

## Residents' Evaluation to Route Bus and Painting Show in Kaga City

Takashi Oyabu<sup>1</sup>, Yusuke Kajiwara<sup>2</sup>, Hiromi Ban<sup>3</sup>, and Haruhiko Kimura<sup>4</sup>

<sup>1</sup> Kokusai Business Gakuin College, oyabu24@gmail.com

<sup>2</sup> College of Information Science and Engineering, Ritsumeikan University, kajiwara@de.is.ritsumei.ac.jp

<sup>3</sup> Graduate School of Engineering, Nagaoka University of Technology, ban@vos.nagaokaut.ac.jp

<sup>4</sup> Graduate school of Natural Science and Technology, Kanazawa University, kimura@ec.t.kanazawa-u.ac.jp

### Abstract

*In Japanese rural areas, there are various types of decreasing trends in customer number of public transportation due to the falling birth rate and the aging. Especially, the trend for route bus is of particular note even though it is close to the inhabitants. Reduction of the transportation-fee surplus in bus operating company is continuing and the local government supports it. On the other hand, the number of people who are unable to go shopping will increase more if the bus service could become impossible. The number of people who are unable to visit a clinic will also increase by decreasing the number of the service. It will be difficult to continue the function of community as the workforce decreases due to the acceleration of demographic aging. In this study, the advantages and the rate of utilization of route bus were examined in Yamanaka Spa area which belongs to Kaga City in Japan. The paintings are displayed on the bus and those are painted by kindergartners in the area. Those bestow a healing power on the passengers, especially elderly persons. As a result, most passenger use the bus in the morning and daytime, and the purpose is shopping and hospital (clinic) visit. About 50 % of passengers are taking the bus once weekly and over. The passenger of 86% evaluated the painting show as "good". It became obvious that the painting show played a part to create good ambience for the passengers. Most workers use own private vehicle because the last bus closes between 7 and 8 p.m. in the area.*

### Keywords

*low birth rate and longevity, rural area, route bus, decrease in passenger, painting show*

### 1. INTRODUCTION

In 2013, the Japanese government reported that Japan was well on the way to a super-aging society and the rate of elderly person would be over 40 % in fifty years' time. The ratio is about 25 % in 2014. Japan has the highest aging levels in the world. Some areas are over 40 % in the provinces. Noto peninsula area is one such example, which area is located in the northern part of Ishikawa Prefecture. Kaga City, which is located in the southern part of the prefecture, is about 30%. The both areas are seeking an immediate countermeasure against the falling birth rate and the aging population (Tsuboyama et al., 2013). In Kaga city, there is a fade-out situation for the route bus line and there is also the decrease of number of the service with the acceleration of demographic aging. Therefore, there is a tendency to increase the people who are unable to go shopping and visit a clinic (vulnerable people for shopping and clinic). There is not a universal solution to limit on the falling population and aging society. Ensuring of route bus service forms the backbone of life of local resident.

In this study, the residents' evaluation to the route

bus and a painting show on the bus in the city were investigated. Preliminary experiment was carried out in the year before. As the result, the following feelings were gotten. First, it is the most effective means to increase the utilization ratio of route bus service by elderly person and the measure could prevent the decrease of passenger due to falling population. Second, it is necessary to create a pleasant atmosphere on the bus for the aged in addition to accessible schedule and acceptable fare to increase the rate of bus utilization. Of course, it is necessary to communicate with a bus driver pleasurably. Interesting advertisement leaflets and paintings is also effective to create a good ambience.

In this study, the effects on placing paintings on a bus were examined in detail, which were drawn by kindergartners in Yamanaka area of Kaga City to promote the bus utilization of the aged in addition to residents. The examination was carried out on "Onsen-Yamanaka line" which connects between Yamanaka-Spa area and JR Kaga-Onsen station. The project is called as "Kindergartener Art Show on Bus" (organizer: transport office of city government) which is aimed at revitalization of route bus. The route bus is an important public transportation in rural area. It was supported by the preliminary experiment that the painting shows which were painted by children had various types of healing

effects. Many elderly persons took an interest in the paintings even in this experiment. And the intention to get on the route bus again will grow by replacing the paintings and the utilization efficiency will increase further as a result. This project is the third time and carried out November in 2013 and February in 2014. The evaluation for this project is examined to figure out whether to continue it.

## 2. OVERVIEW OF KAGA CITY

There were over eighty thousands persons in 1990s in Kaga City and it achieved a peak. The population is decreasing gradually after that. Manufacturing industry (machine parts, especially clout nail and screw) and hot springs are main industries in the city. There are three main hot-spring areas, namely Yamanaka, Yamashiro and Katayamatsu. Traditional crafts are also popular in the areas, which are Yamanaka-nuri (lacquered ware) and Kutani ware (ceramic). Demographic change in Kaga City is shown in Figure 1.

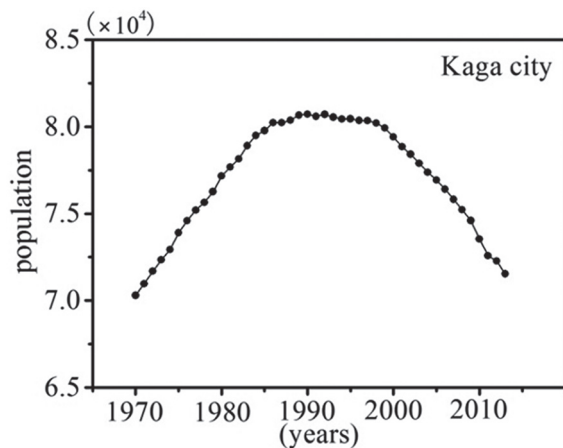


Fig. 1 Demographic change in Kaga City

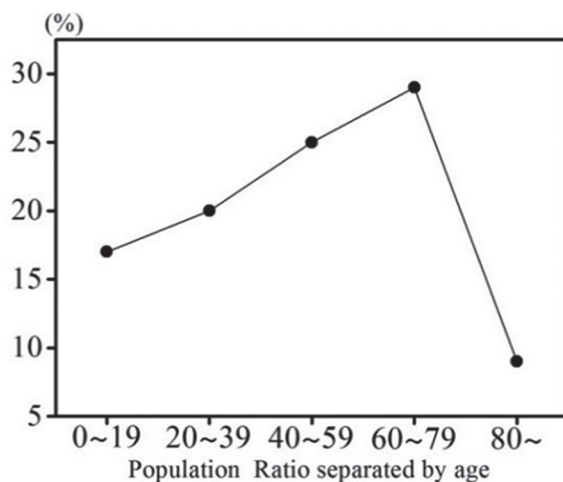


Fig. 2 Composition ratio of each generation in Oct. 2013

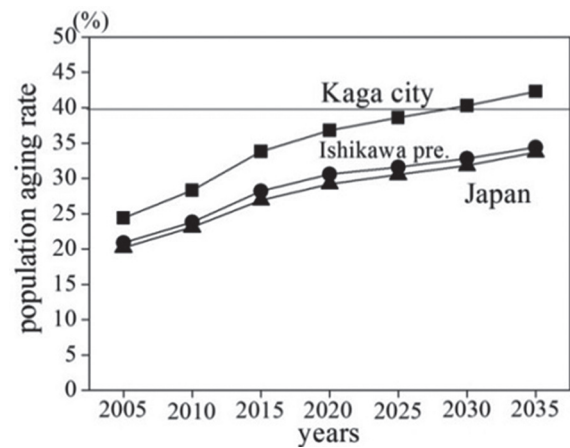


Fig. 3 Change of the aging rate in Kaga City

There are about seventy two thousands in October, 2013. Population rate in each generation is also shown in Figure 2. The rate for 60 to 79 years old accounts for 30 % and the ratio of 80 years old and over shows a sharp decrease. The ratio change of the aged (65 years old and over) is indicated in Figure 3 (Statistic section of Kaga City, 2013). The ones for Japan and Ishikawa Prefecture are also represented as reference in the figure. The characteristics after 2013 are predicted value. In the figure, the population aging rate will reach about 40 % in 2025. Japanese Cabinet Office estimates that the aging rate will reach 40 % in 2060 as a whole. The aging ratio of Kaga City reaches 40 % as 25 years ahead of schedule than the one for Japan. It has a trend to progress quickly. The working spots for young people gather around Kanazawa City (capital city of Ishikawa Prefecture), and the ratio of south (Kaga City) and north areas (Noto Peninsula) tend to increase. Kanazawa City is positioned roughly in the center of Ishikawa Prefecture.

In Kaga City, a plan which is called as “Kaga Peace Model” has been practiced to secure the means of transportation for residents. Following measures are conducted as transportation arrangements in 2013, namely (1) route bus (Onsen-Yamanaka line: 42 services, Yamashiro-Daisyoji line: 12 services, Yoshizaki line: 8 services, Onsen-Katayamatsu line: 7 services), (2) CAN-BUS, which is a kind of round tour bus for tourist (23 services), (3) Osanpo-go, which is also a kind of tour bus and makes a loop trip in 40 minutes (ten services), (4) share-ride taxi (demand type: four area services, namely Hashidate, Chokushi, Higashi-Tanikuchi and Yamanaka), (5) vehicle for supporting communities (application of distribution vehicles by hospital and driving school in the areas, these are not public transportation). Item (2) and (3) are mainly used by tourists. Item (4) and (5) are run because there is no public transportation. Key transportation is the

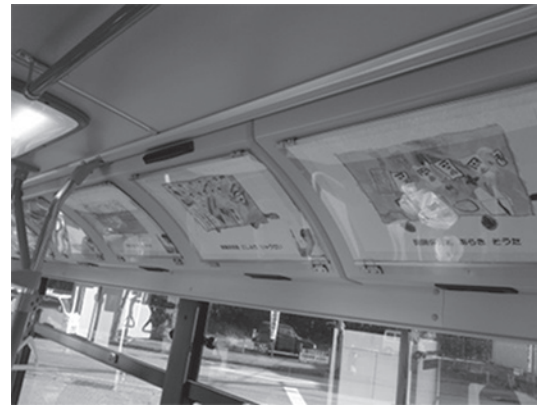
route bus and the business model (idea) is required to provide the transportation means. If inhabitants can communicate comfortably on the bus, utilization factor of bus will increase and the number of service will also increase. Of course, efficiency will be improved. A guide in the train of Noto Tetudo (railroad) makes considerable achievements as a similar successful case (The Hokuriku-Cyūnichi Shimbun morning edition, 2013). Noto railway is connecting Nanao City and Anamizu Town (about 33.1 km) in Noto peninsula. Additionally, art show on the bus could have the same effect when passengers appreciate the art with interest and have a healing effect.

### 3. QUESTIONNAIRE SURVEY

Protection of people's lives should be considered sufficiently in the rural area because the area is mostly in the process of population decrease. Especially, it is necessary to take measure against shopping and hospital visit (Sasai, 2010). It is fundamental to take a bus for transportation arrangement in the area. A decline in bus ridership is derived from population decline. And it is popular to use bus or taxi as transportation way when the aged moves. It is a high-priority issue to secure the transportation methods. Even though there is a pickup bus for hospital visit, it is unsuitable for shopping and utilization of recreation facility. It is strongly required to utilize route bus, school bus, taxi and pickup bus of each facility comprehensively. The main factors to increase utilization ratio of route bus are effective and timely "fare" and "operation diagram". Negative spiral will occur when the number of bus service decreases and the fare goes up. And the number of passenger will decrease furthermore when the spiral occurs. First of all, it is necessary to increase bus-utilization rate and the measure is necessary. A strategy is planned as the measure. It is named "Art show on bus by children". In this study, the effect was evaluated and the transportation trend of inhabit-



**Fig. 4** Advertising of art show lies centrally on the bus side



**Fig. 5** Paintings stacked up on the bus

ant was examined. The two preliminary surveys were carried out a year and two years ago before this study (2013), namely 2011 and 2012. Five investigators got on to a public bus and carried out a questionnaire survey to passengers in this study. The photograph of route bus on which there is the advertising of art show is stick up, is shown in Figure 4. A photograph of stacked up paintings is indicated in Figure 5. The number of gathered questionnaire sheets is 99. Total questionnaire days is five (including Sunday).

### 4. QUESTIONNAIRE RESULT

Questionnaire survey was carried out by hearing investigation on the bus, namely five investigators got on the bus and heard the opinions of passengers about the painting show and the objective of bus boarding. The investigated day and the number of collected questionnaire sheets are as follows.

(1) Nov.17, 2013 (Sunday):	40 sheets
(2) Nov.21, 2013 (Thursday):	27 sheets
(3) Nov.22, 2013 (Friday):	9 sheets
(4) Dec.18, 2013 (Wednesday):	5 sheets
(5) Dec.19, 2013 (Thursday):	18 sheets
Total	99 sheets

The investigations were carried out at an early hour, in daytime and late afternoon. There were few passengers on each bus and the investigators got on plural buses to collect a lot of sheets. There are some tourists on Sunday. The items of questionnaire are composed of the following three sections.

- (1) Attribute (age, gender and habitation area)
- (2) Evaluation on painting show
- (3) Evaluation on route bus.

#### 4.1 Attribute

The categorize passengers according to gender are as

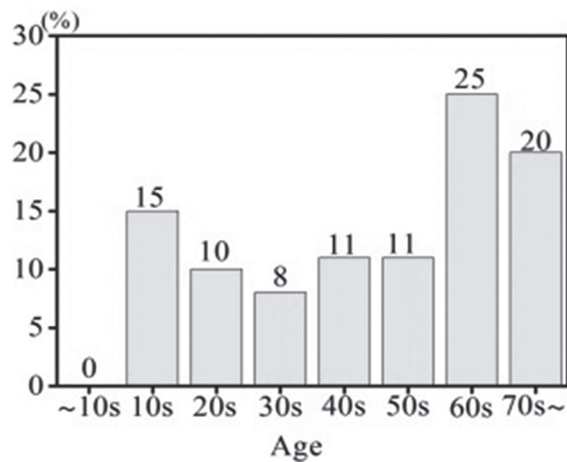


Fig. 6 Ratio of passenger generation

follows: male is 24 % and female is 76 %. The ratio for female is about three times as many as the one for male. Male usually takes off in one's car and female population is greater than the one for male in Japan. The ratio of generation is shown in Figure 6. The biggest generation ratio is 60's and the second is 70's and over. Route bus is an important transportation for elderly people and this can be also understood in Figure 2. The ratio of 30's is lowest. The generation is working population and they have a big range, for example leisure, sports and knowledge acquisition. Therefore, most of them have a private vehicle respectively. The people of 20's to 50's in the area have the similar tendency. The passengers of 73 % for route bus are living in Kaga City and the ones of 20 % are living in other prefectures. Some of passengers are tourists for Yamanaka Spa area. Inhabitants living in other municipalities are negligible because many of them commute to work by own car.

#### 4.2 Evaluation for painting show

Art show on a bus painted by kindergarteners did not become widely known. The rate of passengers who did not know the show accounted for 84 % and others (16 %) already knew it. The show made public by the web page of Kaga City and a newsletter magazine "Kaga". The medium did not have an efficiency for the passengers, especially the aged. They do not read them carefully. The evaluation for the show is indicated in Figure 7. The rate for "very good" and "good" accounts for 86 %. The one for "bad" is no more than 1 %. It has a great effect for the passengers. There are some feedbacks that a few passengers have also interests in the show painted by primary school children and middle school students. Many passengers (85 %) want to maintain the show and other people (15 %) choose "unclear". It is considered that there is an effect to maintain the show.

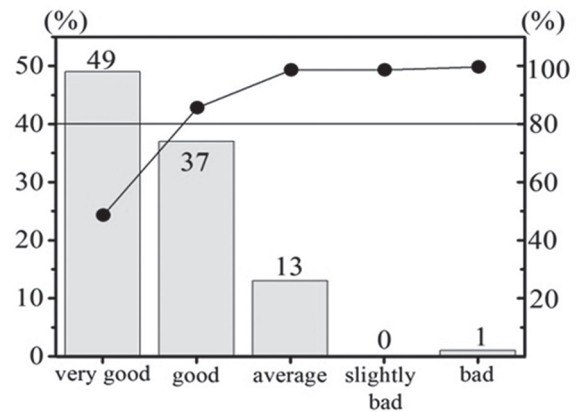


Fig. 7 Evaluation for the painting show

#### 4.3 Evaluation for bus ridership

It is necessary that many passengers utilize the route bus. It is preferable to bring down the fares and increase the number of service in order to increase the number of passenger. It is more efficient to assemble the centered establishments (e.g. shopping center, school and hospital) and connect between the point and habitation area (Okumoto et al., 2002). The establishments are the facilities for gathering people. In Kaga City, a big shopping center is established around JR Kaga-onsen station and two hospitals will be merged by the city. The hospital is also designed to build around the station. New urban development in which the JR station is a core, is already under way. Limited train stops at the station and three spa areas (Yamanaka, Yamashiro and Katayamatsu) are connected with the station by the public bus respectively. Tourist can also visit the spa areas by the bus. Tourists and inhabitants can communicate mutually on the bus. Radial route bus services are designed and JR station is also a bus station center. The questionnaire results on route bus are provided in below.

##### 4.3.1 Frequency and utilizing aim for bus service

Frequency and the utilizing aim for route bus are very important in this questionnaire survey. It is necessary to make a bus diagram matching with them. That will make bus utilization ratio higher. Key factor of utilization aim is "shopping" (30 %) because food supply is necessary every day. The second factor is "hospital visit" (15 %) and third is work trip (11 %). Next is commute to school (10 %). The passenger rate for commuting to work and school is small unexpectedly. This survey was carried out by collecting questionnaire sheets in wide range of hour including daytime. However, boarding rate is not large even in the morning and evening, namely passengers rate for commuting to work and attending to school is not so



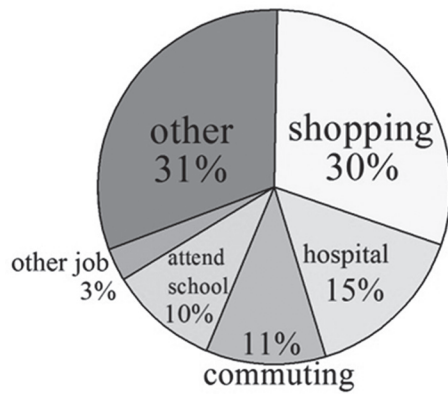


Fig. 8 Utilization aim of the passenger

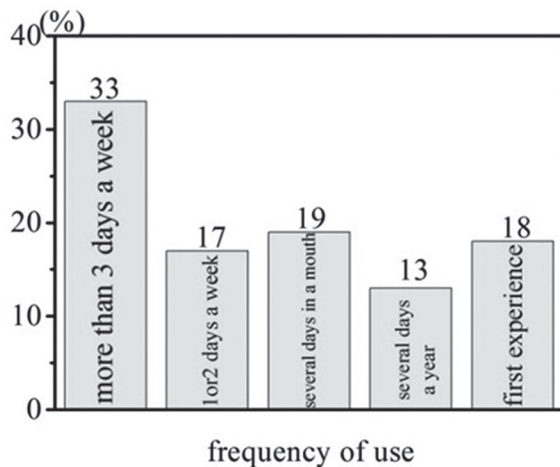


Fig. 9 Utilization frequency of the passenger

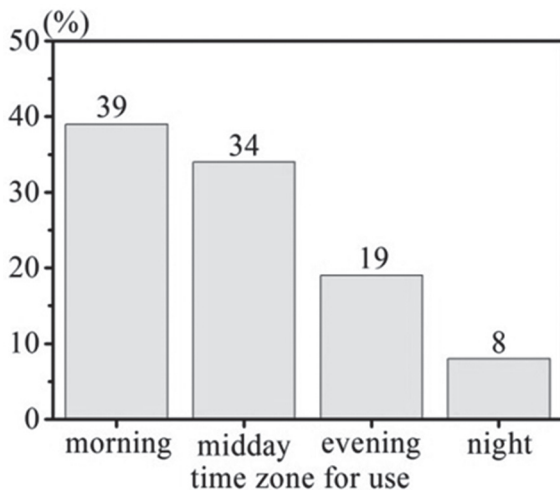


Fig. 10 Utilization hour

large. There are some persons (3 %) to go to another work (not routine job) by bus. Other aims account for 31 % of the boarding rate and the tourists are including in the one. This characteristics are shown in Figure 8. The characteristic of the utilization frequency is shown in Figure 9. Three or more times a week

accounts for 33 % and one or twice accounts for 17 %. The total of the rates reaches 50 %, namely fifty percentage of passengers utilizes the bus every week. The investigation of utilization hour was also carried out. The result is shown in Figure 10. The rate for morning and daytime accounts for 73 %. The rate for evening is 19 % and it is less. This tendency comes into line with the ratio (21 %) for commuting to work and school. Bus passengers for shopping, hospital visit and another work are distributed in the morning and daytime. Inhabitant satisfaction will increase due to making inhabitant-friendly diagram in the daytime, namely accessible diagram to the facilities to which passengers want to go. The latest bus for Yamanaka-onsen from JR Kaga-onsen station operates among 18 to 19 p.m. The time zone is earlier to the residents and the diagram is not close to the requests from the community persons. There are facilities that many customers are attracting around JR Kaga-onsen station.

The length of time required to reach a nearest bus stop on foot is also examined and the result is shown in Figure 11. The rate of passengers within 10 min. is 64 % and the one over 15 min. is 26 %. When the population aging rate increases, the elderly persons over 10 min. could not get on a bus because they could not reach a bus stop on foot. It is necessary to consider the shifting means to a bus stop from their residents in future. One of them is a shared-taxi and volunteer who has a family car is also effective. It has to consider that the aged can get on a bus freely any place in the line. The demand responsive transport (DRT) which is generally called "demand bus" in Japan is also effective.

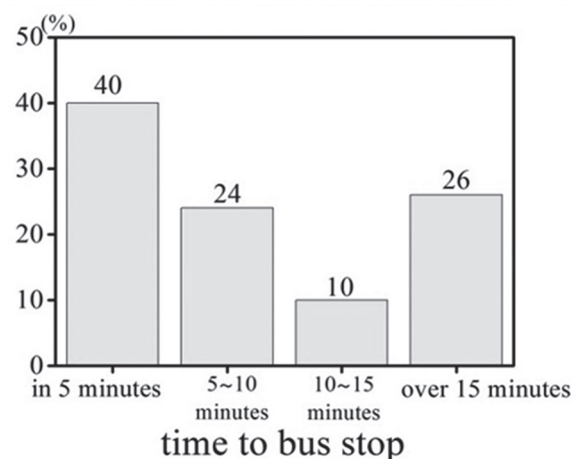


Fig. 11 Length of time required to reach a nearest bus stop

#### 4.3.2 Need for utilizing route bus and the fare

Necessities for utilizing the bus are also investigated.

The survey is carried out to examine the need of the route bus as a transportation device of resident, namely to decide whether it is essential or not.

The result is shown in Figure 12. The rate that there is no shifting measure except the bus is 44 % and the rate of 31 % utilizes the bus because there are services just as well.

Some of person (9 %) utilize the bus to catch a train. It is only a few. The persons make connections with the train and bus, and go out of the city. Many people live in and visit to only Kaga City. If there is no bus service, many people take a taxi or utilize the drop and pick up by the family member. The rate accounts for 72 %. The result is indicated in Figure 13. The ratio of the walk or cycle is 22 %. The one for drive by oneself is only 6 %. People who have a car and can drive it, do not utilize the bus from the beginning. The thinking on the number of bus service and the diagram are also examined. About half of passengers (48 %) feel just as well on the number of bus service. On the other hand, there are persons of 45 % who want to increase the services. The passenger satisfaction degree will increase up to 50 % when the number is increased according to residents' demands. The examined result on the number of service and the diagram is represented in Figure 14.

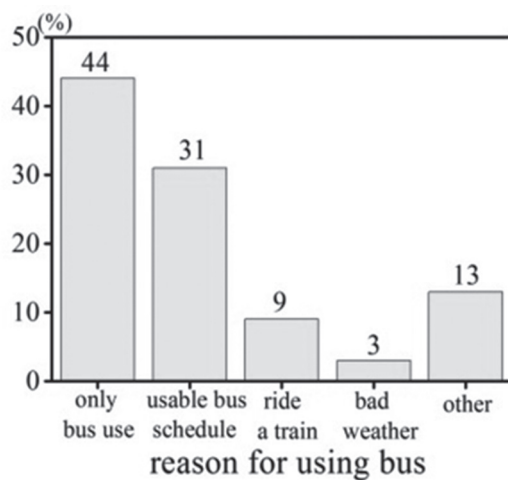


Fig. 12 Necessities for utilizing bus

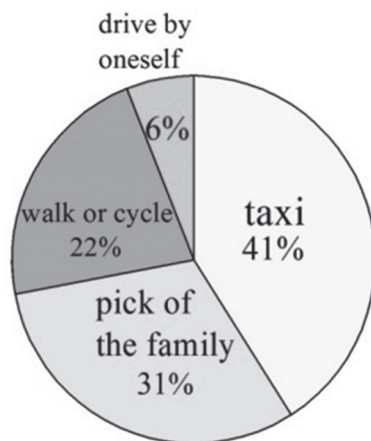


Fig. 13 Transportation measure when there is no bus service

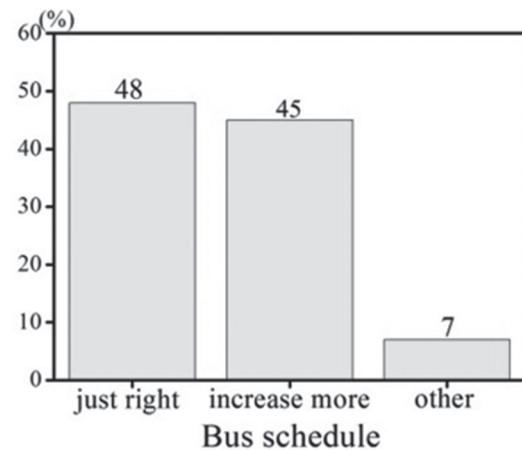


Fig. 14 Examined result on the number of service and the diagram

feel just as well on the number of bus service. On the other hand, there are persons of 45 % who want to increase the services. The passenger satisfaction degree will increase up to 50 % when the number is increased according to residents' demands. The examined result on the number of service and the diagram is represented in Figure 14.

Many persons evaluate the bus fare as "average" in the questionnaire sheet and the rate is 66 %. It leaves other items far behind. It is thought that inhabitants are at least satisfied with the fare. They are fully briefed on the financial condition of the bus operating company. Questionnaire results on bus fare is shown in Figure 15. Payment method (communication ticket, cash and ticket books) at the time of bus utilization is also examined and the result is indicated in Figure 16. Many passengers use the communication ticket (74 %) and the rate of ticket-books user is low compared with the result of Figure 9. Some passengers say that communication ticket is very convenient but it does

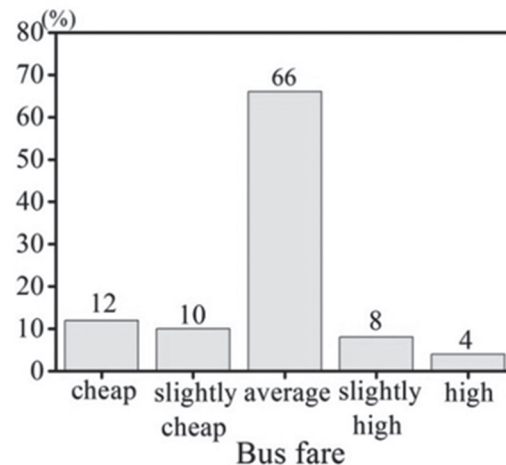


Fig. 15 Questionnaire results on bus fare

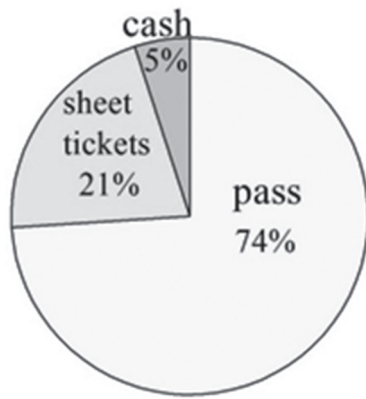


Fig. 16 Method of payment for fare

not cheap. It is better to make the fare a bit cheaper (for example 5,000 Japanese yen) and to offer the ticket for elderly persons.

It is important that many person can utilize the bus (Oyabu, 2013). Monthly ticket for all kinds of transport without limitation between stations is effective and the number of passenger will increase. In addition, opportunity for outgo will increase. And there are following requests from the passengers; keeping the voice at a comfortable pronunciation on bus, light-hearted chitchat with the bus driver, kindly driver, increasing the number of service and the route (especially Yamanaka-onsen to Daisyoji). The hospitality of bus driver to the passenger is important.

## 5. CONCLUSIONS

In Japan, it is difficult to maintain public transportation facilities in many rural areas due to the falling birth rate and the aging population. This has the potential to come down into a negative spiral, namely commuter and attending school person decreases and the number of bus service decreases. And the fare increases. At first, it is necessary to increase the passenger, especially aged people who occupy majority of the passenger. The requests of the aged person are important. Reasonable fare and powerful commutation pass for the aged is effective to increase the bus utilization ratio. Bus commuter pass is expensive, and it is bothersome to pay the bus fare with cash and ticket books for the aged. And it should be considered to take out a subsidy account to the pass for the aged. The aged have a preference for homelike atmosphere on the bus due to hearing investigation. One of them is a genial communication with the driver and the aged prefer it strongly. Another is various kinds of events on the bus, for example a painting show. This painting show received a high evaluation. But it is not clear whether the cost-effectiveness is high or not in

this study. However, it is obvious that the event give a comfortable healing to the aged passengers. Many of the aged sought healing even on bus. And it also becomes obvious that there are many elderly persons who want to go shopping and visit a hospital by bus in the morning and daytime. The study was carried out only in one bus line (Onsen-Yamanaka line) and it is considered that there is same tendency even in other lines.

It is asked that the service number, the fare and wide range of people should work together efficiently in public transportation facilities. Namely, it is necessary that various interesting events on the bus are carried out throughout a year. That will lead to increase the passengers (elderly and the person from other areas).

## References

- Okumoto, S., M. Morishige, and A. Shikita, On modalities of transportation toward revitalization for tourism and commerce, *Proceeding of The 17th Annual Meeting of Japanese Society on Tourism Study*, 233-236, 2002.
- Sasai, S., Issue for disadvantaged shoppers (Current condition and activities toward solution), *Rippo and Chosa*, No. 307, 109-119, 2010.
- Statistic section of Kaga City, *Statistical Information of Kaga City in 2012*, 2013.
- Oyabu, T., Study on new transportation system in Kaga City, *Society for Tourism Informatics*, Vol. 9, No. 1, 13-20, 2013.
- Tsuboyama, T., K. Mizuno, H. Sasaki, S. Nishihara, Construction of simulation environment for a demand bus using Swarm, *Proceeding of The 75th Annual Meeting of Information Processing Soc. of Japan*, No. 3V-2, 129-130, 2013.
- The Hokuriku-Cyunichi Shimbun, Morning Edition, Popular guide in Noto Tetsudo, 15th page (Sep.6), 2013.

(Received October 30, 2015; accepted November 12, 2015)