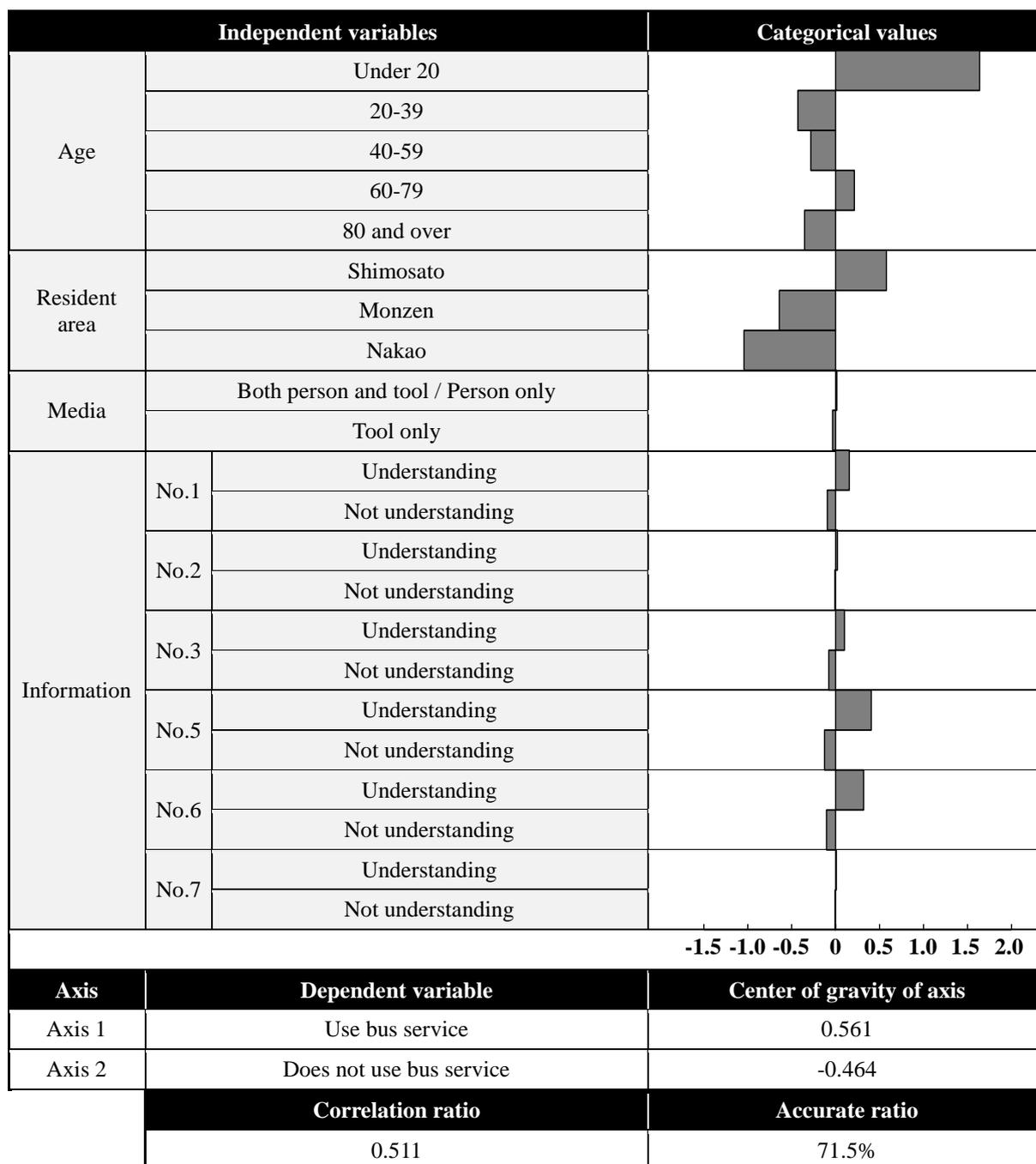


Figure 11. Factor analysis of bus use behavior

## 5. SOCIAL EFFECTS OF INTRODUCTION OF THE TRIAL BUS SERVICE

Three social effects as increment of opportunity to go out, decrement of opportunity to use car or motorbike and increment of opportunity to go to the center of Kawachi-nagano city around Kawachi-nagano station were evaluated by the introduction of the trial bus service.

As a result, it is clarified that introduction of the trial bus service contributes to three social effects (Figure 12).

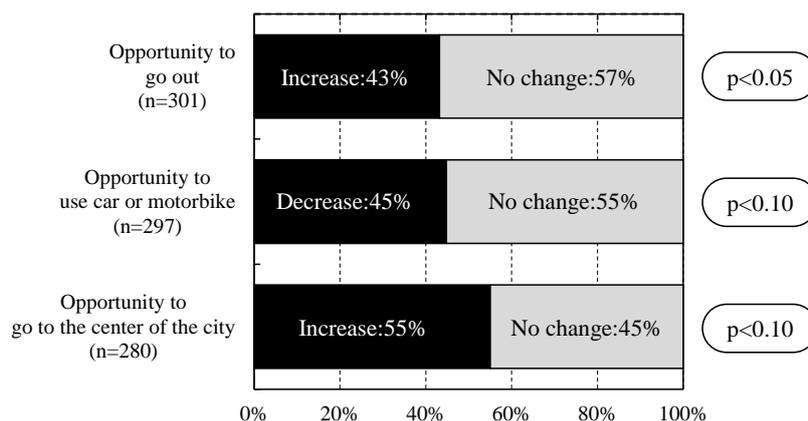


Figure 12. Social effects of introduction of the trial bus service

## 6. CONCLUSION AND NEXT

Some major results are summarized as the follows.

- 1) To provide information directly by local residents is more helpful to encourage local residents to understand the necessity of bus service.
- 2) To provide some information concerned with the future condition and the importance of public involved approach must be helpful to encourage local residents to understand the necessity of bus service and to use bus service.
- 3) Understanding for the necessity of bus service enhances awareness of collaboration and willingness to use bus service.
- 4) Bus service introduced by public involved activities has possibility to bring about social effects such as increment of opportunity to go out, decrement of opportunity to use car or motorbike and increment of opportunity to go to the center of the city.

Next step is to analyze effectiveness of information provision including information which introduction of bus service has possibility to bring about three social effects such as increment of opportunity to go out, decrement of opportunity to use car or motorbike and increment of opportunity to go to the center of the city.

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