

Japanese Transport – much to be done for infrastructure

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Social capital investment relevant to the transport sector plays a major role in constructing a social economy bringing true satisfaction to all citizens and creating a vigorous society.

Continued investment is urgently needed in areas such as alleviating rush-hour congestion in commuter trains.

1. Introduction

Although Japan's economic growth stagnated during the two oil crises after the high-growth era (1950s - 1973), it has generally kept expanding. Today, Japan's per capita national income is one of the highest in the world.

Statistically, Japanese consumption has grown in quantity and is also more diversified in style, but people are said to feel their daily life falls far short of being truly privileged. Accordingly, there is much more to be done to enhance the quality of life.

Transportation is a means of bringing people and communities together. It supports the flow of goods and information. In short, it forms the foundation of people's life and economic activities. This means that social capital investment related to transportation plays a significant role in constructing a society bringing satisfaction to all citizens, and in creating a vigorous society.

This article analyses the present situation of transport in Japan and discusses what needs to be done.

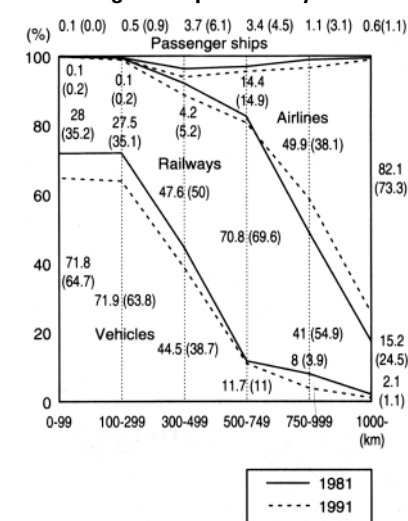
2. Present situation of transport in Japan

In passenger-km terms, domestic passenger transportation in Japan grew rapidly during the high economic growth era. Although the rate declined after the oil crises, it is growing again (approx. 1.3 trillion passenger-km in 1992).

The continuing growth of car ownership from the 1960s has caused a steady fall in the railway share of the transport market. However, the volume has started to grow steadily again recently. The share for air transport is still small but growing steadily.

Railways occupy more than 70% of journeys of distances from 500 to 750 km, representing a slight increase from a decade ago. Railways and cars have nearly the same shares in the range from 300 to 500 km, but cars have more than a 70% share under 300 km.

Figure 1 Modal contributions in passenger transportation by distance



Notes:

- (1) Source: Ministry of Transport statistics
- (2) Figures are contribution ratios in different distance ranges in 1991 followed (in parentheses) by those in 1981.

Air transport has a slightly larger share than railways in the range from 750 to 1,000 km and has a share of more than 80% beyond 1,000 km (Figure 1).

Domestic freight in tonne-km registered a very high growth rate during the period of high economic growth as did passenger traffic. It fell during the two oil crises but soon recovered high growth rates (approx. 550 billion tonne-km in 1992). The truck freight share increased during this period. In 1986, it exceeded sea freight and now enjoys the largest share among all freight transportation modes.

In comparison with other G5 countries (USA, UK, France, West Germany), railways in Japan have the highest contribution ratio (approx. 30%) on a passenger-km basis (compared to approx. 1% in the USA, and 5% to 8% in Europe). However, in terms of a tonne-km basis, trains in Japan hold just less than 5% (compared to slightly less than 40% in the USA, 10% in the UK, and over 20% in France and former West Germany).

Sea freight represents approx. 45% while air passenger traffic represents approx. 5%—the highest figure after the USA, reflecting the Japanese north-south geography surrounded by sea.

3. Present situation and issues of different transportation mode

1. Present situation and issues of railways

(1) Present situation of railways

The basic part of the national trunk railway network in Japan was completed before the 1960s. It now covers some 27,000 km with about 15,000 km of electrified lines and 1,800 km of Shinkansen lines. However, the average scheduled speed (average train speed including standing time at stations) is between 60 and 90 km/h on most conventional trunk lines. The average scheduled speed is slightly less than 100 km/h for all major trunk lines even including *Shinkansen* lines. Consequently, the present situation is hardly satisfactory for users in terms of speed and comfort.

Under these circumstances, construction and development projects are under way to construct new tracks over five sections of three *Shinkansen* lines (*Tohoku*, *Hokuriku*, and *Kyushu*). The *Hokuriku Shinkansen* between Takasaki and Nagano has top priority and is scheduled for completion in time for the Winter Olympics in Nagano in February 1998.

Other projects are also under way including direct connection of conventional lines to the *Shinkansen* for further expansion of the high-speed traffic network by making use of conventional lines with relatively small investment and short work terms (Figure 2).

Commuting is also a major issue for people living in the Tokyo and Osaka areas. While most people rely on railways, their capacity is insufficient, resulting in average overcrowding of around 200% (twice the number of passengers as the car capacity). This feels crowded with almost no space even to read a small magazine. In some sections, the overcrowding is as high as 250%, far higher than in major cities in any other countries (Figure 3).

More express commuting trains are being introduced during the rush hours to reduce the travel time. To increase carrying capacity, railway operators are trying to increase the number of cars per train and the train frequency. However, in some sections, these efforts are increasing travel time. As a last resort, railway operators are building ex-

tra lines next to existing ones, as well as extending subway lines. However, demand is increasing faster than the efforts to increase capacity.

(2) Railway issues

1) Qualitative enhancement of trunk railway network

The primary goal of trunk railway development is to improve the quality and travel comfort in areas where trains are preferred to other modes of transport. In short, the quality of the nationwide high-speed train network needs to be further enhanced in combination with the air and road systems. A number of development projects are currently under way, especially in the sections described below, to maximise use of existing tracks:

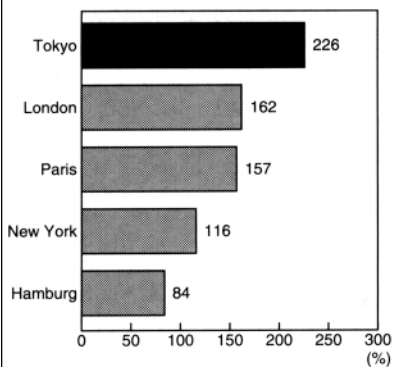
(a) Railways of 100- to 800-km length connecting metropolitan areas with major regional cities. Railways are competitive enough with cars and airplanes over these distances.

(b) High passenger volume sections

Another target is increasing the average scheduled speed to 120 km/h on major trunk lines based on user demand, investment return, and other elements.

Travel time between all medium-sized cities and Tokyo, Osaka, Nagoya, Fukuoka, or Sapporo should be within 3 to 4 hours. This will be achieved by improving track alignment and devel-

Figure 3 International comparison of subway congestion



Notes:
 (1) Sources: "Studies on Economic Analysis, etc., based on Latest Trends in Traffic and Transportation" by Japan Transport Economics Research Center; MOT statistics sources: "Studies on Economic Analysis, etc., based on Latest Trends in Traffic and Transportation" by Japan Transport Economics Research Center; MOT statistics section (between Machiya and Nishi Nippori on Chiyoda Line for Tokyo)

oping new rolling stock. Moreover, tracks and other railway facilities should be improved to match with transportation needs. At the same time, the overall quality of the trunk railway network should be enhanced by measures such as direct connection of *Shinkansen* and existing lines.

2) More incentives for railway construction

Unlike airports and seaports, railways lack a long-term development plan at the national level. Railway operators are required to invest to remain competitive in the market over the long term.

Railway construction requires enormous investment. In the first place, available land is hard to find. If it is available, a large amount of money is needed to buy it and construct railways; this enormous capital investment can only be recovered over many years. Therefore, while railway operators are required to keep making necessary business efforts to provide high-quality services, it is equally necessary to ask railway users and other beneficiaries to bear a greater burden than they do now.

While the beneficiaries should bear the burden as a rule, appropriate cooperation and support is needed from central government and local communities to encourage more investment by rail-

Figure 2

Standard-gauge <i>Shinkansen</i> tracks (full specification)	<i>Shinkansen</i> on existing tracks (direct ride-on method)	New <i>Shinkansen</i> -specification tracks (Seikan-Tunnel method)
Mini- <i>Shinkansen</i> Full-size <i>Shinkansen</i> (Max. speed 260 km/h)	Mini- <i>Shinkansen</i> (Max. speed 130 km/h)	Super Express (Max. speed 160-200 km/h)
<ul style="list-style-type: none"> Build new lines to <i>Shinkansen</i> clearances equipped with standard-gauge tracks and run full-size <i>Shinkansen</i> rolling stock. 	<ul style="list-style-type: none"> Add third standard gauge rail along existing narrow gauge tracks. Run Mini-<i>Shinkansen</i> rolling stock. (with standard-gauge bogies and conventional loading gauge) 	<ul style="list-style-type: none"> Build new track formation to full-size <i>Shinkansen</i> clearances (leaving room for future addition of standard-gauge tracks). Install narrow-gauge tracks for time being for Super Express trains.

way operators and to promote further construction. This will be achieved by introducing more investment incentives by means such as the subsidy systems of the Railway Development Fund (a special public corporation that receives government subsidies and distributes them among railway operators), and the non-taxable system by which railway operators are allowed to save a percentage of their passenger fare revenues to invest in projects aimed at reducing commuter congestion.

3) Need to reduce commuter congestion

Commuter congestion in large cities must be reduced to a target of 150% on average (passengers may brush shoulders but they can read a newspaper easily) on main sections by long-range planned comprehensive investment. This requires a combination of effective measures targeting increased transport capacity (more train services, more cars per train, extension of subways, etc.) and those targeting reduced peak commuting (staggered commuting hours, flexitime, etc.) through cooperation of companies and schools.

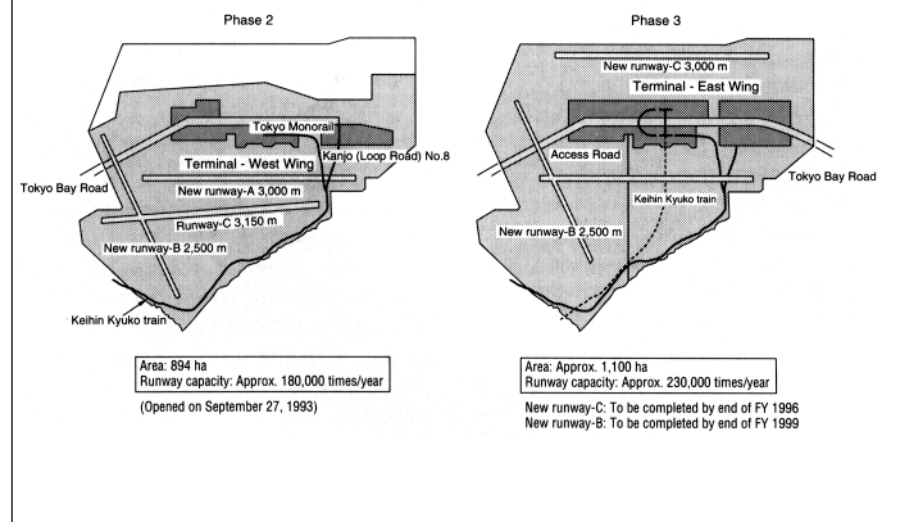
2. Present situation and issues of air network

(1) Present situation of air network

At April 1993, there were 85 airports in Japan including 50 serving jets. It can be said that there are sufficient airports scattered throughout Japan for domestic services. The annual number of domestic and international air passengers is increasing steadily, totalling approximately 70 million domestic and 35 million international passengers. Air freight is also increasing steadily with annual domestic air freight totalling 670,000 tonnes. International air cargo is growing very rapidly, totalling 1.5 million tonnes a year. The busiest airports are in Tokyo and Osaka. These airports serve over 80% of domestic and international air passengers, over 80% of domestic air cargo, and more than 90% of international air cargo. They are extremely congested and are already operating at close to their limits.

The present situation calls for further development of both domestic and

Figure 4 Tokyo International Airport – Haneda (expansion phases)



international air networks. The sixth 5-year plan for airport development was decided by the cabinet in November 1991 (with investments totalling ¥3.19 billion from 1991 to 1995). This plan is now under way with the top priority on three big projects: Completion of Phase 2 of the facilities at New Tokyo International Airport (Narita); Reclaimed land expansion of Tokyo International Airport (Haneda); and Opening the New Kansai International Airport.

Japan is an archipelago stretching about 3,300 km from north to south. The air network plays an important role in connecting areas separated by sea, mountains, or long distances.

(2) Air network issues

1) Promotion of three big projects

Japan's domestic air network is formed of two hub airports: Tokyo International (Haneda) and Osaka International (Itami). However, they are now operating at almost full capacity. The new West Terminal at Tokyo International Airport was opened for commercial use on September 27, 1993 in line with the airport expansion plan. It should reduce congestion at this airport. In addition, great effort is being made to expedite Phase 3 of the project including addition of new runways B and C, plus construction of the East

Terminal building (Figure 4).

The New Tokyo International and the New Kansai International airports are expected to serve as convenient hub airports for international flights in all directions.

2) Strengthening of air networks around key local airports

The domestic air network is being changed from the present dual hub structure to a multipolar structure. This calls for establishment of air networks connecting key local airports, and other local airports by direct flights.

In concrete terms, the terminal buildings at Fukuoka, Sapporo and other key local airports need improving and/or expanding so that the percentage of the population in areas other than Tokyo and Osaka who can reach an airport in 90 minutes can be increased from 80% in 1990 to 85% by 2000. At the same time, other local airports are being modernised and expanded to serve jet or other large aircraft.

The demand for international air services is expected to keep growing toward the turn of the century. The total design of the New Kansai International Airport is being studied. A comprehensive study is also under way for the New Chubu International Airport in Nagoya. Similar studies are also being investigated for a new airport in the

Tokyo area.

3. Present situation and issues of sea transport

(1) Present situation of sea transport

There are approximately 4,000 sea-ports, including fishing ports in Japan. Fifty-one (167 berths in total) have terminals for large ferries and container ships.

Domestic sea transportation in Japan in 1992 carried approximately 16 million passengers and 540 million tonnes of cargo. Sea transport is a key mode of freight transportation representing around 45% of Japan's total freight transport on a tonne-km basis.

However, the sea transport industry is suffering from a shortage of crew although the problem has improved slightly recently. Hiring young labour is an urgent matter because the average age of ship crews is increasing. Since a modal shift in transport from trucks to sea is in the growing interest of society, the role of sea transport is expected to be increased in domestic distribution. However, there are insufficient domestic terminal buildings for larger ships and parking spaces.

Long-distance ferries are growing very popular. Further strengthening of the ferry network is needed to meet the fast-increasing demand.

(2) Sea transport issues

As mentioned above, freight transport in Japan relies heavily on trucks. But there are a number of problems such as labour shortages, road congestion, and growing concern about the environment. Under these circumstances, a modal shift from truck transport to more efficient sea and railway transport is in the national interest. Sea transport is preferable to trucks because of its energy efficiency and reduced carbon-dioxide emissions per unit of transport. A modal shift taking full advantage of large-volume transportation by sea and railways is essential in establishing a more efficient distribution system in Japan.

A modal shift from trucks to sea transport requires construction of appropriate ships such as container carriers, vehicle carriers, and medium- and long-distance ferries. In addition, it re-

quires close consideration of measures to establish integration between land and sea transport, secure parking spaces and other premises, and improved loading and unloading facilities at depots.

Furthermore, since medium- and long-distance ferries are expected to play a growing role in bypassing trunk road transport, a ferry network must be established to better meet users' needs.

4. Present situation and issues of road transport

(1) Present situation of road transport

Passenger transport by public buses in Japan increased steadily from 1955 to 1965, but, since the peak year of 1968, it has kept decreasing (to only 6,500 million passengers in 1990).

This decline, especially in cities, is due to increasing car ownership creating road congestion resulting in bus scheduling difficulties, and to construction of subways and other means of public transport. The passenger decline in regional areas is also due to the increased popularity of private passenger cars.

In contrast, land transport by trucks has shown remarkable increase thanks to expressways and other infrastructure improvements making door-to-door delivery and other services possible. Indeed, trucks play a very important role in people's daily life and economic activities. Trucks contribute to 90.2% in terms of tonnage and 50.2% in terms of tonne-km of total domestic freight transport.

However, truck transportation faces a number of serious issues. They include a labour shortage due to the increasingly aging population, severe road congestion due to increased traffic volumes, and air pollution by NOx and other emissions. These all create serious problems for smooth road transport.

(2) Road transport issues

Buses are the most common means of transport for many people. They also play an important role in terms of environmental preservation, energy efficiency, and minimisation of road traffic congestion in cities. Much needs to be done to encourage further progress of transportation by buses.

In addition, buses that are more convenient for the aged and disabled passengers, such as the buses with lifts, need to be introduced in cooperation with government agencies responsible for citizens' welfare.

The most urgent issue for truck transport is to encourage safe and more value-added services meeting advanced needs, while overcoming the limits such as the growing labour shortage, road congestion and air pollution.

4. Concluding remarks

Further development of the transport infrastructure is essential to achieve a true welfare society in the next century. The present decade is most important for leaving future generations with high-quality social capital supported by present high savings rates. In this regard, sufficient investment is required with appropriate distribution of responsibilities between central government, local municipalities and users. The most urgent area is to mitigate commuter-train congestion. Moreover, special efforts should be made to improve transportation services to meet people's diversifying needs. ■



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Mr. Nagai was born in 1942. He graduated from the Faculty of Law of the University of Tokyo in 1965. He entered the Ministry of Transport the same year where he took charge of many fields, including railway business management issues, supervision of road transportation businesses, air control and safety, construction and operation of airports, and tourist administration, prior to assuming his present post, Deputy Director of Transport Policy Bureau.