Development of Technology to Improve the Mobility Environment in Suburban Residential Areas

(Research period: FY2018-)

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1. Background and purpose of research

In the suburban residential areas that were systematically supplied after the period of rapid economic growth, the number of residents with difficulties in independent travel is increasing due to the aging of the population, while the level of existing public transportation service is declining due to the sluggish demand and shortage of drivers. Under these circumstances, in order to improve the quality of life in suburban residential areas, which can be one of the hubs for the realization of sustainable cities, it is considered useful to improve the transportation environment by introducing a new mobility system (e.g., small electric cart with excellent environmental performance and mobility).

Therefore, in order to study how new mobility systems should be introduced, we conducted a demonstration experiment using small electric carts in several suburban residential areas (**Table 1**), where the population is aging and there are ups and downs that make walking difficult, and analyzed the effects, issues, etc. in introducing a mobility system.

Table 1: Target suburban residential areas (Outline)

	Name	Ryosei area	Kitanodai area	Komamusashidai area
	Location	Ayase-shi, Kanagawa	Hachioji-shi, Tokyo	Hidaka-shi, Saitama
	Distance from the center of Tokyo	About 40 km	About 40 km	About 50 km
Size	Population	About 3,500	About 6,800	About 4,700
Size	Area	About 44 ha	about 87 ha	about 93 ha
Size	Difference in elevation (slope)	About 30 m (about 4%)	About 40 m (about 4%)	About 70 m (about 5%)
Characteristics	Move-in period	From 1962	From 1976	From 1977
Characteristics	Population aging rate (2015 National Census)	42%	42%	45%

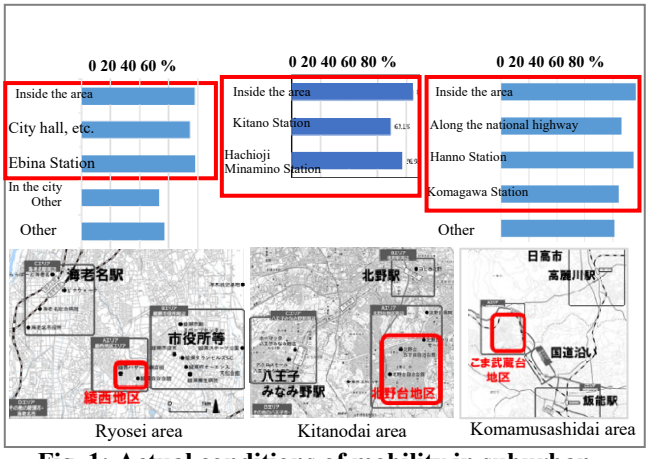


Fig. 1: Actual conditions of mobility in suburban residential areas

2. Actual conditions of mobility in suburban residential areas

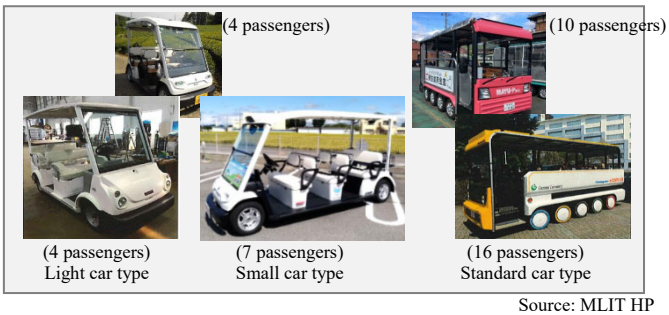
We conducted a questionnaire survey for the three areas in **Table 1** on the actual state of mobility in the suburban residential area, and found that the inside and outside of the area are almost comparable as the destination of daily activities (**Fig. 1**).

In the future, if the diversity and improved functionality of the suburban residential areas that serve as hubs increase their attractiveness, demand for travel within the area will grow, and their importance may increase further. Whether there is a demand for travel within the area and whether this demand is met can also be a barometer of whether the area is "independent and easy to live and work."

3. New mobility system "Green Slow Mobility"

In recent years, a variety of mobility tools such as walking aid tools, personal mobility, and micro-mobility have been popular and developed as a means to support intra-area travel and access to transportation outside the area. Among these, the use and combination of mobility tools such as "Green Slow Mobility" (abbreviated as "Grislo") (**Fig. 2**), which is allowed to be light-weight and open on public roads on the condition of low speed, depending on area characteristics and travel scenes including existing public transportation, are expected to contribute to a society where people can live on foot.

In this research we decided to use a seven-passenger vehicle that can make small turns on area roads and can be shared by multiple groups.



Source: MLIT HP

Fig. 2: "Grislo", one of the diverse mobility systems

4. Implementation and results of the demonstration experiment

Table 2 shows the results of the demonstration experiment conducted in FY2021. The number of users per day in each of three areas was 13 to 15, indicating a similar trend in demand for use.

In the questionnaire surveys conducted during and after the demonstration experiment, many users highly evaluated the communication function, etc. along with the improved mobility, saying "communication tool," "moving salon," "mobile community square," and "good opportunity for going out" (**Fig. 3**). This shows that a new mobility system has the potential to create diverse value.

In addition, respondents were also asked about the amount they would be willing to pay for the use of a new mobility system if it is fully introduced (**Fig. 4**).

Table 2: Results of the demonstration experiment (FY2021)

	Name	Ryosei area	Kitanodai area	Komamusashidai area
	Area	About 44 ha	about 87 ha	about 93 ha
	Difference in elevation (slope)	About 30 m (about 4%)	About 40 m (about 4%)	About 70 m (about 5%)
Experiment outline	Operation period	Oct. 17 - End of March	Nov. 11 - Dec. 1	Dec. 7 - Jan. 9
Experiment outline	Operation days	5 months (35 days *)	21 days	30 days
Experiment outline	Route (Number of services)	3 routes (12 services)	1 route (4 services)	Weekday: 1 route (5 services) Holiday: 2 routes (8 services)
Result	Number of users (persons)	537 (*up to Jan. 4)	274	381
Result	Number of users / day	15.3 / day	13.0 /day	12.7 / day
Result	Number of users / service	1.3 / service	3.3 / service	2.2 / service

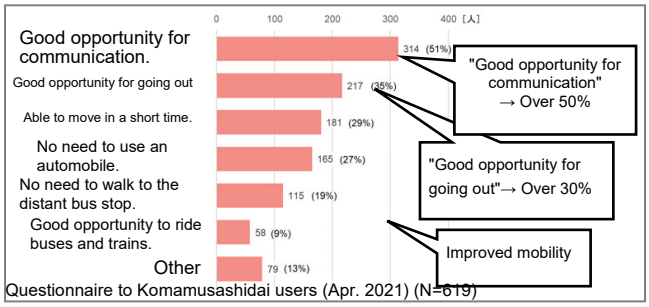


Fig. 3: User evaluation of ''Grislo''

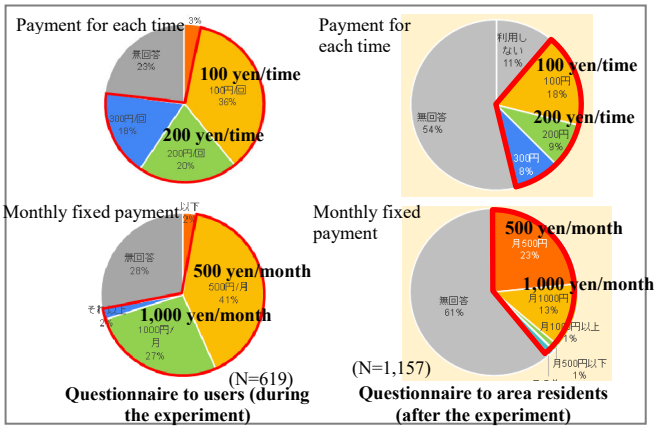


Fig. 4: Amount willing to pay for ''Grislo''

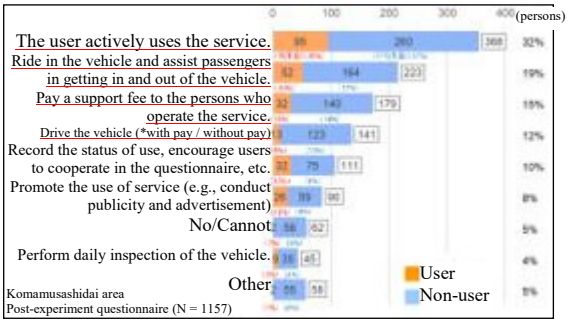


Fig. 5: Intention to contribute to the initiative

In the case of Komamusashidai (implemented in March and April 2021), respondents answered that they would pay 100 yen or 200 yen for each ride and pay 500 yen or 1,000 yen for a fixed monthly fee. It should be noted that in the post-experiment questionnaire survey to all residents, there was a certain percentage of people, including non-users, who were willing to pay for both the one-time payment and the fixed monthly payment.

Based on these results, we estimated the income and expenditures, although it is hypothetic. Income was expanded to the entire area based on the results of the post-experience questionnaire survey and multiplied by the amount of willingness to pay.

500 yen/month (estimated number of payers: approx. 1,000) 6.1 million yen/year

1,000 yen/month (same approx. 380 persons) 4.6 million yen/year

On the other hand, as for expenditures (costs), the total of rewards for drivers, vehicle procurement cost (depreciated over 3 years), and other overhead costs are 5 million yen/year (3.3 million yen/year after depreciation). The result was roughly balanced.

We can get a glimpse of the value assessment by the area's residents.

In addition, when we asked about their willingness to contribute to such an initiative, we confirmed their willingness to provide direct and indirect support and cooperation (**Fig. 5**). From the above, it can be assumed that a certain degree of local acceptance of a new mobility initiative will be formed, and above all, it can be imagined that such an initiative can help revitalize the community and various activities for self-reliance and self-help.

5. Future initiatives

We conducted a long-term demonstration experiment to collect and analyze information on changes in residents' behaviors, etc. In the future, we will compile information on introduction methods for a new mobility system and safety standards for each type of urban area to serve as a reference across the country.

☞See the following for details.

1) Journal of the City Planning Institute of Japan No.355, pp.62-65 (March 2022)