Development of technology for improving the mobility environment in suburban residential areas

(Research period: FY 2018–)

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Keywords: Sustainable city, suburban residential area, convenience of living, new mobility

1. Background and objective of this study

In suburban residential areas that have been systematically constructed after the period of rapid economic growth, the number of residents who find it difficult to move about independently because of aging and other factors is increasing. Meanwhile, the level of public transportation services is declining markedly because of sluggish demand and a shortage of drivers. Under such circumstances, it is considered effective to introduce new mobility (e.g., small electric carts with excellent environmental performance and mobility) to improve the quality of life in suburban residential areas (Figure 1), which can become one of the core areas of cities for the realization of sustainable cities.

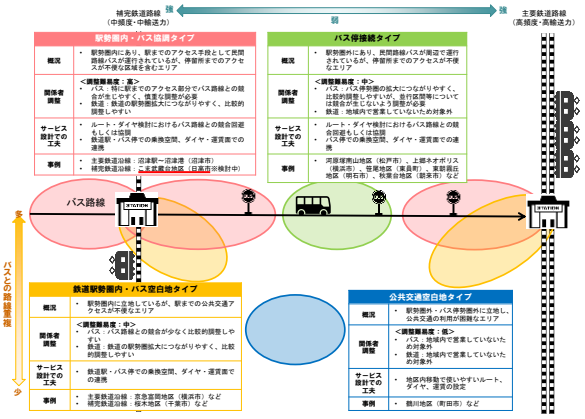

Figure 1: Categorization of suburban residential complex from mobility perspective

Therefore, in order to study a good way to introduce new mobility, a new mobility demonstration experiment (Figure 2) is conducted in Komamusashidai, Hidaka City, a residential complex with an aging population and hilly terrain that makes walking a burden, to analyze the effects of the introduction and issues.


小型電動カート(7人乗り)

Figure 2: Example of a new mobility

2. Outline of Komamusashidai residential complex

The population of this residential complex is aging (the housing supply started in 1977, population about 4,700 people with about 2,200 households, about one hour to Ikebukuro Station), and the largest proportion of the population is in the 65–69 age group.

The nearest station is Koma Station on the Seibu Ikebukuro Line, and there are three bus routes that run in the direction of Hanno Station and JR Komagawa Station.

The shopping centers in the district where convenience facilities are located have many vacant units, and since the withdrawal of the Tokyu store in 2008, many residents drive to stores outside the district.

3. Mobility of local residents

A questionnaire survey was conducted to understand the recent mobility situation and mobility needs of residents in the residential complex (Table).

Table: Outline of the questionnaire survey

Subject	- All residents of 1 to 7 chome (blocks), Musashidai, Hidaka City, Saitama
Method	- Distribution of the survey form to each household (one survey form (containing three copies) is distributed to each household and two forms to a two-family household.) - Survey form collected by mail
Period	- December 12, 2020 to January 6, 2021 (postmark deadline)

(1) Amount of travel

The number of visits to the area around Komamusashidai (hereinafter referred to as "Area A") was the highest among residents of all blocks. The ratio of visits to Area A is smaller among residents of block 6 compared to residents of other blocks (Figure 3).

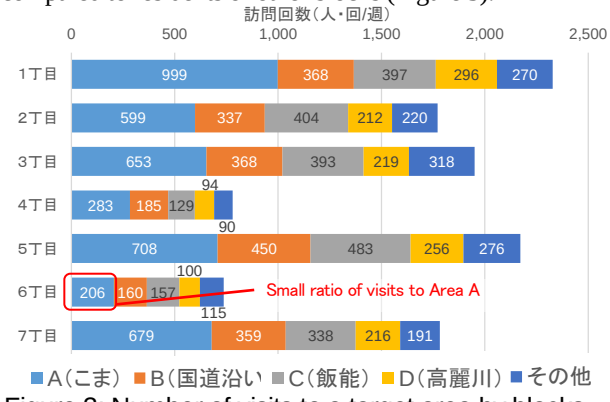

Figure 3: Number of visits to a target area by blocks

(2) Means of transportation used

Bus usage is relatively high among residents of blocks 2 and 5, where the access to bus stops is relatively good, while bus usage is low among residents of block 6, located far from a bus stop (Figure 4).

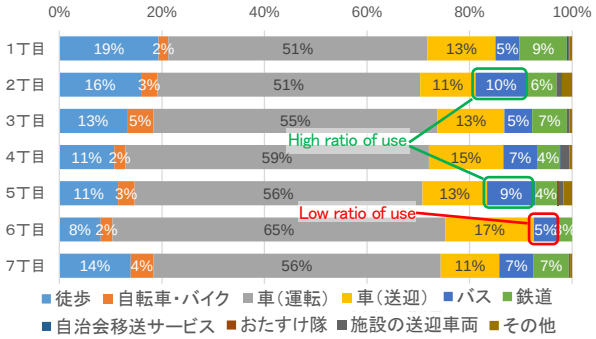

Figure 4: Means of transportation used by blocks

(3) Bus usage

The bus use to Area A is low among residents of all blocks, indicating that the use of buses is limited among residents of the residential complex. In comparison with Figure 3, bus usage is low in blocks 1 and 3, which are located near the train station and in blocks 4, 6, and 7, which are relatively far from the bus stop (Figure 5).

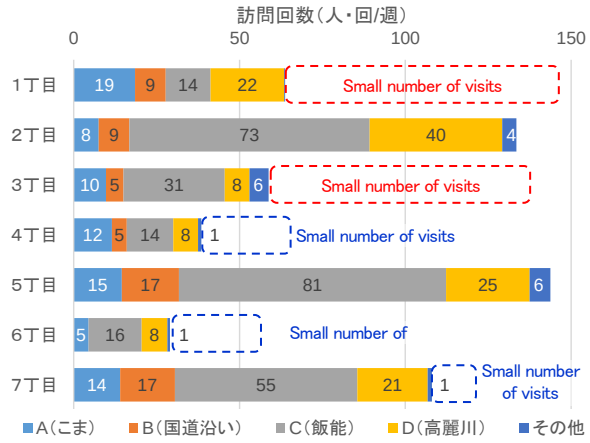

Figure 5: Number of visits made by bus users by districts and destination areas

(4) Request concerning the experimental route

Route C (Figure 7), which operates on Chuo Avenue, was the most preferred route and received the most votes from residents of blocks 5 and 6. The second most popular route was Route A, receiving many votes from residents of blocks 4 and 7, which were located along the route (Figure 6).

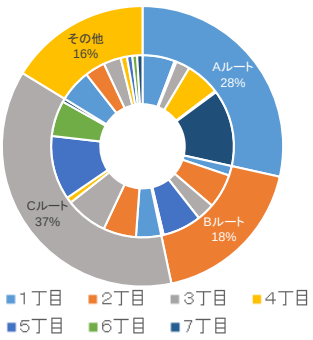

Figure 6: Preferred route

4. Verification experiment using small electric carts

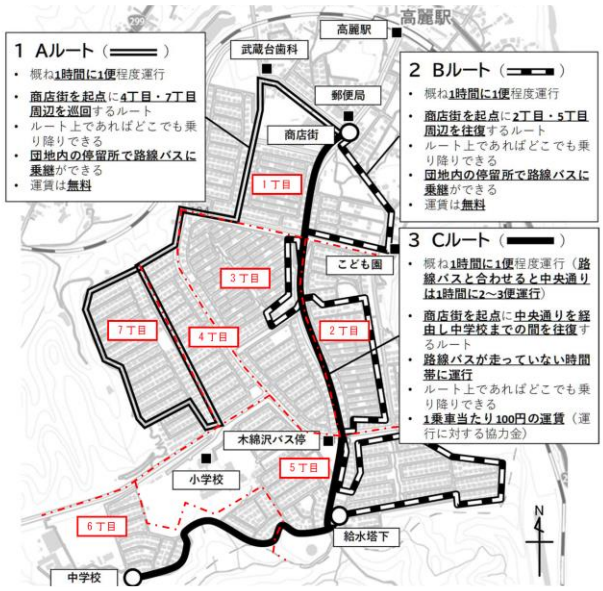

Figure 7: Routes presented in the survey

Based on the results of the questionnaire survey and other factors, routes were set up for the verification experiment (March 21 to April 11, 2021) from the perspective of measures to address areas lacking transportation (blue route) and to enhance existing transportation services (red route), and uses were assessed and analyzed (Figure 8).

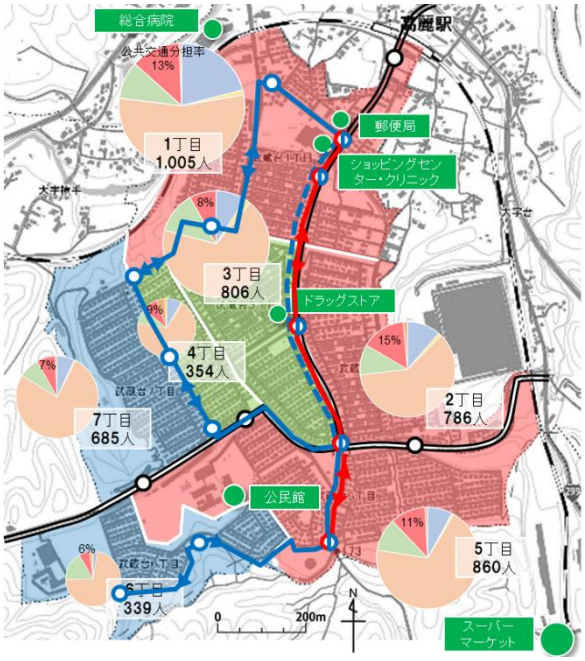

Figure 8: Verification experiment route (example)

5. Future activities

In this study, a new mobility route was set up based on the mobility needs of a district with train stations and bus routes.

In the future, longer term verification experiments will be conducted to collect and analyze data on behavioral changes and other aspects that will become available as a result of such experiments, while working to study methods for combining the introduction of new mobility and safety standards for each type of residential areas.