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# Mobility perspective for a local city in Japan

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ABSTRACT

Japan is now heading toward a population decrease and a highly aging society. The nationwide automobile dependency established over the past 50 years has affected the country's road building policy and the formation of urban structure based on automobile usage. Now, Japan is facing serious mobility problems, especially among the elderly. This tendency is more prominent in local cities throughout the country. The solutions to improve mobility are found in three areas: the promotion of public transportation, bicycles, and compact cities.

Utsunomiya City, a regional capital heavily dependent on automobile transportation, suffers from severe traffic congestion, a high traffic accident rate, high carbon dioxide emissions, and urban sprawl. In order to achieve the long-term objectives of becoming a sustainable city, it launched an ambitious mobility strategy. Utsunomiya City has been one of the front-runners in introducing a new light rail transit (LRT) system. The prospect of building the first modern LRT system in Japan is very promising at present. This paper attempts to look back at the history of LRT planning efforts and analyze the circumstances and background of various stakeholders and the perceptions of citizens. It also attempts to sort out the various issues and challenges that the city needs to solve in order to achieve the objective of becoming the first city to build a new LRT in Japan.

Another solution to excessive automobile dependency is bicycles, which are a convenient and inexpensive transportation mode all over the world. In Japan, however, automobile-oriented transportation and urban policies have prevailed, leaving the bicycle long neglected. Still, recent years have seen the bicycle gain recognition as a healthy, environmentally friendly alternative to the automobile, especially after the Great East Japan Earthquake in 2011. Utsunomiya City has been actively pursuing a mobility policy of bicycle utilization since 2003 and is regarded as one of the leaders in its promotion. The potential success in Utsunomiya to overcome automobile dependency will make it a model for many local cities in Japan that suffer from similar problems.



## 1. Introduction

Since the emergence of automobiles in the early 20th century, human mobility has changed drastically from an era of walking, horse carriages, and streetcars to a generation of automobiles. Starting with the mass production of the Model T Ford in the United States, the proliferation of automobiles has spread all over the world and continues in developing countries.

Meanwhile, the world population has increased from 1.6 billion at the beginning of the 20th century to 7.1 billion now. According to the latest UN forecast, the world population will exceed 9 billion by the mid-21st century. The emerging population has moved to urban areas, which now account for over half of the world population. There are now more than two dozens of so-called "megacities" with populations of over 10 million, three quarters of which are in developing countries.

Economic progress has attracted people to automobiles as symbols of civilization. As the number of automobiles grows worldwide, problems such as traffic congestion and traffic accidents worsen, especially in urban areas. One of the most serious problems is global warming, which has resulted in the highest average atmospheric temperatures in history. Climate change has caused severe storms, heavy rains, and excessive droughts around the world in recent years. The automobile is responsible for significant amounts of carbon dioxide emissions, a major contributor to global warming and climate change. Although the recent technological development of hybrid and electric vehicles has progressed and helped reduce carbon dioxide emissions, the

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majority of automobiles in developing countries use conventional gasoline engines. Another recent change is the shale gas revolution, which began in North America and has started spreading to other countries, enabling the production of cheap, abundant fossil fuel. The population increase and its concurrent economic development will increase the number of automobiles to two or three times its current level in several decades, which will further increase carbon dioxide emissions.

Another problematic byproduct of excessive automobile dependency is urban sprawl, a phenomenon evident in many North American and Australian cities. Because of the capability of automobiles to travel long distances, many city dwellers move to suburban areas where they can acquire spacious residential land inexpensively. The famous diagram of urban density and transportation-related energy created by Newman and Kenworthy [1] indicates that many cities in the United States show high energy consumption per capita per year and low urban population density per hectare, followed by Australian cities. In comparison, cities in Europe and Asia have much higher population density and lower energy consumption per capita. They argue that, in order to shift toward a sustainable city, excessive automobile dependency must be rectified. Many efforts to overcome automobile dependency are in progress in various cities around the world, ranging from the introduction of public transportation such as LRT (light rail transit) or BRT (bus rapid transit), and the promotion of bicycles to the restructuring of the city itself. The former are transportation mode alternatives to automobiles, and the latter includes compact cities and transit-oriented development (TOD). There are also other "softer" measures such as transportation demand management (TDM) and mobility management. In recent years, there have been numerous reports of cities successfully alleviating excessive automobile use [2,3]. For example, European cities like Strasbourg, Freiburg, and Karlsruhe, as well as American cities such as Portland, have adopted LRT or trams. BRT, having proved a successful public transportation mode in Curitiba and Bogota, is now spreading to other countries. Bicycles have been a very popular mode of transportation in northern Europe, especially in the Netherlands and Denmark, and many cities around the world have recently begun to pay attention to this mode. I will discuss the recent mobility issues in Japan below, paying special attention to local cities. Unlike large cities such as Tokyo and Osaka, where public transportation systems are well established, local cities face many problems due to excessive automobile dependency. These problems have worsened in the last couple decades, but signs of improvement are emerging.

I have been involved in the planning of LRT in Utsunomiya for the last two decades and served as the chairman of the committee for preparing the New Transportation System Introduction Basic Plan (to be discussed later). After playing a central role in the early stage of the current LRT project in Utsunomiya, I am currently observing the development and changes of the project. I have also been interested in bicycle transportation since 2000, and I am currently the chairman of the committee to promote bicycle transportation in Utsunomiya. Based on these experiences and background, this paper will discuss my observations of mobility issues in Utsunomiya and other local cities in Japan.

## 2. Recent mobility issues in Japan

Three years have passed since the Great East Japan Earthquake struck on March 11, 2011. The tsunami caused by the earthquake resulted in the most unprecedented damages in Japanese history and put the number of dead or missing at over 18,600. The aftermath of the nuclear accident in Fukushima poses an uncertainty about future energy policy for the country and leaves the enormous task of decontamination over a wide area in addition to the decommissioning of nuclear reactor which will take more than 40 years. As for transportation, many residents faced situations that they had never experienced in everyday life, such as restricted vehicle use due to gasoline shortages and damage to roads immediately after the earthquake. All nuclear power plants in Japan stopped operations after the disaster, replaced by decrepit thermal power plants that had been out of operation for years. It is feared that burning fossil fuels such as LNG or oil will exacerbate global warming. As for automobiles, excessive automobile usage imposes serious economic and environmental problems while crude oil prices soar from the possibility of conflict in the Middle East.

A low birth rate and an aging population have been growing trends for some time in Japan. We have now entered an era of population decrease for the first time in history. In contrast to the past trends of population growth and economic development, which led to Japan becoming the second-largest economic power, the era of the so-called "shrinking society" has begun. According to population projections from the National Institute of Population and Social Security Research [4], the population of Japan in 2050 will be 95 million, or a decrease of about 33 million (26%) from the current level. The elderly population (65 years or older) will account for 40% of the total population in 2050. These trends will not be uniform throughout Japan. Population decreases and higher elderly population rates are more prominent in rural areas than in metropolitan districts.

The adverse effects of broad urban sprawl and low density caused by motorization are becoming increasingly prominent. The suburbanization of residential, commercial, and business functions has resulted in the hollowing-out phenomena of city centers, with once-crowded downtown shopping districts becoming blighted areas. The population decrease in rural areas, meanwhile, further accelerates motorization and a subsequent decline in public transportation. However, many people find it difficult to live a car-dependent lifestyle as they grow older. Fatal traffic accidents among those over 65 represented more than half of the total for the first time in 2011. Elderly people who can no longer drive due to a decline in mental or physical abilities are the so-called "transportation poor"––public transportation systems to take them shopping or to the hospital do not exist. They are forced to stay home without physical or social mobility. The Economist [5] in the United Kingdom has termed the current state of aging societies with declining populations and sliding economies the "Japan Syndrome." It is no exaggeration to say that the rest of the world may very well face the same situation sometime soon in future, and the world watches with strong interest as to how Japan can cope with the issue.

In terms of urban mobility, which is the subject of this paper, the Great East Japan Earthquake was a turning point—it has provided the opportunity for a paradigm shift away from the conventional automobile-dependent society toward a new mobility society, a movement to switch from automobiles to public transportation and bicycles.

In recent years, the movement to introduce LRT or BRT has spread in many cities in Europe, the United States, and even developing countries. The main intention is to provide public transportation service as an alternative mode to the automobile. In the first half of the 20th century, streetcars were widely used in Japan, as they were in the United States and Europe, but they were steadily overtaken by the wave of motorization that quickly built momentum after World War II. However, excessive automobile dependency has resulted in noticeable negative effects, including traffic congestion, traffic accidents, and environmental burden. In addition, the urban sprawl of residential and commercial facilities to the suburbs and the hollowing out of the CBD has worsened, creating major concerns about aggravated financial burdens on many municipalities. With the number of elderly people incapable of driving increasing rapidly, there is also an urgent need to secure mobility using public transportation and bicycles.

Success stories of LRT-based community development in Europe and North America are well known, but no similar developments have been seen in Japan until recently. The success of Toyama Light Rail in 2006 finally led several cities to explore the possibility of introducing LRT. Among them, Utsunomiya City is the front-runner to build a new LRT. Almost two decades have passed since the inception of the move to