A land utilization framework and transportation system for declining population

1. Background and goals

We investigate the question of whether future generations will be able to inherit Japan's current urban landscape.

Most of Japan's current urban landscape was created in the latter half of the twentieth century and particularly rapid and substantive improvements were made to public-sector social capital such as rivers, roads, ports, airports, and railways. In the latter half of the 1980s, these improvements began to be made with apparent consideration if they are inheritable into the future under the concept of civic design.

In contrast, when we turn our eyes to built-up landscape, it has become a common sense that private sector buildings assumed to be replaced in every generation. Japanese housings, even including those made from concrete, have an average lifespan of only around 30 years. This indicates that they are regarded as consumable-durable goods to be demolished and rebuilt three times per century. Moreover, almost all buildings are designed in isolation, with no consideration of harmony with their surroundings. As a result, the visual appearance of individual street blocks—which are the units at which collaborative landscape creation can be realized—tends to be somewhat unimpressive and even shabby. Most cities, therefore, have not been successful in creating urban stock to be inherited to the future generation.

Another shortcoming is that greenery has not been emphasized in urban areas. Low-rise detached buildings have been allowed even near city centers to result in crowded downtown areas with little green open spaces. Major transportation facilities divide spacious green areas, and low-density built-up areas spread out to the suburbs. Particularly since the 1970s when increased incomes allowed the average household to purchase automobiles, urban areas have encroached beyond the reach of railways and further reduced green areas.

Japan currently faces issues of economic maturity and recession accompanying population decline and aging. This project focuses on whether such unregulated land use are acting to significantly degrade quality of life in Japanese cities.

In search of hints as to which direction Japan should proceed in the future, we introduce some of the results of our on-site investigations regarding cooperative land use and transportation systems in

Project Leader: Yoshitsugu Hayashi
Professor and Director, Education and Research Center for Sustainable Co-Development, Graduate School of Environmental Studies, Nagoya University

Western cities where economic development has preceded one step ahead of Japan's. As a domestic model, we also introduce the corridor-type land-use system being introduced in Utsunomiya City as an accompaniment to its light rail transit system. The outcomes of this project have been published in a book.[1]

2. Research content

2-1. Compact, urban, green (Munich, Germany)

To achieve sustainable economic, social, spatial, and regional development while protecting the environment and minimizing resource consumption, Munich has been advocating strategies of compactness, urbanity (fusion of diversity), and greenness (greenery and global environment) for urban area formation.

Figure 1. Land-use planning in Munich

Munich has established policies limiting new development to the areas within walking distance of train stations, gradually leading to the realization of compact urban districts. This has resulted in a concentration of large-scale development along railways on the west side of the central station. Contracts are formed such that profits from development are evenly shared among developers (landowners), railway operators, and the local government, institutionalizing sufficient infrastructure development through value capture.

In pursuit of realizing urbanity, new development must also devote a certain amount of floor-space to residential space, not only improving compactness but also creating a city in which diverse people can live. Furthermore, local policies require a wide range of rent settings, thereby providing a mix of socially diverse people and forming a city that can pass on an exceptional regional culture.

Lastly, Munich has policies to realize greenness, such as its regulations requiring the development of green areas along railways and accommodating the surrounding urban areas.

2-2. Integration measures for land use and transportation to enhance location efficiency (U.S. cities)

Transit-oriented development (TOD)[2] gave rise to a great movement in the United States in the latter half of the 1990s. TOD is not simply a method of compact urban development formed around public

(1) Hayashi, Yoshitsugu, Kenji Doi, Hirokazu Kato, and International Association of Traffic and Safety Sciences, eds. 2009. *Toshi no kuoritei sutokku: Tochi riyo, ryokuchi, kotsu no togo senryaku* [Quality Stock of Cities: Integrated strategy of land use, green space and transportation]. Kajima Institute Publishing. (in Japanese)

(2) TOD emphasizes development of public transportation nodes as the axis along which urban areas are formed, and induces development around these nodes. This allows economic activity to occur within walking distance of transportation nodes, placing focus on lifestyle opportunities and enhancing quality of life.

Figure 2. Examples of TOD implementation in Prince George's County, Maryland, USA

transportation. Well-known features of TOD include urban development within walking distance of transit stations, high residential density, and high functional diversity, but underlying this a geographical layout are a variety of systems that aim to improve quality of life and social justice.

One such system is location-efficient mortgage (LEM),[3] a policy tool for supporting home acquisition in areas within walking distance of public transportation by creating benefits given to residents who save personal and public transportation costs. This allows escape from over-reliance on automobiles. Discount train passes are also offered to increase utilization of public transportation.

This has changed the definition of richness from one based on income to another based on time. The dissemination of TOD schemes among US cities reflect change in citizens' sense of values. Such a change is also necessary in Japan, particularly when one considers future constraints on public financing, the environment, and consensus formation.

2-3. Intensive land use for transportation networks and corridors (Utsunomiya, Japan)

Realizing TOD necessitates enhancement of the public transportation systems as its axes. Light rail transit systems (LRT) have been attracting international attention as methods for low-cost rapid transit. LRT systems have been introduced in Japan in recent years, significantly changing strategies for urban land usage.

Utsunomiya, having a population of 500,000, is a core city in the northern Tokyo metropolitan area that has experienced significant postwar development as an industrial city. However, it features an extremely high level of automobile dependency, which has resulted in sprawled residential areas in its

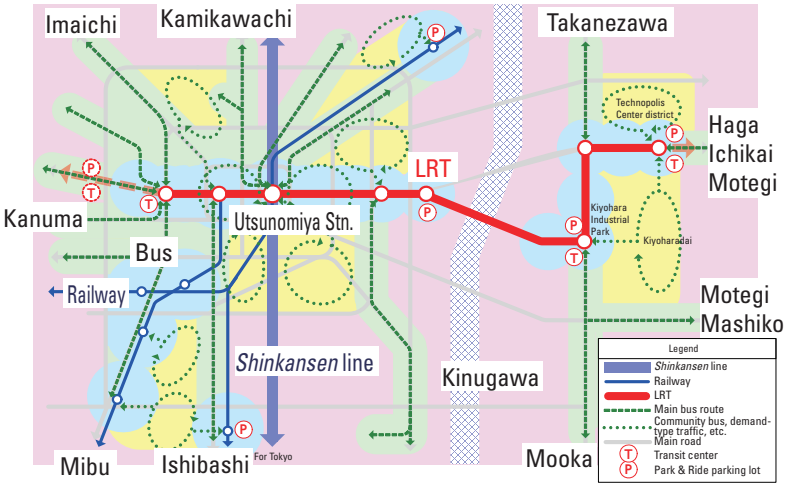

Figure 3. LRT implementation plan (Plan for Securing Daily Life Transportation) in Utsunomiya, Japan

(3) LEM is a coordinated housing and transportation policy system that promotes the realization of TOD. To create benefits for residing in areas accessible by public transportation, savings on automobile-related costs such as fuel, parking, and road tolls are calculated on a by-area basis, and the amount saved is included when determining levels of homebuyer support.

suburbs, diffusion of urban functionality, and progressing hollowing out of the city center.

After the planned introduction of LRT has taken place, public transportation service in Utsunomiya will be divided into four areas based on urban structure, with service provision adopted according to the conditions of each area. Utsunomiya aims to create a public transportation network servicing the entire region through seamless coordination of the bus network with its core LRT system. In the urban center, automobile traffic will be curbed, while pedestrian and bicycle traffic will be developed and emphasized. Introduction of LRT will also involve the conversion of major roads into transit malls, securing walkable spaces in commercial areas to enhance pedestrian movement. At the same time, urban development will aim to revitalize commercial districts along placed LRT routes by introducing LRT in conjunction while also carrying out redevelopment projects. Lastly, composite development, such as the creation of an attractive urban landscape and urban residential areas, will be required in Utsunomiya, in addition to the city's planned redevelopment projects.

3. Conclusions

In this project, we refer to the continual foundation of twenty-first century land and cities as a quality stock that combines building clusters, green areas, and transportation systems. We have presented a vision of urban retreat and reformation based around the formation of high-quality building clusters with a unified look and of green area–public transportation corridors in a book *Toshi no kuoritei sutokku* [Quality Stock of Cities] (Kajima Institute Publishing).[(1)] This goes beyond the simple ideal of a compact city to incorporate universal social goals and a vision featured on local societies, and provides specific methods for realizing this vision.

Maintaining quality of life in the future will require coordination of integrated urban landscapes of transportation, buildings, and green areas. This strategy will not be implementable if the future economy declines too far; thus, this strategy should be taken as an urgent national priority.

4. Future outlook

The creation of quality stock that unifies building groups, green areas, and transportation systems can reverse urban structures, thereby lowering cost of living and improving the environment in the inner city. The result is development of the requirements for compacting and shrinking cities smartly, which constitutes necessary activities for stopping the "slumification" of Japanese cities and allowing the survival of the next generation.