Quality of mobility required for super-aged cities

1. Background and goals

To enhance the quality of mobility in cities, it is necessary to construct a hierarchical network consisting of a fast mobility layer that supports rapid transportation between hubs, and a slow mobility layer that supports low- and medium-speed transportation within hubs and towns. The needs for a safe and comfortable slow mobility layer will likely be particularly important in the context of a super-aged society, and the development of not only individual means of transportation but also the road environments containing them will be vital. Ultra-compact, low-speed, short-range vehicles have been developed in recent years to meet these needs, and some locations in the United States and elsewhere are using space opened up by "road diets" (reducing the number/width of automobile lanes) to create travel space for ultra-compact vehicles and bicycles. Such cases show a sense of road space utilization that is being fostered by a new mode of transportation developing between pedestrians, cyclists, and automobiles. This can be taken as a suggestion of the possibilities for co-development of transportation methods, space, and infrastructure in a super-aged society.

In a project this year, we analyzed changes in values related to quality of mobility. Then we carried out a pilot survey to use as a basis for anticipating future needs for slow mobility transportation methods, road spaces, and system development.

1-1. The viewpoint of this research

The idea of "slow mobility" used in this project is a new mode positioned between walking and other forms of transportation (Fig. 1). Slow mobility is a medium- to slow-speed transportation method that supports walking and emphasizes ease of getting off vehicles, rather than getting into them. Furthermore, it promotes human exchange and can therefore be viewed as a social system that supports and improves regional vitality and quality of life. As Fig. 2 shows, the concept of "co-mobility" is defined here as the combining of community and mobility by tying together not only places but people as well.

The ultra-compact vehicles that hold promise for use in slow mobility can be grouped under current law into four types: walking aid devices, bicycles, mopeds, and mini-cars. In this project, we focus on the use of electric assist bicycles and moped-type micro-electric vehicles (hereinafter, micro-EVs).

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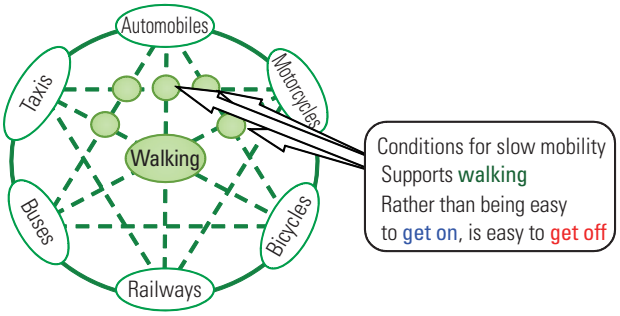

Figure 1. Positioning of slow mobility in urban transportation

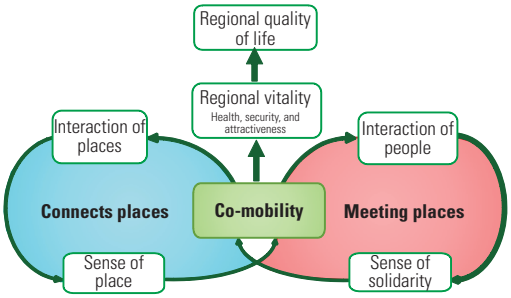

Figure 2. The co-mobility concept

2. Research content

2-1. Pilot survey in Mino, Gifu

The city of Mino (pop. 23,000) in Gifu Prefecture has long aimed at town planning that supports cycling, but cycling has not caught on due to its hilly terrain and the advancing age of its residents. In this study, we proposed a co-mobility strategy for Mino's slow life and cycling city concepts, and performed a pilot survey aimed at its realization.

Figure 3. Micro-EV decorated in Mino-produced Japanese paper

In the study, electric assist bicycles and micro-EVs were loaned to participants. GPS tracking and participant journaling were used for monitoring daytime and nighttime usage to investigate attitude changes, behavior, and the potential for lifestyle changes. The focus of the experiment was not to promote slow mobility, but to investigate how subjects would select transportation modes when presented with five options (walking, cycling, riding electric assist bicycles, using micro-EVs, or driving automobiles), and to examining changes in out-of-home behavior patterns.

The results of the experiment confirmed that offering these five modes of transportation resulted in a substantial widening of choices, thereby resulting in more frequent opportunities for out-of-home activity and a lowered reliance on automobiles. For example, the frequency of using personal mobility vehicles such as micro-EVs and electric assist bicycles for commuting or business activities reached the same combined values as that for automobiles. This raises the possibility that increased spread of personal mobility vehicles might lead to changes in mobility styles in regional cities that are currently experiencing over-reliance on personal car ownership.

Comparing usage frequencies of the five modes by distance traveled (Fig. 4), it is apparent that micro-EVs and electric assist bicycles were frequently used within a few kilometers distance, and thus that developing environments of usage space within that range is key to the spread of personal mobility.

To hear the voices of also from a wider range of residents instead of just the experimental subjects,

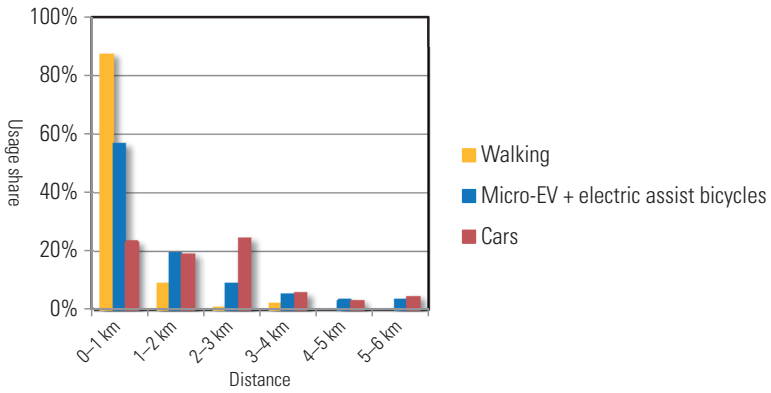

Figure 4. Usage of transportation modes by distance in the pilot survey

a workshop was held during the pilot survey, which provided an opportunity for government and citizens to come together to think of ways in which existing roads could be used to expand the usage range and opportunities for personal mobility. Various opinions were shared, such as the need for reconsidering not only transportation methods but also the structure of cities and road infrastructure, as well as the need for reducing the number of automobile lanes ("road dieting") to allow space for personal mobility. We also proposed community buses and other specific forms of co-mobility that provide meeting places to residents, connecting methods of public transportation and personal transportation.

2-2. Pilot survey in Takamatsu, Kagawa

A running test was then performed in downtown Takamatsu city, in which a road diet was implemented to create bicycle lanes, with the goal of investigating the influence of slow mobility on in-town travels. Takamatsu was selected for this experiment because Mino has few commercial or public welfare facilities in its city center, complicating measurement of the effects on travels, and furthermore because it would have been difficult to create slow mobility running spaces within the timeframe of the study.

In the experiment bicycle lanes were positioned as "slow mobility" lanes, and we verified the ease, safety, and potential for co-existence when micro-EVs shared lanes with bicycles (Fig. 5). The results were as follows:

(1) Bicycles and micro-EVs can travel together without conflict at speeds up to around 20 km/h.

(2) Implementation of simple road diets such as the establishment of slow mobility lanes lowered

No dedicated lane

Dedicated lane

Figure 5. The slow mobility lane experiment in Takamatsu City

automobile running speeds by 3–8 km/h, reducing the speed difference between vehicle types.

(3) Safety was improved in areas where slow mobility lanes were established (i.e., where road dieting was implemented) over areas where they were not.

3. Conclusions

From the results of our investigation of changes in values regarding quality of mobility and from our comprehensive investigation of super-aged society-related factors, including activity needs and desires for improvement to transportation, we found a definite trend toward safety, health, and the environment, and furthermore found that such value changes manifested needs for road diets, speed reduction, and slow, personal forms of mobility. The results of pilot surveys suggest that providing such new methods of mobility has the potential to change mobility styles in regional cities with a limited selection of transportation modes, and they confirm the utility of slow mobility lanes as a way of developing shared running space.

4. Future outlook

Developing countries in Asia and other regions require methods of traffic reduction on the premise of traffic with a variety of vehicle types, including motorcycles. The co-mobility strategies proposed in this project, which combines road dieting, speed reduction, and slow, personal forms of transportation, are likely to provide important clues regarding methods for safe, sustainable transportation in other countries with various traffic situations.