

# Analysis on the Role of Taxi Service and Taxi Subsidy Scheme for the Mobility of Elderly People Living in Depopulated Areas

Ayiguli AINI<sup>1</sup>, Hideo YAMANAKA<sup>2</sup> and Kaoru ONO<sup>3</sup>

<sup>1</sup> Member of JSCE, Graduate Student, Dept. of Civil and Eng., University of Tokushima  
(2-1, Minami-Josanjima, Tokushima 770-8506, Japan)

E-mail: aygul0321@gmail.com

<sup>2</sup>Member of JSCE, Professor, Graduate school of technology, industrial and Social Sciences, University of Tokushima  
(2-1, Minami-Josanjima, Tokushima 770-8506, Japan)

E-mail:yamanaka@ce.tokushima-u.ac.jp

<sup>3</sup>The Faculty of Regional Innovation, University of Miyazaki  
(1-1 Gakuen Kibanadai-nishi, Miyazaki 889-2192, Japan)

E-mail: kaoru\_o@cc.miyazaki-u.ac.jp

With the increasing number of aging population and deregulation policy on public transportation, securing the transportation mobility of elderly people, especially living in rural areas, becomes a serious problem. This paper mainly clarifies the actual conditions and issues for elderly people of using taxi service and taxi subsidy scheme in depopulated areas. In order to identify the role of these two services for securing the mobility of elderly, a comprehensive examination was carried out. Utilizing a variety of data collection methods including focus group, web survey was applied with 300 people in Japan, of which 200 were over 65 with different states of owning a private car and 100 family members who can answer the survey instead of elderly of their family. The findings emphasize the important role of taxi subsidy scheme as a support of maintaining the taxi service which is expected to cover the area with transportation service for elderly people. Being a relatively expensive fare becomes a major difficulty for elderly people using the taxi so many users of the taxi subsidy scheme have requested that the contents of the system currently used should be enhanced, which will increase the frequency of usage.

*Key Words* : taxi service, taxi subsidy scheme (TSS), rural areas, web questionnaire

## 1. INTRODUCTION

A taxi is a public transportation with the characteristics of individual transport like "door-to-door" service, while other public transportation such as railways and buses perform mass transportation, it can respond to various needs that is difficult to achieve by mass transportation. It is also praised as an environmentally responsible alternative to private car use. In different countries, deregulation policy has different impact on taxi industry, at the same time, there are supporters and opponents of deregulation policy.

In Japan, after the deregulation of 2002, some mass transit companies withdrew from bus services in areas of low population density. This caused problems for people living in those areas who have transportation difficulties such as shopping, visiting the doctor regularly due to age or disability. However, the characteristics of rural areas, including dispersed population density, low demand for ser-

vice, also need for financial support causes problems for covering the area with transportation service. Especially some areas couldn't maintain the continuous operation. In addition, as the financial support from government has been a core element for running the on-demand ride-sharing taxis, and only limited group can be served with this subsidy, there always been an aggressive opinion to this service. In order to meet the increasing need of special groups such as elderly and disabled people, it is necessary to introduce flexible transport service like taxi subsidy scheme, on demand ride sharing taxi or private paid passenger transportation system, called 'Jikayou Yushou(自家用有償) in Japanese for rural areas where there is no taxi operator.

In Japan, where the number of elderly people is expected to increase in the future and more and more people are living well into their age of 80 and maintaining active lives. So, it is necessary to consider and understand their mobility needs and travel behaviors. It is necessary to take a close look for the

increasing trend that demand for such services and assistance systems are likely to increase. Therefore, there are several problems need to be verified such as "what is the actual condition and problem of individual transport service in a depopulated rural area" and "what is the strategy for keeping it sustainable in the future?" and also "what is the attitudes of people for this financial subsidized service? ", "how to control the budget for government side? ".

Due to the deregulation policy, withdrawals of route buses had increased. In recent years, traffic accidents caused by the elderly have been a serious issue that need to be paid closely attention, with the promotion of self-return of driver's licenses, it is required to secure transportation means of these groups. Therefore, in place of route buses, there is an increasing demand for demand-type shared taxis and community buses, which require reservations but allow flexible route and schedule settings to support the mobility of elderly in the service area.

With such services, mobility support for the elderly is expanding. On the other hand, people living in the area where there is no demand-type shared taxi or out of the operating area, couldn't receive the service. Even in operating area, because of individual use, the sharing ratio is so low and inefficient. In this way, in areas where there is little demand for public transportation, instead of establishment of sharing type of service, attention is being paid to individual type of transportation services by taxi, which can respond to the individual demands by achieving door-to-door service. In remoted rural areas, in order to provide mobility assistance to residents with disability or significant mobility restriction preventing them from using public and community transport, NPO Corporation are using volunteer driving service with the aid of local residents whom only paid with small amount of reasonable money not for business profit. In some other regions, taxi subsidy scheme (TSS) that subsidizes on the taxi fare by distributed ticket is implemented.

## 2. EXSITING RESEARCH AND PURPOSE OF THIS STUDY

There are existing researches on the role of taxi services in depopulated area, as Kato<sup>1)</sup> provides an overview of recent changes in the legal system related to taxis, he discusses the direction for taxi projects to contribute to regional public transport services by playing indispensable role. Besides the contribution of on demand ride sharing taxi, there may be various contributions in the form of the

original taxi business that transports passengers individually by defeating a taxi meter. In the future, with the diversification of travel needs and the progress of aging and population decline in regional and suburban areas, taxis are expected to expand the phase of securing public transport services by complementing or replacing public bus transportation mode.

According to another research done by Moriyama<sup>2)</sup>, demand ride-sharing taxi seems to be not economical because of cost for the reservation operation. In fact, sometimes it is necessary for driver to wait for customers, which is costly. In addition to this, reservation problems also form barriers for older people. In this way, proper introduction, especially the policies including taxi utilization would be vital in considering the local condition in depopulated areas.

According to Hayakawa's<sup>3)</sup> research, Tatebayashi city of Gunma prefecture (population approximately 78,000) and Omachi city of Nagano prefecture (population 29,000) also introduced taxi subsidy scheme to the elderly with the elimination of the bus service. In these two cities, elderly people were supported by distributing taxi tickets, but the pressure on municipality and users increased. This revealed a fact that bus service is more efficient than taxi subsidy scheme, which caused the restart of bus service in these regions. However, Hayakawa said that taxi subsidy scheme makes a certain sense because some elderly people has the difficulty to access to the bus stop.

Another research done by Ishio<sup>4)</sup> evaluated the characteristics of taxi subsidy schemes as a policy to support the movement of the vulnerable in remote area. The taxi subsidy scheme depends on the environment in which it is implemented, compared to the other demand-based transport service, it was found to be implemented at a low cost. In this article, taxi subsidy scheme is described from the viewpoint of public awareness. Based on the results of questionnaire, the citizens did not basically oppose taxi assistance, but requested that only the necessary people should be provided with the assistance in the minimum necessary range.

In the report<sup>5)</sup> submitted by the Department of Transport and Main Roads (TMR) to Queensland government, a series information including the background of taxi subsidy scheme, sustainability of service, review for eligibility and entitlements and duplication of Government benefits and assistance through other schemes, and funding for the TSS program are given. The Taxi Subsidy Scheme (TSS) was introduced in Queensland in 1987 to provide an

affordable and accessible transport option for people with a disability who experience profound difficulties using other modes of public passenger transport. The state government subsidy funds 50% of the taxi fare for each trip to a maximum subsidy of \$25. Membership is not means tested and the number of taxi trips able to be undertaken and the number of subsidies paid per member are unlimited. Members are issued with an electronic membership smartcard and are also entitled to a maximum of 20 interstate travel vouchers each 12-month period, for use with any taxi service in other jurisdictions. After consideration of all the information made available and the views put forward by the Panel members, the Panel makes the following recommendations such as undertaking research to identify more detailed demographics and usage patterns to understand access of member and transport network, funding provided to the TSS is insignificant compared to whole TMR budget, improving coordination between other transport services for savings and efficiency also the reducing the red tape in application, etc.

The aim of this study is to examine the role of taxi service as well as the taxi subsidy scheme for providing the mobility service to the area and its sustainability in the future. In the following context, we describe the actual conditions and issues from users perspectives. In order to identify the role of taxi service and taxi subsidy scheme for securing the mobility of elderly, a comprehensive examination was carried out in which people's attitudes, request and expectation towards the daily transportation can be identified. A wholly qualitative approach, utilizing a variety of data collection methods including focus groups, web questionnaire survey was applied.

### 3. RESEARCH METHOD --- ONLINE QUESTIONNAIRE SURVEY

#### (1) Outline of questionnaire survey

In this research, a questionnaire survey was conducted on elderly people living in depopulated areas. we aimed the people whose age is over 65 also the family members who finish the survey in the behalf of the elderly in their family. As for the survey method, we conducted a web questionnaire on Rakuten Insight in July 2019, which promote the understanding of current situation of taxi use by the elderly and identifying the characteristics. The web survey requires the respondent to answer 20 short questions which is supposed to last for 15 minutes.

#### (2) Focus group

Total of 300 people living in depopulated areas were chosen as a focus group that is considered of having better understanding for the actual situation with their daily experience. We divided them into three different groups by age and statues of owning a private car or motorcycle in order to find how much influence by the taxi service and taxi subsidy scheme on their life. Men and women who are over 65 years old and owing a car or motorcycle is 100 in total. The ones whose age are over 65 and without driving license or cars accounted for 50 for each men and women, 100 in total. There are 100 proxy respondents in total whose age is under 60, 50 for each gender. They are living with the elderly in their family and considered to be able to give the perspectives from the non-user of subsidy system.

The contents of questions asked in the questionnaire are shown in **Table 1**.

#### (3) Summary of survey results

For the summary of occupation, unemployed, housewife, and company employees accounted for the large three portions in the order from highest to lowest respectively. In means of transportation that can be used freely, bicycle is the most common used mode of transportation, with about 40% of usage rate, compared to other transportation mode.

About the result for comparison of the use of buses and railways by subject according to the presence or absence of private cars and the use of subsidy systems, people who don't have private car think public transportation is indispensable. In addition to this, about 30% of elderly people felt the inconveniences on bus operation hours and travel time.

#### a) Findings about the taxi service

The purpose of using taxi is different according to the statue of owning a private car and usage of taxi subsidy scheme. Those who have transportation means and do not use subsidy system said 40% of purpose of using taxi is for entertainment and private business. On the other hand, those who have no means of transportation and receiving the subsidy system use taxi more often for their daily life activities such as shopping and commuting.

The main reason for using taxi for elderly is the advantages of flexibility of time. Along with this advantages, the reason why it is difficult to use a taxi is shown in **Fig.1**. As for the main reason for difficulties of using taxi was its high price. 60% of respondent said taxi fare was expensive, and the second highest opinion was that they felt taxi is luxurious. So being a high cost becomes one of the hindrances for using taxi.

Table 1 Questionnaire Survey

Q	Question
1	Occupation
2	Transportation that can be used freely
3	Frequency of going out by purpose
4	The most common one-way travel time
5	Usage of transportation
6	Dissatisfaction with the use of buses and railways
7	Purpose of using taxi
8	Reasons for using taxi
9	Difficulties for using taxi
10	Status of introduction of taxi subsidy system
	1 TSS has been introduced and received the distributed tickets.
	2 Targeted people but has not registered and did not received distributed tickets.
	3 TSS has been introduced but not aimed as targeted person.
	4 TSS has not been introduced but being aware of subsidy system
5 Knows nothing about the subsidy system	
11	1 Annual number of taxi tickets distributed (upper limit of use)
	2 Annual number of taxi tickets used (number of uses)
12	Discount rate by taxi subsidy system
13	Self-pay per visit
14	Request for improvement of taxi assistance system
15	The frequency of outgoing with the increasing number of distributed tickets and the discount rate
16	Possible increase on the using of taxi by 50% fare discount and no limitation on using number
17	Suggestion for supporting the mobility in depopulated area
	1 Taxi subsidy system--- expansion of subsidy to limited targeted person
	2 Expansion on the scope of targeted person with inconvenience transportation
	3 Expansion on the scope of targeted person, subsidy rate and number of times
	4 Substantial public transportation except the taxi
5 Support for the mobility of family members	
18	Opinions about ride sharing taxi
19	Rule of taxis in the region
	1 Mobility for daily life
	2 Transport tool for emergency
	3 Support for the mobility vulnerable residents
	4 Transportation availability for visitors
	5 Door-to-door high quality transportation service
20	Pros and cons of taxi business maintenance measures in depopulated areas
	1 Maintain local taxis with public support
	2 Public support through policy mitigation for improving taxi management
	3 Policy mitigation on using private car for supporting mobility
	4 Introduction and development of self-driving taxis
5 Policy mitigation for running taxi business and taxi as a second career for	

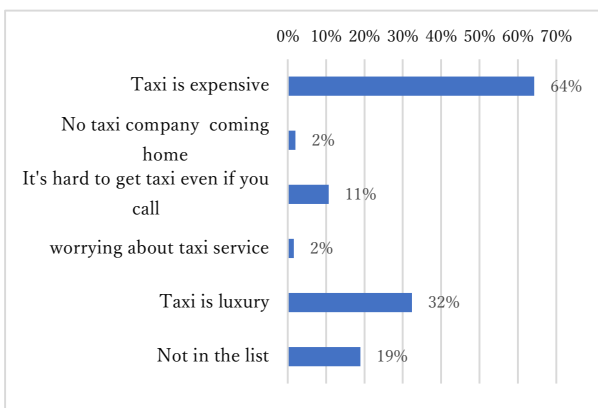


Fig.1 Reasons for difficulties of using taxi

Fig. 2 shows the comparison for the purpose of the objectives of going out by taxi, depending on the presence or absence of a private car and the availability of a subsidy system. For those who have means of transportation and do not use the subsidy system, the main reason for private business and entertainment accounts for more than 40%. On the other hand, those who have no means of transportation and use the subsidy system are more often using for activities that are indispensable for life such as commuting and shopping. The average travel time for one-way trips was 30 minutes on average and 180 minutes at maximum.

Fig. 3 shows a comparison of the annual frequency of using taxis, divided by the presence or absence of private car and subsidy system. Answer items are as following; almost every day (300 times / year), 2-3 times a week (130 times / year), about once a week (50 times / year), about 2-3 times a month ( 30 times / year), once a month (12 times / year), once every 2 or 3 months (5 times / year), once or twice a year (3 times / year), available but rarely used / not available (0 times / year).

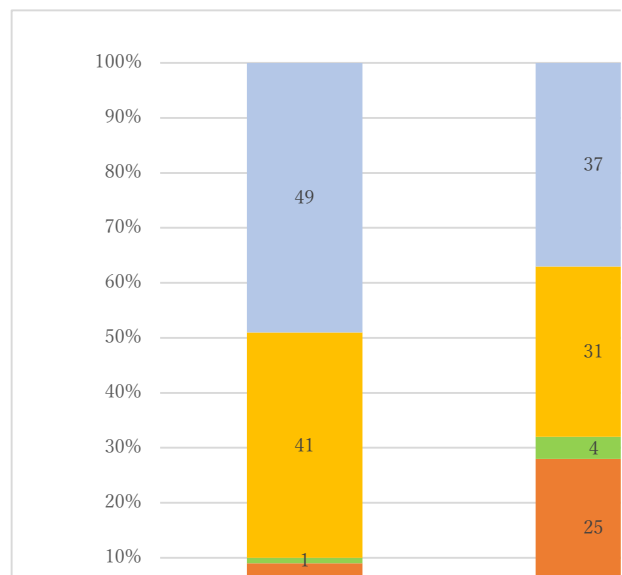


Fig.2 Comparison for purpose of using taxi

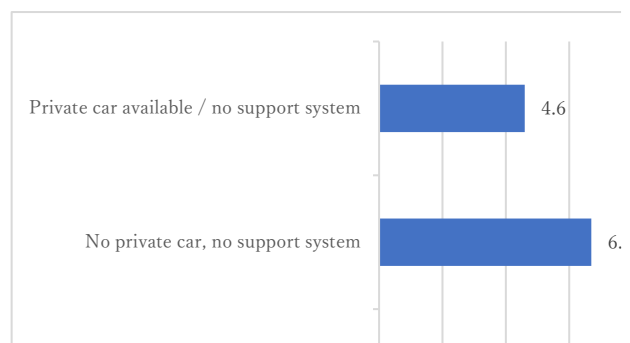
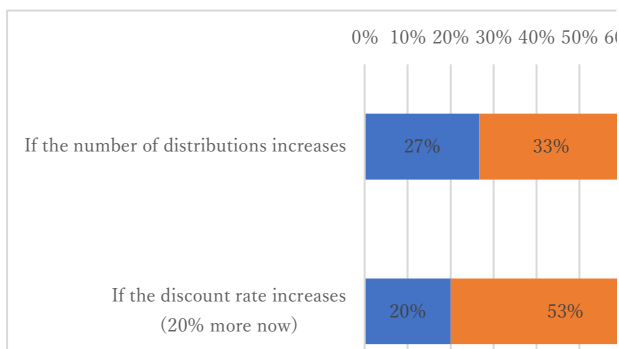


Fig.3 Comparison for annual frequency of usage of Taxi

**b) Introduction and distribution of taxi subsidy scheme**

In introduction and distribution of taxi subsidy scheme section, large portion, approximately 73%, of respondent said they do not know about the TSS. Only 5% of respondent said they are receiving the subsidy and about 4.3% of respondent said even they are the targeted group but didn't received the distributed ticket.

Eventhough the portion of respondent for TSS receiver from this survey is very small, the outgoing frequency by taxi is shown in Fig.4 if the number of subsidiary ticket distributed and the discount rate increased. 60% of respondent said the frequency of outgoing will increase with the growing number of distributed tickets, and 70% of respondent said it will increase with the growing of discount rate.



**Fig.4 Increase in the frequency of going out**

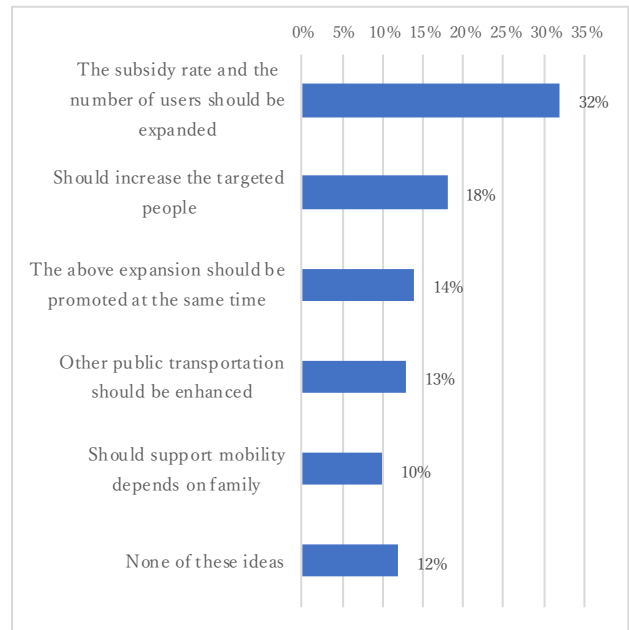
**(4) Analyzes about issues**

According to the questionnaire survey conducted in this study, the average number of subsidiary tickets distributed to subsidy system users per year was about 16, the number of annual tickets used was about 15, and the average discount rate per ticket was about 20%. More than 50% of respondent said they want increasing on the number of distributed tickets or increasing on discount rate. It seems that extended supporting is required. Most of the respondents expect taxi as a means of transportation for mobility vulnerable group, approximately 80% of respondents answered that they think it is very important.

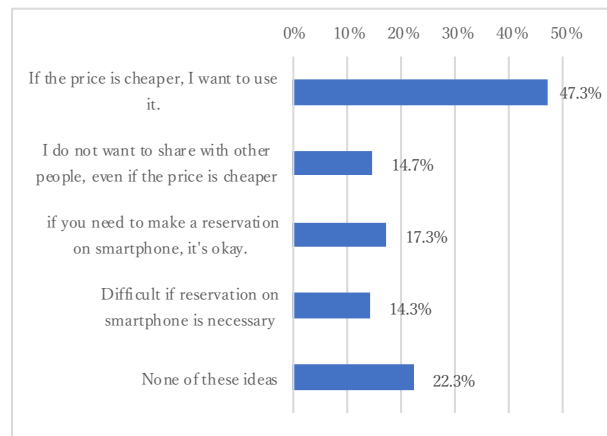
Fig.5 shows the opinions and requests from elderly about the taxi subsidy scheme (TSS). The largest percentage (32%) said the subsidiary rate and the number of usage time should be expanded. The next highest percentage of response is about to increase the number on users. It became clear that expansion on subsidy service content is necessary.

Similar with the taxi service, opinions for on demand ride-sharing taxi is shown in Fig.6. Approximately 50% of respondents said that they would like

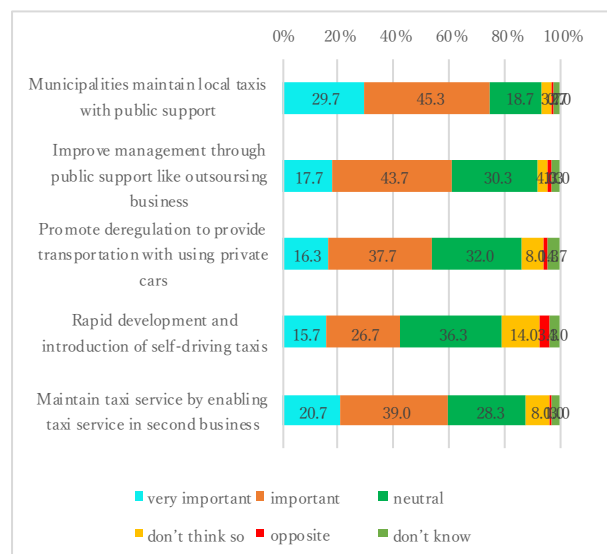
to use shared taxi if the price were low. Fig.7 shows



**Fig.5 Request and expectation from taxi subsidy scheme**



**Fig.6 Opinions about on demand ride-sharing taxi**



**Fig.7 The role expected from taxi service**

opinions on maintaining taxi business in depopulated areas with public support. When asked if local government should maintain local taxi business with subsidy system, more than 70% answered that it would be great.

#### 4. CONCLUSION

From this questionnaire survey, it was clarified that although there is an advantage for taxi for being flexible on time, but the high cost becomes a great hindrance for using it. On the other hand, it is clear that the taxi subsidy scheme is a major support for securing elderly people mobility for their daily life activities, the frequency and number of usage are higher compared to those who do not receive the taxi subsidy scheme.

Many users of the taxi subsidy scheme have requested that the contents of the system currently used should be enhanced, which increase the frequency of usage. It is necessary to support the taxi service with taxi subsidy scheme as it is expected to play a role as a means of transportation for people with mobility difficulties. In addition, in depopulated areas, there was almost no opposition to the maintenance of taxi companies with the public support of local governments, instead of this, there were many favorable opinions.

For areas where there is no demand-type shared taxi or even in operating areas with low and insufficient sharing ratio because of individual use, individual type of transportation service by taxi should be secured. High price is the major difficulty for elderly people using the taxi. There was strong request to expand the contents of assistance for increasing the usage. The questionnaire results showed that the taxi subsidy scheme eased the financial resistance of using taxi and meanwhile increased the

usage of taxi. On the other hand, from the perspectives of people who are not the targeted people of taxi subsidy scheme requires the enhancement for the content of taxi subsidy scheme, current service is unable to meet the need of elderly. Also, in order to increase the number of users, it is necessary to be well-known for the system and to respond to needs. Eventhough, people's opinions towards the taxi subsidy scheme is desirable, but from the survey, it is clear that TSS itself has not reached the need of users and has not well-known yet by the community. So, there is a strong need for effort to be done for the fully implementation of TSS.

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(Received October 1, 2020)